

Cancer Education Framework for Australian Medical Schools

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BN MEdStds (Hons)

Submitted in fulfilment of the requirement for the degree of
Doctor of Philosophy



School of Nursing and Midwifery

Fremantle Campus

March 2021

Declaration

To the best of the candidate's knowledge, this thesis contains no material previously published by another person, except where due acknowledgement has been made.

This thesis is the candidate's own work and contains no material which has been accepted for the award of any other degree or diploma in any institution.

Human Ethics

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007, updated 2018). The proposed research study received human research ethics approval from the University of Notre Dame Australia Human Research Ethics Committee (EC00418), Approval Number 2020-153F and from the University of Western Australia Human Research Ethics Committee (EC00272), Approval Number RA/4/3/1223

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Abstract

The incidence, mortality, survival, and impact of cancer on the Australian health system and community highlight the need for Australian medical schools to adequately prepare medical students to care for patients with cancer. Several studies have shown that Australian medical students are ill-prepared to care for cancer patients upon graduation. At a national level, oncology and palliative care curricula have been developed. However, it is unclear as to the level of uptake of either curricula within Australian medical schools. There remains a lack of consensus on what content to include in a cancer curriculum and how best to deliver such a curriculum.

This thesis presents a multiphase mixed methods approach in the development of a cancer education framework for Australian medical schools, utilising a participatory curriculum design model.

A review of a nationally produced cancer curriculum was undertaken by local cancer clinicians via survey and panel sessions to establish the key knowledge required by Australian medical students upon graduation.

This data and a review of the international literature on cancer education relevant for medical students shaped the development of an overarching framework which was designed to facilitate the implementation of cancer education within existing medical school curricula. The framework comprises three sections: one focusing on clinical exposure to cancer patients whilst the other two focus on the principles of cancer management and cancer-specific knowledge that underpin current cancer and palliative care management.

The framework was reviewed and endorsed by national and international participants as being well organised, appropriate for medical students to obtain prior to graduation and relevant to their practice as interns and junior doctors. The framework was viewed as being adaptable to existing medical curricula.

Implications of the research findings and recommendations for implementation and further research are provided.

Acknowledgements

My PhD candidature was generously supported by the Australian Government Research Training Program (RTP) Domestic Stipend Scholarship. I would also like to thank and acknowledge the generous award of the Lions Cancer Institute Karen & Joshua Chinnery Scholarship in Cancer Research.

I would like to thank my supervisors from the University of Western Australia: Dr. Elaine Chapman, Professor Tom O'Donoghue and Professor Michael Millward, who helped me commence this journey, and to my supervisors from the University of Notre Dame Australia: Associate Professor Kylie Russell and Dr. Dianne Juliff, who have guided me through to its conclusion.

Transferring a PhD from one institution to another during one's candidature is a daunting prospect and not an easy decision to make, and I want to especially thank Associate Professor Kylie Russell for her belief in my project and in my ability. I am extremely grateful for her mentorship, encouragement and support.

Over the years I have had the privilege to work alongside a number of dedicated and passionate oncologists and palliative care physicians, who introduced me to the challenges of cancer education for medical students, and have supported and encouraged my endeavours in this area over the past two decades.

Thank you to Mrs Ellen Province, Mrs Lynne Roberts and Dr. Tracey Coventry for not only providing me with words of encouragement but for making sure that my words made sense.

Finally and most importantly, I wish to acknowledge my family, for without their support, patience and encouragement, none of this would have been possible.

In memoriam

Barry Leonard Starmer

1944 - 2007

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List of Abbreviations

| | |
|--------|--|
| AACE | American Association for Cancer Education |
| AAMC | American Association of Medical Colleges |
| ACS | American Cancer Society |
| ACSQHC | Australian Commission on Safety and Quality in Health Care |
| AHSSQA | Australian Health Service Safety and Quality Accreditation |
| AIHW | Australian Institute of Health and Welfare |
| AMA | Australian Medical Association |
| AMC | Australian Medical Council |
| APM | Association for Palliative Medicine |
| APRA | Australian Prudential Regulation Authority |
| ASCO | American Society for Clinical Oncology |
| BBN | Breaking Bad News |
| CAM | Complementary and Alternative Medicine |
| CBL | Case-based Learning |
| CCA | Cancer Council Australia |
| CDP | Consensus Development Panels |
| COAG | Council of Australian Governments |
| COSA | Clinical Oncological Society of Australia |
| DL | Discipline Leader |

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| EACE | European Association for Cancer Education |
| EAPC | European Association for Palliative Care |
| ECCO | European Cancer Organisation |
| EOL | End of Life |
| EORTC | European Organisation for the Research and Treatment of Cancer |
| ESMO | European Society of Medical Oncology |
| FRACGP | Fellow of the Royal Australian College of General Practitioners |
| FRACP | Fellow of the Royal Australian College of Physicians |
| FRACS | Fellow of the Royal Australian College of Surgeons |
| GLOBOCAN | Global Cancer Observatory |
| GMC | Graduate Medical Council |
| GMP | Graduate Medical Program |
| GOS | Graduate Outcome Statements |
| GP | General Practitioner |
| HREC | Human Research Ethics Committee |
| IACR | International Association of Cancer Registries |
| IMG | Internationally trained Medical Graduate |
| IOC | Ideal Oncology Curriculum |
| ISOMS | International Summer School in Oncology for Medical Students |
| JCCO | Joint Collegiate Council for Oncology |
| MBBS | Bachelor of Medicine, Bachelor of Surgery |

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|--------|--|
| MCQ | Multiple Choice Question |
| MDANZ | Medical Deans Australia and New Zealand |
| MOGA | Medical Oncology Society of Australia |
| MSOD | Medical Schools Outcomes Database |
| NGT | Nominal Group Technique |
| NIH | National Institute of Health |
| NGO | Non-Government Organisation |
| NHMRC | National Health and Medical Research Council |
| NSOC | Non-Surgical Oncology Curriculum |
| NSQHS | National Safety and Quality Health Service Standards |
| OEC | Oncology Education Committee |
| OSCE | Objective Structured Clinical Exam |
| PBL | Problem-based Learning |
| PCC4U | Palliative Care Curriculum for Undergraduates |
| PCD | Participatory Curriculum Development |
| PIS | Participant Information Sheet |
| PMC | Postgraduate Medical Council |
| RAM | RAND-UCLA appropriateness method |
| RCR | Royal College of Radiologists |
| RCSWA | Rural Clinical School of Western Australia |
| ROESCG | Radiation Oncology Education Collaborative Study Group |

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|----------|---|
| SCLO | Swiss Catalogue of Learning Objectives |
| TROG | Trans-Tasman Radiation Oncology Group |
| UICC | International Union for Cancer Control |
| UNDA | University of Notre Dame Australia |
| UWA | University of Western Australia |
| VSSO | Vienna Summer School on Oncology |
| WHO-CCCE | World Health Organisation Collaborating Centre for Cancer Education |

When, as occasionally happens, a cell fails to expire in the prescribed manner, but rather begins to divide and proliferate wildly, we call the result cancer. Cells make this mistake fairly regularly, but the body has elaborate mechanisms for dealing with it. It is only very rarely that the process spirals out of control. On average, humans suffer one fatal malignancy for each 100 million billion cell divisions. Cancer is bad luck in every possible sense of the term.

Bryson^a (p.459-60).

^a Bryson B. A Short History of Nearly Everything. Sydney: Black Swan; 2004.

Chapter One: Introduction

1.1 Introduction

Chapter one will provide an overview of the impact that cancer has both nationally and internationally, highlighting the importance of having adequately trained doctors, regardless of the area of medicine in which they choose to specialise. The lack of a national curriculum for medical schools and the broad, overarching requirements for programme accreditation will be outlined. The issues that impact upon cancer education will be discussed and national curricula in cancer and palliative care will be introduced. The overview of the Australian health system and the process through which hospitals are accredited will provide contextual relevance to the delivery of health care in Western Australia. Chapter one will conclude with a justification for the study and the underpinning research questions will also be discussed.

1.2 Background

Cancer is a collective term given to more than 100 different malignant tumours, each of which is characterised by uncontrolled cell proliferation and spread.¹ Whilst certain genetic, and environmental causes for a number of cancers are known, the aetiology for others are not yet known, or not fully understood.² As a disease group, cancer knows no physical boundaries and cares little about race, age, sex or socioeconomic status.

The incidence, mortality, survival, and impact of cancer on the Australian health system and community^{3, 4} highlight the need for Australian medical schools to adequately prepare medical students to care for patients with cancer.^{5, 6} The absence of a national medical curricula and the breadth of graduate outcomes required for the accreditation of medical schools put the ownership of curriculum content with the individual medical school.^{7, 8} A national body of medical deans was convened to improve the quality of healthcare delivery through the provision of high quality education.⁹ However, the focus of their attention, as with the accrediting body, is broad reaching and not specific to particular clinical areas.¹⁰ Whilst a national oncology curriculum exists,¹¹ the uptake within Australian medical schools has been limited.⁵ The Australian health care system and the professional bodies responsible for accreditation are discussed to provide a context in which Australian medical education is embedded.

1.2.1 Cancer Incidence

Global cancer incidence continues to rise, with an estimated 20 million new cases of cancer and 12 million cancer deaths predicted in 2020.¹² A 62% increase in cancer incidence is expected by the year 2030,¹³ with approximately 70% occurring in developing nations,¹² A number of factors contribute to the global increase in incidence, including aging populations, population growth, exposure to carcinogens (particularly in developing nations), lifestyle choices (such as smoking, alcohol consumption, sedentary lifestyle and diet), urbanisation and better control of other causes of mortality (such as cardiovascular disease).^{14, 15} Ironically, as nations develop and are able to reduce the incidence of infective agents that cause cancers (such as gastric and cervical cancer), those linked to a more western lifestyle increase (such as breast, colorectal and prostate cancer) as a result.¹⁶ Brey et al. predict that cancer is “expected to rank as the leading cause of death and the single most important barrier to increasing life expectancy in every country of the world in the 21st century” ^{15(p394)}.

International comparisons of cancer incidence are not straight forward, as multiple factors need to be considered. The GLOBOCAN database contains data collected by the International Association of Cancer Registries (IACR), to provide estimates of the global incidence and mortality of 36 cancer types.¹⁷ When interrogating this database, Australia is shown to have the highest estimated age-standardised incidence of cancer globally.¹⁸ However, it should be noted that the GLOBOCAN data is highly dependent not only upon the quality of the data provided by the cancer registries within each of the countries included in the dataset; but also the completeness of this data.¹⁶ Australia’s ranking in terms of cancer incidence is almost certainly inflated by the quality of the data in Australian cancer registries and the fact that cancer is a notifiable disease.^{19, 20} Clearly, cancer incidence is likely to be underestimated in countries where cancer registry data does not cover the entire population, is incomplete or where there is no national directive to report cancer cases. This is highlighted by Behera and Patro, who explored the challenges facing cancer registries in India and noted that approximately 0.1% of the rural population of India was covered by cancer registries, and that the overall population coverage was only 10%.²¹ The authors note a myriad of contributing factors, including cost, decreased awareness in rural areas, lack of follow-up and the lack of data linkage between hospital-based and population-based registries.²¹

Whilst incidence rates vary considerably by cancer type, currently, one in two Australians will be diagnosed with a cancer by the age of 85.²² Since peaking in 2008, the incidence of cancer in Australia for both sexes combined has demonstrated steady decline²³ (Figure 1.1). This trend has been attributed to primary and secondary prevention initiatives.²⁴

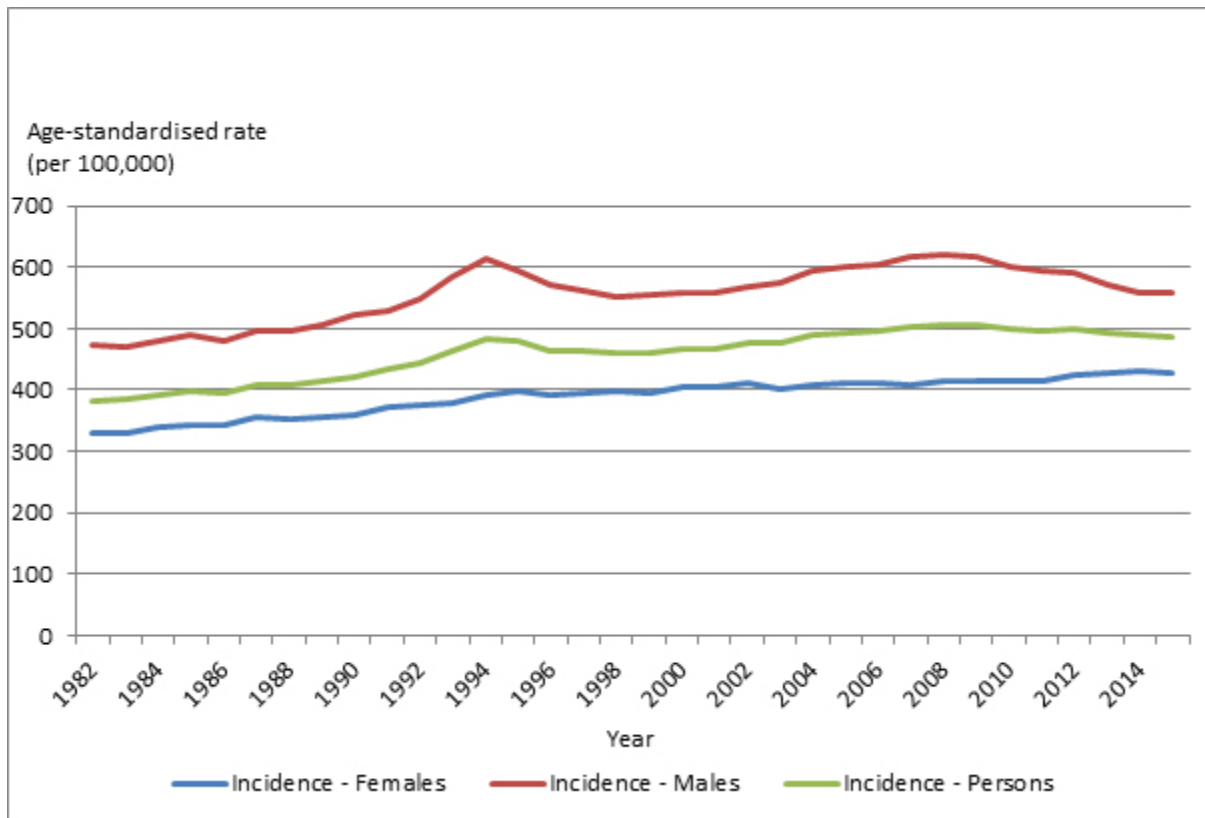


Figure 1.1: Age-standardised incidence rates for all cancers combined
Source: Cancer in Australia Statistics.³

1.2.2 Cancer Mortality

Despite the observed decrease in incidence, cancer was the leading cause of death in Australia in 2018 for both men and women.²² Of these deaths, lung cancer was the most common cause, with prostate cancer and breast cancer the second leading cause in men and women respectively.²⁵ It is estimated that the number of cancer deaths in 2019 will approach 50 000 persons.²³ Whilst cancer is the main cause of death in Australia, mortality rates have demonstrated steady decline since 1995,^{23, 25} as seen in Figure 1.2.

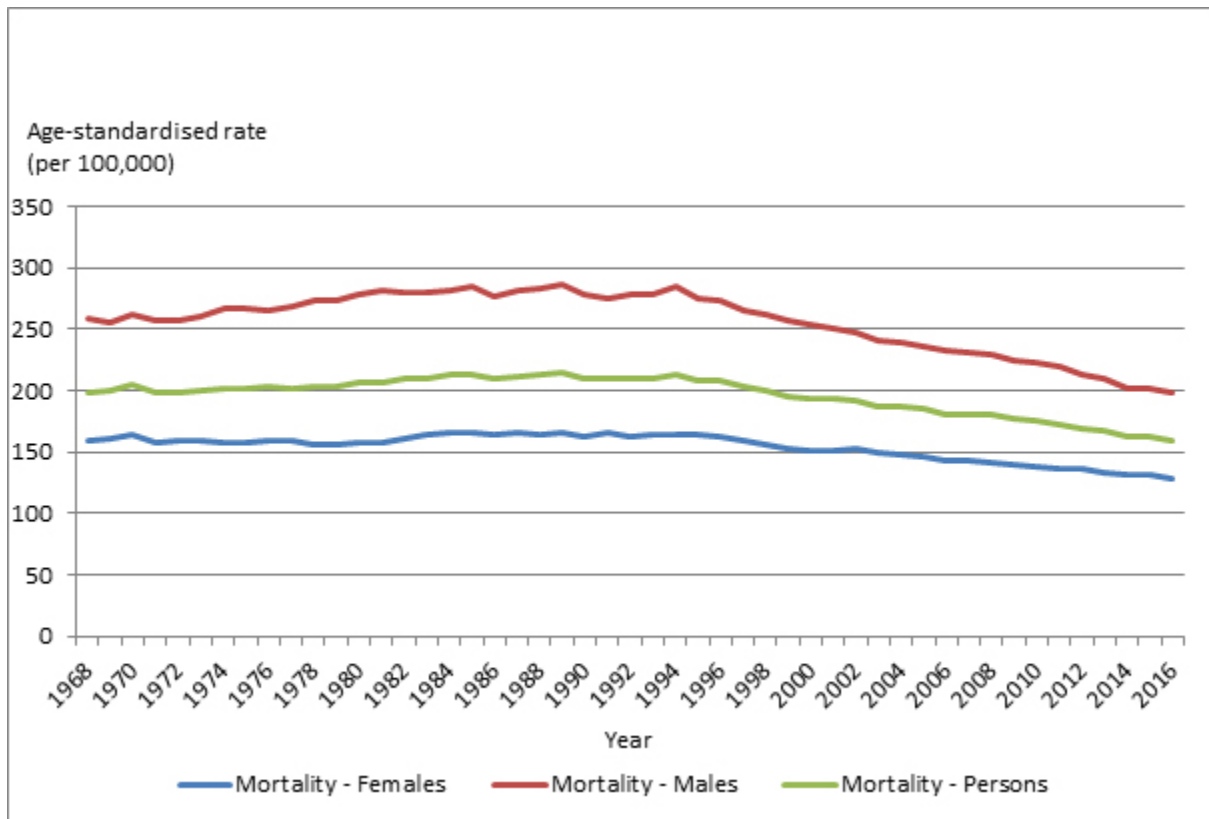


Figure 1.2: Age-standardised mortality rates for all cancers combined
 Source: Cancer in Australia Statistics.³

This reduction in mortality has been attributed to early detection and improvements in treatment options, including the introduction of novel treatments such as immunotherapy.²³
²⁶ This is in contrast to cancer mortality in developing nations, where treatment options may be limited or non-existent, inaccessible to many, or where cancers are detected late and present as advanced disease.^{27, 28} Further, cause of death data is often incomplete or inaccurate in these countries.¹⁶

1.2.3 Survival

Currently, 69% of Australians are alive five years after their initial diagnosis.³ As a result, there are more patients living with cancer, many of whom will require ongoing care (including education and surveillance), may relapse, develop co-morbidities, or even develop another primary tumour.²⁹⁻³⁵ Combined five-year survival is shown in Figure 1.3.

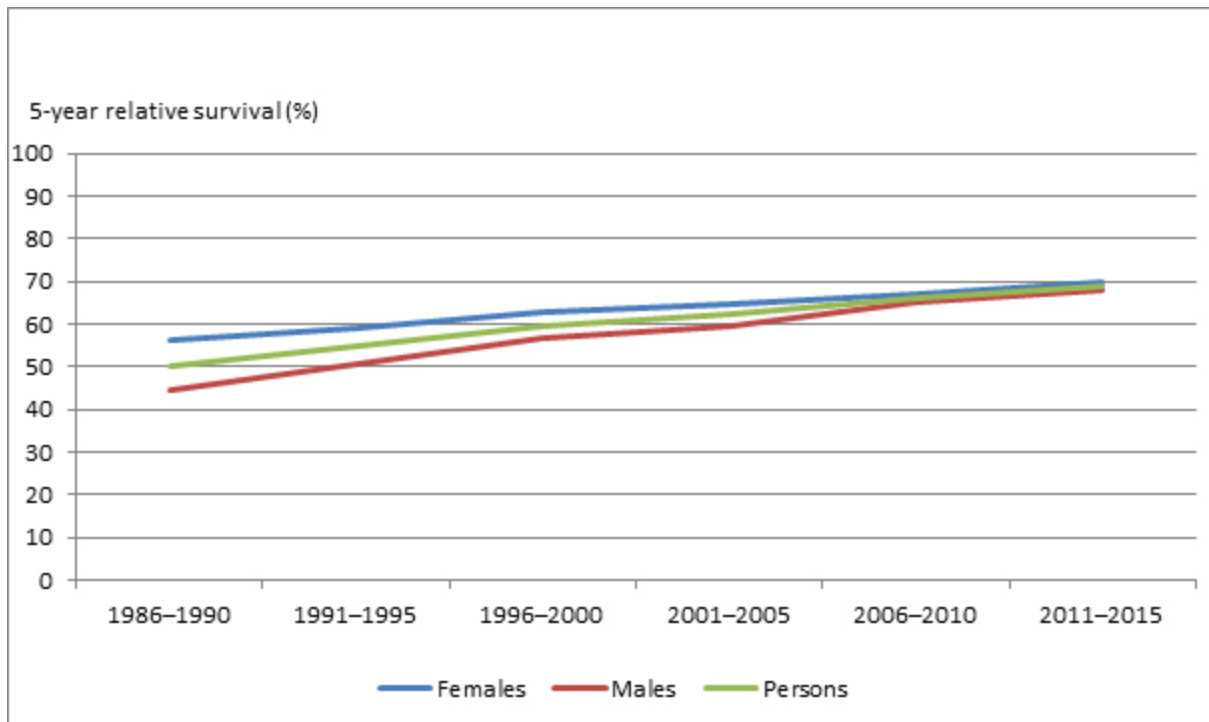


Figure 1.3: 5-year relative survival from all cancers combined
 Source: Cancer in Australia Statistics.³

1.2.4 Burden of Disease

In 2015 cancer represented the largest proportion of disease burden in Australia, accounting for 19% of total disability-adjusted life years.⁴ During the 2015/2016 financial year, \$10.1 billion (8.6%) of total health system expenditure on chronic disease was directly attributable to cancer. Not included in this figure is the cost of capital goods or equipment used exclusively for the treatment of cancer, or administration costs not attributable to cancer screening programs.³⁶ As such, the overall fiscal cost of cancer will exceed the reported value.

Clearly the burden of cancer on the community cannot be measured in terms of mortality alone. A diagnosis of cancer is associated with significant psychological, social and economic encumbrance,³⁷⁻⁴⁰ and many cancer patients and their families suffer from clinically significant psychological disorders, such as depression and anxiety, as a direct result of cancer.^{35, 41, 42}

For many Australians, cancer remains one of the most feared diseases and one that is still considered a death sentence by many.²⁹ In 2000 the Roy Morgan Research Group posed the following question to Australians over the age of 14: "Thinking now about illnesses and other

medical conditions. Which three health issues do you consider most important?" Cancer was the most frequently identified health issue by both men and women, and across all age groups.⁴³

1.2.5 Medical Education in Australia

Medical education in Australia is offered both as undergraduate (school leavers^b) and postgraduate (Bachelor degree already attained) programs.⁴⁴ Undergraduate programs take either five or six years to complete, compared to four years for postgraduate programs. The Australian Medical Council (AMC) is a non-government organisation that is responsible for the accreditation of Australian and New Zealand medical schools.⁴⁵ Whilst there is no standardised national medical curriculum, each school has to demonstrate that their program produces graduates that meet the AMC graduate outcome statements (GOS) (Appendix 1).⁸

The AMC GOS comprises four domains that medical students should be able to demonstrate upon graduation, to ensure they are adequately prepared to undertake their internship.⁸ These are:

1. Science and Scholarship: the medical graduate as scientist and scholar
2. Clinical Practice: the medical graduate as a practitioner
3. Health and Society: the medical graduate as a health advocate
4. Professionalism and Leadership: the medical graduate as a professional and leader

Within each domain there are several objectives and the four domains total 40 objectives. In order for each of the 21 Australian medical schools to map their curriculum to the GOS, the AMC has had to make these objectives broad. Whilst this lack of specificity is necessary, it results in objectives that do not identify how they are measured or how the student is to demonstrate that he/she has met the objective in question.⁴⁶ For example, consider the following objective^{8(p3)}:

^b Some undergraduate placements are available for students who did not undertake the standard exit exams or meet the requirements for alternate entry pathways.

Accept responsibility to protect and advance the health and wellbeing of individuals, communities and populations.

It is not clear how a student would demonstrate that they accept this responsibility. This lack of specificity requires individual schools to translate broad statements into specific learning objectives to form their curriculum.⁴⁶ The result of which is a lack of consistency in the learning outcomes between Australian medical schools.

Given the lack of a national medical curriculum, minimal guidelines exist as to the content that should be taught by medical schools. The AMC recommends that medical graduates have teaching in critical care, general practice, internal medicine, obstetrics and gynaecology, paediatrics, primary care, psychiatry, surgery and related disciplines.⁷ Cancer spans all of these areas but is not specifically identified as an area of focus for medical school teaching. Society expects that medical graduates will have the knowledge, skills and attitudes to meet the needs of the community in which they will practice.²⁹ However, despite the current Australian cancer demographics, evidence exists that Australian medical schools are not meeting these needs.⁶ In addition to there being no national curriculum in oncology, few medical schools have mandatory clinical placements in oncology or palliative care, despite approximately half of all patients in palliative care having a primary diagnosis of cancer.^{6, 47, 48}

Australian medical graduates are required to complete a 12-month (minimum of 47 weeks, full time) internship prior to being licensed to practice medicine in Australia.^{44, 45, 49} Medical graduates must first obtain provisional registration in order to commence their internship⁸ and cannot practice medicine outside of an accredited intern position.⁴⁹ Internship comprises supervised practice, which must include 10-weeks experience in both medicine and surgery and eight-weeks experience in emergency medicine.⁴⁹ The remainder of the 47 weeks comprises a range of approved terms.⁵⁰ This mandatory experience must be provided in a clinical setting that has been accredited by the relevant postgraduate medical council (PMC), which are themselves accredited by the AMC.⁵¹ Each state in Australia has its own PMC and since 2014, these have been accredited against a national framework (Appendix 2).⁵¹

Unlike other states in Australia, Western Australia does not offer intern placements in oncology or palliative care services.⁵⁰ The complexity and specialisation of oncology,

combined with the demands on junior doctors (who are often required to work independently) precludes interns from being employed in this setting (J. Dewar MBBS FRACP, medical oncologist, email, April 2020). A similar rationale was given for palliative care. Further, supervision of junior doctors in palliative care is being increasingly undertaken by nursing staff, which would preclude intern placements in palliative care being approved by the PMC (D. Thorne MBBS FRACP, palliative care physician, email, April 2020). Despite the absence of intern positions in cancer service units, junior doctors will encounter cancer patients in other clinical settings during their internship.⁴⁸ In the absence of a national cancer curriculum, and in particular a lack of organised clinical placements in cancer service units, many Australian medical graduates may not receive any structured teaching in clinical oncology until several years after their graduation from medical school. This has implications for our medical workforce, as opinions toward certain disciplines or diseases are formulated early in medical school and may result in students not considering a career in oncology.⁵² More importantly, general practice remains the largest single group of medical practitioners and their role in the diagnosis and ongoing medical care of cancer patients cannot be understated.²⁹

1.2.6 Australian Health System

The Australian health system provides healthcare delivery through both government funded (public) and consumer funded (private) systems. All Australian citizens and permanent residents are eligible to free or subsidised medical care through the Medicare program, which is funded by taxpayers at a rate of 2% of their taxable income.⁵³ Private health care coverage is purchased by the individual through health insurance providers. Private health insurance is not compulsory; however, Medicare taxation^c increases for individuals or families who do not have private health insurance.⁵³ Every Australian has the right to purchase private health insurance and to renew their health insurance.⁵⁴

According to the Australian Prudential Regulation Authority (APRA) 44% of the population had hospital treatment policies and 53% of the population had general treatment policies as of December 31, 2019.⁵⁵ The APRA website defines hospital treatment as being “intended to

^c This applies to an individual earning more than \$90 000 per annum or a family earning more than \$180 000 per annum.

manage a disease, injury or condition provided to a person at a hospital or arranged with the direct involvement of a hospital...(and) includes hospital substitute treatment” in contrast to general treatment which “is intended to manage or prevent a disease, injury or condition”.⁵⁶ These are generally referred to as ‘hospital cover’ and ‘ancillary (or extras) cover’, and may be purchased individually or as a combined policy.⁵⁴ The various options available for private health insurance policies is beyond the scope of this chapter and will not be discussed in detail. However, a variety of policies are available to all Australians and the types of services available and the level of care included in the policy can be customised accordingly.⁵⁷ Further, options exist to include an excess or co-payment, which reduces the amount of the insurance premium without compromising cover⁵⁷. In 2019 almost \$16 million was paid in hospital treatment benefits, with an average out of pocket expense of \$300 per claim.⁵⁵

Medicare provides either full or partial payment for seeing a general practitioner (GP) or a specialist doctor.⁵⁸ Not all GPs in Australia will bill Medicare directly, a process known as ‘bulk billing’, some bill the patient directly. In this instance the patient pays the cost in full and Medicare reimburses the patient a set amount.⁵⁸ GPs and hospital emergency departments are the gateways through which Australians access the health care system.^{22, 59} Each day approximately 406 000 people visit their GP,⁵⁹ whilst approximately 22 000 present to an emergency department.⁶⁰ Where necessary, GPs will refer patients to specialists for assessment and/or further management. Patients referred to a specialist by a GP are eligible for either partial or full reimbursement through Medicare.⁵⁹

Medicare also provides full or partial funding for most treatment deemed clinically necessary in a public hospital, for investigations, eye tests (conducted by optometrists),^{58, 61} and for some approved medications.⁶¹ Ambulance services, most dental services, visual and hearing aids, and cosmetic surgery are not covered by Medicare, and the patient will have to pay in full or with the assistance of private health insurance.⁵⁸ Public patients can wait significant periods of time for an initial appointment with a specialist doctor. The most recent report available from The Western Australian Department of Health on referrals to public outpatient surgical clinics reported that the “median waiting time for referrals yet to have a first attended appointment at metropolitan tertiary hospitals was 8.78 months”.^{62(p3)} Non-emergency and non-urgent care and elective surgery may incur a further wait period. The Western Australian Department of Health assigns elective surgery to one of three categories:

Category 1 – procedures that are clinically indicated within 30 days

Category 2 – procedures that are clinically indicated within 90 days

Category 3 – procedures that are clinically indicated within 365 days

Data reported monthly from January 2019 through January 2020 showed that the average median wait time per category was 12, 36 and 113 days respectively.⁶³ However, there is always a risk that the actual wait time will be much longer, should surgery be postponed or cancelled due to a more urgent case taking priority,⁶⁴ or a disruption to health services, such as that experienced with the current COVID-19 pandemic. Generally, a patient in the public system will be treated in the hospital closest to their home. Should this hospital not be equipped to provide the necessary services required, the patient will be transferred to one that can.⁶⁴ The public hospital will allocate the medical team,⁶⁵ which may involve care being provided by doctors who are in specialist training but who have not yet qualified in their chosen speciality.⁶⁶

In contrast, the private health system provides greater choice over the hospital the patient is admitted to and the treating doctors assigned to them.⁶¹ Most patients are able to obtain an initial consultation with a specialist within 14 to 21 days.⁶⁷ Similarly, elective surgery in the private system is dependent on the surgeon and has an average wait time of 14 – 28 days.⁶⁷ Private health insurance does not cover all expenses and the level of coverage depends upon the individual policy.^{61, 64} The difference, referred to as the 'gap' or 'out of pocket expenses', must be paid by the patient.^{61, 64}

Patients with private health insurance have the option of being treated in the public health system as either a private patient or a public patient.^{58, 68} When an individual decides to be admitted to a public hospital as a private patient Medicare will cover 75% of the eligible medical costs⁶⁹. In many cases, the out of pocket expenses may be less expensive than in a private hospital, making this an attractive option for many patients.⁷⁰ In some instances public hospitals may be better equipped to manage complex cases than a private hospital.⁶¹ Public hospital waiting list times still apply if you are admitted as a private patient.⁶⁹

Health expenditure accounts for approximately 10% of Australia's gross domestic product.⁷¹ The Australian Institute of Health and Welfare (AIHW) produces a report on the nation's

health every two years. Data from the 2018 report showed that health spending in Australia had increased by 50% over the period from 2006/2007 to 2015/2016, with an annual total of \$170 billion dollars.²² In 2018 this rose to approximately 181 billion.⁷¹ Two thirds of health expenditure is government funded. Of the non-government funded portion, half is paid by individuals.²² An overview of Australian health funding and areas of expenditure are shown in Figure 1.4.

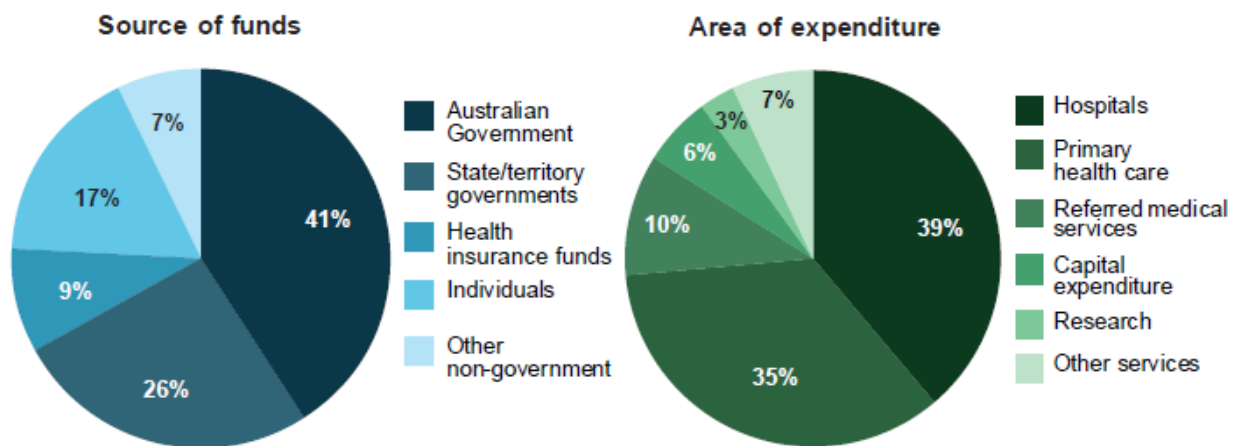


Figure 1.4: Sources of funding and areas of expenditure in Australian health in 2015-2016
Source: Australia's health 2018.²²

The federal government health budget mainly funds medical services (through Medicare), subsidises medication costs and funds medical research, whilst state and territory health budgets are predominately used to fund community health services.⁷¹ It should be noted that the funding of Australia's health system is complex and the responsibility for funding does not necessarily correspond with a responsibility for the administration or operation of the service being funded.²² Public hospitals are owned and operated by state and territory governments, despite some of their funding being provided by the federal government.²²

In 2006 the Council of Australian Governments (COAG) established the Australian Commission on Safety and Quality in Health Care (ACSQHC), which was charged with the delivery of safe, high quality health care on a national level.⁷² In 2011 the ACSQHC was established as a corporate Commonwealth entity, making it an independent statutory authority.⁷³

The ACSQHC along with the Australian government, state and territory governments, and representatives from the private health sector, medical workforce and patients collaborated to develop a set of national safety standards.⁷⁴ The resulting document: the National Safety and Quality Health Service Standards Guide for Hospitals (NSQHS Standards) provides a nationally consistent statement about the level of care consumers can expect from their health service⁷⁵. The eight NSQHS standards listed on the ACSQHC website are as follows⁷⁵:

1. Clinical governance standard
2. Partnering with consumers standard
3. Preventing and controlling healthcare-associated infection standard
4. Medication safety standard
5. Comprehensive care standard
6. Communicating for safety standard
7. Blood management standard
8. Recognising and responding to acute deterioration standard

The ACSQHC website states that the primary aim of the NSQHS Standards is “to protect the public from harm and to improve the quality of health service provision”.⁷⁵

In addition to developing the national safety and quality standards, ACSQHC also developed several clinical care standards (such as the colonoscopy clinical care standard), which aim to “improve the implementation of evidence-based health care, coordinating work in specific areas to improve outcomes for patients, and providing information, publications and resources about safety and quality”.^{73(p4)} Each standard guides the clinical care of a specific clinical condition to ensure that the care provided is to the same standard irrespective of where in Australia that care is delivered.⁷³

Both the NSQHS Standards and the specific clinical care standards have been produced to reduce risks, improve health outcomes and provide a framework to facilitate the continued monitoring and management of adverse events. The standards also provide a framework against which medical student education and performance can be measured. For example, in 2017 the Western Australian Department of Health mandated that sterile gloves be used for the insertion of peripheral intravenous cannulae in Western Australian healthcare facilities.⁷⁶ This change in policy resulted in a change in the teaching and assessment of this

procedural skill at the School of Medicine at the University of Notre Dame Australia.⁷⁷ Data is not currently available on the teaching of this particular skill at the other two medical schools within the state. This example shows how local policy changes are implemented in response to NSQHS standard 3 (develop and implement systems for the use and management of invasive devices)⁷⁶ and the knock-on effect ensuring that medical student training meets the national health care delivery needs.

In 2011 the ACSQHC was charged with formulating and coordinating a national accreditation process through which Australian health care facilities would be assessed.⁷⁸ All hospitals and day procedure units in the public and private sectors, as well as most public dental practices are required to demonstrate the implementation of the NSQHS standards at all levels, and must be accredited under the Australian Health Service Safety and Quality Accreditation (AHSSQA) Scheme.⁷³ The accreditation process is detailed and beyond the scope of this chapter. A flow chart produced by the ACSQHC outlining an assessment to the NSQHS standards is included in Appendix 3.

1.2.7 Cancer Education in Australia

Cancer education in Australia can be characterised as opportunistic, inconsistent and plagued by duplication, omission and contradiction.^{29, 79} Cancer education presents a special challenge for medical schools because relevant cases are seen by many disciplines. Oncologists are few in number and often only span a narrow part of the clinical spectrum of cancer themselves, with cancer services also being provided by specialists in all of the other clinical disciplines.⁸⁰ As such, cancer is often poorly represented in traditional medical curricula,^{79, 81} with the bulk of cancer teaching occurring primarily in pathology and surgery.^{81, 82}

Given the absence of a national medical curriculum, medical schools are, by and large, free to structure their curriculum as they see fit.⁸³ These curricula are often based upon traditional models, with disciplined-based departments and organ system blocks of teaching,^{82, 84, 85} which have not necessarily remained aligned with the needs of society.²⁹ In an attempt to address this issue, there has been an increased focus on implementing non-biological teaching (such as professionalism, leadership and teamwork) into curricula.⁸⁶

As more Universities move to shorter Master level programs, the competition for curricula time becomes more intense, and for cancer, more critical.⁸³ Medical school curricula are slow to change and the process is time and resource hungry.⁸⁰ Often there are fiscal implications, with department budgets directly linked to student teaching, adding further complexity and resistance to change. Chester captured the enormity of the process of curricula reform when he stated that it “is easier to win a war than to change a medical curriculum by even one half hour”.^{87(p14)}

Cancer education should aim to produce medical graduates who will enter the workforce with the knowledge, skills and attitudes to be able to meet the needs of the community in which they will serve.^{29, 79, 88} However, there remains a lack of consensus on what content to include in a cancer curriculum^{89, 90} and how best to deliver such a curriculum.⁸⁸ Further, there has been minimal feedback from key stakeholders, such as the Australian Medical Association (AMA), medical schools, professional bodies (e.g. the Clinical Oncological Society of Australia) and the clinical community to stimulate meaningful curricula change.⁸⁹

1.2.8 Oncology Curricula

Cancer Council Australia (CCA) is Australia’s peak cancer charity and the largest non-government funding body for cancer research. In 1995 CCA^d established the Oncology Education Committee (OEC) to provide guidance on cancer education for medical students.⁸³ The committee comprised cancer clinicians and academics from Australian and New Zealand medical schools, and cancer consumer representatives.⁹⁰

In 1999 the OEC published the Ideal Oncology Curriculum for Medical Schools (IOC), which focused on the general knowledge of cancer and palliative care for Australian medical graduates.⁹¹ In preparing the IOC, feedback was obtained from medical faculties and curriculum committees, cancer societies and professional colleges (including nursing and allied health), medical student associations and government ministers in Australia and New Zealand, as well as Australian medical professionals, and cancer advocates and consumers.⁹¹ In 2007 the OEC released a revised version of the IOC, which included essential clinical

^d Cancer Council Australia was initially founded as The Australian Cancer Society.

experiences.¹¹ Both versions of the IOC were endorsed by the International Union for Cancer Control (UICC).^{11, 91}

Currently the IOC has been used sporadically within Australian medical schools, with many using it as a guide in assisting blueprinting or as a checklist.^{5, 6} To date, no material has been published to indicate that any Australian medical school has implemented the IOC in its entirety. In 2016 CCA undertook a review of its strategic plan. One of the outcomes of this review was the decision that cancer education for medical students was no longer a remit of the CCA. As such, support for the revision of the IOC, maintenance of the Clinical Oncology for Medical Students eBook⁹² and the student essay competition⁹³ was withdrawn, and the OEC was disbanded in 2016 following a restructure of CCA (S. Aranda AM PhD, CEO Cancer Council Australia, email, August 2016).

1.2.9 Medical Deans Australia and New Zealand

The Medical Deans Australia and New Zealand (MDANZ) comprises membership of the Deans of the 21 Australian and two New Zealand medical schools, whose vision is to improve the health of Australian and New Zealand through high quality education of medical students to produce medical graduates that are ready to fulfil the variety of roles expected of a doctor⁹.
⁹⁴. MDANZ list nine objectives that underpin their vision⁹⁴:

1. Support medical schools to produce quality medical graduates through education, training and assessment
2. Inform medical workforce planning
3. Promote improvements in Indigenous health through education and workforce development
4. Promote excellence in health and medical research
5. Promote improvements in rural health through education and workforce development
6. Provide a collegial forum through the Medical Deans membership for the exchange of information and the development of policy
7. Provide leadership in medical education, research excellence and advocacy
8. Support social accountability and community engagement

9. Strengthen Medical Deans connection and engagement with medical students

MDANZ is active in a number of projects, spanning a variety of medical school outcomes, including assessment benchmarking, student welfare, Indigenous, and rural and remote healthcare, medical workforce, social accountability and medical education.¹⁰

One of the projects that MDANZ had undertaken annually since 2004 is Medical Schools Outcomes Database (MSOD), which provides an overview of medical student demographics and satisfaction with their educational experience.⁹⁵ One important additional piece of information sought from students is their future career aspirations. Historically most medical graduates will enter general practice.^{29, 96} Given the increasingly important role that the GP has in cancer prevention, screening and treatment,^{6, 29, 88} it is essential that medical students receive adequate training in cancer and palliative care.^{5, 29}

The survey is completed by students in their final year of medical school^e and may, therefore, include duplicated data should a student need to repeat their final year of medicine. The overall response rate for data collected at the end of 2018 was 58% (n=2228) and whilst response rates for individual universities are not reported (only percentage of total respondents), raw student numbers per university are included.⁹⁷ Comparing these numbers with graduate data available for each university⁹⁸ demonstrates variable participation nationally, with response rates ranging from 8.50% to 92.91%, with an average of 56.85%. Figure 1.5 shows the response rates calculated for the 19 Australian medical schools included in the 2019 report. The sequence in which the data is presented has been randomly generated, so that the individual medical schools cannot be identified.

^e Only Australian medical schools participate in the survey. Two medical schools (Curtin and Macquarie) had not yet graduated their first cohort, so are not included in the existing database

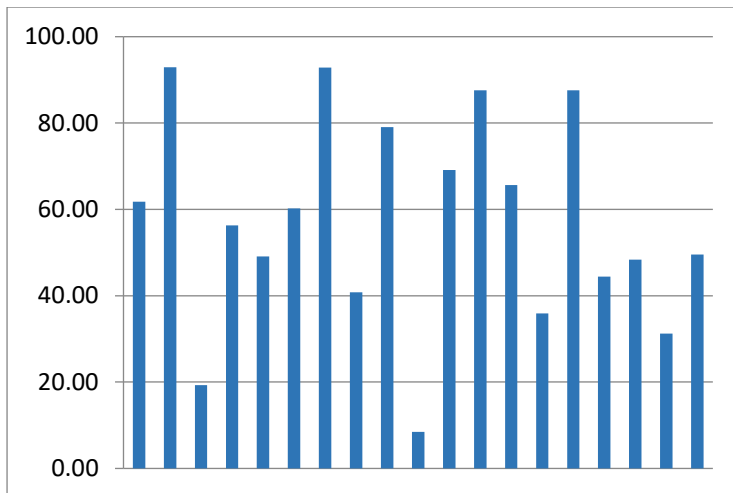


Figure 1.5: Australian medical school response rates for 2018 MSOD survey. Source: Medical Schools Outcomes Database.⁹⁵

Career aspirations group adult medicine and internal medicine physician training into one category, which has accounted for the largest number of first preference indications since 2014, with general practice and surgery representing the second and third choices respectively.⁹⁷ Clearly, first preference indications for half of the final year medical students in Australia does not accurately account for actual numbers of junior doctors who enter speciality training. Unfortunately, no published data exists following cohorts of doctors from graduation to specialisation. Available data from specialist colleges does not include the year of graduation for the recipients of fellowship and the pathway from graduation to specialisation does not take the same amount of time. Further, those undertaking a second specialisation, as well as internationally trained medical graduates (IMG) would have to be excluded from the complex data set that would emerge. As incomplete and premature the data available on first preferences for medical vocational training in the MSOD database is, it does provide a snapshot of the career aspirations of medical students about to graduate⁹⁷. When considered in light of the overwhelming proportion of IMGs that choose to enter general practice,⁹⁹ the comment by Barton et al. in 2006, that GPs “form the largest single group of medical practitioners” in Australia^{29(p596)} still rings true. Given the importance of the GP in cancer prevention, screening, diagnosis, management, survivorship care and palliation, the importance of cancer education cannot be understated.^{6, 29, 88, 100} Further, regardless of

their future career choice, all doctors will encounter cancer patients.^{5, 6, 48} As such, cancer education should be an area of focus for all medical schools.^{5, 29, 101, 102}

1.3 Justification

The impact of cancer on the Australian population and health care system cannot be overstated, with cancer patients representing the “most prevalent patient diagnostic group”.^{6(p5)} Currently half of all Australians will develop a malignant neoplasm by the age of 85³. Whilst cancer is the leading cause of death in Australia, it also has one of the highest five-year survival rates.¹⁰³ The net result is that there are more people living with cancer than ever before, which places an incredible demand on the health system.¹⁰⁴ A large number of patients who survive cancer will require ongoing care, encounter significant psychological disorders and are at risk of developing late-onset complications of treatment.^{29, 35, 39} This is particularly pertinent for children who survive cancer.³⁰

As a result GPs are becoming increasingly involved in the post treatment care of cancer patients, including surveillance and end of life care.⁸³ Further, regardless of their chosen career, all doctors will encounter cancer patients, highlighting the need for cancer education to be a priority in medical school curricula.⁶ It should be noted that the aim of cancer education for medical students is not to produce specialists in oncology and palliative care.¹⁰⁵ Instead, it is to provide them with the basic understanding of the aetiology and natural disease patterns, as well as the principles of cancer management.^{29, 105} General postgraduate cancer teaching is not within the remit of any of the professional colleges, making medical schools the most appropriate place to provide cancer education.¹⁰²

The lack of a national medical curriculum results in individual medical schools with considerable diversity in teaching and clinical exposure.^{46, 106} The AMC does not accredit the curriculum content of a medical school but rather the process through which it can map its curriculum to the AMC GOS.⁸³ As such, no minimum requirements for cancer education exist in Australia. Several studies have shown that medical students are ill-prepared to care for cancer patients upon graduation.^{6, 100, 106, 107} Additionally, medical students and junior doctors themselves have highlighted shortcomings in their own cancer education.^{5, 6, 47, 48, 108} In 1999 CCA published the IOC, which outlined the general knowledge of cancer and palliative care

applicable for Australian medical students.⁹¹ In 2007 a revised version was released, which included five essential clinical encounters.¹¹ Whilst both versions were endorsed by the UICC, the IOC has not been systematically embedded into Australian medical school curricula.⁵ In many instances the IOC has been used as a check list or to guide in curricula review.^{5, 6} The dissolution of the CCA's OEC in 2016 further highlights the need for medical school curricula to provide a solid foundation in cancer education in the absence of a national voice. Curricula reform is a difficult and drawn out process, and one which has become increasingly complex, as medical programs have reduced in length and content.^{83, 86} Most medical schools have a traditional curriculum where learning is focussed around body systems and clinical disciplines.^{82, 84, 85} Barton raises an interesting point when he commented that “[u]niversities are under no pressure to improve medical education because the demand for places outstrips the number of places which is capped by the Australian Government”.^{83(p823)}

The period between graduating from medical school and entering vocational training with one of the professional colleges may span several years. In 2019 Langworthy reflected upon the cancer education that she received as a medical student in light of her clinical experience gained in her residency in a public hospital in Perth. Despite actively seeking out cancer patients and relevant experiences, she reports feeling overwhelmed and underprepared in her clinical encounters with cancer patients.⁴⁸ Data from 2018 and 2019 shows that exposure to cancer patients whilst in medical school was uncoordinated and opportunistic, and that students felt similarly underprepared for their future interactions with cancer patients.^{6, 52} Clearly medical schools need to better prepare medical students to care for cancer patients once they commence internship. The Australian public can ill afford to wait until our medical staff complete their specialist training in order to receive appropriate care. The need for a program of cancer education to be embedded into current Australian medical curricula has shaped the research questions to be addressed in this thesis.

1.4 Research Questions

The purpose of this descriptive mixed method study is to provide a rich source of data that describes understanding of the Cancer Council Australia, Australian Oncology Education Committee (OEC), Ideal Oncology Curriculum for Medical Schools (IOC) to support the

development and evaluation of an Oncology Medical Curriculum Guide for Australian Medical Schools.

The specific questions of this research study are as follows:

1. In what way do medical practitioners perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care in Australia?
2. Which elements of the IOC do medical practitioners consider vital inclusions in Australian medical school curriculum?
3. To what degree do medical educators and practitioners perceive that the '*Cancer Education Framework for Australian Medical Schools*', provides a comprehensive resource to support the implementation of cancer curricula in Australian medical schools?

Data obtained from the initial phase one expert group of medical practitioners informed the design of the Oncology Medical Curriculum Guide for Australian Medical Schools (phase two) in conjunction with national and international literature that was evaluated in phase three by members of the Cancer Council Australia's former Oncology Education Committee.

1.5 Summary

Chapter one has provided an introduction to the research program described in this thesis. A brief summary of the chapters comprising this thesis are provided below.

Chapter One - Introduction: This chapter provides an overview of the impact of cancer in both a local and global context, highlighting the need for adequately trained doctors. An overview of the Australian healthcare system has been provided to allow for comparisons to be drawn with international systems of healthcare. Western Australian examples have been provided as slight nuances exist between state-based healthcare delivery, particularly with regards to intern placements in cancer service units. Medical education in general and cancer education in Australia is also introduced, as is the research justification and the research questions to be answered by the research presented in this thesis.

Chapter Two – Literature Review: The literature review will commence with the theoretical framework underpinning the research undertaken in this theses in addition to the model used

in the development of the *Cancer Education Framework for Australian Medical Schools*. A review of the current literature on cancer education for medical students will be presented and from this the key factors emerging from the review will be discussed. The role of the GP (family physician) and an historical overview of Australian cancer education will be discussed.

Chapter Three – Methodology: Chapter Three presents an overview of social science research and pragmatism, as well as the research methods employed in this thesis. Each research phase is detailed, including all instruments used, participant selection and recruitment, and data collection and analysis. Finally, ethical considerations are outlined, including the University requirements that govern the conduct of the research program described in this thesis.

Chapter Four – Phase One - Data Analysis and Findings: This chapter outlines the process through which the content of the IOC was selected and the knowledge items unpacked for review by cancer clinicians. Phase one comprised two stages, the first entailed individual review of the items and stage two the convening of face-to-face panel sessions to reach consensus agreement on the level of knowledge required for each item. Chapter Four presents the reconstructed objectives from the IOC following the outcome of the review process. These reconstructed objective statements formed the basis for the development of the *Cancer Education Framework for Australian Medical Schools*.

Chapter Five – Phase Two - Framework Development: Phase two outlines the development of the *Cancer Education Framework for Australian Medical Schools* based upon the findings of phase one and the review of the literature undertaken in Chapter Two. Key components of the framework are identified and discussed, including the rationale for their inclusion. Further, the decision to omit certain material from the framework is discussed. A review of the draft version was undertaken by three academic oncologists and their feedback incorporated into the final draft version that was circulated for widespread review in phase three.

Chapter Six – Phase Three - Data Analysis and Findings: This chapter describes the review of the framework by national and international cancer clinicians and GPs. The development and validity testing of the survey instrument is outlined along with the strategy employed to

recruit participants. Analysis of the survey data reflected many of the issues commonly encountered with cancer education for medical students both nationally and internationally. Participants were asked a series of questions about their own involvement in cancer education and the characteristics of the program at the medical school with which they were affiliated. Questions specific to the *Cancer Education Framework for Australian Medical Schools* included whether the content was appropriate for medical students to obtain prior to graduation and whether this knowledge would adequately equip them to care for cancer patients upon graduation. Enablers and barriers to implementing the framework into existing medical school curricula was also explored.

Chapter Seven – Discussion: The discussion chapter begins with a review of the theoretical framework used to guide the research, followed by a review of the major findings with the literature. Four main focus areas to emerge from the review of the *Cancer Education Framework for Australian Medical Schools* are discussed in detail, which guide the recommendations outlined in Chapter Eight. The three research questions are addressed, as are the limitations of the research program.

Chapter Eight – Conclusion: This chapter outlines the research implications of this thesis in relation to education, research and clinical practice. Recommendations for education and research are provided to guide the dissemination and further development of the *Cancer Education Framework for Australian Medical Schools*.

Chapter Two: Literature Review

2.1 Introduction

This chapter commences with a description of the theoretical framework underpinning this research, followed by a review of the literature on cancer education curricula, both nationally and internationally. Further, key factors that impact upon cancer education are discussed. These factors can be summarised as curricula content, clinical teaching and exposure to cancer patients, and student attitudes towards cancer. Factors deemed essential in the provision of effective cancer curricula and desired outcomes of these curricula are then outlined.

2.2 Conceptual Framework

The literature sources and their relationship with the research topic; medical student cancer education, are displayed in Figure 2.1. The conceptual framework includes both theoretical and empirical findings that informed the researchers understanding of the topic and their relationship with the research questions to support findings. These findings will be used to outline the contents of this chapter.

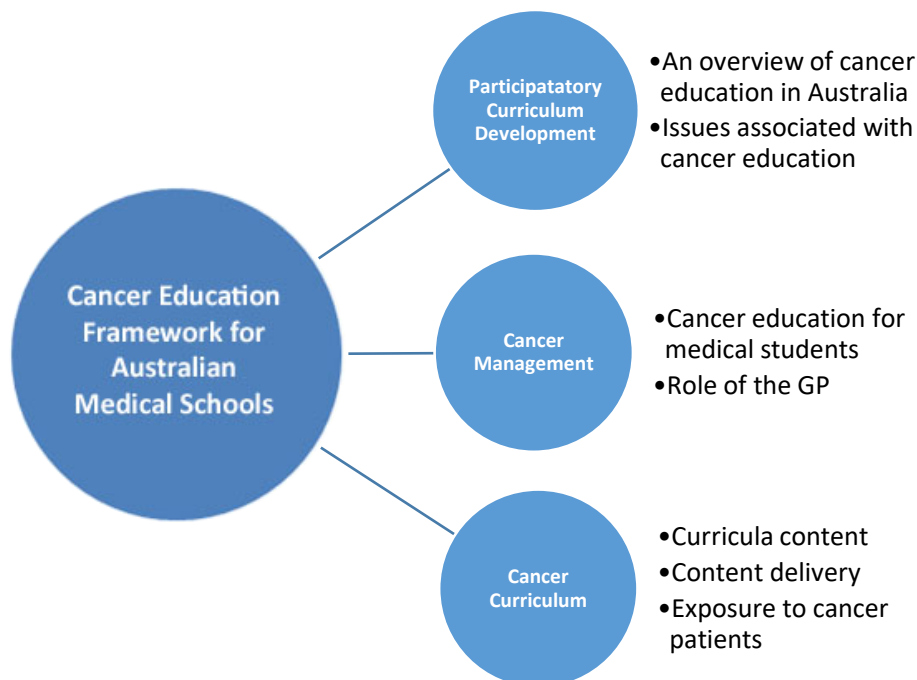


Figure 2.1: Conceptual framework for the development of the Cancer Education Framework for Australian Medical Schools

2.3 Participatory Curriculum Development

Participatory curriculum development (PCD) is a process through which the wider community of stakeholders are involved in the design and development of a curriculum that would normally not otherwise occur.^{109, 110} The benefits of a PCD approach include improving the relevance of the curriculum to the 'real world'.¹¹⁰

Medical school curricula traditionally rely on pathology and surgery to teach students about cancer^{81, 82} and many schools lack academic oncologists on their curriculum committees⁸⁰, meaning that decisions about cancer education are often made by non-cancer clinicians. Studies have shown that Australian medical schools are not adequately preparing medical students to effectively care for cancer patients,^{100, 106} which is something that medical students themselves are now voicing concerns about.^{6, 48, 108} Adopting a PCD approach using key stakeholders not otherwise included in curriculum development may produce a curriculum that better reflects the actual expectations of junior doctors with regards to caring for cancer patients.

In the research presented in this thesis, stakeholders comprise hospital clinicians from the cancer-specific disciplines involved in providing care across the cancer continuum, namely medical, radiation and surgical oncologists, haematologists and palliative care physicians. GPs were included as they are also heavily involved in patient care from prevention and screening, through diagnosis and end-of-life (EOL) care. Their inclusion supports the primary goal of this research to develop an educational framework to facilitate the inclusion of cancer education into any Australian medical school. PCD provides a theoretical framework to achieve this by engaging cancer clinicians to identify appropriate knowledge for medical students to obtain prior to graduation and which is relevant to the needs of the society in which they will work.

Sidebotham et al. describe 10 stages^f undertaken in the development of a midwifery curriculum, beginning with identifying a project lead and concluding with the evaluation of the PCD process.¹¹⁰ An overview of the steps and their function is shown in Table 2.1, the full

^f Whilst Sidebotham et al. use the term phase, I have replaced this with stage, given that I refer to the component of the research undertaken in this thesis as phases. The substitution of terms is done to reduce confusion.

table, which includes the actions taken by the authors in their research is presented in Appendix 4.

Table 2.1: A phased model of Participatory Curriculum Development

| Phase | Function |
|--|---|
| 1: Identify project lead and commence information gathering | Identify the, strengths and challenges of the current curriculum and the drivers influencing the development of a new curriculum with the academic team involved in the current curriculum |
| 2: Identify and invite appropriate stakeholder involvement representative of all curriculum drivers | Create commitment, ownership, and be representative and inclusive of the real world of practice |
| 3: Develop macro curriculum outline | Provide overview of macro curriculum to steering group to provide feedback and guidance to project group and sub committees |
| 4: Program alignment to professional values, pedagogical and educational philosophy | Ensure the pedagogical and philosophical drivers, and program values are visibly prominent and remain central to the process of micro development |
| 5: Micro curriculum development | Establish first draft micro curriculum document guided by framework model and meeting accreditation standards |
| 6: Widespread consultation on full draft | To produce an Aligned Mapped Curriculum that all stakeholders feel connected and committed to, that is representative and inclusive of the real world of practice and meets accreditation standards |
| 7: Final Curriculum agreed | Agreement from all stakeholders that curriculum ready for submission for accreditation |
| 8: Program accreditation process | Submit curriculum for external review against national standards and respond to regulator requests made up to the point of final accreditation |
| 9: Accreditation approval Program implementation | Ensure newly accredited program delivered by a well prepared faculty teaching team and student feedback is sought |
| 10: Evaluation of Participatory Curriculum Development Process | Develop an evaluation framework of the PCD process to determine the effectiveness of the model in achieving the stated aims. |

Adapted from: Sidebotham et. al. ¹¹⁰(p8)

However, it should be noted that not all of the phases outlined by the authors are applicable to the research presented in this thesis. Rather than develop a comprehensive curriculum for a bachelor program that requires professional accreditation, the aim of the research presented in this thesis is to develop a framework that can be implemented into any

Australian medical school. In order to make the framework applicable to all medical schools, the focus of the PCD process was on curriculum content, and in particular, knowledge. Only the relevant Stages outlined by Sidebotham et al. will be described and addressed below, which is why the stage numbers are non-sequential^{110(p8)}:

Stage one – Identify project lead and commence information gathering

The researcher led the project, with the support of his research supervisors. The researcher has a long-standing interest in cancer education for medical students and identified the issues with variability in cancer teaching in Australian medical schools. His experience in the design, implementation and evaluation of cancer teaching units and research in this area, combined with the growing body of literature on the area served as the situation and training needs analysis. The Cancer Council Australia's Ideal Oncology Curriculum (IOC) was chosen as the starting point for the development of the *Cancer Education Framework for Australian Medical Schools* for several reasons:

1. The curriculum was designed for Australian medical students
2. The curriculum was developed by cancer clinicians and academic oncologists who were actively teaching medical students, as well as consumer representatives
3. Extensive consultation was undertaken with key stakeholders such as medical faculties and curriculum committees, cancer societies and professional colleges, government officials, cancer advocates and consumer groups, medical professionals, medical student associations and international reviewers.
4. The curriculum was endorsed by the UICC

The development of the IOC itself is an example of PCD, with cancer clinicians working collaboratively with each other and seeking input from other key stakeholders. The objectives in the IOC were unpacked by the researcher to facilitate the identification of the domain in which each component was grounded (knowledge, skill or attitude). The knowledge items were then prepared for review (Chapter Four).

Stage two – Identify and invite appropriate stakeholder involvement, representative of all curriculum drivers.

Given the size and inclusiveness of the IOC, and the fact that there had been minimal uptake into medical school curricula in Australia ⁵ the key stakeholders identified to undertake the review were cancer clinicians and GPs, with a wide range of experience across the cancer continuum, as well as teaching medical students. The only curriculum driver is cancer education, given that this is the focus of the framework. This process comprised Phase One of this research and is detailed in Chapter Four.

Stage three – Develop a macro curriculum outline.

The macro curriculum represents a broad overview of the curriculum and includes the general areas to be covered (such as anatomy, physiology and pathology etc.). The macro curriculum was prepared based upon the review of the IOC knowledge items undertaken in Phase One of this research and comprised Phase Two of the research project (Chapter Four).

Stage five – Micro curriculum development

The micro curriculum includes the specific detail to be covered under the broad headings outlined in the macro curriculum. The micro curriculum was developed from the macro curriculum following a review of the literature, including cancer-related curricula and recommendations from special interest groups to identify evidence on what is appropriate cancer-related knowledge for medical students (addressed in detail later in this chapter).

Stage six – Widespread consultation on full draft.

A preliminary draft of the curriculum was sent to a surgical oncologist in the Netherlands who is the former Chair of the International Summer School on Oncology for Medical Students and a former President of the European Association for Cancer Education (EACE), as well as to a clinical oncologist from the UK, who was also a past EACE President, for review and comments. The *Cancer Education Framework for Australian Medical Schools* was revised to accommodate the feedback received and was then sent to key stakeholders nationwide. As seen in stage two, key stakeholders identified to undertake this review were cancer clinicians and GPs, with a wide range of experience across the cancer continuum, as well as teaching medical students. Based upon the comments received from the initial review of the draft

Cancer Education Framework for Australian Medical Schools, an international review was also undertaken. The combined review process is detailed in Chapter Six.

Stage seven – Final curriculum agreed

Based upon the feedback received in the preceding stage, final revisions were made to the *Cancer Education Framework for Australian Medical Schools*. These changes are discussed in Chapter Six.

One of the drawbacks of PCD is the cost in time and resources, as well as managing the various stakeholders and their interactions.¹⁰⁹ With this in mind, stakeholders were limited to cancer clinicians and GPs. The decision was a pragmatic one and one taken when considering that the IOC was subjected to extensive stakeholder consultation and endorsed by the UICC.⁹¹ Students were considered but given the diversity in cancer education, it is difficult for students to understand what it is that they need to know about cancer, which is supported by Langworthy's account of her experiences caring for cancer patients in her first year after graduation.⁴⁸

An overview of the PCD process as it pertains to this research program is depicted in Figure 2.2. The grey steps indicate those that are not used in the development of the *Cancer Education Framework for Australian Medical Schools*, given the differences between a curriculum for a single accredited program and a framework that is intended to be adaptable across multiple medical schools.



Figure 2.2: The PCD model used to support the development of the cancer education framework for Australian medical schools

2.4 Review of the Literature

This chapter section presents a review of current cancer curricula, curricular recommendations and other sources that provide insight into the cancer-related content deemed appropriate for medical students. The role of the GP will be explored, as it provides insight into the non-specialist cancer needs of patients and therefore serves as a guide as to what the requirements of a junior doctor may entail. A historical overview of cancer education in Australia is presented, showcasing the challenges in teaching medical students about cancer, particularly in providing them with adequate patient encounters during medical school.

2.5 Search Strategy

The search period for this review was from 2015 to 2020 inclusive. This six-year period was chosen to focus the search on the most recent research findings and curricular recommendations. The review focused on both national and international peer reviewed academic literature retrieved from the EBSCOhost platform. EBSCOhost enables multiple databases to be searched simultaneously. The following databases were included in the search:

- Academic Search Premier
- MEDLINE
- CINAHL Plus

A Boolean search was used to identify records that related to medical student cancer education curricula, based upon the subject terms used to categorise the works in the database. To ensure that the search parameter was inclusive of differences in terminology, the Boolean search included such variations, including wildcards[§] to ensure that the search was inclusive. The Boolean search used shown in Figure 2.3.

[§] Wildcard search terms permit the first few letters that are common to the variations in words to be included in the search. The inclusion of an asterisk (*) is used to indicate that a wildcard search term is being used. For example, a search for oncol* would return results for oncology, oncologic, oncologies, oncologist, oncologists and oncological.

The screenshot shows the EBSCOhost search interface. At the top left is the EBSCOhost logo. The search bar contains the query: "cancer OR oncol* OR pallia*". Below this, there are four rows of search terms, each with a dropdown menu for the operator:

- Row 1: AND dropdown, "student AND medi*" text box, "SU Subject Terms" dropdown.
- Row 2: AND dropdown, "curricu*" text box, "SU Subject Terms" dropdown.
- Row 3: NOT dropdown, "nurs* OR physi* OR pharm* OR veteran*" text box, "SU Subject Terms" dropdown.

 To the right of the search bar is a green "Search" button. Below the search bar is a "Clear ?" link. At the bottom of the interface are links for "Basic Search", "Advanced Search", and "Search History".

Figure 2.3: Boolean search used for literature review

The operators AND, OR and NOT are used to establish which search terms are included or excluded (NOT) and whether terms with similar meanings are being included (OR) or where all of the search terms must be present (AND). The parentheses are used to instruct the sequence of the search, in the same way they are used in mathematics to instruct us how to solve the problem.

In the Boolean search used for this literature review, three separate searches are combined:

- **cancer OR oncol* OR pallia*** – returns results relating to cancer, oncology or palliative care.
- **student AND medi*** – returns results for medical students
- **curricu*** – returns results for curriculum.
- **nurs* OR physi* OR pharm* OR veteran*** – used to exclude references to nursing, physiotherapy, pharmacy and veterinarian works.

In addition to the use of EBSCOhost, searches were conducted using Google Scholar and research community sites such as researchgate.net, publons.com and scopus.com. The references of relevant articles were cross-checked, and articles of interest were included, as were relevant items already in the researcher’s reference library, including text books and curriculum documents. The research strategy is shown in Table 2.2.

Table 2.2: Research strategy

| Item | Details |
|--------------------------------|---|
| Electronic sources | PubMed, Google Scholar, MedlinePlus, Academic search primer, Research Gate, Publons, Scopus |
| Year range | 2015-2020 |
| Inclusion criteria | <ul style="list-style-type: none"> • Peer reviewed articles • Journals • Books • Commentaries, editorials and personal opinions relating to cancer-related curricula |
| Exclusion criteria | <ul style="list-style-type: none"> • Conference abstracts without publications • Language other than English • Vocational/fellowship programs • Subspecialised (e.g. gynaecological oncology or paediatric palliative care) |
| Additional search terms | <ul style="list-style-type: none"> • Curriculum and organisational frameworks • National standards • Professional society recommendations |

The decision to omit subspecialised content is supported by Denunzio et al. who state that such content “requires special expertise and sensitivity...and may lie beyond the scope of a more generalized oncology curriculum”.^{111(p230)}

Unfortunately, a number of articles reviewed failed to provide sufficient detail regarding the content of the curriculum, focusing instead on student perception and/or performance on pre- and post-test assessments. DeCoste-Lopez et al. also encountered this issue in their systematic review of innovations in palliative and EOL care curricula, in which they reported that a number of articles failed to describe the curriculum in sufficient detail to permit replication by others.¹¹²

Developing the search strategy involved continual assessment and refinement. The search strategy was aimed to be both sensitive and specific. The adopted degree of sensitivity enabled the search to recall relevant studies, while remaining specific to exclude irrelevant ones. The type of data being sought (cancer-related content considered relevant to medical student education) guided the review protocol, which was based on a clearly defined review question and inclusion criteria as demonstrated in Figure 2.4. The search was further supplemented with snowball searching, in which relevant articles referred to by articles

included in the review were sought out and included where relevant. Further, articles were included to provide a background into cancer education Australia, as well as the role of the GP, which may also provide insight into non-specialist cancer education relevant for medical students. Finally, published curricula and recommendations were also included.

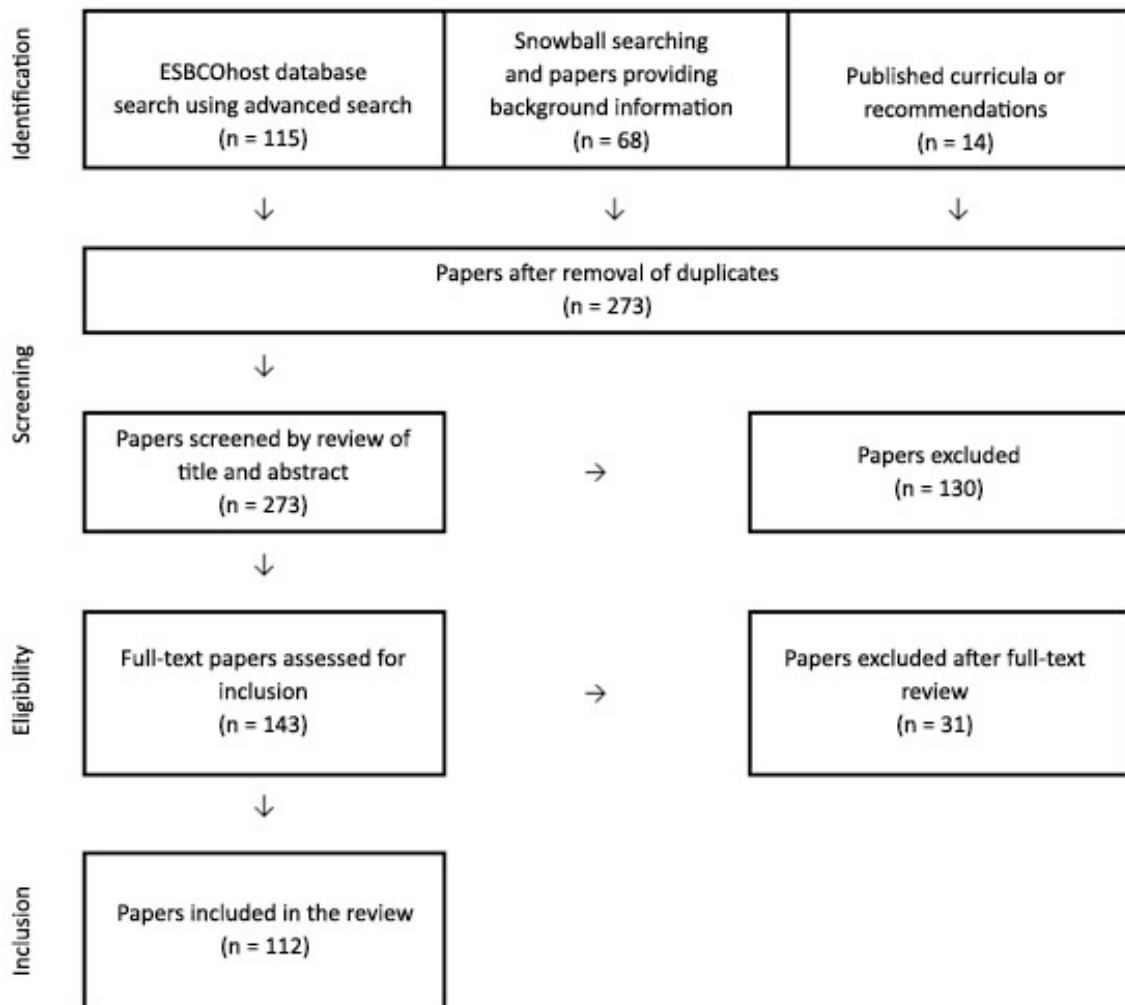


Figure 2.4: Literature search flow chart

A review of the literature identified seven topics of significance related to the conceptual framework for the development of the *Cancer Education Framework for Australian Medical Schools* (Figure 2.1). Each of these will be explored in detail in support of the study.

1. Cancer education for medical students
2. Issues associated with cancer education
3. Curricula content

4. Content delivery
5. Role of the General Practitioner in cancer
6. An overview of cancer education in Australia
7. Exposure to patients with cancer

2.6 Cancer Education for Medical Students.

“Whether considered from the aetiological, biological, clinical or public health viewpoint, malignant neoplasms are of major importance”.^{80(p4)} In Australia, and in many other developed countries, cancer has already surpassed cardiovascular disease as the leading cause of mortality.^{15, 23, 103} Advances in cancer screening, diagnosis and management in developed countries has seen mortality rates decline in the face of increasing incidence, resulting in cancer emerging as a chronic disease.^{4, 23, 113} Subsequently, there are more people living with cancer, placing an increased demand on the health system.¹⁰⁴ Moreover, many cancer survivors will require ongoing care, encounter significant psychological disorders and are at risk of developing late-onset complications of treatment.^{29, 30, 35, 39}

The Edinburgh declaration called for medical education to change “so that it truly meets the needs of the society in which it is situated”.¹¹⁴ Whilst cancer patients have been described as representing the “most prevalent patient diagnostic group”,^{6(p5)} the time dedicated to cancer education in medical schools is often disproportionately at odds with the impact that cancer has on society.^{85, 115} Further, there is often a disparity between what is taught in cancer curricula and what is relevant for non-specialist cancer physicians.¹¹⁶ In light of the increased demands on the medical workforce in relation to cancer prevention, screening, diagnosis, management and ongoing care,^{113, 117} it is clear that medical education has an obligation to better prepare medical students prior to their graduation.^{6, 29, 115}

Regardless of their chosen career choice, all doctors will treat patients with cancer.^{6, 48, 85, 117-119} In particular, GPs are increasingly involved in caring for cancer patients, including symptom control, providing preventative therapy, as well as end of life (EOL) care.^{85, 120} As such, all medical students should possess a basic understanding of the physical, psychological and social aspects of cancer.¹¹³ Additionally, patients themselves have an expectation that

their GP will have a sufficient knowledge base to be able to establish a cancer diagnosis and to aid them in understanding the management of their disease.^{29, 83}

However, despite major advances in cancer management over the past 20 years, research shows that universities are failing to prepare medical graduates with the necessary knowledge, skills and attitudes to appropriately manage cancer patients.^{42, 52, 100, 106, 107, 120} Studies in Australia highlight that medical students often feel underprepared for encounters with cancer patients in areas such as screening, prevention, communication and clinical examination.^{6, 106, 121} If medical education is to meet the needs of the community, then clearly more needs to be done. This is highlighted by Barton who said “patients and the community would be aghast at the chaotic variation in undergraduate medical courses and most would expect that doctors in Australia met a certain minimum standard of knowledge”.^{83(p824)}

A review of undergraduate palliative care curricula in the UK reported that junior doctors felt underprepared in palliative care, resulting in significant distress.¹²² In the US, McKillip et al. report that in addition to medical students, a number of non-oncology physicians identified their training in, and their understanding of, general oncology as being insufficient.¹¹⁷ Junior doctors often have the most contact with patients and their families, which often places them in uncomfortable positions when asked about information on areas in which they feel their knowledge is lacking.^{6, 48}

Whilst those who choose a career in oncology or palliative care will receive specialist training, it is important to consider that junior doctors will frequently encounter patients outside of these specialities.^{48, 117, 123} Tasks may include certifying their first death, caring for patients following cancer treatments, especially in patients presenting to the emergency department and establishing management plans, particularly when prescribing opioids.⁴⁸ In the UK, the Association for Palliative Medicine (APM) reports that a first year doctor will, on average, care for 40 patients who die and will provide care to approximately three times as many patients who are in their final months of life.¹²⁴ In 2017-2018 almost 30 000 admissions to Australian emergency departments were for a principal diagnosis of cancer, of which approximately half were considered urgent in nature.⁶⁰ Cancer patients represented 63% of total admissions, second only to cardiovascular admissions (65%). There are a number of emergency

presentations in which patient outcomes can be adversely impacted upon should medical staff fail to understand the importance of an existing cancer diagnosis.⁴⁸

2.7 Issues Associated with Cancer Education

Cancer is not restricted to one organ or body system and is therefore encountered by every discipline of medicine, across both community and hospital settings.^{6, 52} As such, the responsibility for cancer education does not rest solely within one teaching block or clinical discipline.¹²⁵ Whilst the multidisciplinary nature of cancer care is the perfect setting to teach students the benefits of this model of care, it also provides challenges for medical schools to coordinate teaching with both horizontal (in which related topics are taught at the same time) and vertical integration (in which subsequent learning builds upon earlier learning).⁸⁵

Often, there is little or no coordination between the preclinical and clinical teaching of cancer.¹²⁵⁻¹²⁷ As a result, cancer education is frequently haphazard and characterised by duplications and omissions.^{6, 29, 79, 123, 128} A survey of palliative care course organisers in the UK found that a number of respondents reported that the integration of palliative care teaching at their medical school resulted in them being unaware of what was being taught outside of their own teaching.¹²³ In order to address these issues, several authors recommend that medical schools appoint a single person to coordinate the cancer teaching across the entire program.^{85, 115}

2.8 Curricula Content

Despite the impact that cancer has on the Australian community there remains no consensus on what the focus outcomes of cancer education should be, nor is there any agreement as to the most appropriate methods of delivering cancer education programs.^{5, 88, 89} As outlined in Chapter One, Australian medical schools are accredited by the Australian Medical Council (AMC).⁷ However, no standardised national medical curriculum exists, nor is there a national medical licensing exam.^{5, 129} Instead, the AMC publishes a list of graduate outcome statements that each medical student should be able to demonstrate upon graduation.⁸ The lack of a national cancer curriculum is not limited to Australia, with a number of other countries also lacking a uniform national approach.¹³⁰ Barton et al. recommend that a cancer

curriculum should provide the minimum requirements of knowledge, skills and attitudes in addition to core experiences²⁹ but do not offer any insight as to what this may entail.

A review of the literature was undertaken to identify current cancer-specific curricula, in the form of curriculum documents and published manuscripts that detail curriculum development and/or evaluation, in which content is described. Further, personal opinions on what should be included in cancer education for medical students have also been considered. Curricula are classified as either discipline specific (e.g. radiation oncology or palliative care) or comprehensive (i.e. including multiple disciplines).

Over the past decade, several core or “ideal” curricula in oncology and/or palliative care have been developed or initiated.^{11, 131-133} Some frameworks, such as the IOC, focus on the general knowledge of cancer and palliative care that is appropriate for most medical graduates.¹¹ Others, such as the ESMO^h/ASCOⁱ jointly produced *Recommendations for a Global Core Curriculum in Medical Oncology*, are aimed at specialist oncology training.¹³² Whilst there may be overlapping attributes, the general focus of the latter frameworks is specialist, rather than general knowledge.

2.8.1 Comprehensive Curricula

Interestingly, there is a paucity of general cancer curricula aimed specifically at medical students that span the main disciplines involved in cancer care, namely medical, radiation and surgical oncology, haematology and palliative care. Increasingly, curricula are either discipline specific (e.g. radiation oncology or palliative care), focus on a single aspect (e.g. prevention or pain management), or are system/disease specific (e.g. gynaecological or breast). Whilst discipline specific curricula have been included in this review, those focussing on single aspects or on specific pathology were omitted.

As briefly described in Chapter One, the IOC was developed to provide a comprehensive cancer curriculum focussing on the general knowledge, skills and attitudes relevant to cancer

^h European Association for Medical Oncology (<https://www.esmo.org/>)

ⁱ American Society of Clinical Oncology (<https://www.asco.org/>)

and palliative care education for Australian medical graduates.⁹¹ The IOC comprises eight broad categories^{11(p1)}:

1. Public health
2. Cancer biology
3. Patient management
4. Diagnosis
5. Treatment
6. Communication skills
7. Ethics
8. Clinical experience

The IOC formed the starting point for this research, given that as an “ideal” curriculum it is comprehensive in its coverage. Further, it has been specifically designed for Australian medical schools, has been widely reviewed by key stakeholders and is endorsed by the UICC.⁹¹

In Europe, the International Summer Schools Oncology for Medical Students (ISOMS) is run biannually by the University Groningen Medical Centre in the Netherlands. ISOMS is a two-week program that aims to teach medical students oncology topics that are relevant to general practice.¹¹⁶ Curriculum documents obtained from ISOMS for 1997-1998 and 2006 show focus on the principles of treatment modalities, the role of the clinician (including the GP) in the multidisciplinary management of cancer patients, and communication and EOL care.^{134, 135} Common tumours are covered, with many involving a cancer patient in the teaching process.

During the years that ISOMS does not run in Groningen, the Vienna Summer School on Oncology (VSSO) is run instead by the University of Vienna. Both schools share a common aim, and similarities between the two curricula are noted, in particular the focus on fundamental principles of cancer and tumour-specific teaching.^{136, 137} However, the VSSO curriculum contained more emphasis on psychoncology and the management of oncological emergencies.¹³⁷

The European Society of Medical Oncology (ESMO) also run a summer school for medical students and designed their program upon five recommendations^{138(p841)}:

1. It should be an intensive 5-day course covering basics in the epidemiology, prevention, natural history, diagnosis and therapeutic management of all six 'big killers', i.e. breast, lung, colorectal, prostate, gastric and uterus cancers. Other common and/or curable tumors should also be incorporated.
2. It be restricted to sixth-year medical students from European medical schools. The selected students should not exceed 35–40 participants.
3. It should be a clinically orientated and interactive course, along with case presentations.
4. It should be accompanied by adequate educational material.
5. It should be followed by daily testing with multiple-choice questions.

Seven years later the authors expand on the curricula content, stating that it covers the whole spectrum (i.e. prevention through multimodal treatment), including basic principles of medical, radiation and surgical oncology, and palliative care.¹³⁹

In 2012 the UK Joint Collegiate Council for Oncology (JCCO) undertook a Delphi study in which 12 consultant oncologists established the minimum non-surgical oncology competencies required by medical students prior to graduation.¹⁴⁰ The aim of this study was to develop a curriculum that would inform the future practice of UK trained doctors, regardless of their final specialisation. In general, the broad principles of cancer management were favoured over the management of specific cancers. Specific aspects including the management of oncological emergencies and common treatment side effects, as well as communication skills. The authors report that because the Delphi study was used to inform the development of a curriculum a number of items that were not viewed as important were still included in the curriculum, as they provided the theoretical knowledge underpinning oncology (such as risk factors). Similarly, some items considered important were excluded from the curriculum if they were considered to be already taught elsewhere in the medical school curriculum.¹⁴⁰

The JCCO also referenced other curricula, including the IOC in developing the *non-surgical oncology curriculum* (NSOC), which was first produced in 2014 and subsequently revised in

2020.¹⁴⁰⁻¹⁴² The NSOC lists its learning objectives under the descriptors laid out in the UK's Graduate Medical Council (GMC) outcomes for graduates, specifically: professional values and behaviours; professional skills; professional knowledge; and acute oncological presentations and conditions.¹⁴² Like the IOC, many of the outcome statements are composite in nature, using descriptors that are difficult to operationalise.¹⁴³ For example, consider the following outcome statement, in which it is unclear how a student would demonstrate awareness^{142(p10)}:

“Demonstrate awareness of the role of primary care, community care and hospice palliative care.”

Nevertheless, the curriculum provides a comprehensive starting point from which a medical school could look to add cancer-specific teaching content into its existing curriculum. The basic principles of systemic and radiation therapy, and palliative care are covered, as is symptom management. Multidisciplinary care, and psychosocial, legal and ethical aspects are also addressed, as is communication. Further, knowledge underpinning these are included, such as cancer biology, screening and prevention and diagnosis.¹⁴²

In the US a preclinical oncology curriculum was developed to provide medical students with the basic concepts of patient care prior to their clinical placements, comprising six condensed learning outcomes^{111(p233)}:

1. Describe epidemiological concepts in relation to common cancers and the importance of prevention and screening
2. Identify the molecular basis of neoplasia in hematology and oncology
3. Recognize the pathophysiology, morphology, and clinical characteristics of common tumors that affect various organ systems
4. Understand cancer diagnosis, including clinical examination, diagnostic tools, and histopathological classification
5. Identify the basic principles of cancer therapy and multidisciplinary management
6. Develop communication skills needed to counsel and support patients and to work professionally with colleagues

The authors present an outline of study for the oncology block that was implemented at the University of Boston. The outline lists 63 learning activities comprising mostly lectures but also including experiential learning (learning through practice) and self-review. Introductory lectures on treatment modalities (surgery, chemotherapy, radiotherapy and palliative care) and general principles (oncology, cancer biology and tumour immunology) are covered, as are communication skills and psychological care. A number of lectures are tumour/system specific.¹¹¹

A Canadian survey of students and educators was used to assess the oncology education framework used in both Canadian medical schools, and residency training programs for family medicine and internal medicine.¹⁴⁴ When asked to list the five most important oncology topics, undergraduate curriculum committee members listed: common complications of cancer; common complications of cancer treatment; breaking bad news; cancer epidemiology and risk factors; and screening, prevention, treatment and prognosis of common malignancies. Students on the other hand wanted a general approach to diagnosis in a patient with suspected cancer; general knowledge of breast cancer; breaking bad news; general knowledge of colorectal cancer; and general knowledge of lung cancer. Whilst combined they acknowledge that breaking bad news and symptom management are important in cancer education, basic principles of cancer management and psychosocial aspects are not considered.

A three-day oncology program introduced into an Israeli medical school aimed at teaching students about the biological and associated psychosocial issues listed: epidemiology and staging; systematic therapy (included targeted therapy); clinical trials and cancer treatment in developing countries; and complementary and alternative medicine (CAM), chemotherapy, radiotherapy and palliative care.¹¹³ However, no indication as to the inclusiveness of teaching in these topics was entered into.

A pilot curriculum at the University of Chicago aimed at improving first-year medical students understanding of the cancer care continuum and cancer research.¹¹⁷ The authors describe a 20 hour curriculum covering: an introduction to oncology; cancer genetics; medical, surgical and radiation oncology; palliative and hospice medicine; survivorship care; drug development; cancer economics; and cancer disparities.^{117(p51)}

2.8.2 Radiation Oncology Curricula

The Radiation Oncology Education Collaborative Study Group (ROECSG) website list one of their mission statements as to “[d]evelop novel and innovative radiation oncology educational curricula for undergraduate, graduate and continuing medical education”.¹⁴⁵

Whilst the ROECSG website does list a core curriculum this page states¹⁴⁶:

“The ROECSG Core Curriculum Expert Delphi Consensus project aims to develop a United States radiation oncology curricular framework by defining Entrustable Professional Activities (EPAs) and content domains. The development of such a curricular framework will be the first of its kind within our field.”

Whilst no actual curriculum was available on the web site, two publications (one of which was attributed to ROECSG) describe the curriculum as comprising three one-hour lectures: an introduction to radiation oncology; radiation biology and physics; and practical aspects of radiation oncology.^{147, 148} YouTube videos sharing the same title as these lectures are available on the ROECSG website, forming some of the *Introduction to Radiation Oncology* resources for medical students and junior residents.¹⁴⁹

A study from Boston University evaluated the introduction of a 90-minute didactic lecture on radiotherapy delivered to third-year medical students as a PowerPoint slide set, as part of a mandatory clinical placement in radiology.¹⁵⁰ The topics covered in the didactic lecture are shown in Table 2.3.

Table 2.3: Content of didactic session described in Agarwal et. al.¹⁵⁰

| Slide Number | Topic |
|--------------|---|
| 1–4 | Review of incidence and prevalence of cancer in the United States |
| 5–10 | Review of screening guidelines (DRE, PSA, mammogram, etc.) |
| 11–14 | Review of AJCC staging with examples of TNM staging and risk groupings for breast and prostate cancer |
| 15 | Description of multidisciplinary oncology management |

| | |
|--------------|---|
| 16–22 | Introduction to radiation oncology including descriptions of radiation biology and radiation physics, basic diagrams of cell cycle and DNA damage, introduction to nomenclature and frequently used radiation terms (e.g. LINAC, brachytherapy, PBI, SRS, etc.) |
| 23–28 | Review of breast cancer treatment, including pictures of radiation fields |
| 29–31 | Review of prostate cancer treatment options |
| 32–49 | More detailed diagrams of radiation treatments including technology review (pictures of LINACs), examples of three-dimensional conformal radiation plans, select common beam arrangements and field designs |
| 40–46 | Review of intensity modulated radiation therapy plans with rationale and basic discussion of tumor/normal tissue tolerance |
| 47–49 | Review of image-guided radiation therapy with rationale and discussion of onboard imaging |
| 50–55 | Review of brachytherapy with rationale including examples of prostate and gynecologic brachytherapy, with discussion of radioisotope characteristics and radiation protection issues |
| 56–57 | Pictures of newer technology at the institution including cone beam CT and Cyberknife radiosurgery |

The authors do not provide detail as to the choice of topics or the level of depth to which each is covered, instead summarising the didactic as covering the principles of general oncology, breast and prostate cancer, and radiation oncology.¹⁵⁰

Ben Mustapha et al. reported on results returned from 34 academics across 19 European countries, where at least 80% included teaching in radiobiology, treatment complications and the use of radiation in the palliative setting.¹⁵¹ Brachytherapy and radiation physics were taught in 75% of institutions, and the management of treatment complications was taught in half of the institutions. Teaching on site specific tumours accounted for the majority of teaching topics (10 of 21), with breast, prostate and gynaecological malignancies being the most frequently taught (80%). The median number of hours dedicated to teaching radiation oncology was 10 hours (range: 2 – 60), compared with the median of 25 hours (range: 3 – 90) dedicated to medical oncology teaching.

2.8.3 Palliative Care Curricula

A number of countries have mandated the inclusion of palliative care into medical school curricula.^{123, 152-154} In Australia, palliative care teaching is specifically addressed under the domain of *Clinical Practice: the medical graduate as practitioner* in the AMC accreditation standards, requiring that all Australian medical schools produce graduates who can^{8(p3)}:

“2.13 Describe the principles of care for patients at the end of their lives, avoiding unnecessary investigations or treatment, and ensuring physical comfort including pain relief, psychosocial support and other components of palliative care.”

In Australia, the palliative care curriculum for undergraduates (PCC4U) represents a joint collaboration between Queensland University of Technology, the Queensland Government, Flinders University and Curtin University of Technology, with funding provided by the Australian Government Department of Health. The PCC4U provides a comprehensive curriculum, supported by core modules and focus topics, including audio-visual patient cases, which are accessible via the PCC4U website and YouTube.¹⁵⁵ The curriculum comprises four core modules:

1. Principles of palliative care
2. Communicating with people affected by life-limiting illness
3. Assessing and managing symptoms
4. Optimising function in palliative care

In addition to the core modules, four focus topics underpin the curriculum:

1. Multidisciplinary care
2. Aboriginal populations
3. Caring for children
4. Culture-centred care

One advantage that the PCC4U has is the inclusion of self-directed content and student workbooks, which facilitate its inclusion as a self-directed optional module, as opposed to a more traditional curriculum document such as the IOC.

Internationally, the European Association for Palliative Care (EAPC) produced a set of recommendations for the development of undergraduate curricula in European medical schools. EAPC recommend that medical schools adopt a curriculum in palliative care that focusses on seven domains of practice, along with suggestive weightings^{156(p11)}:

| | |
|-------------------------------------|-----|
| 1. Basics of palliative care | 5% |
| 2. Pain and Symptom management | 50% |
| 3. Psychosocial and spiritual needs | 20% |
| 4. Ethical and legal issues | 5% |
| 5. Communication skills | 15% |
| 6. Teamwork and self-reflection | 5% |

Remaining within Europe, the Association for Palliative Medicine (APM) in the UK released its curriculum for undergraduate medical education in 2014. The curriculum outlines eight key areas¹²⁴:

1. Basic principles
2. Physical care
3. Psychosocial care
4. Communication with patients, relatives and others
5. Social and family relationships
6. Grief and bereavement
7. Personal and professional issues
8. Culture, language, religious and spiritual issues
9. Ethical and legal issues

When comparing these three curricula/recommendations, there is clear agreement on the need for topics, such as the principles of palliative care, the assessment and management of symptoms, multidisciplinary teamwork, ethical and legal issues, and communication skills.

The results of a cross-sectional analysis of palliative care teaching in eight European medical schools show that the topics covered in most detail were pain management and symptom

control, psychosocial and emotional support, ethics and communication.¹⁵⁷ The authors state that all the EAPC recommendations were covered but do not provide specific details, other than to note that both the French and Polish university taught paediatric palliative care, and the Polish university also taught lymphoma and chronic wound treatment.

A survey of 30 UK medical schools was undertaken to investigate the teaching of palliative care to medical students and drew comparisons to an earlier study.¹⁵⁸ Palliative care content was reported as being increasingly integrated into curricula but varied greatly in content time with a mean duration of 36 hours (range 7 -98 hours), which the authors note is below the minimum 40 hours recommended by EAPC. Whilst all schools reported teaching symptom management (principles of as well as specific symptoms), communication skills (patient, family, health professionals) and ethics, key topics around psychological social and spiritual aspects were not taught in some schools. Teaching around general principles of palliative care was not discussed.¹⁵⁸

In Switzerland, a survey was undertaken to evaluate the teaching of palliative care in Swiss medical curricula against the EAPC recommendations and to provide recommendations for palliative care teaching in Swiss medical schools.¹⁵⁸ The authors report that experts from the five Swiss medical schools generated a list of 58 palliative care learning objectives, of which 11 were agreed upon and put forward for inclusion into the Swiss Catalogue of Learning Objectives (SCLO) for undergraduate medical training. Palliative care objectives were presented to the Swiss Medical Interfaculty Conference in 2012 and were accepted. The authors state that the objectives were presented “in relation with existing learning objectives...in order to ensure internal coherence with existing learning objectives”.^{158(p216)} However, they do not expand on this reason or discuss external constraints. The resultant list of objectives are placed under five topic headings¹⁵⁸:

- Pain and symptom management
- Dying and death
- Change in treatment goals at the end of life
- Physicians own limitations
- Multiprofessionality and home care

Whilst these topics fit with those already discussed, the absence of a specific topic introducing the principles of palliative care is a noticeable omission. This is despite the fact that the authors report that four of the five Swiss medical schools provided one to two hours of teaching on this topic.¹⁵⁸ Further, the SCLO contains several discipline-specific sections, including internal medicine, surgery, ophthalmology, and forensic medicine¹⁵⁹ and it is unclear as to whether adding a dedicated section on palliative care was considered.

A Finish review of palliative care teaching in a single university reported that 53.5 hours of teaching occurred throughout the six year medical program.¹⁶⁰ The authors reported teaching based upon sections in the EAPC recommendations, which comprised: basics of palliative care; pain and symptom management; psychosocial and spiritual aspects; ethical and legal issues; and communication. Whilst the time dedicated to palliative care was in excess of that recommended by the EAPC, teaching time in some areas was lower than recommended and of note, no teaching occurred in the area of teamwork and self-reflection. The authors note that approximately one-third of teaching was delivered by specialities from disciplines other than palliative care.¹⁶⁰

In Germany, the delivery of 'palliative care basics' teaching via e-learning modules to 670 medical students at a single university was evaluated through multiple choice questions (MCQ) and written student self-evaluations.¹⁶¹ The course was offered as part of a mandatory palliative care curriculum, delivered to students during their clinical years. A 90-minute introduction was given on the fundamentals of palliative care, communication and psychological aspects, in addition to eight specific modules, each of 45 minutes duration:

1. Symptom management: pain, dyspnoea
2. Breaking bad news in palliative care
3. Nutrition and thirst at end-of-life
4. Gastroenterological symptom management
5. Psychiatric symptom management
6. Interprofessional team
7. Clinical ethics

8. Symptom management: final phase

The authors report that although the e-learning modules were well received, students requested more opportunities to engage with patients. Comparisons between those students who engaged with the e-learning and those who did not, failed to show any difference on their performance on the final assessment.¹⁶¹

In Israel a non-mandatory one-week course offered to students in the final three years of medical school was developed to provide basic knowledge on symptom control, take a history from a palliative patient, to provide exposure to questions on end of life and to working within a multidisciplinary team.¹⁶² The authors outline the topics covered as including symptom management (specifically pain, dyspnoea and gastrointestinal symptoms), nutrition, delivering bad news and spirituality, as well as complementary and alternative medicine ¹⁶². Students were also exposed to non-oncological palliative care patients, paediatric oncology and were required to talk to the family of a recently deceased patient. Overall student satisfaction was high, with exposure to patients and the multidisciplinary team (MDT), as well as the physiological aspects among well scoring components. The authors report that whilst most students rated the course as important for medical training, only half felt that it has better prepared them to communicate with patients. As seen with the aforementioned German study, students requested more practical learning opportunities.

In the US, Ellman et al. describe a four-year EOL care curriculum comprising several core learning components, including: basic principles and goals of palliative care; symptom management; communication with patients and family, including delivering bad news; assessing EOL patients; psychosocial and spiritual needs; multidisciplinary care; certification of death; and professional and personal challenges.¹⁵⁴ The curriculum totalled a minimum of 24 hours of contact time in workshops, web-based learning.

In South Korea a 16 hour program covering the necessity of hospice and palliative medicine; the basic concepts of hospice medicine and CAM; symptom management; and social issues and volunteers.¹⁶³ The program included a four-hour clinical placement in which students worked alongside hospice staff. The authors report improvements in knowledge of palliative care, as well as greater self-reported confidence. In particular, pain management and knowledge about opioid usage was noted as the most significant improvement. However,

whilst students felt more confident in advising patients about palliative services, attitudinal changes were reported as being non-significant, particularly regarding recommending hospice care to future patients under their care.

A Japanese survey of 66 medical schools showed that although only one-fifth offered a specialised palliative care course, the majority covered palliative care topics, such as a general outline and pain management, whilst more than half covered symptom relief.¹⁵³ Other topics included informed consent, cancer notification and family care, as well as medical team and hospice, although it not clear what depth or detail these topics are covered.

2.8.4 Summary

Haagedoorn et al. highlighted the issue that medical students are often exposed to specialized knowledge that is not relevant to their future vocation.¹⁰¹ This is supported by focus group data from Australian medical students in the clinical years of their course in 2018, who reported that lectures given by clinicians were often specialised (e.g. chemotherapy regimens for stage III cervical cancer) and did not cover the basic principles of treatment, which was what they actually required.⁶

Tattersall et al. recommended that oncology courses include all aspects of cancer knowledge (i.e. not limited to clinical treatment) and be aimed at the level of the GP.⁸² However, it should be noted that general practice is a speciality in its own right, with trainees undergoing several years of supervised practice, education and assessment prior to receiving fellowship with the Royal Australian College of GPs.¹⁶⁴ Therefore, it seems more appropriate that medical schools provide basic cancer education to equip medical students with the knowledge, skills and attitudes to enable them to provide appropriate care from graduation until entry into their chosen post-vocational specialisation training program, which in Australia may take several years^j.

In a report from the Cancer Education Project of the International Union Against Cancer (UICC) and the World Health Organisation - Collaborating Centre for Cancer Education (WHO-

^j In Australia all medical graduates undertake pre-vocational training (internship and residency) prior to undertaking specialist training (registrar) and subsequently fellowship with a professional college (consultant or general practitioner).

CCCE), the failure of previous efforts to improve cancer education was attributed to the fact that^{101(p204)}:

“In most countries patients who (may) have cancer are usually first seen, and in many cases first treated, by doctors *who have not specifically specialized in oncology*. This means that undergraduate medical cancer education should focus on knowledge and skills relevant for daily practice of all future medical doctors.”

Simply put, cancer education should provide students with a basic understanding of cancer knowledge regardless of their future career path.^{6, 83, 113, 127}

Several common themes have emerged from the literature in regards to what should be focus areas for teaching medical students:

- Common principles of cancer management, palliative and EOL care
- Symptom management
- Communication skills, including the delivery of bad news
- Psychological, social and spiritual support
- Cancer biology
- Screening, prevention, diagnosis, survivorship and EOL care

These themes will be used to guide the development of the *Cancer Education Framework for Australian Medical Schools*, using the data obtained by the revision of the IOC, which is detailed in Chapter Four. The development of the framework itself will be outlined in Chapter Five.

2.9 Content delivery

The multisystem nature of cancer has traditionally seen teaching by organ system during the preclinical phase. Clinical cancer education varies wildly by medical school, with some having dedicated, mandatory clinical placements in the core non-surgical disciplines (medical and radiation oncology, haematology and palliative care) whilst others offer only some of these as electives, or offer none of them in a formal capacity, meaning student exposure to cancer patients is generally opportunistic.^{6, 52} All Australian medical students attend mandatory clinical placements in surgery, in which cancer surgery and exposure to cancer patients is

expected to occur, given that surgery is one of the traditional mainstays of both cancer education and treatment.⁸¹ One study of student exposure to cancer patients whilst on clinical placement at a single Australian university reported that surgery accounted for one-fifth of the placements attended over the two clinical years.⁵²

The aim of this research is to determine the cancer-related knowledge required by medical students prior to graduation. In order to develop a cancer education framework for Australian medical schools that has the potential to be implemented into existing medical school curricula, there is a need for flexibility in the way in which student learning takes place. Whilst there is evidence to suggest that certain methods of teaching cancer yield better results than others,^{42, 127} each medical school needs to have the freedom to determine the method that best suits their educational philosophy, individual needs and resource availability. Schools can be encouraged by the findings of Ni et al. who found that the inclusion of at least one formal lecture on radiation oncology increased self-perceived knowledge in radiation biology and physics, treatments set up, positioning and planning, and in integrating EBM into treatment.¹⁶⁵

Clinical exposure to cancer patients is viewed as an essential experience for medical students¹¹ and the inclusion of clinical placements in cancer clinical service units is the one method of instruction that is recommended in the *Cancer Education Framework for Australian Medical Schools*. This is particularly relevant in radiation oncology, where clinical placements remain limited in a number of medical schools within Australia^{6, 106, 166} as well as internationally.^{167, 168} This is despite approximately half of all cancer patients receiving radiotherapy at some point, particularly in the palliative setting.^{83, 166} Whilst clinical exposure to cancer patients is essential, Australian studies have shown a decline in student exposure to cancer patients despite spending increased time in cancer service units.¹⁰⁰ This finding is discussed in detail later in this chapter.

Clinical exposure to terminal patients has been shown to raise awareness of palliative and EOL care, assisting them to address their own fears about death and dying, and to dispel negative attitudes toward death and dying.¹⁶² This is supported by focus group research exploring cancer patient exposure in clinical year medical students, with one participant stating that their impression that cancer “was not all doom-and-gloom”, whilst another stated

“that their interactions with cancer patients were really actually uplifting...I didn’t find it depressing at all”.^{6(p764)}

2.10 Role of the General Practitioner in Cancer

In most countries, GPs represent the single largest group of doctors,²⁹ with approximately half of all medical graduates entering into careers in general practice.^{96, 107} The role of the GP has become increasingly important as more patients are diagnosed with cancer and as the number of survivors’ increases.^{29, 169} GPs are most often responsible for the initial diagnosis and referral of cancer patients, and are involved in various stages throughout their treatment and EOL care.^{29, 88, 120} A study of cancer patients in Western Australia (WA) found that many patients expressed concern that their GP was incompetent in making a diagnosis of cancer and that it was only their own persistence that eventually resulted in a diagnosis being made.¹⁷⁰

In addition to diagnosing, referring and managing patients with cancer, the role of the GP as an educator and promoter of prevention and early detection has the potential to save lives,^{29, 101} as well as reducing both psychosocial and economic encumbrance.^{169, 171} Hiramaneek and McAvoy further stressed the importance of psychological support in addition to caring for patients’ physical needs, arguing that it is crucial for GPs to remain up-to-date with available strategies through which they can effectively assist their patients.¹⁷² In a survey of Norwegian GPs, one quarter of respondents identified psychosocial support as the main reason for conducting follow-up care of cancer patients (second only behind surveillance) and 90% felt that GPs were best suited to provide this service.¹⁷³

In Australia, most cancer patients will visit their GP within two days of a cancer diagnosis being confirmed, in order to ask questions and to seek advice.³⁷ Not surprisingly, patients who had a long-standing relationship with their GP were more likely to feel comfortable with the information and support they provided.^{150, 170} Focus group research in the Netherlands indicated that GPs themselves felt that “the coordinating role of the GP [in palliative care] can be improved by enhancing (basic) knowledge and opportunities of consultation”.^{174(p30)} In WA, cancer patients and their carers favoured the notion of having a single person who

coordinated their care, and assisted them in navigating through ‘the system’.¹⁷⁰ The authors were of the opinion that the GP was the ideal person to take on this role.

However, Fidjeland et. al. reported that whilst most GPs had experience and were confident in the provision of follow-up care to cancer patients following active treatment, more than 90% were not willing to take on this role, with workload implications cited as the primary reason by 81%.¹⁷³ Unfortunately, the inability or reluctance to fulfil this role ultimately leads to specialist clinician time being needlessly consumed in providing information that could have readily been provided to the patient by their GP.¹⁷⁰

Nationally, it is possible that the discrepancies in the support provided by GPs in the continuum of cancer care reflect the unstructured approach that is frequently taken to cancer teaching in Australia.^{29, 79} Furthermore, in WA, GPs themselves have previously identified deficits in their undergraduate cancer education^{175(p3)}:

“[E]vidence that the present undergraduate teaching in oncology requires a significant overhaul has reached the State Cancer Services Planning Committee of the Health Department of Western Australia in the form of demand from local general practitioners for further training in the area of cancer medicine. Put simply, the doctors we are producing are finding themselves ill-equipped to work with patients with cancer once they enter practice in the local community.”

In the Netherlands a study of 128 recently diagnosed patients with incurable cancer reported that only 63% were satisfied with the information provided to them by their GP.¹⁷⁶ Moreover, results of a study of 341 cancer patients in Northern Ireland indicated that only 25% were satisfied with the information given to them by their GP. This rating was lower than for information received from family or friends (61%), or from specialist nurses (71%).¹⁷⁷ More encouragingly, a national survey of Australia GP registrars^k about to sit their RACGP^l exams highlighted that their general cancer knowledge was considered to be good.¹⁷⁸ However,

^k A GP registrar is a licensed doctor undertaking training to become a GP (similar to a resident in the US medical system)

^l GP registrars who pass their Royal Australian College of General Practitioners (RACGP) exams (and other training requirements) are eligible for fellowship of the College and to work as general practitioners.

their exposure to cancer patients was low and that a considerable number had not examined common cancers.

Given the significant role that GPs play in the continuum of cancer care, it is essential that they possess a broad knowledge base. By implication, cancer education should be an integral component of basic medical training, as it is considered that it is during this period that doctors acquire much of the knowledge that they retain throughout their careers.¹⁰⁵ Gaffan et al. supported this assertion, arguing that while cancer prevention training was highly promising at the undergraduate level, equivalent training of qualified doctors tended to produce variable results.⁸⁸ Further, a UK study into the cancer-related education needs of GPs found that many continuing education sessions were poorly attended, despite the fact that GPs frequently report a need to update their knowledge and skills.¹⁷⁹ The authors reported that much of the postgraduate or continuing education for GPs was ineffective, inefficient and in need of revision. Tattersall and Langlands maintain that the responsibility for GP education sits squarely on the shoulders of medical schools, as postgraduate cancer training is not the responsibility of any one professional college or educational organisation.¹⁰²

2.11 An Overview of Cancer Education in Australia

In 1982, Tattersall et. al. published a position paper recommending that medical education in Australia be reviewed and updated to reflect recent advances in cancer knowledge and treatment.⁸² Five years later, Tattersall et al. followed up on these recommendations through a survey of final year medical students in Australia.⁸¹ The authors distributed a letter to Australian medical schools enquiring about the cancer-related content of their curricula. Responses indicated substantial differences in curricula across schools. The authors then surveyed teaching staff, which further demonstrated significant differences between schools in terms of students' knowledge and experiences.⁸¹ In a survey of Australian and New Zealand medical schools in 1997, Barton and Simons highlighted the difficulties in obtaining an accurate picture of cancer teaching within medical schools, when they received the following feedback from the schools themselves: "departments told us they were teaching subjects where we knew they were not, and that they weren't teaching subjects we knew they were".^{180(p226)}

In 1990, Smith et al. undertook a seminal survey of recently graduated medical students to examine the quality, quantity and balance of undergraduate medical education in Australia.¹⁰⁷ The survey examined cancer-related knowledge and attitudes; self-rated perceptions of cancer-related clinical skills; levels of exposure to cancer patients; time spent in clinical treatment areas; and students' perceptions of the quality of their instruction in various aspects of cancer during their training. Comparisons between states and universities indicated alarming disparities in cancer-related knowledge and skills, as well as a lack of exposure to clinical areas relating to the management of cancer patients.

Smith et al. reported that the majority of graduates appreciated the gravity of cancer, although one in six underestimated cancer mortality by more than 10%. All graduates were able to correctly identify the three leading causes of cancer-related death affecting each sex. However, the number that correctly associated age as an increasing risk factor for cancer was alarming, with only 10% correctly identifying that a woman is at greatest risk of developing cervical cancer in her 60s. Knowledge of appropriate cancer treatments and their associated 5-year survival rates also showed concerning results. Almost all graduates surveyed (99%) recommend screening for cervical cancer be done every 1 to 3 years (suggested frequency at that time was every second year). The appropriate time to cease screening demonstrated a lack of knowledge of when women are at greatest risk of developing cervical cancer, with only 12% correctly reporting an appropriate age of 70 years. Screening for other cancers also demonstrated a lack of understanding, with screening for lung cancer (7%) and melanoma (34%) being considered to reduce population wide mortality. This paper sent a clear message for Australian universities to adopt a standardized set of core outcomes related to cancer teaching.¹⁰⁷

In 2001, Barton et al. undertook a similar survey to evaluate curricula changes undertaken by several universities and to compare graduates from 2001 with those from 1990.¹⁰⁶ The survey tool was based on the questionnaire developed by Smith et al. which permitted direct comparisons with the previous findings. Additional questions related to the content of the IOC were included into the survey tool. The authors reported alarming variations in levels of knowledge between medical graduates from graduate medical programs (GMPs) when compared to non-graduate medical programs (non-GMPs) and the results published by Smith et al. Screening knowledge was generally good and the authors detected no difference

between the GMP and non-GMP graduates in this area. Knowledge of the age that a person is most at risk of developing a specific cancer was greater in the non-GMP graduates for both cervical cancer (14% versus 11%, $p = .020$) and for colon cancer (66% versus 60%, $p = .040$). As seen in 1990, knowledge of age-related risk for breast cancer was reasonable (37% and 40% respectively) but still poor for cervical cancer.

Knowledge for 5-year survival rates was reasonable, with the majority ($\geq 80\%$) of graduates answering correctly for four of the seven cancers listed (colon, breast, prostate and ovarian). Non-GMP graduates demonstrated significantly better knowledge for breast ($p = .012$), lung ($p = .002$) and testicular cancer ($p = .040$). Operable non-small cell lung cancer was the only question reported in the 1990 survey, and this was similarly answered incorrectly in 2001 (56% in 1990 compared to 44% and 61% respectively in 2001).¹⁰⁶

In 2002, Starmer et al. conducted a survey of recent graduates from the University of Western Australia (UWA) to evaluate the introduction of dedicated clinical placements in cancer and palliative care.⁷⁹ The authors used the same survey tool as Barton et al.¹⁰⁶ to enable direct comparisons to be made with the results published in the 2001 national survey. The authors reported that UWA graduates were more likely to refer a newly diagnosed breast cancer patient to a multidisciplinary breast cancer clinic (97% compared with 74%, $p < .001$) and were well informed about screening programs. Despite only one third of UWA graduates correctly identifying that a woman is most likely to present with breast cancer in her 60s, knowledge and exposure relating to breast cancer were encouraging, with 90% reporting that they had examined a primary breast lesion. Ninety-seven percent correctly reported the existence of valid evidence for breast cancer screening and 89% correctly reported that familial breast cancer was responsible for less than 10% of breast cancer incidence.⁷⁹

George et al. surveyed final-year medical students and interns on placement at a regional cancer centre in New South Wales between 2013 and 2015¹²⁰. The authors report that the majority of respondents reported being introduced to oncology in their penultimate year of study. Almost one-third reported that their oncology teaching did not include any theoretical component, instead comprising only of clinical rotations and that half of all oncology rotations were combined with other disciplines. Most rated their teaching as average or satisfactory,

with only 10% returning a rating of 'dissatisfied'. Areas most in need of increased attention were diagnostic investigations, clinical applications and treatment approaches.¹²⁰

Starmer highlighted the shortcomings of surveys that relied upon participant recollection of their cancer education during medical school.⁵² The author undertook a retrospective analysis of clinical log books submitted by medical students during their clinical years in 2015 and 2016 at a single medical school in WA to explore their exposure to cancer patients whilst on clinical placement. The author reported variable exposure to patients with common cancers, with less than half seeing a patient with breast or colorectal cancer, one third seeing a patient with lung or prostate cancer and only 15% saw a patient with melanoma, all of which are less than seen in previous studies.⁵²

A follow-up study saw students recruited to keep a cancer-specific patient log book in 2018, designed specifically to record the type of exposure to cancer patients.⁶ The authors reported that of the 11 students that returned their log books, the average number of patient encounters was 22 (range 2 – 65). When considering the five essential clinical experiences listed in the IOC,¹¹ only two students had not spoken with a cancer patient, nor taken a history or conducted a physical examination, and four had not encountered a patient that was terminally ill. Overall, half of the patients seen by students gave a history and 44% were examined. Sixty percent were terminally ill. A focus group undertaken at the end of the study found that most students felt unprepared for clinical practice with cancer patients upon graduation, stating that a lot of their exposure to cancer patients was opportunistic and purely observational in nature. A number expressed concern about their basic understanding of cancer and in particular, clinical skills such as performing a rectal exam or PAP smear.⁶

Nicholls et al. conducted a survey of radiation oncology teaching in Australian and New Zealand medical schools 2017/18 and reported that whilst nine of the 16 responding schools followed a uniform cancer curriculum, only one school included a specific radiation oncology curriculum.¹⁶⁶ Eight schools had no formal teaching in radiation oncology and only one-fifth of students participated in mandatory clinical placements. The authors report that 80% of schools indicated that they had no intention of increasing their teaching in radiation oncology, with many believing it was a post-graduate subject.

2.12 Exposure to Patients with Cancer

Poor exposure to cancer patients amongst Australian interns has been raised as a significant concern in the aforementioned studies.^{79, 100, 106, 107} Starmer and Barton compared data collected from UWA graduates over a five-year period (2002 – 2006) and compared their results with those reported by Smith et al. and Barton et al. and observed a concerning declining trend in the number of cancer patients that medical students reported examining, despite time being spent in cancer service units actually increasing over the same time period.¹⁰⁰ A comparison of the percentage of interns who reported spending time in a cancer service unit as a medical student and the number of interns who reported examining a patient with cancer during medical school is shown in Figure 2.5.

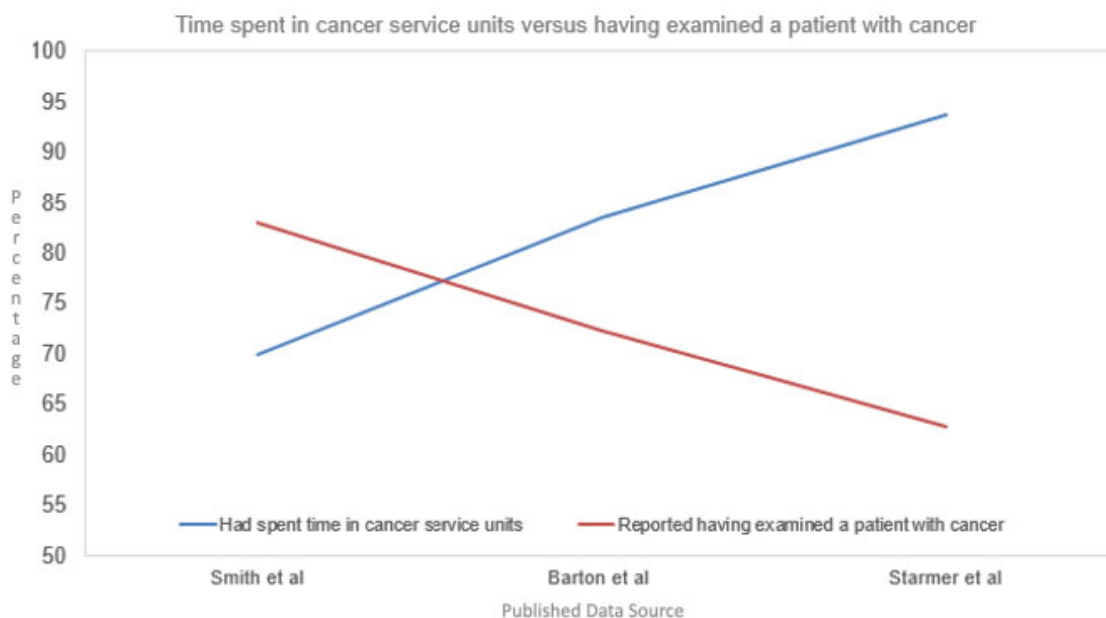


Figure 2.5: Comparison of time spent in cancer service units versus having examines a patient with cancer
Source: Starmer.¹⁸¹

The authors identified several possible reasons for this observation, including a shift from inpatient to ambulatory care and the increasing use of community and private facilities to provide imaging and pathology services.¹⁰⁰ Focus group data reported by Starmer et al. supported their view on the issues associated with placing medical students into outpatient clinics, where there is limited opportunity to examine cancer patients.⁶ In particular, the

authors noted that whilst surgical placements had high throughput of cancer patients, it offered the lowest level of interactivity, with students primarily serving as passive observers.

The shift to ambulatory care has impacted all hospital disciplines, with a study exploring the number of patients available to students across four teaching hospitals in New South Wales reporting that approximately half were not in their room at the time of the audit and of those who were, a number were not accessible to students because either the nursing staff felt the patient was too unwell, or the patient themselves did not want to be examined or have their history taken by a student.¹⁸² The authors reported that of the 1960 inpatients only 320 were available for a total of 500 students. Hospital inpatients are often considered to be unwell or not suitable to be seen by medical students.¹⁰⁰ However, a study of palliative care patients in the UK showed that a number of patients disagreed with staff preventing students from seeing them.¹⁸³ The authors reported that patients found the process to be therapeutic, felt empowered, wanted to help others and importantly, wanted to decide for themselves as to whether they saw students. Similar findings were reported in another UK study, which showed that whilst staff held concerns about patient welfare, the patients themselves were overwhelmingly positive about encounters with students.¹⁸⁴

Whilst the opportunities to examine patients has been highlighted as an issue, time spent in cancer outpatient clinics provided a better understanding of the role of oncologists, the principles of cancer management, the multidisciplinary model of care and shared decision making, as well as dispelling commonly held myths, misconceptions and fears about cancer.⁶
¹⁸⁴ The introduction of dedicated clinical placements in cancer service units at UWA was found to have similar positive effects upon student perceptions of cancer.⁵² However, despite the low numbers of medical students seeing cancer patients, few Australian medical schools have mandatory placements in cancer service units.^{6, 47, 48}

2.13 Recommendations

Based upon the review of the literature presented in this chapter, the research proposes several recommendations to guide the development of the *Cancer Education Framework for Australian Medical Schools*:

- Focus on basic knowledge of modern cancer management, including the fundamental principles that underpin these
- Advocate for experiential learning in cancer service units to ensure that students experience the multidisciplinary approach to cancer care
- Other learning opportunities should be decided upon by the individual school to better facilitate adoption of the framework
- Suggest the inclusion of electronic resources to support the framework and which offer flexible delivery during global or widespread health issues, such as seen with the COVID-19 pandemic, or other unforeseeable events that impact upon student attendance in traditional classroom environments
- Provide meaningful exposure to patients with cancer, including those who are dying and provide emotional support to students who may be impacted upon by this experience
- Have one person responsible for coordinating cancer teaching across the curriculum

2.14 Conclusion

Regardless of their chosen career path, all doctors will encounter patients with, or at risk of, developing cancer.^{5, 6, 48} Thus, all medical students should have a basic understanding of cancer and its management, irrespective of their future career path.^{6, 83, 101} However, studies show that cancer teaching is disproportionate to the impact that it has on the community^{47, 85} and that disparity often exists between what is taught and what is relevant for non-specialist doctors.¹¹⁶ Further, medical students and junior doctors are themselves now raising concerns that their education is not adequately preparing them to serve the community into which they will enter.^{5, 6, 47, 48, 108}

Students generally form attitudes toward certain disciplines or patient groups early on during their medical training.⁵² Experiential learning in palliative and EOL care is an effective way to counter the view amongst many that death indicates that medical care has failed.^{152, 154, 185} This view is often reinforced by the hidden curriculum, though which attitudes and beliefs are portrayed to students outside of the formal curriculum, such as through observed behaviours of staff encountered during clinical practice.¹⁸⁶ This is evidenced by Walker et al. who report that “some clinicians consider [palliative care] to focus on medical failure to cure, to be ‘low

tech' and of little interest".^{187(p580)} Further, exposure to death during medical school has been associated with better knowledge and more positive attitudes regarding EOL care.¹⁸⁶ Stranto-Paul et al. report that home hospice exposure enabled students to develop a rich understanding of what it meant for patients to die with dignity.¹⁵² Further, the experience facilitated reflection on their own attitudes and identity, and highlighted a shift in focus from one treating disease to one treating the person.

Palliative and EOL care has become increasingly prevalent in medical education, as more accrediting bodies recognise the benefit of providing training and exposure in this field.^{42, 183, 186} The benefits of early exposure to death and dying in a controlled and supportive environment is clearly articulated.^{121, 152, 186} Whilst medical, radiation and surgical oncology exposure is seen less frequently, clinical teaching in these disciplines has been shown to dispel misconceptions, improve student attitudes towards cancer and better understand the role of cancer physicians.^{6, 52, 113, 116}

Junqueira raised the salient point that cancer education at the medical student level should not aim to produce cancer specialists, but to produce doctors that have a comprehensive general knowledge, as well as appropriate behaviours and attitudes.¹⁰⁵ Moreover, medical education should produce physicians who always consider the possibility of malignancy when assessing a patient, and who possess the relevant skills and knowledge to appropriately manage and refer the patient in such cases.^{29, 105, 188}

Barton cautions that the role of the medical schools is not to train doctors but rather to produce doctors that can be trained by the specialist colleges.⁸³ Given that several years will pass between graduation from medical school and entry into a vocational training program, all medical students require a sound grounding in cancer education that is relevant for all doctors, irrespective of their future profession.^{116, 125, 140} As such, basic medical training looms as the most appropriate setting for doctors to gain a sound knowledge in cancer medicine and for many, it may be their only opportunity.^{102, 119, 189}

Chapter Three will describe the methodology underpinning the research presented in this thesis.

Chapter Three: Methodology

3.1 Introduction

In the previous chapter an overview of the literature was provided, including the current issues in cancer education for medical students, the role of the GP in cancer care and expectations of cancer knowledge for medical graduates, as well as the conceptual framework underpinning the research described in this thesis.

This chapter provides an overview of social science research and pragmatism, the research method, research phases, data analysis and ethical considerations.

This will be followed by Chapter Four, which details the phase one data analysis and findings.

3.2 Social Science

The term social science relates to the scientific study of the societal relationships that exist between humans, as well as between humans and their environment.^{190, 191} At its most basic level, social science research aims to understand human behaviour and the factors that contribute to these behaviours. Bastow et al. refer to the social sciences as spanning the divide between the natural sciences and the humanities.¹⁹² Social sciences encompass the disciplines of anthropology, archaeology, economics, geography, history, law, linguistics, politics, psychology and sociology.¹⁹¹ Social science research provides insight in the consequences, both positive and negative, of human behaviour, which enables society to consider how changes made today can impact upon the future.¹⁹³ Social sciences inquiry employs a broad range of research methodologies, often combining both qualitative and quantitative approaches,¹⁹² which has seen the emergence of mixed method approaches to research.¹⁹⁴

In the field of medicine, and in particular medical education, social science research lends itself to the pursuit of scholarship in areas such as curriculum development and evaluation, evaluating new assessment strategies or measuring the impact of an educational intervention. The focus on the relationship between humans provides both scope and tools which exist outside the more common biomedical sphere usually associated with research in

medicine, such as the double-blinded randomised control trial. The research presented in this thesis uses the opinions of participants drawn from the field of oncology to determine the cancer-related knowledge required for medical students prior to graduation. The individual ratings as to the relevance of specific knowledge items and discussions between participants during panel sessions provides both quantitative and qualitative data, upon which a framework for cancer education in Australian medical schools can be developed.

3.3 Pragmatism

Pragmatism is the consideration of practical consequences rather than theoretical ones¹⁹⁰. Therefore, in the context of research, a pragmatic approach is one in which practicality is favoured over theory and the approach that is chosen is the one considered best suited to answering the research question.¹⁹⁵⁻¹⁹⁷ Kaushik highlights the fact that early “pragmatist scholars completely rejected the notion that social science inquiry can access the reality solely by using a single scientific method”.^{196(p2)} Reliance on a single methodology is therefore viewed as a barrier to conducting meaningful research due to the core features and idiosyncrasies inherent in any one approach, which result in a research methodology that will likely impact negatively upon its ability to fully answer the research question.¹⁹⁷ As such, a pragmatic method lends itself to the use of both multiple- and mixed-methods approaches¹⁹⁶ through which both quantitative and qualitative methods are employed concurrently,¹⁹⁵ thus mitigating many of the limitations of trying to apply a pure methodology.¹⁹⁷ Whilst a pragmatic approach does afford researchers a license to forge their own path, care must be taken to ensure that the methodology chosen is both sound and appropriate to the research question.^{196, 197}

There are a number of processes in place to ensure that the methods employed in the research presented in this thesis were conducive to a research approach that was both sound and appropriate to the research questions. The researcher commenced his candidature at the University of Western Australia, which provides provisional enrolment for candidates for the first twelve months. Confirmation of candidature is conditional on completion of a human ethics research committee (HREC) application and a substantial piece of written work that demonstrates that the candidate has a conceptual understanding of the area of research and can write at an appropriate academic level. All PhD candidates are required to submit a

detailed proposal to the human research ethics committee (HREC) at the institution at which they are undertaking their research. The submission details of the proposed study are outlined, including the research questions, participants and methods. Further, the candidate's research proposal was presented and defended to a panel of academics. The PhD is closely monitored by supervisors, who bring expert knowledge and experience to the research project. Annual reports are submitted to the research office, which includes milestones for completion and feedback on the progress to date from both the candidate and the supervisors, and to the university human research ethics committee, to ensure compliance with national and international standards of ethical research. These processes are in place to provide governance to the research process and ensure that moral and ethical conduct, in addition to good research practice, is maintained throughout the candidature.

3.4 Mixed Method Research

Given the pragmatic approach of this study, a mixed method approach was used to answer the research questions. A mixed method research approach is one that employs both qualitative and quantitative methodologies.^{194, 198} Creswell outlines several key features that define mixed method research^{194(p217)}:

- It involves the collection of both qualitative (open-ended) and quantitative (close-ended) data in response to research questions or hypotheses.
- It includes analysis of both forms of data.
- The procedures for both qualitative and quantitative data collection and analysis need to be conducted rigorously (e.g. adequate sampling, sources of information, data analysis steps).
- The two forms of data are incorporated into a distinct mixed methods design that also includes the timing of the data collection (concurrent or sequential) as well as the emphasis (equal or unequal) for each database.
- These procedures can also be informed by a philosophical world view or theory.

Phases one and three employ survey instruments in the collection of data. Both survey instruments collect quantitative data through the use of nominal scales in the form of demographic data (such as gender, speciality and years since graduation) and in phase one,

the ratings for the levels of understanding for the knowledge items in the Ideal Oncology Curriculum (IOC). In addition, the phase three survey instrument collects qualitative data through the inclusion of open questions about the cancer education survey (such as how cancer is taught at their institution, and perceived enablers and barriers to the implementation of the *Cancer Education Framework for Australian Medical Schools* into medical school curricula). Descriptive statistics are used to analyse the qualitative data, using mode scores and frequency tables. The analysis is provided in greater detail later in this chapter.

The three research phases that comprise this study were designed to utilise cancer clinicians and, where possible, GPs to establish the level of understanding of cancer-specific knowledge items required by Australian medical students and to review the *Cancer Education Framework for Australian Medical Schools* that was subsequently developed. The instruments used to collect the data were tested for face validity and appropriateness before being utilised and sufficient time was built into the research program to enable the analysis of data to influence, and if necessary, modify the subsequent phase(s). The three phases of the research program are outlined in Figure 3.1 and are supported by the participatory curriculum development framework, described in Chapter Two and later in Chapter Four.

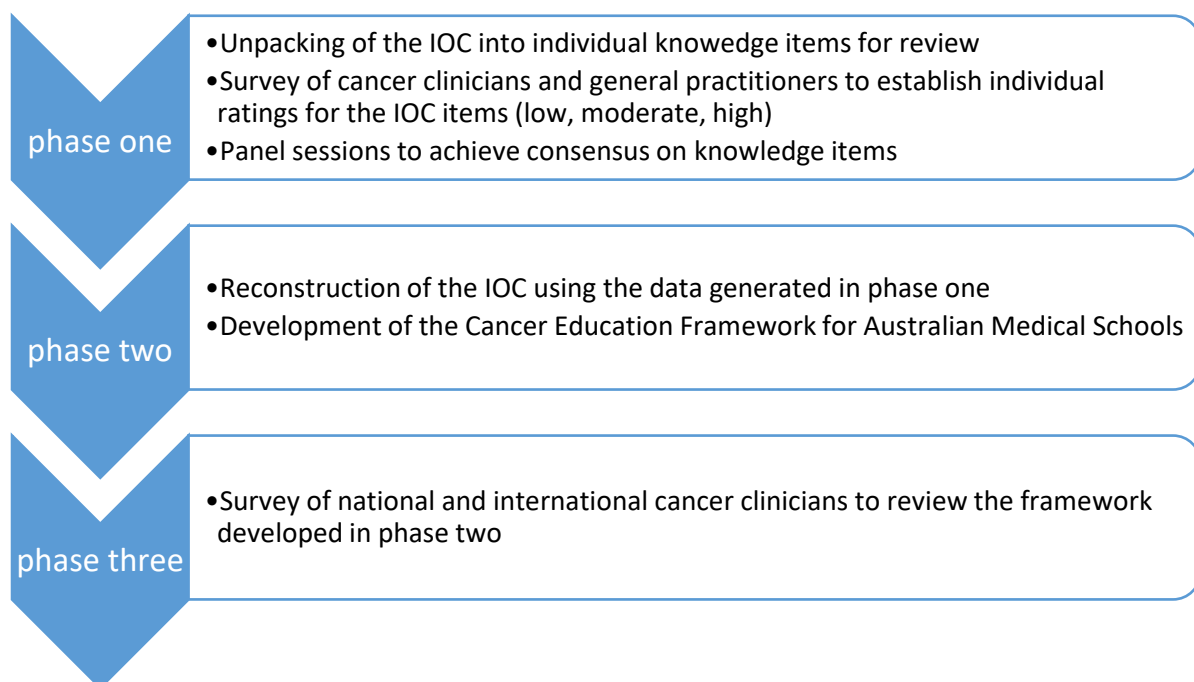


Figure 3.1: Overview of the research program

3.4.1 Quantitative Research

Quantitative research is a method of data collection and analysis using numerical data.^{194, 199} Variables to be measured are identified and numerical values are assigned to them.²⁰⁰ Variables may be defined as nominal, ordinal, interval (scale) or ratio.^{200, 201}

Nominal data is assigned to variables where the data cannot be measured or ordered.^{200, 201} For example, if a study were to count the number of cars that passed through a toll booth on a given day. Each colour would be assigned a number (e.g. white = 1, blue = 2, red = 3 and so on). Similarly, the sex of the driver could also be recorded as nominal data (e.g. female = 1 and male = 2). Simple descriptive statistics could be used to report the frequency with which red cars passed through the tollbooth or the percentage of females who drove white cars.

Ordinal data is assigned to variables in which a rank order can be assigned, such as the use of Likert scales (e.g. strongly disagree = 1, agree = 2, neutral = 3, agree = 4 and strongly agree = 5).^{200, 201} Whilst ordinal data can be ranked, the difference between the numbers is not assumed to be equal. For example, the difference between 3 and 4 in the aforementioned Likert scale may not be the same as the distance between 4 and 5 on the same scale.

Interval data is assigned to variables in which a rank order can be assigned and the difference between the points on the scale are the same,^{200, 201} such as temperature (i.e. the difference between 22°C and 23°C is the same as the difference between 35°C and 36°C). However, interval data assumes that there is no point at which the variable ceases to exist (i.e. a true zero). In fact, negative numbers are treated in the same way as positive numbers, except their relationship to zero is inverse. Therefore, temperature does not cease to exist and given that there is not true zero, 30°C cannot be stated as being twice as much as 15°C.

Ratio scales differ from interval scales only in that they do have a true zero.^{200, 201} Ratio scales include height and weight, both of which can be zero and the difference between the units of measurement are the same on each scale, regardless of where on the scale these are measured.

Descriptive statistics, used in this study, aim to summarise data and present it in a more meaningful way, which is easier to interpret than looking at the raw data, which may include multiple variables collected for a large sample.^{200, 201} Descriptive statistics include measures

of central tendency, as well as measure of spread. Measures of central tendency indicate the distribution of scores in a sample and commonly report the mean score (the average score obtained by adding up all the scores and dividing this by the number of scores), mode score (the most commonly occurring score) and the median score (the score that occurs at the mid-point of the distribution of scores).^{200, 202} In a normally distributed sample, the mean, mode and median are all equal.²⁰² Measures of spread provide information on how the scores in a sample are distributed across the sample and can be reported in a number of ways.²⁰³ Commonly used statistics are range (the distance between the lowest and highest score), quartiles (scores are divided into quarters and reported as the lowest 25% of scores, the scores 25% below the median score, the scores 25% above the median scores and the highest 25% of scores), absolute deviation (the average distance between each score and the mean score) and the standard deviation (the distribution of scores around the mean score).^{200, 203} The collection of numerical data enables a range of statistical analysis tests to be undertaken to identify relationships between variables. The type of variable (nominal, ordinal, interval or ratio) determines the type of analysis that can be performed and the inferences that can be made.¹⁹⁹⁻²⁰¹

Statistical analysis comprises a number of analytical tools that are utilised in order to organise and understand the data collected.²⁰⁰ Given the survey data collected in phases one and three comprise nominal variables, only nonparametric tests can be used to analyse the data.^{201, 204} This is due to the fact that nominal data cannot be used to generate a mean score, or calculate variance or standard deviation.²⁰⁵ The most commonly used test for nominal data is the Chi-square (χ^2) test,²⁰⁶ which uses frequencies and proportions that can be easily calculated with data of this type.²⁰⁵ Whilst other non-parametric tests exist (such as the Mann-Whitney U, Fisher's exact test and the exact binominal test), many are used to compare sample data with population data, or to compare data from matched groups.^{201, 205}

The multi-dimensional Chi-square test was used to test for the association between variables and whether the observed association is independent. For example, does the medical speciality of the participant have any bearing on their rating of a particular area of the IOC (e.g. the knowledge items relating to palliative care) as being appropriate for inclusion in a medical school curriculum? This question could be tested using a multi-dimensional Chi-square.²⁰¹ To test whether the observed difference is significant (i.e. that it is unlikely to occur

by chance) an alpha (α) level is set. The α indicates the probability of the difference occurring by chance and is commonly set at either 0.05 or 0.01, indicating a 5% or 1% likelihood (respectively) of the observed difference occurring by chance.^{200, 201} Chi-square analysis reports three values: Chi-square value (χ^2), the degrees of freedom (df) and the p value.

- χ^2 indicates the difference between the expected result and the actual result, calculated by squaring the number of expected values from the number of observed values and dividing this by the number of expected values (Equation 3.1).
- df indicates the maximum number of independent values.
- p value indicates the significance of the difference and is compared to the set α .

Equation 3.1: Chi-square analysis formula

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where:

O = observed values

E = expected values

The research presented in this thesis utilises quantitative data to establish the level of understanding required by Australian medical graduates, which underpinned the development of the *Cancer Education Framework for Australian Medical Schools*, as well as descriptive statistics related to the survey participants and the ratings of the individual knowledge items unpacked from the IOC. Frequencies are used to summarise participant variables gathered from the surveys employed in both phases one and three (e.g. gender, speciality, duration of specialist practice etc.). Mode scores were calculated in order to classify the knowledge items as being required at a moderate or high level of understanding by Australian medical students, or not required at this level. Differences in ratings of the knowledge items based on participant specific variables (e.g. gender, speciality, duration of specialist practice and teaching involvement) were tested using Chi-square (χ^2) tests with an alpha (α) level set to 0.05 to establish the threshold for significance.

3.4.2 Qualitative Research

Qualitative research utilises the collection of non-numerical data in order to provide insight and understanding into phenomenon or events.^{194, 199} Non-numerical data may comprise

written or spoken language, observation images or videos.^{194, 207, 208} As such, qualitative research offers a means through which to understand the research area and provides new tools for collecting and analysing data that explores the research question, rather than testing a particular hypotheses.^{208, 209} Qualitative research is undertaken to provide an understanding of the human impact of the phenomenon being studied.²⁰⁰ For example, the ratings provided by each participant on the survey in phase one indicates the importance they place on a medical student attaining each specific knowledge item prior to graduation. A nominal scale was used where a low level of understanding = 1, a moderate level of understanding = 2 and a high level of understanding = 3. Frequencies and mode scores can be calculated to establish an overall consensus rating or to test for differences in ratings based on variables such as gender or speciality. However, these numbers do not provide any insight into why each member rated a particular knowledge item in a particular way, or upon which grounds they decided to change their rating when discussing a particular item with their peers – data which cannot be reduced to numbers. To collect this data a qualitative approach is required, using either open-ended survey questions or panel sessions (as used in the research presented in this thesis), through observation or the study of media (written, pictorial, music or performance).^{198, 209} Qualitative research generally uses inductive reasoning, and can be thought of as divergent in its processes, as much of the data gathered leads to new questions being asked.^{200, 209} This is in contrast with quantitative research, which used deductive reasoning and can therefore be thought of as convergent in nature; beginning with a hypothesis, and data collected and analysed in order to test the hypothesis.^{200, 209} The inductive reasoning utilised in qualitative research is facilitated by the analysis of data as it is being collected, so that it may guide the research and subsequently generates richer and more generalizable findings.^{198, 209}

Qualitative methodologies in the form of the phase one panel sessions and open-ended questions in the survey used in phase three were subsequently utilised to further refine the *Cancer Education Framework for Australian Medical Schools* and provide feedback on its utility within the context of Australian medical education. Panel sessions are conducted in a similar fashion to focus groups, which according to Nicholls “look to bring different opinions together – to explore, not to represent, a plethora of viewpoints”.^{198(p642)} The use of panel sessions in phase one sought to explore the different ratings of the knowledge items

generated through the survey, in order to reach a consensus on items where a bimodal^m distribution of ratings existed. Here the discussion around the knowledge items from the IOC not only enabled consensus to be reached but also provided rich data that subsequently shaped the *Cancer Education Framework for Australian Medical Schools* once all panel sessions were concluded.

The research presented in this thesis is predominately descriptive in nature, which is to say that the aim is to describe the necessary cancer-related knowledge required of Australian medical graduates, how this is presented in an educational framework and the applicability of the *Cancer Education Framework for Australian Medical Schools* to Australian medical school curricula. The mixed method approach undertaken in this research uses qualitative research methods to describe the opinions of specialist clinicians that determine the level of understanding of specific cancer-related knowledge items required by Australian medical students upon graduation, as well as their thoughts and comments on the framework itself. Quantitative research methods are used to generate the mode scores for participant ratings of the level of understanding required for each knowledge item, as well as measuring differences between ratings and participants. Finally, participant demographic data is presented using tables and figures.

A sequential approach was undertaken to identify the need for a cancer education framework using Cancer Council Australia's Ideal Oncology Curriculum for Australian Medical Schools (IOC)¹¹ as a starting point. Assembling a panel of experts to first evaluate the knowledge items in the IOC independently and then in panel sessions highlights the use of quantitative data being used to inform and direct the qualitative data collection. The data generated through phase one not only provided the numerical rating for each item but also the context and discussion points as to why certain items were viewed more, or less important than others.

Utilisation of both forms of research inquiry was chosen to provide greater insight into the cancer-related education requirements necessary to graduate competent doctors than either methodology would likely produce if used alone. Whilst quantitative research would enable

^m A bimodal distribution is one in which two ratings occur most commonly (i.e. there is no single rating that occurs more frequently than the other ratings). For example, an item with ratings of 1, 2, 2, 3 and 3 would demonstrate a bimodal distribution.

each of the knowledge items to be rated, the panel sessions enriched this data by providing context and insight into why participants rated items in a certain way. This is particularly important when group discussion was necessary to achieve consensus on an item. For this reason, as consensus method was chosen for phase one.²¹⁰

Creswell describes a variety of mixed method approaches.¹⁹⁴ This study has employed a multiphase mixed methods evaluation design that offers the researcher flexibility, allowing for the collection of qualitative and quantitative data that supports program development, implementation and evaluation. The multiphase mixed methods approach combines several mixed methods projects in a longitudinal study.¹⁹⁴ This is ideally suited to research on program development and implementation, in which each phase informs the next. The individual phases in a multiphase mixed methods study may contain qualitative, quantitative or combinations of both.¹⁹⁴ This approach differs from exploratory research (in which the researcher uses a two-step approach in which quantitative data is collected and analysed, and the results used to design qualitative research), or explanatory research (in which the researcher uses a two-step approach in which qualitative data is collected and analysed, and the results used to design quantitative research).¹⁹⁴ The multiphase mixed method research plan is shown in Figure 3.2.

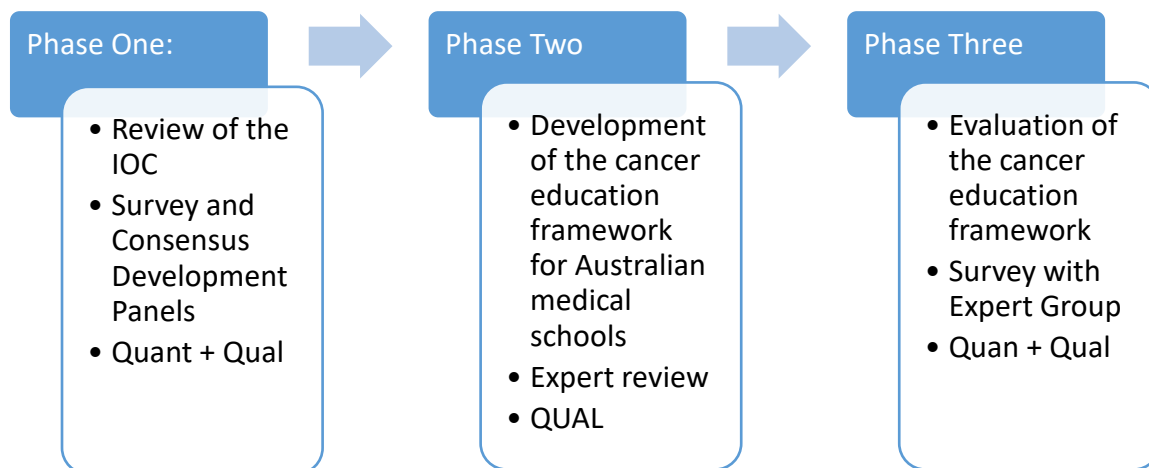


Figure 3.2: Application of Creswell¹⁹⁴ multiphase mixed methods evaluation design to research

3.4.3 Triangulation

Triangulation refers to the process in which multiple methods, or multiple sources of data are used to obtain a more comprehensive understanding of the research data and may include

the use of different investigators and/or different research theories.^{211, 212} Further, the internal validity of the research findings may be increased through the triangulation of data obtained through different methodologies or participants.^{212, 213}

The use of multiple methods provides the benefits of each method to add richness to the research whilst mitigating many of the limitations associated with using a single methodology.^{214, 215} Similarly, the sampling of multiple groups enriches the data through to inclusion of more participants, different dynamics between groups and between participants within groups.²¹⁴

There are four different types of triangulation^{213, 216}:

1. Data source triangulation
2. Method triangulation
3. Theory triangulation
4. Investigator triangulation

Data source triangulation utilises data obtained from multiple sources.²¹¹ Turner defined data triangulation as a method “involving the use of heterogeneous data sources”.^{214(p171)} The use of multiple sources of data within a study is undertaken with the aim of painting a more comprehensive picture of the topic being studied, as it is more likely to provide differing view or perspectives.^{213, 214} In evaluating the resultant *Cancer Education Framework for Australian Medical Schools*, the same survey instrument was sent to several different participant groups in order to gain different perspectives. The survey was sent to medical and radiation oncologists, haematologists, surgeons and palliative care physicians within Australia and overseas, as well as GPs. The combination of cancer clinicians provides cancer-specific specialist input with both national and international perspectives. GPs provide a different perspective, given the different role they play in the cancer care continuum. Given the disparities observed between outcomes for rural and urban cancer patients, input was sought from GPs who practice in urban centres, as well as those who practice solely in the rural and remote setting. This is an example of methodological triangulation, in which multiple sets of data are obtained using the same methodology.^{211, 215} Overlap exists between data source

triangulation and method triangulation, as multiple methods of data collection can be applied to multiple participants.

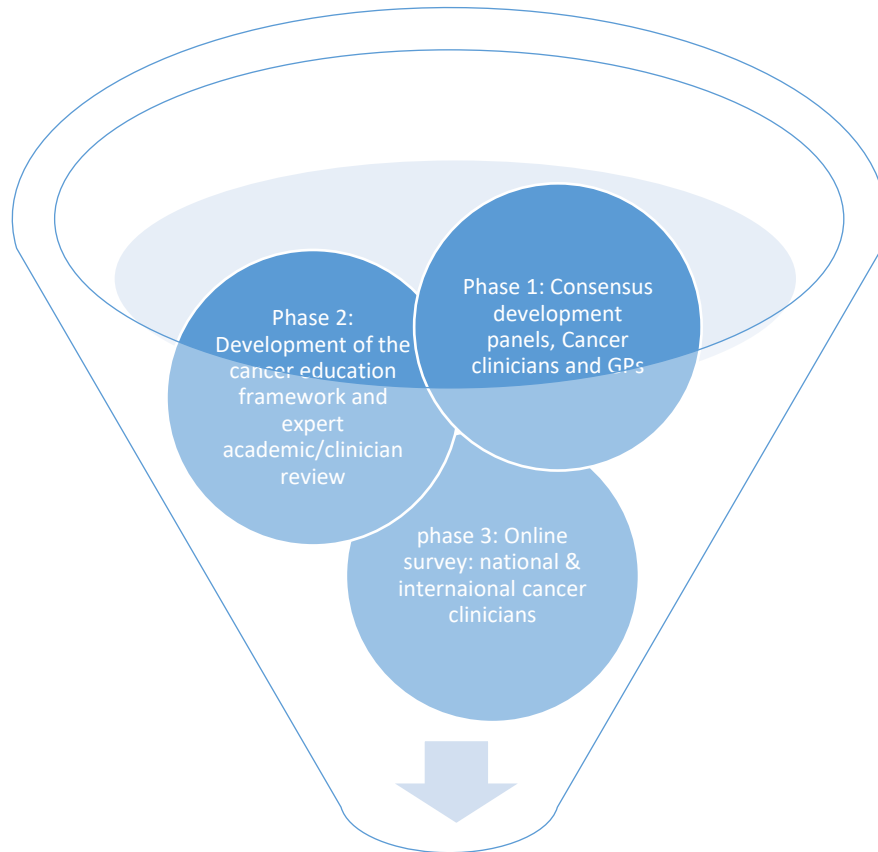
Method source triangulation involves the use of different methods to collect data, such as the use of qualitative and quantitative methods.²¹⁴ Using multiple methods increases the chances of relevant findings being collected. Method source triangulation increases the internal validity of the research findings through the use of more than one method of collecting data.²¹²

In the research presented in this thesis the knowledge components of the IOC were evaluated through the means of a quantitative survey followed by panel sessions to achieve a consensus on the level of understanding required of these items for medical students. Here, triangulation in the form of both qualitative and quantitative data assist in the mitigation of the limitations inherent in each type of research.²¹¹

Theory triangulation involves the use of different theories in the analysis and interpretation of the data.^{213, 214} The research presented in this thesis uses a mixed method design, comprising both qualitative and quantitative elements.

Investigator triangulation is a process through which more than one researcher collects and analyses data.^{213, 214} Investigator triangulation predominately takes place in qualitative studies in which the coding of data is required and the validity of the coding instrument is evaluated.²¹⁴ As the work presented in this thesis comprises a PhD, investigator triangulation was not considered appropriate in this context. However, the research methodology, and means through which data has been collected and analysed has been done so under the scrutiny of university appointed PhD supervisors who are experienced in the research methodology being employed.

Triangulation adds validity to the research by providing multiple perspectives on the research question through the collection of data from multiple sources, by multiple means and from different theoretical frameworks.^{211, 214} Application of the theoretical framework, as described in Chapter Two, is articulated in Figure 3.3. The Participatory Curriculum Development articulates the inclusion of stakeholders with education providers to support real world learning.^{109, 110}



Cancer Education Framework for Australian Medical Schools

Figure 3.3: Application of Participatory Curriculum Development to the development of the Cancer Education Framework for Australian Medical Schools

It must be acknowledged that triangulation can only provide a more complete picture of the data, through multiple views (be they complimentary or contradictory), as no matter how many perspectives are uncovered, each one can only offer a limited perspective of the overall research question.²¹² Turner maintains that “triangulation can only provide a fuller picture rather than any form of objective truth and its results must be interpreted and presented in this light”.^{214(p172)}

3.5 Research Techniques

3.5.1 Phase One

Phase one included the unpacking of the IOC statements by the researcher to send as a survey to medical practitioners to rate each IOC statement as requiring a low, moderate or high level of understanding by medical students. These ratings were then confirmed through moderated group sessions.

3.5.1.1 Consensus Method

Phase one employed a consensus method in determining the level of understanding of cancer knowledge items for Australian medical graduates. A consensus method, as the name implies, is one in which a consensus on the research question is achieved. Consensus development panels represent a qualitative method of data collection.²¹⁷ The aim of the panel sessions was to achieve consensus on the level of understanding for each of the knowledge items unpacked from the IOC required to be attained by Australian medical students prior to graduation from medical school. It should be made clear that a consensus agreement does not equate to an unanimous agreement and that consensus methods aim to measure levels of agreement in order to arrive at a final decision.²¹⁸ There is no generally accepted criteria for determining what constitutes a consensus, however, it is important that the consensus threshold is established by the researcher, prior to the commencement of the study.²¹⁹ Halcomb et al. describes consensus methods as “a process for making policy decisions, not a scientific method for creating new knowledge”.^{220(p57)} The authors go on to identify enhanced decision-making, developing review criteria and synthesising professional norms or expert opinions as general aims of consensus methods.²²⁰ In many cases the generation of new ideas or approaches are reflected in the development of clinical practice guidelines or policy documents.^{210, 219, 221} Therefore, this method is ideally suited to the review of a cancer-specific curriculum published by a leading NGO, which is the focus of phase one. The acceptable level of consensus should be established and agreed upon, and consideration given to whether the consensus on the overall task is sufficient, or whether consensus on each individual task is required.²¹⁸ Consensus methods generally involve at least two rounds of review and discussion in order to reach a consensus.²²⁰ Fink et al. caution that a “basic tenet of all consensus strategies is that solvable problems must be selected”.^{222(p981)} Commonly used

consensus methods include the Delphi method, nominal group technique, consensus development panels (also called consensus development conferences) and the RAND-ULCA appropriateness method (RAM).^{210, 218, 219, 221-224} An overview of these consensus groups is provided in Table 3.1.

Table 3.1: Overview of the Four Commonly used Consensus Methods.

| Method | Panel Composition | Panel Size | Face-to-face contact | Number of rounds/sessions | Literature provided |
|----------------------------------|---------------------------|------------|----------------------|---------------------------|---------------------|
| Delphi | Multidisciplinary experts | 6 – 11 | No | ≥ 2 | Yes |
| Nominal Group | Multidisciplinary experts | 5 – 9 | Yes | 4 | As necessary |
| Consensus Development | Multidisciplinary experts | 5 – 10 | Yes | Variable (as required) | Yes |
| RAND-UCLA Appropriateness | Multidisciplinary experts | 7 – 15 | Yes | 2 | Yes |

Adapted from: Waggoner et. al.²¹⁹

3.5.1.1.1 Delphi Method

The Delphi method was developed as a systematic process through which expert opinion could be obtained²²² and is based on an anonymous process in which participants participate in a series of postal or electronic surveys until consensus has been reached or no further meaningful progress is being made.^{222, 225, 226} Whilst this may entail several survey cycles, the literature suggests that three to four cycles are sufficient in most cases.^{222, 227} However, as few as two have been reported as providing sufficient results.²¹⁹ It should be noted that the number of survey cycles can negatively impact upon the process due to the risk of ‘survey fatigue’ leading to participant attrition before the process has been completed.²²² The Delphi method is well suited to studies that involve large numbers of participants or those who are geographically dispersed, as participants are not required to meet face-to-face.^{210, 222, 226} One of the advantages of using the Delphi method is the negation of skewed results due to one, or a small number of participants, dominating the process.^{210, 227}

3.5.1.1.2 Nominal Group Technique

A nominal group technique (NGT) is one in which participants come together in a small groups in order to facilitate discussion of a particular research question.^{210, 224} Fink et al. describes these meetings as attempting “to provide an orderly procedure for obtaining qualitative information from target groups who are most closely associated with a problem area”.^{222(p980)} NGT seeks to generate new ideas and approaches in order to answer the particular research question thus generating enriched qualitative data through the discussion process.^{210, 219, 221} The use of a face-to-face meetings introduces the risk of bias due to participant domination.²¹⁹ Several variations of the NGT have been reported in the literature. Some involve the use of a moderator to reveal ideas generated by panel members, thus providing anonymity,^{219, 220} whilst others rely on the participants sharing their thoughts and ideas themselves.²²² Waggonner et al. outline four clearly defined phases.²¹⁹ Whilst others are less prescriptive,^{218, 220} Potter et al. suggest that a single two hour meeting is sufficient to achieve consensus using NGT.²²⁴ Regardless of the exact process undertaken, the aim remains the achievement of consensus among members.^{210, 220, 224} Group members are suggested as being between five and 10, with any less than five limiting the diversity of opinions and more than ten tipping the scale towards more diversity, which is likely to result in an overly lengthy process.²¹⁹

3.5.1.1.3 Consensus Development Panels

Consensus development panels (CDP) provide structured face-to-face meetings in which content experts engage in discussion facilitated by a skilled moderator.^{219, 220} The CDP has evolved from the original consensus development conference, which utilised participants who were considered experts in their own field but who did not have clear linkages with the subject being discussed.²¹⁸ Participants consider evidence presented by stakeholder groups and/or experts in the field prior to considering key questions and producing a consensus statement.²²⁰ As with NGT, the risk of bias introduced by group dynamics has to be considered and this is where the role of the moderator is important in mitigating such bias.^{219, 220} Waggonner et al. highlights the merits of using CDP in academic medicine, pointing to the fact that panel members may be “presented with literature and data that make this particular method more reliant on evidence-based opinions rather than personal experience”.^{219(p665)}

3.5.1.1.4 RAND-UCLA Appropriateness Method

The RAND-UCLA appropriateness method (RAM) was “developed as an instrument to enable the measurement of the overuse and underuse of medical and surgical procedures”.^{223(p1)} However, RAM has also been used in the development of clinical practice guidelines and classification criteria.²¹⁸ RAM differs significantly from the other consensus methods, in that it uses two interdependent groups. One group comprises clinical experts who review the available data to arrive at a consensus decision, whilst the second group represents a core panel who provide guidance and synthesised data from the literature to the expert panel.²¹⁸ RAM is a review method which works on the premise that sufficient data exists to create the initial survey and that evaluation of existing data, and not the creation of new ideas, is the overall aim of this method.²¹⁰

3.5.1.1.5 Consensus Method Choice and Justification

When considering the consensus methods described above, CDP was thought to provide the best fit for the research questions being considered:

1. In what way do medical practitioners perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care in Australia?
2. Which elements of the IOC do medical practitioners consider vital inclusions in Australian medical school curriculum?

The intended participants were also a determining factor when deciding on the consensus method to use. Multiple surveys, such as those used in the Delphi method would likely result in low response rates due to the number of iterations that would reasonably be required to reach consensus, making survey fatigue a likely consequence. In addition, the Delphi method fails to capture the rich data that would be expected to be generated through face-to-face discussions.^{219, 220} Similarly, the multiple face-to-face meetings use in NGT and the need to have a core panel in RAM would again likely result in low participation rates. All of these have to be factored when considering the busy workload of practicing hospital clinicians, most of whom combine service commitments with their own research and teaching commitments.^{228, 229} Compounding this issue further is the shortage of cancer clinicians and GPs in Western Australia,²³⁰⁻²³² which further impacts upon the time each is available to participate in research projects. CDP was considered the best approach to address the research questions

in phase one, as it can combine survey generated data with a face-to-face session, in which the data generated through the survey could be discussed. The survey could be undertaken by each participant in their own time and did not require completing in a single setting. Whilst the survey did take time to complete, it could be completed independently and did not require attendance at a panel session. The survey was kept as small as possible (i.e. limited to 50 items) with the aim of limiting the face-to-face meeting to a single session, in which consensus could be achieved. In summary, when considering the requirements of the study and the characteristics of the participants, CDP offered a research method that was best suited to engage the participant population for the collection of meaningful data upon which the *Cancer Education Framework for Australian Medical Schools* could be developed.

In phase one, the use of a panel of experts was considered to be the most appropriate means through which to achieve consensus on what is required knowledge for Australian medical graduates and in particular, the level of knowledge that should be attained prior to graduation. The IOC was chosen as the starting point given that it was produced by the Cancer Council Australia's Oncology Education Committee (OEC), which comprised academic cancer clinicians from across Australia and had been specifically written for Australian medical schools.⁹⁰ Further, the IOC had received endorsement for the international union against cancer (UICC)ⁿ. The IOC itself could be reviewed through a survey in which experts could rate the content using a three-point scale. Items for which consensus could not be achieved could then be discussed in a face-to-face meeting. Engaging clinicians in research is not an easy task due to their workload, which includes service, research and teaching. As such, a method that would minimise participant workload and maximise output was required. With these considerations in mind, the CDP method was chosen. By reducing the volume of work for each participant through the use of multiple groups, it was envisaged that the IOC could be reviewed through a single survey and a single panel session (per group). This approach was chosen as it provided the most efficient use of participant time by maximising output whilst minimising time commitment.

A total of six groups were required to undertake a review of all of the knowledge items contained in the IOC, with approximately 50 items being assigned to each group. All cancer-

ⁿ The UICC initials represent the Swiss name, which is Union Internationale Contre le Cancer

related disciplines (medical oncologists, radiation oncologists, surgical oncologists, haematologists and palliative care physicians) as well as GPs would be represented in each group. The knowledge items in the IOC were sequentially allocated across the six groups to ensure that there was even distribution of content from the breadth of the curriculum and that no one group reviewed an entire section in isolation. As many of the knowledge items were unpacked from composite objectives, this process ensured that the unpacked items from a single objective were not reviewed by a single group. For example, objective 2.4.a contains eight individual knowledge components, which would be allocated sequentially across the groups resulting in four groups reviewing one item each and two groups reviewing two items each. The schema for phase one is shown in Figure 3.4

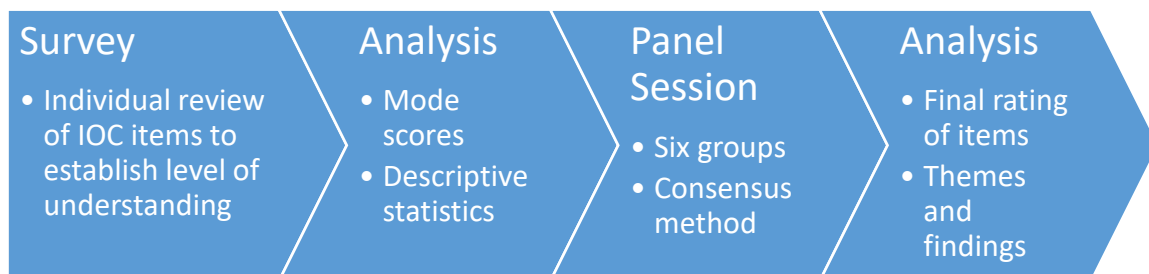


Figure 3.4: Overview of phase one

Halcomb et al. list five key elements of consensus methods that require consideration when undertaking a consensus project^{220(p60)}:

1. The approach to the given task: cues, focus, comprehensiveness of scenarios.
2. Participant selection: choice of participants, homogeneity of group, group size.
3. Presentation of scientific data: format, analysis undertaken by presenter
4. Structure of the interaction: physical environment, number of rounds, equitable participation.
5. Method of synthesising data: definition of consensus, methods of dealing with outliers, methods of aggregation.

One of the approaches taken to the review of the knowledge items unpacked from the IOC was to remove the verb that appeared with the original objective from which the knowledge item was unpacked. For example, consider objective 4.2.d^{11(p17)}:

“4.2.d: Identify important familial cancer syndromes and demonstrate an understanding of their molecular basis, mode of inheritance, associated risk of disease and implications for family counselling.”

The verbs identify and demonstrate may have different meanings to different participants, and could indicate differing levels of understanding accordingly. This approach reduced the risk of influencing the objective due to the verb cuing the participant as to the expected level of understanding required of medical students prior to graduation. Further, the knowledge items were sequentially distributed across six panels to ensure that no single section of the IOC was reviewed by any one group.

Halcomb et al. argues that the composition of the participant group must be considered when reviewing the consensus reached.²²⁰ When considering the participants, cancer clinicians from all disciplines of cancer care (medical, haematological, radiation and surgical oncologists, and palliative care physicians) were included in each of the six panels. The rationale here was to ensure that all knowledge items were reviewed by clinicians from all disciplines, in order to limit the potential bias that could occur if the knowledge items for one particular discipline were reviewed entirely by specialists from that discipline.²³³ To further limit any bias, GPs were also invited to participate in phase one. Additionally, the multidisciplinary make-up of the panels is more likely to generate diversity in opinions and stimulate discussion.²²⁰

Presentation of scientific data provides a common grounding for the panel and promotes cohesion among members, reducing reliance upon personal experiences.²²⁰ Participants consider the evidence presented by stakeholder groups and/or experts in the field prior to considering key questions and producing a consensus statement.^{218, 220} Data provided in phase one comprised the knowledge items unpacked from the IOC, which was developed by the OEC which included academic oncologists from the medical schools in Australia and New Zealand, as well as consumer representatives.⁹⁰ Further, the IOC was distributed to numerous medical faculties, curriculum committees, cancer societies, professional colleges, medical student associations, cancer advocates and consumers, government officials and selected medical professionals for consultation, as well as to the NIH and the UICC.⁹¹ As such, the IOC clearly meets the criteria of ‘evidence presented by stakeholder groups and/or experts in the field’. A list of author affiliations and consultations is provided in Appendix 5. Each participant

was asked to rate each knowledge item by placing a mark the box that best represents the level of understanding required (Low (N/A), Moderate or High).

Following the survey phase, mode scores were presented to the panel, along with copies of the IOC (should participants wish to see a knowledge item in the context of the original objective from which it was unpacked). Each participant also received a copy of their survey data for reference.

Halcomb et al. asserts that each participant should receive clear instruction on the consensus process being used and the proposed interactions between panel members.²²⁰ Additionally, the processes and structures should be established prior to data collection and may include face-to-face, electronic communication and surveys (or combinations of these), as well as the number of rounds likely to be required.²²⁰ Phase one comprised the use of both individual surveys as well as face-to-face panel sessions. All participants were provided with clear documentation outlining the task involved in completing the survey (Appendix 6), as well as participation information and consent forms (Appendix 7).

In order for a consensus method to provide meaningful data, the question presented to participants must be able to be answered.²²² Further, the means through which consensus is achieved needs to be specified.^{218, 220} As detailed previously in this section, phase one asked the participant to rate the level of understanding required for each of the knowledge items, using a three-point scale (low (N/A), moderate or high). Given that the question asks the participant to provide a rating based upon their knowledge and experience in the topic area, the question can be answered by each participant. Consensus on the survey data was determined by the mode score (i.e. the score with the highest frequency) of all ratings for that item. During the face-to-face sessions the mode scores for each item were reviewed and items with a bi-modal distribution (i.e. for which there was no single rating that occurred with the highest frequency) were discussed until a mode score was obtained. Items with a mode score were accepted by the panel unless objection was raised, in which case the item in question was discussed.

3.5.1.2 Instrument Development

The survey phase involved sending each participant an Excel spreadsheet via email. The spreadsheet included the knowledge items assigned to the group into which they were enrolled and a grid into which each participant's ratings could be recorded. Participants were asked to review each of the knowledge items assigned to them to rate the level of understanding required of medical students prior to graduation using a three-point rating system:

- Low (N/A) – an understanding of the item content is not required
- Moderate – a broad conceptual grasp of underlying principles relating to the item content is required
- High – an in-depth understanding of the content of the item is required (e.g. mechanisms of action and their relationship to other factors)

An example of the spreadsheet is shown in Figure 3.5.

| Instructions: For each knowledge item, please mark the box that best represents the highest level of understanding required (Moderate or High). Mark any knowledge items that you feel are not relevant, as being not required. | | | | |
|--|--|------------------|-----------------|-------------|
| Knowledge Items (Knowledge of... or Understanding of...) | | Low (N/A) | Moderate | High |
| 1.2.a.3 | the epidemiological concepts of relative risk in relation to common cancers | | | |
| 1.2.d.2 | the non-genetic risk factors for various malignancies. | | | |
| 1.2.e.6 | in a general way how the most common causes of cancer death differ between Australia and different parts of the world. | | | |
| 1.2.g.2 | the differing outcomes of cancers, in general, in rural. | | | |
| 1.3.b.1 | the methods of screening for cancer. | | | |
| 1.3.d.2 | behavioural approaches to the prevention of cancer. | | | |
| 2.1.a.3 | the anatomical basis of cancer assessment such as the anatomical relationships of relevance to oncology (eg. pelvis). | | | |
| 2.3.c.1 | patterns of spread of common cancers. | | | |
| 2.4.a.2 | the molecular genetics of cancer in relation to tumour suppressor genes. | | | |
| 2.4.c.1 | hormonal influences relevant to tumour type. | | | |
| 2.4.d.3 | the mode of inheritance for important familial cancer syndromes. | | | |
| 3.1.c.1 | the need to recognise psychological distress in the patient. | | | |

Figure 3.5: An extract from the Excel spreadsheet used in the survey process in phase one (group five)

Also included in the spreadsheet was a survey that captured demographic information about the participant, including their gender, speciality, location and type of practice, country in which they undertook their initial medical training, year of graduation and number of years since specialisation, and their current involvement in cancer education. Additionally, each participant was asked to include their name. This was done so that each participant could be provided with a copy of their data during the panel sessions.

In addition to the Excel spreadsheet, the email also included documentation outlining the task, with examples of assessment items that could be constructed in order to demonstrate the level of knowledge that could be demonstrated by medical students (i.e. questions that could be posed to a student that would enable them to demonstrate they had acquired the particular knowledge at the required level) and a participant information and consent form. The Excel spreadsheets are included in Appendix 8. Due to the length of the original documentation, which included background information on the project, the key components of the document have been extracted and included in Appendix 6. Participants were asked to return their survey by email.

3.5.1.3 Face Validity

The survey instrument was designed to provide each participant with the knowledge items assigned to them to review. It was reviewed by a medical and radiation oncologist, and a palliative care physician, all of whom felt it was fit for purpose (Appendix 8).

3.5.1.4 Participants

Clinicians from all disciplines of cancer and GPs from Perth, WA were chosen as being well suited to provide insight on the knowledge required of medical students to adequately prepare them for working with cancer patients as junior doctors.

Cancer clinicians were identified through two means. First, clinicians who were actively involved in teaching cancer and palliative medicine to medical students were invited to participate. Second, medical staff in the relevant departments at major public and private hospitals, palliative care units and hospices were invited to participate.

GPs were identified through the Silver Chain Hospice service and GP practices that were located close to the Queen Elizabeth II (QEII) medical campus^o (Nedlands, WA) and were invited to participate. Practices located close to QEII were specifically targeted in order to minimise disruptions to their clinical practice by minimising travel times.

This targeted approach to participant selection, is known as a purposive sample, in which the selection process aims to recruit participants who have been identified as being knowledgeable in the construct being studied.^{198, 199, 212, 234} Bias can be reduced by targeting specific participants, rather than a representative sample.^{208, 212} For example, Medical doctors in general, rather than those primarily involved in the care of cancer patients could have been chosen. Were this the case, bias may be observed due to unfamiliarity with the cancer-related requirements of medical graduates, or views on the importance of cancer in medical school curricula. Purposive sampling can also be used to ensure that particular voices are heard, which may not be the case with other participant recruitment strategies.^{212, 234} In this particular research it was important to target GPs in addition to cancer specialists, as GPs for the largest single specialist medical workforce group and are involved in the care of patients throughout the cancer continuum.²⁹ In this method the researcher chooses who to invite to participate in the study (in this case clinicians well placed to determine required cancer knowledge for medical students).²³⁴ Further, purposive sampling has the potential to enhance sample coverage and provide a framework for analysis.²¹²

3.5.1.5 Recruitment

Given the size of the IOC and the large number of knowledge items that were identified through the unpacking of the curriculum, a pragmatic approach to the revision of these items was required. Phase one involved a review of all 301 knowledge items, with each participant rating the level of understanding required of medical graduates, followed by face-to-face panel sessions to achieve consensus on the final item ratings. In order to maximise the recruitment of participants it was decided to limit the number of items to 50 per person. Hence, it would require six groups to facilitate a review of all 301 knowledge items unpacked from the IOC. Specialist cancer clinician numbers are small in some of the disciplines and due

^o The panel sessions were conducted at Cancer Council Western Australia's Crawford Lodge, which is situated on the QEII medical precinct. This venue was chosen as it provided a central location with free visitor parking.

to their clinical workload, combined with research and teaching commitments, the researcher (in consultation with one of his supervisors, who is a medical oncologist) established that it would be unlikely to recruit more than one representative from each of the disciplines in any one group. As such, it was determined that one participant, per discipline, per group could provide meaningful data to support this research and avoid possible bias by the overrepresentation of one or more disciplines. Therefore, a total of 30 clinical cancer specialists (six haematologists, six medical, six radiation and six surgical oncologists and six palliative care physicians) could provide a review of the cancer-specific knowledge items unpacked from the IOC. In addition, GPs were invited to participate given their role in cancer patient care throughout the cancer care continuum. This would yield six groups, each with six participants who together spanned the main treatment modalities utilised in cancer patient care.

Forty clinicians from the disciplines of haematology, medical oncology, radiation oncology, palliative care and surgical oncology were contacted by email and invited to participate in the study. A further three clinicians were invited to participate on the recommendation of initial invitees, who were unable to participate and had suggested a colleague as an alternative. A GP from Silver Chain was contacted to assist in the recruitment of GPs into the study. GPs represent the largest medical specialist workforce in the Australian health care system²⁹ and are involved in all phases of the cancer continuum, from diagnosis through to end of life care.^{29, 88} As such, they provide a different perspective from specialist cancer and palliative care clinicians. Silver Chain is a national non-profit organisation that provides community-based care, including palliative care and hospital at home.²³⁵ Silver Chain was chosen as its GPs are often involved in providing care to cancer patients. Additionally, local GP clinics were contacted via email to increase the recruitment of GPs. Engaging GPs in research is challenging as in Western Australia GPs predominately work in private practices where they are self-employed, which impacts financially upon their ability to take time away for their practice (in a conversation with M.C.C. Young, MBBS FRACGP [April 2018]).

Each clinician was sent a personal email outlining the research project and inviting them to participate. Clinicians were asked to indicate their general availability to facilitate their allocation to one of the six groups. Each day was split into a morning or afternoon session, providing a total of 10 possible sessions. Clinicians were selected into the study based upon

commonly available times until all six groups were filled. In instances where multiple clinicians from the same discipline were only available for a single session, only one was enrolled into the study. In instances where a particular discipline was absent a snowballing approach was used to identify additional clinicians who, in some instances, were in advanced stages of training. Once all six groups had representation from each of the disciplines, the items were distributed via email.

Examples of the emails inviting clinicians to participate in the research are provided in Appendix 9. The participant information and consent sheet are included in Appendix 7.

3.5.1.6 Data Analysis

Descriptive statistics were used to establish mode scores for the level of understanding for each of the knowledge items. Items that were bimodal were discussed in order to reach a consensus agreement on the final rating for the item.

Relationships between demographic variables and ratings were explored in order to identify any rating patterns based upon gender, speciality, number of years since specialisation, practice type and teaching involvement. Relationships between variables were examined using Chi-square tests with an alpha of 0.05.

3.5.1.7 Panel Sessions

Panel sessions were convened several weeks after the survey results were collated and analysed. The timing of the panel sessions was influenced primarily by participant availability. During the panel session the items that returned a bimodal rating were projected onto a screen, along with the individual ratings received from all participants. An example is shown in Figure 3.6. Each participant was provided with a copy of their survey data, as well as a copy of the IOC, so that they could refer to the items as they appeared in the IOC, so that a particular knowledge item could be reviewed in relation to the original objective from which it was unpacked.

Item 6.3.f.2

the benefits to ongoing patient education that result from utilising a multidisciplinary team including health professionals and others

1 1 2 2 3

Figure 3.6: Slide showing the bimodal score for the level of understanding required for item 6.3.f.2

Each item was then discussed until a mode score was established. No standardised approach to establishing the threshold for consensus exists in the literature, with researchers ultimately deciding upon what best suits their particular research question, participant profile and chosen methodology.²¹⁸⁻²²⁰ Nair et al. state that “the objective of the consensus methodology is to identify a central tendency among the group and grade the level of agreement reached”.^{218(p95)} The authors point out that several methods exist to define consensus and provide three examples^{218(p95)}:

- A final vote to determine the percentage agreement (e.g. 80%)
- A rating scale (e.g. a specified mean rating)
- A majority rating among participants

Rating scales have been widely reported in surveys employed in the Delphi technique^{218, 219} and provide a means through which consensus can be statistically determined. As discussed previously in this chapter, measures of central tendency include the mode score.^{200, 202} Given the aim of phase one, consensus was defined as being reached when a mode score was established for each knowledge item. Mode score was chosen because it is the preferred measure for nominal variables,^{202, 205, 206} such as the level of understanding ratings generated

during the survey. In the example shown in Figure 3.6, the knowledge item received ratings spanning the full range (Low (N/A) through to High). The distribution of ratings shows two mode scores (1 and 2), thus resulting in a bimodal distribution. If the mean score was to be calculated, it would be 1.8 $((1 + 1 + 2 + 2 + 3) / 5)$, which is not useful in making a decision on the expected level of understanding required for that knowledge item. Further, because these numbers represent points on a nominal scale, calculating a mean score would actually equate to: $(\text{Low (N/A)} + \text{Low (N/A)} + \text{Moderate} + \text{Moderate} + \text{High}) / 5$, highlighting why mean scores should not be calculated for nominal data.^{205, 216} Similarly, the observed modes are actually Low (N/A) and Moderate. However, nominal data is generally summarised in numerical form to simplify its presentation.

During the first panel session, it became obvious that some of the participants had not fully understood the task that had been assigned to them in the survey and one participant had rated the items as how important each item was in their daily practice. Based upon this finding, it was decided to project and discuss each of the items regardless of their mode score. Given the necessity of time, the items were presented and discussed based upon their initial rating. A pragmatic approach was taken, with bimodal items discussed first before moving onto items with a single mode score. This was to increase the likelihood that the bimodal items would all be discussed should participants have to leave the session due to time constraints. Items with a clear mode score were only discussed when needed and unless the panel objected, the mode score was accepted as the final rating. In instances where discussion of the items with a clear mode score resulted, a number of clinicians revised the rating they had provided in the survey. This was generally based upon the discussion that ensued but also occurred when a participant voiced concern with their initial rating.

CDP utilises a moderator in the panel sessions, to guide and control the proceedings.^{218, 220} This role was undertaken by the researcher, who has experience in chairing several national and international committees. For each panel session, the moderator outlined the aim (to review items with a bimodal distribution and reach a consensus view), provided each participant with a copy of their own data from the survey instrument, as well as a copy of the IOC for reference. Consent was obtained to record the session and one of the supervisors took notes. For each item being discussed, the moderator asked a different panel member if they would like to comment. This approach was taken to ensure that all panel members were

provided an equal opportunity to voice their opinion and to reduce bias being introduced through one panel member becoming the dominant voice.^{219, 220} Care was taken by the facilitator not to lead the group discussion but rather answer questions or direct participants to the data they have been provided (such as their own data, when they ask “why would anyone think this is expected at a high level of understanding?”, or to the relevant section of the IOC when a query arose as to whether the word “cost” was used in the context of financial cost, or physical/emotional cost), or clarify what defines a junior doctor. Finally, the moderator checked that all participants accepted the final decision prior to moving forward. This approach was also taken with items that generated a clear mode following the survey phase. This was done following the review of the bimodal items as it became clear that a number of participants wished to change their ratings once the process and aims had been clarified. For example, one member in the first panel convened, commented that they hadn’t read the instructions provided with the survey and assumed that the ratings were related to how important each knowledge item was to their day-to-day practice. The moderation process allowed calibration of all panel members, ensuring that the ratings agreed upon in the panel sessions were a more accurate representation of the opinions of each member than achieved during the survey phase.

3.5.2 Phase Two

Upon completion of the review process undertaken in phase one, the knowledge items from the IOC were reconstructed based on whether the panel evaluated them as being required at either a high or moderate level of understanding by medical graduates, or being unnecessary (low) at this level.

The panel sessions were audio recorded, with each participant providing verbal consent prior to the recording commencing. The purpose of the recordings was not to transcribe the discussion during the sessions but rather to provide a reference point, should the researcher need to refer to them. However, the recordings were not required to be reviewed, as the notes taken during the session by both the researcher and one of the supervisors provided sufficient data. Further, consensus was achieved for the majority of the items with minimal discussion.

Given that the knowledge items in the (IOC) were unpacked from the original composite learning outcomes, a pragmatic approach was taken in instances where similar knowledge items are evaluated differently. For example, consider Objective 1.2 a)^{11(p9)}:

“Describe the epidemiological concepts of morbidity (incidence and prevalence), mortality, relative risk and survival in relation to common cancers.”

The review of this objective focussed on the four epidemiological concepts and the final level of understanding assigned to each:

- morbidity (incidence and prevalence) - Moderate
- mortality - High
- relative risk - Moderate
- survival – Moderate

As each concept was reviewed by a different panel, and done so in isolation, the reconstruction of this objective would result in two objectives:

1. Outline the epidemiological concept of mortality.
2. Summarise the epidemiological concepts of morbidity (incidence and prevalence), relative risk and survival.

Whilst one group rated a single component as requiring a high level of understanding, the inclusion of this objective would necessitate that all four components be done so at the same level of understanding, as it would be difficult to argue that understanding the concept of mortality is any more important than understanding the level of morbidity, survival and relative risk. As such, this objective would be included as a single objective that is worded appropriately to convey a moderate level of understanding is required.

Given the challenges associated with curricula change, the aim of the *Cancer Education Framework for Australian Medical Schools* is to provide a minimal set of clinical experiences and learning outcomes, sufficient to provide all medical students with a core knowledge-base that underpins the general principles of cancer management. Once the knowledge items were reconstructed into learning outcomes, these outcomes were compared with other national and international curricula, and the current literature on cancer and palliative care education for medical students. The final result is a framework that outlines essential clinical

experiences, the principles of cancer management and the specific cancer-related knowledge that underpins these principles. A draft version of the *Cancer Education Framework for Australian Medical Schools* (Appendix 10) was sent to a Surgical Oncologist from the Netherlands, who is the former Chair of the International Summer School in Oncology for Medical Students (ISOMS) and a former President of the European Association for Cancer Education (EACE), a Clinical Oncologist from the UK who is also a former President of EACE and to a radiation oncologist from the US who is well published in the area radiation oncology teaching for medical students. Feedback from these reviewers is provided in Appendix 11 and was incorporated into the final version of the *Cancer Education Framework for Australian Medical Schools* that was circulated for review in phase three.

The final document includes information introducing the *Cancer Education Framework for Australian Medical Schools*, and outlining its background and intentions. Further, several freely available resources that could be used to underpin the learning objectives contained in the framework are included. Whilst the final document totals 14 pages (including both covers), the actual framework comprises only five pages (Chapter Five).

3.5.3 Phase Three

Research questions one and three were addressed in phase one. Phase three will address the third research question:

3. To what degree do medical educators and practitioners perceive that the '*Cancer Education Framework for Australian Medical Schools*', provides a comprehensive resource to support the implementation of cancer curricula in Australian medical schools

3.5.3.1 Instrument Development

An online survey was created using Qualtrics XM survey software^P to enable participants to provide feedback on the *Cancer Education Framework for Australian Medical Schools* developed in phase two. The survey contained demographic questions (e.g. gender, location and discipline), questions regarding participant involvement with medical students and

^P <https://www.qualtrics.com/au>

medical education, the cancer curriculum at the medical school with which they are affiliated, as well as questions specific to the *Cancer Education Framework for Australian Medical Schools*. A link to the framework was embedded into the survey.

3.5.3.2 Face Validity

The survey instrument was piloted amongst several academic members of staff in the School of Medicine at the University of Notre Dame Australia's Fremantle campus. The final survey was developed following the feedback received during this process. The feedback on the original survey instrument is provided in Appendix 12 and the final version of survey is provided in Appendix 13.

3.5.3.3 Participants

The survey was sent to former members of Cancer Council Australia's Oncology Education Committee (OEC), as well as to medical, radiation, haematological and surgical oncologists, palliative care physicians and academic GPs in Perth, Western Australia. As undertaken in phase one, a targeted approach to participant recruitment was used to identify those most likely to be able to comment on the utility of the *Cancer Education Framework for Australian Medical Schools* and its applicability for Australian medical schools. As with phase one, a snowballing method was used to ensure sufficient representation in the participant group.

The literature on cancer education for medical students highlights the principals of cancer management as a common thread internationally, therefore a slightly modified survey (demographic questions) was sent to members of the American Association for Cancer Education (AACE) and the European Association for Cancer Education (EACE) and the European Summer Schools in Oncology in both Groningen, the Netherlands and Vienna, Austria. The survey contained additional information for participants, it highlighted that one section of the *Cancer Education Framework for Australian Medical Schools*, the local context, could be adapted to their location making the overall framework adaptable to international medical schools, this information was provided to support review of the framework. The same participant information sheet was used for the international review and is provided in Appendix 14. The modified version of survey which was sent to international participants is included in Appendix 15.

3.5.3.4 Recruitment

Participants were invited by personalised email, which provided a brief synopsis of the research project and contained a hyperlink to the survey. The *Cancer Education Framework for Australian Medical Schools* was embedded into the survey and the participant information sheet was attached to the email (as a pdf attachment). Participants were encouraged to forward the email invitation to their colleagues. Forwarding the email will result in both the survey link and the PIS being retained within the email. Invitations to GPs were distributed through the Rural Clinical School of Western Australia, as well as by the Discipline Leader (DL) for General Practice at the University of Notre Dame Australia School of Medicine Fremantle, as suggested by the DL (L. Gilkes MBBS FRACGP, email, November 2016). Examples of the invitation emails are provided in Appendix 16.

3.6 Summary of the Research Phases

The aforementioned research phases were designed to ensure that the research questions could be answered using appropriate underpinning methodology and instruments with sufficient fidelity. Further, the analysis undertaken was done so using appropriate methods to enable the development and evaluation of the resultant framework. In addition, all stages of the research were conducted in accordance with the ethical standards for research.

3.7 Ethics

At its most basic level, ethics is concerned with the way in which the research is undertaken and in particular, that the research conduct is deemed to be correct and does not deceive participants or treat them badly.^{199, 200} The Australia code (the code) for the responsible conduct of research articulates the expectation that research be “be conducted responsibly, ethically and with integrity”.^{236(p1)} Within Australia, human research is governed by law, which protects participants and places certain responsibilities on to institutions and researchers undertaking such research.²³⁷ The National Health and Medical Research Council (NHMRC) is an independent statutory agency that operates within the Australian Government and provides leadership and governance for the conduct of human and health research.²³⁸ The NHMRC, in collaboration with the Australian Research Council and Universities Australia, has produced a National Statement on Ethical Conduct in Human Research (the statement)

which is published on the NHMRC website. The aim of the statement is to “promote ethically good human research” and assist researchers, institutions and ethical review bodies to “them to meet their responsibilities: to identify issues of ethics that arise in the design, review and conduct of human research, to deliberate about those ethical issues, and to justify decisions about them”.²³⁷ The standard includes a number of guidelines and those that relate directly to the research outlined in this thesis will be addressed in turn. In addition to the code and the statement, Australian universities have their own governance structures, policies and procedures for the governance of human research.^{239, 240}

3.7.1 Ethics Approval

Ethical approval was received by the University of Western Australia Human (UWA) Research Ethics Committee (RA/4/3/1223) for phase one and from the University of Notre Dame Australia (UNDA) Human Research Ethics Committee (2020-153F) for phase three⁹. The HREC approval letter from UWA is included as Appendix 17 and the HREC approval letter from UNDA is included as Appendix 18.

3.7.2 Risk and Benefit

The NHMRC defines risk as “a potential for harm, discomfort or inconvenience” and identifies causes of harm as including physical, psychological, social, economic and legal.²³⁷ Participants in the research project presented in this thesis were asked to either complete a survey and/or participate in a face-to-face panel session. For research to be ethically acceptable, the perceived benefit has to justify the associated risks. Benefits of research may include new knowledge and understanding, improved welfare or wellbeing, or new skills and expertise.²³⁷

Both HREC applications and subsequent approvals were for ‘low risk research’ in which the NHMRC website stipulates that there is “no foreseeable risk of harm or discomfort; and any foreseeable risk is no more than inconvenience”.²³⁷ The only foreseeable risks for participants were those relating to privacy and confidentiality, both of which were addressed in participant information sheets and informed consent forms, which are discussed in the next

⁹ The researcher commenced this project at the University of Western Australia prior to transferring candidature to the University of Notre Dame Australia.

section. As stakeholders in cancer education, participation in this research is likely to benefit the participants through their ability to have input into the development of a *Cancer Education Framework for Australian Medical Schools*. However, participants' decision to participate may be purely altruistic in nature.

3.7.3 Consent

In order for an individual^r to participate in research, they must be able to understand the research, what the research involves, what their rights and obligations are, and who they should contact if they require further information.²³⁷ Participation in phases one and three were voluntary, with participants able to withdraw from the research at any stage prior to the data being analysed and disseminated.

Phase one of this research required a consent form to be obtained from each participant, as the data collected would identify them by name. This was necessary to enable their survey data to be made available to them during the panel sessions. In addition to consenting to participating in phase one, participants were asked whether they consented to being audio recorded during the panel sessions. The participant information and consent sheet are included in Appendix 7.

Phase three of this research involved implied consent, in which completion of the online survey indicated that the participant consented to their participation. No name or identifying data was collected during phase three, as there was no requirement to match data with the participant. The participant information sheet is included in Appendix 14.

3.7.4 Confidentiality

As mentioned above, it was not possible to provide participant anonymity during phase one, as survey data needed to be provided to the participant during the panel sessions. Further, due to the size of the medical workforce in Western Australia and the small number of cancer clinicians, most of the participants were known to one another. All name identifying data was

^r The ability to participate involve further ethical and sometimes legal consideration, especially in research that involves children and young people, those highly dependent on medical care, or with a cognitive impairment, an intellectual disability, or a mental illness (NHMRC).

removed from the survey data and replaced with a unique ID. The master list of participant names and IDs was password protected and stored separately to the research data. In addition, no institutional identifiable data was collected. Phase three employed an anonymous survey that did not collect any name identifying data.

3.7.5 Data Management

The university's 2019 procedure document on research data management provides clear guidelines for the collection, analysis, storage, back-up, access and disposal of all research data.²⁴⁰ The policy outlines the roles and responsibilities of the University, research supervisors and the researcher (be they staff or student). The policy has been developed in accordance with the 2018 edition of the Australian Code for the Responsible Conduct of Research.²³⁹ The data collected and analysed in this research has been collected, stored and accessed in accordance with the aforementioned policy and procedures. Some of the key considerations in the management of research data will be outlined below.

Confidentiality and privacy of data is one of the main ethical considerations and one of the main concerns with research data.²³⁷ To protect participant confidentiality and the privacy of the data, only the researcher and their supervisors have access to the data. Further, name identifying data has been removed and replaced with a participant ID.

Collection of research data is not permitted to be undertaken without institutional HREC approval. Further, the way in which the data is intended to be used, including any analysis undertaken has to be clearly articulated in the HREC application.²⁴⁰ As mentioned above, HREC approval was received for all data collection undertaken in this research.

The policy states that all research data must be securely stored within the university.²³⁹ In the case of hard copy documents, a locked filing cabinet in the researcher's office is used to store the data. All electronic data is stored on the University server, which requires password protection in order to gain access. The University servers are routinely backed up. In accordance with the university procedure, all data will be retained for a total of five years from the date of publication, after which it can be deleted.²⁴⁰

3.7.6 Dissemination of Findings

The dissemination of research findings is an important aspect of any research and is one of the means through which new knowledge, techniques and experiences are communicated to key stakeholders, other researchers, consumers and the public in general.²⁴¹

HREC applications specifically ask how research findings will be disseminated to participants. All participants who were invited to participate in phases one and three via email, will be provided with a summary of the research findings upon completion of the study. Whilst the identity of those who participated in phase one is known, the identity of participants in phase three is unknown, as the survey in phase three was undertaken anonymously. As such, all clinicians invited to participate in phase three will receive the research summary. Unfortunately, participants recruited via 'snowballing' (invited participants sending the survey link to their colleagues) will not be able to be sent the summary, as their identity is unknown to the researcher.

In addition to providing participants with a summary of the research findings, the researcher aims to present finding from this research at conferences, as well as publishing them in peer review journals.

3.8 Conclusion

Chapter Three has provided an overview of the multiphase mixed methods approach used in this research project and how this method sits within the social sciences research field, and the pragmatic approaches taken. An overview of the key aspects and justification for the use of a mixed methods approach is articulated in the context of the research program.

Within each research phase the qualitative and quantitative methods are outlined and their application to the research questions are clearly articulated, demonstrating the researcher's ability to understand and apply sound research methodology appropriately to answer the research questions and in doing so, adhere to the principles of honest, ethical and consciousness research. The development of the survey instruments and of the *Cancer Education Framework for Australian Medical Schools* are outlined, as is the selection and recruitment of participants, and the processed undertaken in the analysis of the data.

Research must be undertaken in a responsible and ethical manner and the key considerations of research ethics as they apply to this thesis are summarised along with the means through which each was addressed throughout this research.

Chapter Four will describe the development of the *Cancer Education Framework for Australian Medical Schools*.

Chapter Four: Phase One - Data Analysis and Findings

4.1 Introduction

In the previous chapter the research methodology and ethical considerations of the study were described. This chapter describes the process through which the Cancer Council Australia's Ideal Oncology Curriculum (IOC) was unpacked and reviewed by a local panel of cancer clinicians in Perth, Western Australia. The data generated from the review of the IOC was used to inform the development of *Cancer Education Framework for Australian Medical Schools*. The development of the framework is described in Chapter Five.

4.2 Data Preparation

Phase one of this project involved using local cancer clinicians and GPs to review the contents of the IOC and determine its relevance to medical student education. Reviewers were asked to consider the following question:

Determine the level of understanding necessary for a junior doctor to perform his/her duties competently

The IOC comprises 150 objectives, which are distributed across eight broad categories^{11(p1)}:

1. Public health (14)
2. Cancer biology (10)
3. Patient management (30)
4. Diagnosis (13)
5. Treatment (50)
6. Communication skills (24)
7. Ethics (4)
8. Clinical experience (5)

In preparing the IOC for review, two steps were taken. Step one involved a task analysis to unpack the composite items into discrete items and to classify each as being knowledge, skill or attitude. Step two removed the action verb to reduce the risk of this verb influencing the

participants in their review of the item. These two steps informed the participant IOC summary document provided in stage one.

Step One

The first step in preparing the IOC for review was to undertake a task analysis which served three main purposes. First, it allowed for the full scope of the curriculum to be viewed. Second, it enabled composite objectives to be separated into different tasks. Third, it facilitated the classification of each objective statement into knowledge, skills, attitudes or generic attributes.

Composite objectives are those that contain more than one item, which are generally related to a common theme (e.g. management). It is important to separate these items and review them in isolation to determine the expected level of understanding required upon graduation from medical school. Consider objective 4.2.d^{11(p17)}:

“Identify important familial cancer syndromes and demonstrate an understanding of their molecular basis, mode of inheritance, associated risk of disease and implications for family counselling.”

In its original form, this objective assumes that the following aspects of familial cancer syndromes are all expected at the same level of understanding:

- molecular basis;
- mode of inheritance;
- associated risk of disease; and
- implications for family counselling

Unpacking composite objectives enables each aspect to be considered individually, thus allowing non-essential items to be removed or grouped according to the expected level of attainment given the position of the student on the training trajectory.

As a result of the analysis of the IOC undertaken in step one, 301 knowledge items, 2 attitudes, 21 skills and 61 generic attributes were identified. A review of the skills by the researcher found that these items were underpinned by the knowledge items identified for review and,

as with the generic skills, would be expected to be present in all Australia medical school curricula (e.g. 1.3.f. Demonstrate ability to take a family history and 3.3.a Describe the importance of evidence based medical practice). Similarly, the attitudinal objectives (such as 3.1.g Demonstrate an attitude of accepting responsibility for ensuring continuity of care for patients over the long-term, and at all hours) were also considered generic in nature. Thus, given the scope of the IOC and the questions being asked of each participant, it was decided to focus on the 301 knowledge items identified in the task analysis.

Step Two

The final list of 301 knowledge statements were further refined by removing the verb, to reduce this influencing the rating of the content by the participants (Appendix 19). For example, consider objective 4.2.d^{11(p17)}:

“Identify important familial cancer syndromes and demonstrate an understanding of their molecular basis, mode of inheritance, associated risk of disease and implications for family counselling.”

The verbs identify and demonstrate may have different meanings to different participants and could indicate differing levels of understanding accordingly. Removing the verb is supported by Halcomb et al. who argue that the way in which the data is presented to participants can influence the way in which they interpret and respond.²²⁰ By removing these verbs when the objective is unpacked into its various components, participants are presented with a discrete knowledge item to consider. Objective 4.2.d was unpacked into the following five discrete items for participants within their respective groups:

Group 3: 2.4.d.1 important familial cancer syndromes (broad).

Group 4: 2.4.d.2 the molecular basis for important familial cancer syndromes.

Group 5: 2.4.d.3 the mode of inheritance for important familial cancer syndromes.

Group 6: 2.4.d.4 the associated risk of disease for important familial cancer syndromes.

Group 1: 2.4.d.5 the implications for family counselling for important familial cancer syndromes.

Participants were allocated to one of six groups in order to spread the workload associated with the review process. The individual knowledge items unpacked from the IOC objectives were sequentially allocated across the groups to ensure broad coverage of the content. The rationale for this decision was to ensure that each participant reviewed content from each of the seven⁵ areas outlined in the IOC. Further, it reduced the influence that several related items being presented sequentially may have on the overall rating of these items. This is explained in detail in Chapter Three.

Establishing the level of understanding that is to be expected of a junior doctor for each item will ensure that the expectation of a medical student can be clearly articulated at an appropriate level in the resulting framework. Knowledge items represent the individual building blocks that form the foundation for medical practice. Items at this level are generally referred to in the literature as knowledge and understanding; retrieval and comprehension or simply as comprehended knowledge.

Knowledge (in its simplest form) encompasses the recall or remembering of facts, such as vocabulary, normal reference ranges or lists, and does not imply any understanding of the subject matter. For example, a student may know the normal range for serum potassium without having any understanding of the causes, manifestations or implications of hypo- or hyperkalaemia, or the impact of certain treatments on serum potassium levels. Understanding, however, implies a mental perception of the importance, cause, explanation and/or nature of the item at hand.^{191, 242}

Each panel member was asked to rate the level of understanding required of each item in order for a junior doctor to competently undertake their duties (Appendix 8). A three-point rating system was used to rate each item:

- Low (N/A) – an understanding of the item is not required.
- Moderate level – a broad conceptual grasp of underlying principles is required.

⁵ The IOC contains eight sections. However, section eight is devoted to clinical experience (five essential cancer clinical experiences) and was not included in the review. Therefore, only items from sections one through seven were unpacked for review.

- High level – an in-depth understanding of the item (e.g. mechanisms of action and their relationship to other factors) is required.

Each panel member was provided with an example of each level of understanding to provide a reference point and assist in calibrating their ratings. Additionally, a representative assessment question was also provided to demonstrate how the particular item may be examined. It was decided to include these assessment examples to provide context for the participants of how their rating not only influenced curriculum but also student assessment, which can provide greater insight into the expected learning (Figure 4.1).

| | |
|-------------------------|--|
| Knowledge Item: | 5.3.f.2. Short-term side effects of radiotherapy. |
| Level of understanding: | Low/Not applicable – the junior doctor is aware that radiotherapy may cause side effects, but is unable to provide any insight as to what these are or how they are caused. |
| | Moderate level of understanding – the junior doctor possesses a basic understanding of common side effects of radiotherapy and can apply this knowledge to treat the symptoms and offer some suggestions on how to reduce them. |
| | High level of understanding – the junior doctor possesses a sound knowledge of the natural course of radiotherapy side effects, the types of reactions and the underlying tissues affected, and can apply this knowledge to implement preventative measures, treat side effects and weigh up their severity on treatment decisions and cost benefit of treatment. |
| Recommendation: | Moderate. |
| Reasoning: | It would be reasonable to expect a junior doctor to have a basic understanding of the common short-term side effects of radiotherapy. |

It may be helpful to consider the types of questions that could be developed based on the level of understanding ascribed to a particular item.

Given the example above, the minimal/not applicable level of understanding would not be assessed. However, both the moderate and high levels would require assessment. As the level of understanding is going to affect the difficulty of the question(s) asked, it is clearly important to ensure that assessment occurs at the appropriate level. Too easy and it will not be possible to identify individuals who do not understand the content. On the other hand, if the question is too difficult, it may discriminate those who actually do understand the content at the desired level.

A question assessing a moderate understanding of the short-term side effects of radiotherapy would be:

Which of the following short-term side effects of radiotherapy would you expect to see in a patient receiving radiotherapy to the chest wall?

- a) Telangiectasia
- b) Alopecia
- c) Pulmonary fibrosis
- d) Skin erythema
- e) Peripheral neuropathy

Correct answer: d.

Skin erythema is a common short-term side effect of radiotherapy. Whilst radiotherapy can cause alopecia, it only does so when the hair is within the treatment field. The remaining conditions are all long-term side effects.

Figure 4.1: Example of level of understanding as applied to a particular item and a representative assessment question

4.3 Research Participants

Local medical, radiation and surgical oncologists, haematologists, palliative care physicians and GPs were invited to participate in phase one. Each clinician who agreed to participate was asked to indicate days on which they were routinely available and whether their availability was in the morning or afternoon. This data was then used to schedule groups in which all of the aforementioned disciplines would be available. With the exception of GPs,

sufficient interest and availability for all other disciplines was adequate to assemble the six review groups necessary to undertake the review (Table 4.1). Feedback from GPs indicated that they had insufficient time to participate due to clinical load, administrative tasks and ongoing professional education. A total of 32 clinicians agreed to participate in this research.

Table 4.1: Representation of disciplines comprising each review group

| Group | GP | Haem. Onc | Med. Onc. | Pall. Care | Rad. Onc. | Surg. Onc |
|------------|----|-----------|-----------|------------|-----------|-----------|
| 1 (Mon PM) | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 (Tue PM) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 (Wed AM) | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 (Wed PM) | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 (Fri AM) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 (Fri PM) | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ |

4.4 Method

An expert group of clinicians was used to provide formal consensus of the essential IOC objectives for the *Cancer Education Framework for Australian Medical Schools*. The formal consensus method engages experts via a step by step process to ensure integrity of decision making and final agreement. The level of agreement required for consensus is set by the researcher; a majority agreement, established through mode score calculation was used in this case rather than a specific percentage, with the use of the aforementioned three-point rating systems. For this research consensus development panel (CDP) method was used. This involves experts individually reviewing the provided information and then meeting in groups to reach a consensus.^{210, 223}

Stage one was undertaken by each clinician individually in their own time, and required them to review approximately 50 items and indicate the level of understanding required for a junior doctor. Participants were emailed an excel spreadsheet containing knowledge items allocated to them for revision (Appendix 8), as well as a document outlining the specific task (Appendix 6).

In stage two, mode scores for all 301 items were generated and panel groups convened with representation from each of the disciplines. During the panel group sessions items that returned a bimodal score were discussed until a consensus was reached. Each participant was provided with a copy of their original review of the items to facilitate discussion.

4.5 Data Analysis

Descriptive statistics were used to establish mode scores (i.e. the score with the highest frequency) for the level of understanding for each of the knowledge items. Items that were bimodal (i.e. for which there was no single rating that occurred with the highest frequency) were discussed in order to reach a consensus agreement on the final rating for the item.

Relationships between demographic variables and ratings were explored in order to identify any rating patterns based upon gender, speciality, number of years since specialisation, practice type and teaching involvement. As discussed in Chapter Three, relationships between variables were examined using Chi-square tests with an alpha of 0.05.

4.5.1 Stage One Findings

Overall 27 of the 32 clinicians who agreed to participate returned data (rr = 84.38%). Approximately two-thirds of participants submitted hard copies (n = 16), whilst the remainder returned them electronically (n = 11). Participation by discipline is presented in Table 4.2.

Table 4.2: Participation by discipline (stage one)

| Discipline | Agreed to participate | Returned Data | Percentage |
|---------------------------|-----------------------|---------------|--------------|
| Medical Oncology | 6 | 6 | 100.00 |
| Radiation Oncology | 6 | 6 | 100.00 |
| Haematology | 6 | 4 | 66.67 |
| Palliative Care | 6 | 6 | 100.00 |
| Surgical Oncology | 6 | 4 | 66.67 |
| General Practice | 2 | 1 | 50.00 |
| Total | 32 | 27 | 84.38 |

The majority of the participants were male (63%), had completed their basic medical training in Australia (78%) and were directly involved in teaching medical students (81%). Full demographic data is presented in Table 4.3.

Table 4.3: Demographic data for participants (by group allocation).

| Group | | 1 | 2 | 3 | 4 | 5 | 6 | Total | Percent |
|--|---------------|---|---|---|---|---|---|-------|---------|
| Gender | Male | 3 | 4 | 3 | 1 | 1 | 5 | 17 | 62.96% |
| | Female | 1 | 0 | 2 | 3 | 4 | 0 | 10 | 37.04% |
| Graduating University | Australian | 3 | 2 | 5 | 3 | 4 | 4 | 21 | 77.78% |
| | International | 1 | 2 | 0 | 1 | 1 | 1 | 6 | 22.22% |
| Years since graduation | <10 years | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 11.11% |
| | 10-19 years | 2 | 2 | 1 | 1 | 1 | 1 | 8 | 29.63% |
| | 20-29 years | 1 | 0 | 3 | 1 | 3 | 2 | 10 | 37.04% |
| | 30-39 years | 1 | 1 | 1 | 1 | 0 | 0 | 4 | 14.81% |
| | 40+ years | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 7.41% |
| Speciality | Med Onc | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 22.22% |
| | Rad Onc | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 22.22% |
| | Surg Onc | 1 | 0 | 1 | 1 | 0 | 1 | 4 | 14.81% |
| | Haem | 0 | 1 | 1 | 0 | 1 | 1 | 4 | 14.81% |
| | Pall Care | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 22.22% |
| | GP | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3.70% |
| Years since Specialist Training | In training | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 11.11% |
| | <10 years | 3 | 2 | 1 | 1 | 1 | 1 | 9 | 33.33% |
| | 10-19 years | 0 | 0 | 3 | 1 | 2 | 1 | 7 | 25.93% |
| | 20-29 years | 1 | 2 | 0 | 1 | 1 | 1 | 6 | 22.22% |
| | 30-39 years | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 7.41% |
| Practice Types & Geographic Locations* | Public | 3 | 4 | 3 | 4 | 3 | 5 | 22 | 81.48% |
| | Private | 3 | 2 | 4 | 1 | 3 | 2 | 15 | 55.56% |
| | Metro | 4 | 4 | 5 | 4 | 4 | 5 | 26 | 96.30% |
| | Regional | 3 | 1 | 0 | 0 | 1 | 0 | 5 | 18.52% |
| | Remote | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3.70% |
| Involved in Education (specific)* | Yes | 3 | 4 | 5 | 4 | 3 | 5 | 24 | 88.89% |
| | (Students) | 3 | 4 | 4 | 3 | 3 | 5 | 22 | 81.48% |
| | (Post Grad) | 1 | 4 | 4 | 4 | 3 | 3 | 19 | 70.37% |
| | (Adv Trainee) | 3 | 4 | 5 | 2 | 3 | 3 | 20 | 74.07% |

* More than one may be applicable for each group member

Data for the required level of understanding was returned for all 301 knowledge items. The majority of the items were rated as requiring a moderate level of understanding (56.20%). Ratings of low and high were observed for 14.99% and 28.51% (respectively) of items. Only two items were missed by participants who returned their survey (0.15%). Table 4.4 shows the summary of rating levels by discipline.

Table 4.4: Summary of ratings for level of understanding

| Discipline | Low (N/A) | Moderate | High | Missing | Total |
|---------------------------|------------------|-----------------|-------------|----------------|--------------|
| Medical Oncology | 67 | 178 | 55 | 0 | 301 |
| Radiation Oncology | 48 | 178 | 75 | 0 | 301 |
| Surgical Oncology | 44 | 96 | 60 | 1 | 201 |
| Haematology | 8 | 117 | 75 | 0 | 200 |
| Palliative Care | 30 | 155 | 114 | 1 | 301 |
| General Practice | 6 | 37 | 7 | 0 | 50 |
| Total | 203 | 761 | 386 | 2 | 1354 |

Less than one-fifth (18.94%) of the ratings for understanding showed a bimodal distribution. A mode rating of moderate was seen most frequently, accounting for 54.15% of the ratings. Modes of low and high accounted for 7.64% and 19.27% (respectively) of the ratings (Table 4.5).

Table 4.5: Mode scores for level of understanding.

| Mode | Frequency | Percent |
|------------------|------------------|----------------|
| Low (N/A) | 23 | 7.64 |
| Moderate | 163 | 54.15 |
| High | 58 | 19.27 |
| Bi-modal | 57 | 18.94 |
| Total | 301 | 100.00 |

Of the bimodal items, 38.60% had a mode of low and moderate, 3.51% a mode of low and high and 61.40% a mode of moderate and high. Unanimous agreement was observed for

11.96% of items, whilst 11.30% of items received ratings that spanned the entire range of options (low, moderate, high).

Given the small number of participants and the distribution of many of the demographic variables, gender and discipline were identified as two variables that may influence the ratings given to the knowledge items. Item ratings were classified as either low (i.e. the item would be excluded) or moderate/high (i.e. the item would be retained). Table 4.6 shows the distribution of ratings by gender and discipline.

Table 4.6: Level of understanding ratings for knowledge items by gender and discipline

| | Rating of Low | | Rating of Moderate or High | | Total number of items reviewed |
|---------------------------|---------------|-----------|----------------------------|------------|--------------------------------|
| | Male | Female | Male | Female | |
| Medical Oncology | 57 | 10 | 193 | 40 | 300* |
| Radiation Oncology | 22 | 26 | 128 | 125 | 301 |
| Surgical Oncology | 39 | 5 | 111 | 45 | 200* |
| Haematology | 8 | 0 | 142 | 50 | 200 |
| Palliative Care | 17 | 13 | 134 | 136 | 300* |
| General Practice | 0 | 6 | 0 | 44 | 50 |
| Total | 143 | 60 | 708 | 440 | 1351 |

*One item missed on survey

All participants used the moderate and high rating when evaluating the level of understanding necessary for the knowledge items. However, not all participants used the low rating. The relationship between ratings given by gender and by discipline were examined using Chi-square tests with an alpha of 0.05.

Chi-square analysis demonstrated a significant difference between gender and the number of items that were considered to be not applicable for medical students ($\chi^2 = 5.962$, $df = 1$, $p = .017$) (Table 4.7 and Table 4.8).

Table 4.7: Crosstabulation for Gender * Rating

Gender * Rating Crosstabulation

Count

| | | Rating | | Total |
|--------|--------|--------|----------|-------|
| | | Low | Mod/High | |
| Gender | Male | 143 | 708 | 851 |
| | Female | 60 | 440 | 500 |
| Total | | 203 | 1148 | 1351 |

Table 4.8: Chi-square analysis for Gender * Rating

Chi-Square Tests

| | Value | df | Asymptotic Significance (2- sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|--|--------------------------|--------------------------|
| Pearson Chi-Square | 5.692 ^a | 1 | .017 | | |
| Continuity Correction ^b | 5.322 | 1 | .021 | | |
| Likelihood Ratio | 5.849 | 1 | .016 | | |
| Fisher's Exact Test | | | | .018 | .010 |
| Linear-by-Linear Association | 5.688 | 1 | .017 | | |
| N of Valid Cases | 1351 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 75.13.

b. Computed only for a 2x2 table

Chi-square analysis demonstrated a significant difference between disciplines and the number of items that were considered to be not applicable for medical students ($\chi^2 = 45.702$, $df = 5$, $p < .001$) (Table 4.9 and Table 4.10).

Table 4.9: Crosstabulation for Discipline * Rating

Discipline * Rating Crosstabulation

Count

| | | Rating | | Total |
|------------|--------------------|--------|----------|-------|
| | | Low | Mod/High | |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Radiation Oncology | 48 | 253 | 301 |
| | Surgical Oncology | 44 | 156 | 200 |
| | Haematology | 8 | 192 | 200 |
| | Palliative Care | 30 | 270 | 300 |
| | General Practice | 6 | 44 | 50 |
| Total | | 203 | 1148 | 1351 |

Table 4.10: Chi-square analysis for Discipline * Rating

| Chi-Square Tests | | | |
|------------------------------|---------------------|----|--|
| | Value | df | Asymptotic Significance (2- sided) |
| Pearson Chi-Square | 45.702 ^a | 5 | .000 |
| Likelihood Ratio | 50.884 | 5 | .000 |
| Linear-by-Linear Association | 24.965 | 1 | .000 |
| N of Valid Cases | 1351 | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.51.

Table 4.9 shows that the Chi-square was calculated using a six-by-two crosstabulation. Table 4.10 reports the presence of differences between frequencies in the 12 cells that comprise the crosstabulation but does not indicate between which cells these differences occur. In order to explore these differences further, additional *post hoc* Chi-square analysis are required^{201, 243}. When undertaking *post hoc* testing, the α level is generally adjusted to correct for an increase in the number of type I errors which can occur when running multiple tests on the same dependent variable (rating).^{204, 243, 244} Put simply, the more you look for a difference, the more likely you are to find one. Keppel's modified Bonferroni correction²⁴³ was chosen to establish the new α level (Equation 4.1), as several authors believe that the original Bonferroni correction (where α is divided by the number of tests) is too conservative and can result in statistically significant relationships being incorrectly rejected.^{243, 245, 246}

Equation 4.1: Keppel's Modified Bonferroni Correction for α

$$\alpha_{new} = \frac{1 - (1 - \alpha)^{df}}{c}$$

Where:

α = original α level

df = degree of freedom for each *post hoc* test undertaken

c = the number of *post hoc* tests undertaken

Using Keppel's modified Bonferroni, the adjusted α was set at $p = .036$ (Equation 4.2), which is less stringent than the α level of .003, had the original formula ($\alpha = .05 / 15$) been used.

Equation 4.2: Keppel's modified Bonferroni calculation for corrected α level for post hoc Chi-square testing

$$\alpha_{\text{new}} = \frac{1 - (1 - \alpha)^{df}}{c} = \frac{1 - (1 - .05)^{15}}{15} = \frac{0.5367}{15} = .036$$

As the post hoc Chi-square tests were calculated using two-by-two tables, Yate's corrected Chi-square (continuity correction) is calculated in addition to the more commonly reported Pearson's Chi-square. A Yates's corrected Chi-square represents a statistical correction that is undertaken to account for small sample sizes, or for samples in which concern exists that the participants may not be representative of the general population.²⁰¹ In addition, should any of the cells in the crosstabulation have an expected value of less than five, Pearson's Chi-square cannot be used and Yate's corrected Chi-square should be reported instead.²⁰¹ Given the small number of participants and one of the cells in the Chi-square comparing Haematologists with GPs having an expected count of less than five, it was decided to report the Yate's corrected Chi-square in preference of the Pearson's Chi-square.

Using the adjusted α level of .036 and the Yate's corrected Chi-square, significant differences in the rating of knowledge items as low versus moderate/high were noted between Haematology and Medical Oncology ($\chi^2 = 30.634$, $df = 1$, $p < .001$); Haematology and Radiation Oncology ($\chi^2 = 16.092$, $df = 1$, $p < .001$); Haematology and Surgery ($\chi^2 = 27.078$, $df = 1$, $p < .001$); and Haematology and Palliative Care ($\chi^2 = 5.326$, $df = 1$, $p = .021$). In all cases, Haematologists were significantly less likely to rate knowledge items as requiring a low level of understanding than their colleagues from other disciplines.

Using the adjusted α level of .036 and the Yate's corrected Chi-square, significant differences in the rating of knowledge items as low versus moderate/high were noted between Palliative Care and Medical Oncology ($\chi^2 = 15.937$, $df = 1$, $p < .001$) and Palliative Care and Surgery ($\chi^2 = 12.769$, $df = 1$, $p < .001$). In both cases, Palliative Care physicians were significantly less likely to rate knowledge items as requiring a low level of understanding than their colleagues from Medical Oncology and Surgery.

The results for all 15 Chi-square tests are shown in Table 4.11. The full SPSS output for these Chi-square tests are presented in Appendix 20.

Table 4.11: Chi-square analysis between Disciplines * Ratings given

| Discipline | Medical Oncology | Radiation Oncology | Surgical Oncology | Haematology | Palliative Care | General Practice |
|------------------------------|------------------|------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|
| 1. Medical Oncology | -- | $\chi^2 (1) = 3.559$ $p = .059$ | $\chi^2 (1) = .000$ $p = 1.000$ | $\chi^2 (1) = 30.634$ $p < .001^*$ | $\chi^2 (1) = 15.937$ $p < .001^*$ | $\chi^2 (1) = 2.182$ $p = .140$ |
| 2. Radiation Oncology | | -- | $\chi^2 (1) = 2.547$ $p = .111$ | $\chi^2 (1) = 16.092$ $p < .001^*$ | $\chi^2 (1) = 4.193$ $p = .041$ | $\chi^2 (1) = .255$ $p = .614$ |
| 3. Surgical Oncology | | | -- | $\chi^2 (1) = 27.078$ $p < .001^*$ | $\chi^2 (1) = 12.769$ $p < .001^*$ | $\chi^2 (1) = 1.914$ $p = .167$ |
| 4. Haematology | | | | -- | $\chi^2 (1) = 5.327$ $p = .021$ | $\chi^2 (1) = 3.448$ $p = .063$ |
| 5. Palliative Care | | | | | -- | $\chi^2 (1) = .032$ $p = .857$ |
| 6. General Practice | | | | | | -- |

* Significant at $\alpha = .036$ (Keppel's modified Bonferroni adjusted α)

4.5.2 Stage Two Findings

Stage two provided participants the opportunity to meet in small groups to review the IOC objectives, and their applicability to the *Cancer Education Framework for Australian Medical Schools*. A summary of participation by discipline is provided in Table 4.12.

Table 4.12: Participation by Discipline (stage two)

| Discipline | Completed stage one | Attended group | Percentage |
|--------------------|---------------------|----------------|--------------|
| Medical Oncology | 6 | 4 | 66.67 |
| Radiation Oncology | 6 | 4 | 66.67 |
| Haematology | 4 | 3 | 75.00 |
| Palliative Care | 6 | 4 | 66.67 |
| Surgical Oncology | 4 | 2 | 50.00 |
| General Practice | 1 | 1 | 100.00 |
| Total | 27 | 18 | 66.67 |

Initially, the aim of this session was to discuss items that were bimodal in order to arrive at a consensus. It was during the first group panel session that several issues were raised with regards to the approach taken by participants during stage one. The level of understanding was frequently confused with importance of the specific item and in one instance, a participant thought this was how important the item was in their day-to-day practice (i.e. as a specialist versus a medical student). There was a tendency to associate a high level of understanding to broad items (i.e. the broader the item, the more content it is likely to cover and therefore the more important it is). Variability existed in the assigned rating based on whether the item was something encountered frequently encountered, or infrequently encountered but was considered critical. Some participants were unsure as to the level of training of a junior doctor and this was subsequently clarified at the commencement of each group session, to ensure calibration of the group members.

Further, the wording used in some of the IOC objectives was misleading and this may have been exacerbated through the unpacking of the objectives into individual knowledge items, which resulted in a loss of context in some instances. For example, the term cost in some could have been interpreted as financial costs, opportunity costs or the impact of the disease

(e.g. physical, emotional, spiritual etc.). To mitigate this, the IOC was made available to each member in the group, so that the original objective could be viewed for clarity. However, participants commented that in some instances the language used in the IOC was still unclear when the objective was viewed in its original form. For example, Objective 6.4.a refers to physical supports^{11(p43)}:

“Discuss the role of psychosocial, physical, financial and information supports available for patients and their families.”

Participants were unsure if in this reference “physical” pertained to patient transport, home hospital or mobility frames (or all). Some of the ratings were made based upon an agreement of how ambiguous items should be interpreted or modified. Based on this feedback, all items were discussed and for those with a unimodal score the mode score was accepted unless this was challenged, discussed and consensus reached.

Due to scheduling issues, two panel sessions (groups one and three) were unable to be convened. Upon conclusion of the four panel sessions, and review of the outcome of these sessions, the researcher undertook a review of the survey data received by participants assigned to groups one and three. Items were reviewed and consensus decisions made based upon comparison with similar changes made during the sessions that were convened, as well as the discussion that arose around particular issues (for example, the context in which cost was used). The sequential approach used in unpacking knowledge items from the IOC and allocating these to the groups ensured that other knowledge items from the same objectives being reviewed by the researcher had been reviewed during the panel sessions. A Chi-square test with an alpha of 0.05 was used to assess differences between changes made to mode scores for the survey data and the mode of revising these to achieve consensus (panel session versus researcher review). No significant difference was observed ($\chi^2 = .177, df = 1, p = .732$) (Table 4.13 and Table 4.14).

Table 4.13: Crosstabulation for change in item rating * panel session convened

**Panel Session Convened * Change in Item Rating
Crosstabulation**

Count

| | | Change in Item Rating | | Total |
|------------------------|-----|-----------------------|-----|-------|
| | | Yes | No | |
| Panel Session Convened | Yes | 43 | 157 | 200 |
| | No | 20 | 81 | 101 |
| Total | | 63 | 238 | 301 |

Table 4.14: Chi-square analysis for change in item rating * panel session convened

Chi-Square Tests

| | Value | df | Asymptotic Significance (2- sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|-------------------|----|--|--------------------------|--------------------------|
| Pearson Chi-Square | .117 ^a | 1 | .732 | | |
| Continuity Correction ^b | .037 | 1 | .848 | | |
| Likelihood Ratio | .118 | 1 | .732 | | |
| Fisher's Exact Test | | | | .766 | .428 |
| Linear-by-Linear Association | .117 | 1 | .733 | | |
| N of Valid Cases | 301 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.14.

b. Computed only for a 2x2 table

The primary task of the panel session was to review the 57 items with a bimodal rating, in order to reach consensus on the final rating. Of the 22 bimodal items with a mode of low and moderate, 13 were rated as low and 9 were rated as moderate. One item received a mode of low and high and was rated as low by the panel. Thirty-four items had a mode of moderate and high. Of these, 10 were rated as moderate and 24 rated as high (Table 4.15).

Table 4.15: Review of bimodal items and subsequent changes

| | | No change | Low (N/A) | Moderate | High | Total |
|---------------|----------------------|-----------|-----------|----------|------|-------|
| Bi-mode range | Low (N/A) & Moderate | 0 | 13 | 9 | 0 | 22 |
| | Low (N/A) & High | 0 | 1 | 0 | 0 | 1 |
| | Moderate & high | 0 | 0 | 10 | 24 | 34 |
| Total | | 0 | 14 | 19 | 24 | 57 |

The first panel session revealed that not all participants had understood the survey tasks and that variability existed in the way in which they rated the items. In light of this discovery, the researcher decided to ask the panel members to review the unimodal items as well. Data for these items was presented in the same way as for the bimodal items. No change was made to the 23 items that received a mode of low. Of the 163 items that received a mode of moderate, 13 items were revised down to a rating of low and 7 were revised up to a rating of high. Of the 58 items with a mode of high, 4 were revised down to a rating of low and two were revised down to a rating of moderate (Table 4.16).

Table 4.16: Review of unimodal items and subsequent changes

| | | No change | Low (N/A) | Moderate | High | Total |
|-------|-----------|-----------|-----------|----------|------|-------|
| Mode | Low (N/A) | 23 | -- | 0 | 0 | 23 |
| | Moderate | 143 | 13 | -- | 7 | 163 |
| | High | 54 | 2 | 2 | -- | 58 |
| Total | | 220 | 15 | 17 | 7 | 244 |

Upon completion of stage two, consensus was reached for all 301 items (Table 4.17).

Table 4.17: Final ratings of knowledge items

| Mode | Frequency | Percent |
|-----------|-----------|---------|
| Low (N/A) | 52 | 17.27 |
| Moderate | 164 | 54.49 |
| High | 85 | 28.24 |
| Total | 301 | 100.00 |

Findings are presented under each of the eight IOC categories. Within each category are the individual objective statements included in the study, followed by the consensus agreement (theme) and the overall recommendation (finding). Each of these findings were then used to develop the *Cancer Education Framework for Australian Medical Schools* (Chapter Five). A full description of participant rankings to form these findings is provided in Appendix 21. As not all of the objectives in the IOC were reviewed in this research project, the sequential identifiers used in the IOC will have obvious gaps. For example, under the section on *patient management*, objective 3.1 is missing statements f and g, both of which were excluded from

the review as they represent generic attributes. Objectives not included in this review, as discussed in section 4.2, are provided in Appendix 22.

The findings for each objective are presented in a uniform manner, arranged by section and objective, as originally presented in the IOC. The main points are as follows:

1. The original objective, as it is presented in the IOC
2. Theme – this is a summary statement describing the outcome of the review process for each of the knowledge items that were reviewed and the final rating for each (low (N/A), moderate or high). For complex items, data may be presented in list or tabular form, in addition to the text.
3. Finding – this is a reconstruction of the objective. If all items within the objective were rated as low, the finding will simply be the exclusion of the objective from the *Cancer Education Framework for Australian Medical Schools* (e.g. objective 1.2 c). Were items to receive different ratings, new objectives would be created to account for these differences (e.g. objective 1.1 a).

Figure 4.2 shows the layout of the finding for each of the objectives reviewed.

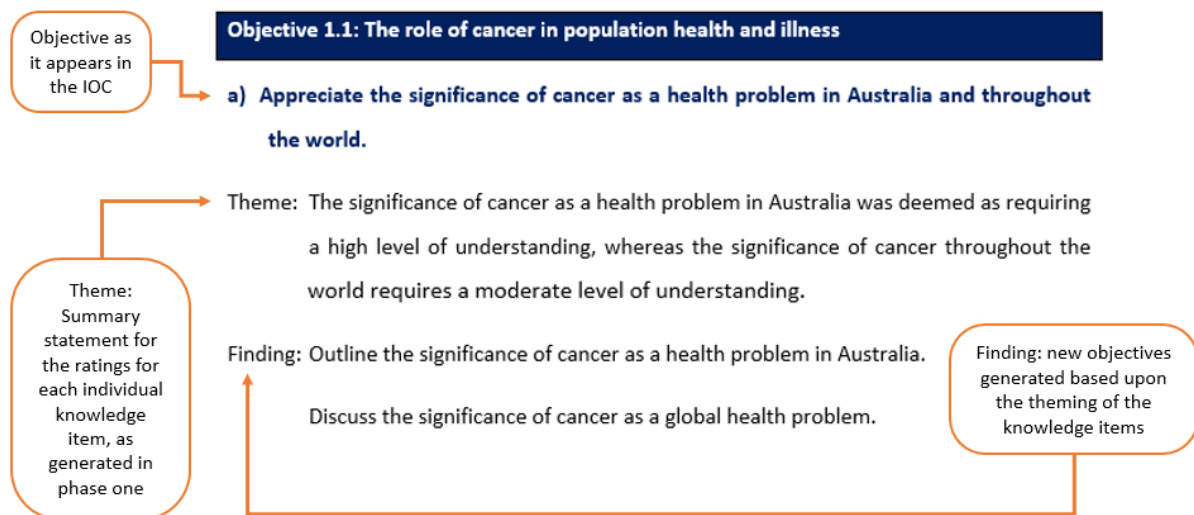


Figure 4.2: Presentation of research findings

4.5.2.1 Public Health

Objective 1.1: The role of cancer in population health and illness

- a) **Appreciate the significance of cancer as a health problem in Australia and throughout the world.**

Theme: The significance of cancer as a health problem in Australia was deemed as requiring a high level of understanding, whereas the significance of cancer throughout the world requires a moderate level of understanding.

Finding: Outline the significance of cancer as a health problem in Australia.

Discuss the significance of cancer as a global health problem.

Objective 1.2: Cancers – epidemiology and risk factors

- a) **Describe the epidemiological concepts of morbidity (incidence and prevalence), mortality, relative risk and survival in relation to common cancers.**

The review of this objective focussed on the four epidemiological concepts:

- morbidity (incidence and prevalence) - Moderate
- mortality - High
- relative risk - Moderate
- survival – Moderate

Theme: The concepts of morbidity, relative risk and survival were deemed necessary at a moderate level of understanding. The concept of morbidity was deemed necessary at a high level of understanding.

It was noted that these concepts should be taught in all medical curricula and do not change based upon the disease in question.

Finding: Outline the epidemiological concept of mortality.

Summarise the epidemiological concepts of morbidity (incidence and prevalence), relative risk and survival.

b) Discuss the role of statistical information, including surveillance and monitoring data, and understanding the medical practitioner's need to be able to access numerical information.

Theme: This objective was deemed necessary at a moderate understanding.

Finding: Discuss the role of statistical information, including surveillance and monitoring data, including the medical practitioner's need to be able to access numerical information.

c) Discuss the purpose of cancer registries.

Theme: This objective was deemed necessary at a low level of understanding.

Finding: Exclude.

d) Describe risk factors for various malignancies – genetic and non-genetic.

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Outline the risk factors for various malignancies.

e) List the most frequently diagnosed malignancies and the most common causes of cancer death in Australia; describe in a general way how these are different in different parts of the world.

This objective was unpacked into six individual components:

- Most frequently diagnosed malignancies in Australia – High
- Most frequently diagnosed malignancies globally – High
- Most common causes of cancer death in Australia – High
- Most common causes of cancer death globally – Moderate
- General differences in cancer diagnosis in Australia versus global – Low
- General differences in causes of cancer death in Australia versus global - Low

Theme: Frequency of cancer diagnosis in Australia and globally, and the most common causes of cancer death in Australia were deemed necessary at a high level of understanding. The most common causes of cancer death globally was rated as

requiring a moderate level of understanding. Global differences were not considered necessary knowledge for medical students.

Finding: Outline the most frequently diagnosed malignancies in Australia and globally, as well as the most common causes of cancer death in Australia.

Discuss the most common causes of cancer death globally.

f) Describe the differential rates of cancers and their outcome in Indigenous and non-Indigenous Australians and the reasons behind them.

This objective was unpacked into four components:

- Differential rates of cancers in Indigenous Australians and the reasons behind them – Low
- Differential rates of cancers in non-Indigenous Australians and the reasons behind them – Moderate
- Outcomes for differential rates of cancers in Indigenous Australians and the reasons behind them – Moderate
- Outcomes for differential rates of cancers in non-Indigenous Australians and the reasons behind them – Moderate

Theme: The differential rates of cancer in Indigenous Australians was not considered important knowledge for medical students. The differential rates of cancers in non-indigenous Australians, as well as the outcomes for cancers for all Australians were considered necessary at a moderate level of understanding.

Finding: Discuss the differential rates of cancers in non-indigenous Australians, and their outcome in Indigenous and non-Indigenous Australians and the reasons behind these.

g) Describe the differing outcomes of cancers, in general, between rural and urban populations and the reasons behind them.

This objective was unpacked into three components:

- The general outcome of cancer in urban populations – Low
- The general outcome of cancer in rural populations – Low

- The reasons behind the differing outcomes of cancer between urban and rural locations - Moderate

Theme: The general outcome of cancers in urban and rural locations was considered to be unnecessary for medical students. The difference between urban and rural locations was considered necessary at a moderate level of understanding.

Finding: Discuss the reasons behind the differing outcomes of cancers between rural and urban populations.

Objective 1.3: Prevention, screening and family risk

- a) Describe methods for the primary and secondary prevention of cancer, including measures that employ a public health approach, as well as those depending on individuals and their doctors.**

This objective was unpacked into four components:

- Primary prevention of cancer that employ a public health approach – Moderate
- Secondary prevention of cancer that employ a public health approach – Moderate
- Primary prevention of cancer that depend on individuals and their doctors – High
- Secondary prevention of cancer that depend on individuals and their doctors – High

Theme: Both primary and secondary prevention that employed a public health approach were rated as requiring a moderate level of understanding. Both primary and secondary prevention that that depended upon individuals and their doctor were rated as requiring a high level of understanding.

Finding: Outline methods for the primary and secondary prevention of cancer that depended upon individuals and their doctor.

Discuss methods for the primary and secondary prevention of cancer that employ a public health approach.

- b) Describe the methods of screening for cancer and pre-malignant conditions.**

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss the methods of screening for cancer and pre-malignant conditions.

- c) Demonstrate an understanding of the scientific evidence for the utility of screening, the difference between population-based screening and surveillance of individuals, and cost-effectiveness issues.**

Theme: The scientific evidence for the utility of screening, and the difference between population-based screening and surveillance was considered appropriate at a moderate level of understanding. Issues relating to cost effectiveness were considered to be unnecessary for medical students.

Finding: Discuss the scientific evidence for the utility of screening, and the difference between population-based screening and the surveillance of individuals.

- d) Discuss environmental control and behavioural and chemical approaches to the prevention of cancer.**

Theme: Behavioural approaches to the prevention of cancer were deemed appropriate at a moderate level of understanding, whilst environmental and chemical approaches were deemed unnecessary.

Finding: Discuss behavioural approaches to the prevention of cancer.

- e) Demonstrate an understanding of the psychosocial impact of screening and staging investigations on the patient.**

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss the psychosocial impact of screening and staging investigations on the patient.

4.5.2.2 Cancer Biology

Objective 2.1: Functional Anatomy

- a) **Demonstrate an understanding of the anatomical basis of cancer assessment such as: vascular supply (e.g. liver); lymphatic drainage patterns (e.g. breast); and anatomical relationships of relevance to oncology (e.g. pelvis).**

Theme: Lymphatic drainage was considered necessary at a high level of understanding. Vascular supply and anatomical relationships were deemed necessary at a moderate level of understanding.

Finding: Outline the anatomical basis of cancer assessment with regards to lymphatic drainage patterns.

Describe the anatomical basis of cancer assessment with regards to vascular supply, and anatomical relationships of relevance to oncology.

Objective 2.2: Physiology

- a) **Describe the principles of handling of chemicals (by cells): drug metabolism, handling of carcinogens.**

Theme: The handling of chemicals by cells in relation to drug metabolism was not considered necessary for medical students. The handling of chemicals by cells in relation to carcinogens was deemed necessary at a moderate level of understanding.

Finding: Discuss the principles of handling of chemicals (by cells): handling of carcinogens.

Objective 2.3: Pathology

- a) **Describe the concept of carcinogenesis.**

Theme: This was deemed to require a high level of understanding.

Finding: Outline the concept of carcinogenesis.

b) For the common cancers, demonstrate an understanding of microscopic and macroscopic findings, including pathological features from pre-malignant to malignant stages of cancer.

Theme: This objective was considered from the micro- and macroscopic aspects. The macroscopic findings, including pathological features from pre-malignant to malignant stages of cancer were deemed necessary at a high level of understanding. The microscopic findings, including pathological features from pre-malignant to malignant stages of cancer were deemed necessary at a moderate level of understanding.

Finding: Outline the macroscopic findings, including pathological features from pre-malignant to malignant stages of common cancers.

Discuss the microscopic findings, including pathological features from pre-malignant to malignant stages of common cancers.

c) Describe patterns of spread of common cancers.

Theme: This objective was considered to be necessary at a moderate level of understanding.

Finding: Describe patterns of spread of common cancers.

d) Demonstrate an understanding of the role and purpose of molecular pathology particularly the prognostic and/or predictive values of receptors and other targets.

The review of this objective focussed on four components:

- The role of molecular pathology - Moderate
- The purpose of molecular pathology - Low
- The prognostic and/or predictive values of receptors in relation to molecular pathology - Low
- The prognostic and/or predictive values of other targets in relation to molecular pathology - Low

Theme: With the exception of understanding the role of molecular pathology at a moderate level, the remaining components were deemed unnecessary for medical students.

Finding: Discuss the role of molecular pathology.

Objective 2.4: Molecular biology

a) Demonstrate an understanding of the molecular genetics of cancer: role of proto-oncogenes; tumour suppressor genes; DNA and RNA viruses; controls of apoptosis and angiogenesis; and elements of molecular genetic techniques.

The review of this objective focussed on six components:

- The molecular genetics of cancer in relation to the role of proto-oncogenes - Moderate
- The molecular genetics of cancer in relation to tumour suppressor genes - Low
- The molecular genetics of cancer in relation to DNA and RNA viruses - Low
- The molecular genetics of cancer in relation to controls of apoptosis - Low
- The molecular genetics of cancer in relation to angiogenesis - Moderate
- The molecular genetics of cancer in relation to elements of molecular genetic techniques - Moderate

Theme: The molecular genetics of cancer was rated as requiring a moderate understanding of the role of proto-oncogenes, angiogenesis and techniques used in molecular genetics. Tumour suppressor genes, DNA and RNA viruses, and the control of apoptosis were considered necessary at a low level of understanding.

Finding: Discuss the techniques used in molecular genetics.

Discuss the molecular genetics of cancer in relation to angiogenesis and proto-oncogenes.

b) Demonstrate an understanding of the molecular correlates of the pathological progression of cancer in a model system.

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Demonstrate an understanding of the molecular correlates of the pathological progression of cancer in a model system.

c) Describe hormonal influences and tumour markers relevant to tumour type and prognosis.

The review of this objective focussed on four components:

- Hormonal influences relevant to tumour type - Moderate
- Hormonal influences relevant to prognosis - Moderate
- Tumour markers relevant to tumour type - High
- Tumour markers relevant to prognosis - Moderate

Theme: Tumour markers relevant to tumour type was deemed necessary at a high level of understanding. Tumour markers relevant to prognosis, and hormonal influences relevant to tumour type and prognosis were considered to require a moderate level of understanding. The rating of high was obtained from individual panel members without being discussed at a panel group. When considering that the other three components were discussed, a decision was made to set all four components at a moderate level of understanding.

Finding: Outline tumour markers relevant to tumour type.

Describe the hormonal influences relevant to tumour type and prognosis, and tumour markers relevant to prognosis.

d) Identify important familial cancer syndromes and demonstrate an understanding of their molecular basis, mode of inheritance, associated risk of disease and implications for family counselling.

The review of this objective focussed on four components:

- Important familial cancer syndromes - Moderate
- The molecular basis for important familial cancer syndromes - Low
- The mode of inheritance for important familial cancer syndromes - Low
- The associated risk of disease for important familial cancer syndromes - Moderate
- The implications for family counselling for important familial cancer syndromes - Moderate

Theme: The overall topic of important familial cancer syndromes was deemed as requiring a moderate level of understanding. The associated risk of disease and implications for family counselling were expected at a moderate level of understanding. The molecular basis and mode of inheritance were expected at a low level of understanding.

Finding: Discuss important familial cancer syndromes including their associated risk of disease and implications for family counselling.

4.5.2.3 Patient Management

Objective 3.1: Patient management including referral and multidisciplinary management

a) Demonstrate awareness of clinical practice guidelines, where available, for appropriate referral patterns - understand the need for evidence based medicine.

Theme: This objective was considered necessary at a high level of understanding. However, it was felt that clinical practice guidelines and the need for evidence based management should be separated into two objectives.

Finding: Outline the purpose of clinical practice guidelines, where available, for appropriate referral patterns.

Outline the need for evidence based medicine.

b) Identify effective means of communication to enhance the clinical management of patients with cancer.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Identify effective means of communication to enhance the clinical management of patients with cancer.

c) Demonstrate an understanding of the need to recognise, address and manage psychological distress in the patient.

Theme: The need to recognise and address psychological distress in the patient was considered necessary at a high level of understanding. The management of psychological distress was considered necessary at a moderate level of understanding.

In unpacking this objective “the need to manage psychosocial distress” was included as a knowledge item for one group. Although the word manage would suggest that this is a skill, the objective is worded (and was considered by the group) to suggest that the students should understand the importance of managing psychosocial distress rather than actually attempt the management themselves.

Finding: Outline the importance of recognising and addressing psychological distress in the patient.

Discuss the importance of managing psychological distress in the patient.

d) Recognise the importance of coordinated care in optimising overall management of patients.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the importance of coordinated care in optimising overall management of patients.

e) Recognise their own clinical limitations and understand that help from those with better specialist knowledge can be sought.

Theme: The recognition of one’s own clinical limitations was considered to be a generic attribute that is applicable to all aspects of medicine. As such, this component of the objective was not included in the research.

The actuality that one can always seek help from someone with better specialist knowledge was deemed necessary at a high level of understanding.

Finding: Outline the importance of seeking help from those with better specialist knowledge in situations where clinical uncertainty or limitations exist.

h) Describe the integration of treatment modalities.

Theme: This was deemed necessary at a high level of understanding.

Finding: Outline the integration of treatment modalities.

i) Survey treatment options available to the patient, including a knowledge of unproven/experimental therapies, as distinct from alternative therapies.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the difference treatment options available to the patient, including a knowledge of unproven/experimental therapies, as distinct from alternative therapies.

j) Demonstrate an understanding of the range of medical and non-medical health professionals involved in cancer care.

Theme: The range of medical health professionals was considered expected knowledge at a high level of understanding, whilst an understanding of the range of non-medical health professionals was considered to be moderate.

Finding: Outline the range of medical health professionals involved in cancer care.

Discuss the range of non-medical health professionals involved in cancer care.

k) Demonstrate an understanding of the effective use of a multidisciplinary management team.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Discuss the effective use of a multidisciplinary management team.

Objective 3.2: Quality of life, therapeutic ratio and resource costs

a) Understand how quality of life is assessed.

Theme: This objective was rated as requiring a high level of understanding.

Finding: Outline how quality of life is assessed.

b) Appreciate the balance of risks and benefits of treatment as a key consideration in making treatment decisions.

Theme: This objective was rated as requiring a high level of understanding.

Finding: Outline the importance of balancing risks and benefits of treatment when making treatment decisions.

c) Demonstrate an understanding of the concepts of cost effectiveness, cost benefits and opportunity costs.

Theme: The concepts of cost effectiveness and cost benefits were considered appropriate at a moderate level of understanding. Opportunity costs were considered necessary at a low level of understanding.

Finding: Discuss the concepts of cost effectiveness and cost benefits.

d) Demonstrate an understanding of the principles of measurement of quality of life.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the principles of measurement of quality of life.

e) Demonstrate an understanding of the concept of therapeutic ratio.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the concept of therapeutic ratio.

- f) Assess the effects of clinical decisions about treatment on the patient, their family and the health care system in terms of: quality of life; burden of treatment; effect on the disease process; and financial and other costs, including costs to the patient and family associated with patient location v treatment location.**

This is an extremely complex objective, covering five different effects of clinical treatment decisions for a patient on three distinct entities (the patient, their family and the healthcare system). For simplicity, the review data for this objective is presented in tabular form (Table 4.18).

Table 4.18: Ratings for required levels of understanding for the components of Objective 3.2 (f)

| Effects of clinical treatment decisions on: | Patient | Their Family | Healthcare System |
|--|----------------|---------------------|--------------------------|
| quality of life | Moderate | High | Low |
| burden of disease | Low | High | Low |
| disease process | High | Low | Low |
| treatment costs | High | Low | Moderate |
| patient's location v treatment location | Moderate | Low | Moderate |

Theme: With regards to the effects of clinical decisions on the patient regarding treatment, issues related to the disease process and treatment costs were considered necessary at a high level of understanding. Issues related to quality of life and the patient's location in relation to the location of treatment at a moderate level of understanding. Issues related to their burden of disease were considered necessary at a low level of understanding.

With regards to the effects of clinical decisions on the patient's family regarding treatment, issues related to the quality of life and burden of disease were considered necessary at a high level of understanding. Issues related to disease process, treatment costs and the patient's location in relation to the location of treatment were considered necessary at a low level of understanding.

With regards to the effects of clinical decisions on the healthcare system regarding treatment, issues related to treatment costs and the patient's location in relation to the location of treatment were considered necessary at a moderate level of

understanding. Issues related to the quality of life, burden of disease and the disease process were considered necessary at a low level of understanding.

Finding: Outline the effects of clinical decisions about treatment on the patient in terms of: disease process and treatment costs.

Discuss the effects of clinical decisions about treatment on the patient in terms of: quality of life and the patient's location versus treatment location.

Outline the effects of clinical decisions about treatment on the patient's family in terms of: quality of life and burden of disease.

Discuss the effects of clinical decisions about treatment on the healthcare system in terms of: treatment costs and the patient's location versus treatment location.

g) Incorporate measurements of quality of life in assessment of performance status.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the importance of incorporating measurements of quality of life in the assessment of performance status.

h) Demonstrate an awareness of supportive care networks and how to access and utilise them.

Theme: It was felt that medical students required a high level of understanding of supportive care networks but did not need to know how to access these.

Finding: Outline the role and benefit of supportive care networks in the cancer setting.

Objective 3.3: Uncertainty and information management

a) Describe the importance of evidence based medical practice.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the importance of evidence based medical practice.

b) Demonstrate an understanding of the need to be able to critically appraise evidence.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the need to be able to critically appraise evidence.

g) Demonstrate an understanding of clinical trials and their importance; explain their value to patients and encourage patients to participate in trials.

Theme: This objective includes both knowledge and skills components. Only the knowledge component was included in the review.

Understanding clinical trials and their importance in cancer was considered necessary at a high level.

Finding: Outline clinical trials and their importance in the setting of cancer.

h) Describe basic elements of clinical trials, cohort studies and case control studies.

Theme: Clinical trials were deemed necessary at a high level of understanding. Case control studies were considered necessary at a moderate level of understanding. Cohort studies were considered as requiring a low level of understanding.

Finding: Outline the basic elements of clinical trials.

Describe the basic elements of case control studies.

j) Demonstrate an understanding of the limits of evidence, its broad application and its advancement over time.

Theme: Understanding the limits of evidence and its advancement over time was considered necessary at a moderate level. The broad application of evidence was considered necessary at a high level of understanding.

Finding: Outline the broad application of evidence in relation to patient management.

Discuss the limitations of evidence and the advancement of evidence over time.

- k) Discuss unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their claimed benefits and their costs in a critical manner.**

Theme: This objective was considered necessary at a low level of understanding.

Finding: Exclude.

4.5.2.4 Diagnosis

Objective 4.1: Clinical examination

- a) Discuss clinical manifestations of cancer, considering broad aspects of:**

- functional anatomy (vascular supply, lymphatic drainage, oncological anatomical relationships);
- oncological pathophysiology;
- pathology.

Theme: Oncological pathophysiology and pathology was considered necessary at a high level of understanding. Functional anatomy was considered necessary at a moderate level of understanding.

Finding: Outline the clinical manifestations of cancer, considering broad aspects of oncological pathophysiology and pathology.

Discuss the clinical manifestations of cancer, considering broad aspects of functional anatomy (vascular supply, lymphatic drainage, oncological anatomical relationships);

- b) Demonstrate an understanding of the components of the clinical examination of common cancers.**

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the components of the clinical examination of common cancers.

d) Describe the results of clinical examination.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the results of clinical examination.

e) Accurately describe the physical signs of cancer.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the physical signs of cancer.

Objective 4.2: The diagnostic process

a) Demonstrate an understanding of the wide range of potential presentations of cancer, and be open to unusual presentations.

Theme: Potential presentations of cancer was deemed necessary at a high level of understanding, whereas unusual presentations were considered appropriate at a moderate level of understanding.

Finding: Outline the wide range of potential presentations of cancer.

Discuss the importance of considering a cancer diagnosis in cases with an atypical presentation.

d) Discuss the differential diagnosis of common cancers based on specific oncological findings.

Theme: This objective was deemed necessary at a high level of understanding.

Finding: Outline the differential diagnosis of common cancers based on specific oncological findings.

e) Describe how to establish a diagnosis of cancer: outcome overview; diagnostic tools (biopsy, surgery, cytology, imaging, endoscopy); genetic/biochemical/molecular markers.

During the process of unpacking the IOC into discrete knowledge items, this objective was missed and subsequently omitted from the survey instruments sent out to participants. Unfortunately, this omission was only detected after both the survey and the panel sessions had been conducted, and the IOC objectives were being reconstructed. Had this objective been unpacked, it would have been unpacked into the following knowledge items:

- how to establish a diagnosis of cancer
- outcome overview
- diagnostic tools (biopsy, surgery, cytology, imaging, endoscopy)
- genetic/biochemical/molecular markers

Theme: A number of these knowledge items overlap significantly with those seen in other objectives in the IOC. How to establish a diagnosis of cancer has parallels with objective 4.1, as well as other objectives within objective 4.2 itself. Based upon the ratings of similar items, knowing how to establish a diagnosis of cancer was rated by the researcher as requiring a high level of understanding. Genetic, biochemical and molecular markers share similarities with objective 2.4 and were rated as requiring a moderate level of understanding, as were diagnostic tools. Outcome overview

Finding: Outline how a diagnosis of cancer is established.

Discuss the role of diagnostic tools (biopsy, surgery, cytology, imaging, endoscopy) genetic, biochemical and molecular markers.

f) Demonstrate an understanding of the histopathological classification and staging of cancers, including the concept of TNM and the implications of staging for prognosis and treatment.

The review of this objective focussed on four components:

- The histopathological classification of cancers, including the concept of TNM - Moderate.
- The histopathological staging of cancers, including the concept of TNM - Moderate.
- The implications of histopathological staging for treatment - High.
- The implications of histopathological staging on prognosis - High.

Theme: The histopathological classification and staging of cancers, including the concept of TNM was deemed appropriate at a moderate level of understanding. The implications of histopathological staging on treatment was considered necessary at a high level of understanding.

Finding: Discuss the histopathological classification and staging of cancers, including the concept of TNM.

Outline the implications of histopathological staging of cancers on treatment and prognosis.

g) Recognise common complications of malignant disease, e.g. superior vena cava obstruction, spinal cord compression, bone involvement.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the common complications of malignant disease, e.g. superior vena cava obstruction, spinal cord compression, bone involvement.

h) Evaluate critically the cost effectiveness of investigations.

Theme: This objective was deemed appropriate at a low level of understanding.

Finding: Exclude.

4.5.2.5 Treatment

Objective 5.1: General principles of treatment

a) Demonstrate a recognition of the importance of the patient in the decision-making process and the influences that affect their choices.

Theme: The importance of the patient in the decision making process was considered necessary at a high level of understanding. Factors that influence their choice in making decisions was deemed appropriate at a moderate level of understanding.

Finding: Outline the importance of the patient in the decision-making process.

Discuss the influences that affect patient choices in the decision-making process.

b) Describe the principles of treatment with intent to cure and palliate.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the principles of treatment with intent to cure and palliate.

c) Describe the role of multidisciplinary management of the patient.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the role of multidisciplinary management of the patient.

d) Demonstrate an understanding that tailoring of standard treatment protocols may be an appropriate component of patient focused care.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss why the tailoring of standard treatment protocols may be an appropriate component of patient focused care.

e) Demonstrate awareness of the process and outcome measures including concepts of self-audit and quality assurance to minimise deviation from best practice.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss process and outcome measures including concepts of self-audit and quality assurance to minimise deviation from best practice.

f) Outline how the treatment of malignancies by different modalities of treatment is guided by the natural history of the malignancy and the findings of staging evaluations.

Theme: The influence of the natural history of the tumour on treatment was deemed necessary at a high level of understanding, whilst the influence of staging evaluations was considered necessary at a moderate level of understanding.

Finding: Outline how the treatment of malignancies by different modalities of treatment is guided by the natural history of the malignancy.

Discuss how the treatment of malignancies by different modalities of treatment is guided by the findings of staging evaluations.

g) Demonstrate an understanding of the unique features of the management of cancer in children and adolescents and cancer in the elderly.

Theme: This objective was considered necessary at a moderate level of understanding, with the exception of the management of cancer in children, which was not considered necessary for medical students.

Finding: Discuss the unique features of the management of cancer in adolescents and the elderly.

h) Demonstrate an understanding of the management of potential complications of cancer treatments e.g. febrile neutropenia, mucositis, radiation skin injury.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the management of potential complications of cancer treatments e.g. febrile neutropenia, mucositis, radiation skin injury.

i) Demonstrate an understanding of the management of common oncological emergencies e.g. spinal cord compression, hypercalcaemia.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the management of common oncological emergencies e.g. spinal cord compression, hypercalcaemia.

j) Demonstrate an understanding of the patho-physiology of oncology emergencies and their management e.g. compressive, obstructive, coagulation and metabolic syndromes.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the patho-physiology of oncology emergencies and their management e.g. compressive, obstructive, coagulation and metabolic syndromes.

Objective 5.2: Principles of surgery

a) Describe the aims of surgical treatment of cancers and the general principles of common procedures.

Theme: The aims of surgical treatment of cancers was considered appropriate at a moderate level of understanding. The general principals of common procedures was deemed appropriate at a high level of understanding.

Finding: Discuss the aims of surgical cancer treatment.

Outline the general principals of common cancer surgical treatments.

b) Demonstrate an understanding of the range of surgical options and the ways these are affected by the integration into multi-modality care.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the range of surgical options and the ways these are affected by the integration into multi-modality care.

c) Recognise clinical indications for surgery of common cancers.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the clinical indications for surgery of common cancers.

d) Evaluate the outcomes of surgery, including efficacy, short and long-term side-effects, financial costs and quality of life.

Theme: With the exception of short-term side effects, which were considered necessary at a high level of understanding, this objective was considered necessary at a moderate level of understanding.

Finding: Outline the short-term side effects of surgery.

Discuss the outcomes of surgery, including efficacy, long-term side-effects, financial costs and quality of life.

e) Describe the general and specific pre-operative factors that influence surgical decision making.

Theme: The general preoperative factors were considered necessary at a high level of understanding, whilst specific preoperative factors were considered necessary at a moderate level of understanding.

Finding: Outline the general pre-operative factors that influence surgical decision making.

Discuss the specific pre-operative factors that influence surgical decision making.

f) Discuss the effect surgery may have on body image, including the role of reconstructive surgery.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the effect surgery may have on body image, including the role of reconstructive surgery.

g) Recognise the common complications of cancer surgery and understand their management.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the common complications of cancer surgery and understand their management

h) Discuss interactions with other modalities of therapy, both pre and post-operatively.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss interactions with other modalities of therapy, both pre and post-operatively.

Objective 5.3: Principles of radiotherapy

a) Describe the principles of radiobiology.

Theme: This objective was considered to require a low level of understanding.

Finding: Exclude.

b) Discuss the principles of radiotherapy: loco-regional treatment with either curative or palliative intent; when administered with curative intent it might be primary therapy or adjuvant to the primary modality.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the principles of radiotherapy: loco-regional treatment with either curative or palliative intent; when administered with curative intent it might be primary therapy or adjuvant to the primary modality.

c) Describe the salient features of delivering radiation treatment using equipment such as linear accelerators and brachytherapy machines. This should include a general description of treatment simulators, bunkers and the treatment planning departments.

Theme: The salient features of delivering radiotherapy via linear accelerators and brachytherapy were considered necessary at a moderate level of understanding. The role of simulators, bunkers and treatment planning departments were considered necessary at a low level of understanding.

Finding: Describe the salient features of delivering radiation treatment using equipment such as linear accelerators and brachytherapy machines.

d) Describe the general features of brachytherapy treatment, including the use of different isotopes placed with a variety of techniques in various anatomic sites, most prominently for ca cervix and ca prostate.

Theme: The general features of brachytherapy treatment was judged to be necessary at a moderate level of understanding. However, specifics, such as the isotopes uses and

the techniques used in specific anatomical sites was considered unnecessary for medical students.

Finding: Discuss the general features of brachytherapy treatment.

e) Recognise the clinical indications for radiotherapy.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the clinical indications for radiotherapy.

f) Evaluate the outcomes of radiotherapy including: efficacy, short and long-term side effects, costs and quality of life.

Theme: Efficacy, short and long term side effects, and quality of life were considered necessary at a moderate level of understanding. Cost were considered unnecessary for medical students.

Finding: Discuss the outcomes of radiotherapy including: efficacy, short and long-term side effects, and quality of life.

g) Recognise the common complications of radiotherapy and understand their management.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the common complications of radiotherapy and, in general, how these are managed.

h) Discuss the integration of radiotherapy with other modalities.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the integration of radiotherapy with other modalities.

i) Demonstrate an understanding of the access problems associated with radiotherapy and how this may affect patient choice.

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss access problems associated with radiotherapy and how this may affect patient choice.

Objective 5.4: Principles of systemic therapy

a) Outline the principles of systemic therapy including chemotherapy, hormone and immunotherapy biological therapies (including immunomodulators, signal transduction inhibitors and monoclonal antibodies) and (prospectively) gene therapy.

Theme: The principles of chemotherapy, hormone therapy and immunotherapy were considered necessary at a moderate level of understanding. Gene therapy was considered unnecessary for medical students.

Finding: Discuss the principles of systemic therapy including chemotherapy, hormone and immunotherapy biological therapies (including immunomodulators, signal transduction inhibitors and monoclonal antibodies).

b) Recognise clinical indications for use of systemic therapy in early and advanced disease.

Theme: Clinical indications for the use of systemic therapy in early disease were considered necessary at a high level of understanding. Clinical indications for the use of systemic therapy in advanced disease were considered necessary at a moderate level of understanding.

Finding: Outline the clinical indications for the use of systemic therapy in early disease.

Discuss the clinical indications for the use of systemic therapy in advanced disease.

c) Evaluate the outcomes of systemic therapy including efficacy, short and long-term side effects, financial costs and quality of life.

Theme: Quality of life was considered necessary at a high level of understanding. Efficacy, and short and long term side effects were considered necessary at a moderate level

of understanding. Financial costs were considered unnecessary for medical students.

Finding: Outline the outcomes of systemic therapy on quality of life.

Discuss the outcomes of systematic therapy in terms of efficacy, and short and long term side effects.

e) Recognise the common complications of systemic therapy and understand their management.

Theme: This objective was deemed necessary at a high level of understanding.

Finding: Outline the common complications of systemic therapy and, in general, how these are managed.

f) Demonstrate ability to manage toxicities and adverse reactions to systemic therapy e.g. emesis, febrile neutropenia.

Theme: This objective was retained because of the potential life-threatening risks associated with systemic therapy. Whilst the objective depicts this as a skill, the requisite knowledge was considered in this context. Whilst an intern will not be attached to a cancer service unit, they may encounter a patient presenting with an adverse reaction in the emergency department. The knowledge of toxicities and adverse reactions was considered necessary at a high level of understanding.

Finding: Outline toxicities and adverse reactions to systemic therapy e.g. emesis, febrile neutropenia.

g) Discuss the integration of systemic therapy with other modalities.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the integration of systemic therapy with other modalities.

Objective 5.5: Principles of palliative care

- a) Demonstrate an understanding of the importance of the patient in decision making processes and the influences that affect their choices.**

Theme: This is the same as Objective 5.1 a). As it was reviewed without the context of general treatment (5.1) or palliative care (5.5) it was only reviewed once.

Finding: Refer to Objective 5.1 a).

- b) Explain the role and structure of palliative and supportive care in the multidisciplinary management of advanced cancer.**

Theme: The role and structure of palliative care in the multidisciplinary management of advanced cancer was deemed necessary at a high level of understanding. The role and structure of supportive care in the multidisciplinary management of advanced cancer was considered necessary at a moderate level of understanding.

Finding: Outline the role and structure of palliative care in the multidisciplinary management of advanced cancer.

Discuss the role and structure of supportive care in the multidisciplinary management of advanced cancer.

- c) Explain considerations of when and how palliative care should be introduced.**

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the considerations of when and how palliative care should be introduced.

- e) Discuss principles of both pharmacological and non-pharmacological pain relief and the palliative management of other symptoms.**

Theme: The principles of pharmacological pain relief and the palliative management of other symptoms was considered necessary at a high level of understanding. The principals of non-pharmacological pain relief was considered necessary at a moderate level of understanding.

Finding: Outline the principles of pharmacological pain relief and the palliative management of other symptoms.

Discuss the principles of non-pharmacological pain relief.

f) Demonstrate an understanding of "end of life" issues that confront patient, family and physician:

- Physical effects of advanced cancer;
- Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement;
- Ethical aspects of "end of life" decision-making.

This is a complex objective, covering three different issues associated with end of life care on three distinct entities (the patient, their family and their physician). For simplicity, the data for this objective is presented in tabular form (Table 4.19).

Table 4.19: Ratings for required levels of understanding for the components of Objective 5.5 (f)

| End of life issues that confront the: | Patient | Their Family | Their Physician |
|---|----------------|---------------------|------------------------|
| Physical effects of advanced cancer | Moderate | High | Moderate |
| Psychosocial aspects of terminal cancer, support, loss and bereavement | Moderate | High | Moderate |
| ethical aspects of "end of life" decision-making | High | Moderate | Moderate |

Theme: Ethical aspects of end of life decision making that confront the patient were considered necessary at a high level of understanding. Physical effects of advanced cancer and the psychosocial aspects of terminal care, support, loss and bereavement that confront the patient were considered necessary at a moderate level of understanding.

Physical effects of advanced cancer and the psychosocial aspects of terminal care, support, loss and bereavement that confront the patient were considered necessary at a high level of understanding. Ethical aspects of end of life decision making that

confront the patient's family were considered necessary at a moderate level of understanding.

Physical effects of advanced cancer and the psychosocial aspects of terminal care, support, loss and bereavement and ethical aspects of end of life decision making that confront the patient's physician were considered necessary at a moderate level of understanding.

Finding: Outline the "end of life" issues that confront the patient in regards to the ethical aspects of "end of life" decision-making.

Discuss the "end of life" issues that confront the patient in regards to the physical effects of advanced cancer, psychosocial aspects of terminal cancer, support (religious, cultural, spiritual and existential), loss and bereavement.

Outline the "end of life" issues that confront the patient's family in regards to the physical effects of advanced cancer, psychosocial aspects of terminal cancer, support (religious, cultural, spiritual and existential), loss and bereavement.

Discuss the "end of life" issues that confront the patient's family in regards to the ethical aspects of "end of life" decision-making.

Discuss the "end of life" issues that confront the patient's physician in regards to the physical effects of advanced cancer, psychosocial aspects of terminal cancer, support (religious, cultural, spiritual and existential), loss and bereavement and ethical aspects of "end of life" decision-making.

g) Demonstrate understanding of the Palliative Care Act(s).

Theme: This objective was not considered necessary for medical students.

Finding: Exclude.

j) Demonstrate understanding of utility of procedures to relieve symptoms e.g. ascitic and pleural taps.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the utility of procedures to relieve symptoms (e.g. ascitic and pleural taps).

Objective 5.6: Follow-up and relapse

a) Demonstrate an understanding of the aims of follow-up including:

- **recognition and management of local and distant recurrence;**
- **complications of treatment;**
- **detection of new primaries.**

Theme: The aims of recognition and management of local recurrence was considered necessary at a high level of understanding. The aims of recognition and management of distant recurrence, complications of treatment and the detection of new primaries was considered necessary at a moderate level of understanding.

Finding: Outline the aims of follow-up with regards to the recognition and management of local recurrence.

Discuss the aims of follow-up with regards to the recognition and management of distant recurrence, complications of treatment and the detection of new primaries.

b) Describe manifestations of recurrence of common cancers.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the manifestations of recurrence of common cancers.

c) Describe the management of recurrences, including aims, treatments and outcomes.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the management of recurrences, including aims, treatments and outcomes.

d) Demonstrate an understanding of the psychosocial impact of expected and unexpected recurrences.

Theme: The psychosocial impact of expected recurrences was considered necessary at a low level of understanding. The psychosocial impact of unexpected recurrences was considered necessary at a moderate level of understanding.

Finding: Discuss the psychosocial impact of unexpected recurrences on the patient.

e) Demonstrate an understanding of the limitations and cost effectiveness of follow-up itself.

Theme: The limitations of follow-up was deemed necessary at a moderate level of understanding. The cost effectiveness of follow-up was not considered necessary for medical students.

Finding: Discuss the limitations of the process of follow-up.

f) Recognise recurrence patterns of common cancers.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline the recurrence patterns of common cancers.

4.5.2.6 Communication Skills

Objective 6.1: Psychosocial and cultural significance of cancer

a) Discuss cultural and psychosocial factors influencing presentation for screening and diagnosis.

Theme: Cultural factors influencing presentation for screening and diagnosis was considered necessary at a moderate level of understanding. Psychosocial factors influencing presentation for screening was considered necessary at a low level of understanding. Psychosocial factors influencing presentation for diagnosis was considered necessary at a moderate level of understanding.

Finding: Discuss cultural factors influencing presentation for screening and diagnosis.

Discuss psychosocial factors influencing presentation for diagnosis.

b) Discuss the psychosocial impact of cancer diagnosis and treatment on the patient and their family, and how they adjust in the short and long-term.

This is a complex objective, looking at the short- and long-term psychological impact of a cancer diagnosis and the treatment thereof on both the patient and their family. For simplicity, the data for this objective is presented in tabular form (Table 4.20).

Table 4.20: Ratings for required levels of understanding for the components of Objective 6.1(b)

| Psychosocial impact on the: | Patient | Their Family |
|---|----------------|---------------------|
| Psychosocial impact of a cancer diagnosis and how they adjust in the short-term. | Moderate | High |
| Psychosocial impact of a cancer diagnosis and how they adjust in the long-term. | Moderate | High |
| Psychosocial impact of cancer treatment and how they adjust in the short-term. | Moderate | Moderate |
| Psychosocial impact of cancer treatment and how they adjust in the long-term. | Moderate | High |

Theme: The short-term and long term psychosocial impact that a cancer diagnosis and treatment has on the patient was expected at a moderate level of understanding. The short-term and long term psychosocial impact that a cancer diagnosis has on the patient's family was deemed necessary at a high level of understanding, as were the short-term psychosocial impact of cancer treatment. The long term psychosocial impact of cancer treatment was considered necessary at a moderate level of understanding.

Finding: Discuss the psychosocial impact of a cancer diagnosis and treatment on the patient and how they adjust in the short and long-term

Outline the psychosocial impact of a cancer diagnosis on the patient's family and how they adjust in the short and long-term.

Discuss the psychosocial impact of cancer treatment on the patient's family and how they adjust in the short-term.

Outline the psychosocial impact of cancer treatment on the patient's family and how they adjust in the long-term.

c) Discuss the economic impact of cancer on the patient and family.

Theme: The economic impact of cancer on the patient was considered necessary at a moderate level of understanding. The economic impact of cancer on the patient's family was considered unnecessary for medical students.

Finding: Discuss the economic impact of cancer on the patient.

d) Demonstrate an understanding of the impact of cancer on sexuality and fertility.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the impact of cancer on sexuality and fertility.

e) Be aware of significant cultural and religious differences in the population that frame the challenge of breaking of bad news effectively.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss significant cultural and religious differences in the population that may negatively impact upon the effective breaking of bad news.

f) Demonstrate understanding of resources offering appropriate and reliable patient support information.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the importance of providing resources offering appropriate and reliable patient support information.

h) Demonstrate awareness of significant cultural and spiritual (rather than religious) differences within the society.

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the presence of significant cultural and spiritual (rather than religious) differences within the society.

Objective 6.2: Communication and counselling

b) Be aware that the impact of receiving bad news interferes with patients' ability to comprehend fully the important information being presented to them. Illustrate the ability to assess a patient's realistic understanding of their situation and to individually tailor verbal and written information provided according to patient preferences and understanding.

Theme: As outlined at the beginning of this chapter, skills were not reviewed in this phase of the research. Therefore, the second component in this objective was omitted.

The impact that receiving bad news has on the patient's ability to comprehend important information was considered necessary at a moderate level of understanding.

Finding: Discuss how receiving bad news may interfere with a patients' ability to comprehend fully the importance of the information being presented to them.

d) Demonstrate an understanding of how to explain the risks and benefits of options for management to the patient and their significant others, so that active participation in the management process is encouraged.

Theme: This objective was considered necessary at a high level of understanding.

Finding: Outline how to explain the risks and benefits of options for management to the patient and their significant others, so that active participation in the management process is encouraged.

Objective 6.3: Education of patients

- a) Demonstrate an understanding of the principles of educating patients to be actively involved in their care.**

Theme: This objective was considered necessary at a moderate level of understanding.

Finding: Discuss the principles of educating patients to be actively involved in their care.

- b) Demonstrate an understanding of resources available to patients and the public (e.g. Cancer Councils, cancer support groups, books, brochures, internet, Medline, search engines, clinical alerts, databases, chat lines, commercial helpdesks, media, family, friends etc.) and the limitations of these (ie. peer reviewed journals vs popular press).**

Theme: The variety of resources available to patients was deemed necessary at a moderate level of understanding. The limitations of such resources was considered necessary at a high level of understanding.

Finding: Discuss the types of resources available to patients and the public (e.g. Cancer Councils, cancer support groups, books, brochures, internet, Medline, search engines, clinical alerts, databases, chat lines, commercial helpdesks, media, family, friends etc.).

Outline the limitations of the various types of resources available to patients and the public (i.e. peer reviewed journals versus popular press).

- c) Discuss the doctor's role in patient education about self-examination and worrying signs.**

Theme: The role of the doctor in educating patients' self-examination techniques was considered appropriate at a moderate level of understanding. Educating patients' about worrying signs was deemed necessary at a high level of understanding.

Finding: Outline the doctor's role in patient education about worrying signs.

Discuss the doctor's role in patient education about self-examination.

- f) Demonstrate an understanding of the benefits to ongoing patient education and care that result from utilising a multidisciplinary team including health professionals and others.**

Theme: The benefits to ongoing patient care that result from utilising a multidisciplinary team including health professionals and others was considered necessary at a moderate level of understanding. The benefits to ongoing patient education that result from utilising a multidisciplinary team including health professionals and others was deemed appropriate at a low level of understanding.

Finding: Discuss the benefits to ongoing patient care that results from utilising a multidisciplinary team including health professionals and others.

Objective 6.4: Family and community support

- a) Discuss the role of psychosocial, physical, financial and information supports available for patients and their families.**

This is a complex objective, covering the role of four different support types available to the patient and their family. For simplicity, the data for this objective is presented in tabular form (Table 4.21).

Table 4.21: Ratings for required levels of understanding for the components of Objective 6.4(a)

| The role of: | Patient | Their Family |
|------------------------------|----------------|---------------------|
| Psychosocial supports | Moderate | Moderate |
| Physical | Moderate | Moderate |
| Financial supports | Moderate | Low |
| Information supports | High | Moderate |

Theme: Psychosocial and physical supports for both patients and their family were considered necessary at a moderate level of understanding. Financial supports for patients was deemed appropriate at a moderate level of understanding and at a low level for family members. Information supports were considered necessary at a high level of understanding and at a moderate level for family members.

Finding: Outline the role of information supports available for patients.

Discuss the role of psychosocial, physical and financial supports available for the patient.

Discuss the role of psychosocial, physical and information supports available for the patient's family.

b) Identify available information resources, community resources, financial resources and other physical supports.

Theme: Community resources were deemed appropriate at a high level of understanding. Information and physical supports were considered necessary at a moderate level of understanding. Financial supports were not considered appropriate for medical students.

Finding: Outline available community resources.

Discuss available information resources and other physical supports.

c) Demonstrate an understanding of the means by which doctors can facilitate the provision of these services.

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss the means by which doctors can facilitate the provision of support services.

d) Identify the impact on the family of a shift to home care.

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss the impact on the family of a shift to home care.

4.5.2.7 Ethics

Objective 7: Ethics and professionalism

- a) **Demonstrate an understanding of the effects on health professionals of caring for patients with cancer and of the ways in which the stresses of this work can be managed appropriately.**

Theme: This objective was deemed necessary at a moderate level of understanding.

Finding: Discuss the effects on health professionals of caring for patients with cancer and of the ways in which the stresses of this work can be managed appropriately.

- b) **Discuss the bioethics of issues such as access, equity and resource allocation, as well as medical care at the end of life.**

Theme: The bioethics of issues surrounding medical care at the end of life was considered necessary at a moderate level of understanding. The bioethics of issues such as access, equity and resource allocation were not considered appropriate for medical students.

Finding: Discuss the bioethical issues surrounding medical care at the end of life.

- c) **Identify the key medico-legal issues in diagnosis, screening/early detection, management, evidence-based guidelines, defensive medicine, commutative justice, distributive justice, social justice, physician-assisted suicide, euthanasia.**

The review of this objective focussed on the key medico-legal issues in the following 10 areas:

- Diagnosis – Moderate.
- Screening/early detection – Low.
- Management – High.
- Evidence-based guidelines – Low.
- Defensive medicine – Moderate.
- Commutative justice – Low.
- Distributive justice – Moderate.

- Social justice – Moderate.
- Physician-assisted suicide – Moderate.
- Euthanasia – Moderate.

Theme: The key medico-legal issues in management was deemed necessary at a high level of understanding. The key medico-legal issues in diagnosis, defensive medicine, distributive and social justice, physician-assisted suicide and euthanasia were considered necessary at a moderate level of understanding. The key medico-legal issues in screening and early detection, evidence-based guidelines and commutative justice were not considered necessary for medical students.

Finding: Outline the key medico-legal issues in management.

Discuss the key medico-legal issues in diagnosis, defensive medicine, distributive justice, social justice, physician-assisted suicide and euthanasia.

d) Discuss principles, elements and role of informed consent in patient decision making.

Theme: The elements and role of informed consent in patient decision making was considered necessary at a high level of understanding. The principles of informed consent in patient decision making was deemed necessary at a moderate level of understanding.

Finding: Discuss the principles of informed consent in patient decision making.

Outline the elements and role of informed consent in patient decision making.

4.6 Summary of Findings

The findings of stage one and two provide the necessary information for the development of the *Cancer Education Framework for Australian Medical Schools*. Upon completion of stage one 244 (81.06%) of items returned mode scores, with the remaining 57 (18.94%) items returning a bimodal score. Modes of *Low*, *Moderate* and *High* were received for 23 (7.64%), 163 (54.15%) and 58 (19.27%) items respectively.

During the panel sessions convened in stage two, participants reviewed the items to reach consensus on the level of understanding required of Australian medical students for each of the knowledge items. Of the 57 items that demonstrated bimodality, 14 (24.56%) were rated low, 19 (33.33%) were rated moderate and 24 (42.11) were rated high. Twenty items that had an initial mode of *Moderate* were reviewed and changed to a rating of low and high (13 and 7 respectively) whilst 4 items that had an initial mode of *High* were reviewed and changed to a rating of low and moderate (2 and 2 respectively).

Upon completion of phase one, 52 (17.27%) of the knowledge items reviewed were rated as requiring a low level of understanding, 164 (54.49%) requiring a moderate level of understanding and 85 (28.24%) requiring a high level of understanding.

4.7 Conclusion

Chapter Four has provided a two-stage mixed methods approach that utilised both qualitative and quantitative methods to review the 301 knowledge items unpacked from the IOC. In total, 249 (82.75%) knowledge items were considered necessary for medical students to obtain prior to graduation, highlighting the relevancy of the IOC for Australian medical schools. Conversely, this figure also highlights the sheer volume of knowledge comprising the IOC, which is one of the issues with attempting to incorporate such a curriculum into existing medical curricula. These issues only heightened when considering the skills, attitudes and generic attributes contained in the IOC that were excluded from this review (as outlined in Chapter Three).

Chapter Five will describe the development of the *Cancer Education Framework for Australian Medical Schools*.

Chapter Five: Phase Two – Framework Development

5.1 Introduction

In Chapter Four the findings of the phase one review of the knowledge items unpacked from the Ideal Oncology Curriculum (IOC) were described and the reconstitution of the IOC presented. This chapter describes the development of the *Cancer Education Framework for Australian Medical Schools*, using a participatory curriculum design (PCD) approach. This will be followed by Chapter Six, phase three data in which the analysis and findings following key stakeholder input on the final version of the framework will be presented.

5.2 Examples of Curriculum Frameworks

As outlined in Chapter Two, a number of cancer frameworks currently exist both nationally and internationally. As discussed in previous chapters, IOC is a nationally developed cancer curriculum that was specifically designed for Australian medical schools.¹¹ The IOC represents the only Australian produced comprehensive cancer curriculum. However, the full extent to which the IOC has been implemented within Australian medical schools is currently unknown, although it is believed to have been used as a guide in assisting blueprinting or as a checklist in some schools.^{5, 6, 47} To date, no material has been published to indicate that any Australian medical school has implemented the IOC in its entirety. One of the issues with attempting to incorporate the IOC into an existing medical curriculum is the sheer size of the curriculum, which spans 36 pages and comprises 150 objectives distributed across eight broad categories,¹¹ making integration of the content challenging.¹¹¹

The *Palliative Care Curriculum for Undergraduates* (PCC4U) represents a nationally produced curriculum for palliative care, which is structured around core modules and focus topics.²⁴⁷ The curriculum has been developed for all health-related professions, not just for medicine.²⁴⁸ As with the IOC, it is difficult to gauge the uptake of the PCC4U in Australian medical schools. A PCC4U newsletter published in July 2010 indicates that three-quarters of the medical schools in Australia had either implemented the curriculum or were reviewing it.²⁴⁹ Combined, the IOC and PCC4U represent significant effort in addressing the issues of cancer education in Australia, yet there is a paucity of evidence that either have been implemented on a national scale. The PCC4U follows a more contemporary and flexible approach,

comprising core modules and resources to support self-directed learning. On the other hand, the IOC represents a more traditional curriculum with learning objectives that requires resourcing, in addition to the eBook released by CCA in 2014.⁹² The framework described in this chapter aims at combining components of both these curricula to provide a light, nimble and flexible framework to support cancer education for Australian medical students.

5.3 Elements for Inclusion

Two main themes emerged from the literature and guided the development of the *Cancer Education Framework for Australian Medical Schools*:

1. The positive impact of exposure to cancer patients
2. The acquisition of principles rather than specialist knowledge

The benefit associated with patient exposure is highlighted in both evaluations of cancer teaching and within curricula documents.^{11, 42, 121, 135, 186} Given the positive impact that experiential learning has on the development of student attitudes, confidence, competence and knowledge application, clinical exposure to cancer patients features prominently in the *Cancer Education Framework for Australian Medical Schools*. Further, exposure to cancer patients in cancer service units provides students with first-hand experience of the multidisciplinary model of cancer management.⁶

One of the issues with cancer teaching is the level of knowledge taught, particularly in the clinical years. Consensus exists in the literature that cancer education should focus on the general principles that underpin cancer management and that is relevant for all doctors, regardless of their future career.^{6, 83, 127}

Topics that were seen recurrently in the literature focussed on treatment modality, symptom control, assessment and management of oncological emergencies, the role of the multidisciplinary team, communication (patient/family/professionals), psychological, social and spiritual aspects, legal and ethical issues and cancer biology.^{117, 135, 142, 149, 161}

The *Cancer Education Framework for Australian Medical Schools* needs to convey the curricula content in a clear and concise manner, without repetition. As previously stated, the curriculum content in the IOC spans 36 pages,¹¹ which may provide a barrier to its

implementation. The initial intention was to have the *Cancer Education Framework for Australian Medical Schools* take up no more than three pages. A small framework needs to clearly articulate the outcome statements whilst providing flexibility for medical schools to incorporate the framework into an existing medical curriculum.

5.4 Development of the Framework

As outlined in Chapter Two, a participatory curriculum design (PCD) method was used as the theoretical framework that guided the development of the *Cancer Education Framework for Australian Medical Schools*.

PCD highlights the importance of obtaining feedback from stakeholders who may not usually be consulted as part of the curriculum development process.^{109, 110} Medical school curricula have traditionally relied upon pathology and surgery to teach students about cancer^{81, 82} and many schools lack academic oncologists on their curriculum committees,⁸⁰ meaning that decisions about cancer education are often made by non-cancer clinicians. The use of a PCD approach using key stakeholders not otherwise included in curriculum development aims to produce a curriculum that better reflects the actual expectations of junior doctors with regards to caring for cancer patients. Feedback from key stakeholders has been sought and incorporated into the development of the *Cancer Education Framework for Australian Medical Schools* at several stages:

- The IOC underwent extensive stakeholder consultation during its development
- Local cancer clinicians undertook a review of the knowledge items unpacked from the IOC
- A review of the literature incorporated views on cancer education from leading academic oncologists, surgeons and palliative care physicians, educational researchers, and medical students and junior doctors
- Feedback from the researcher's supervisors, who have extensive experience in both curriculum development, and clinical supervision and education of students and junior staff

- A draft version of the *Cancer Education Framework for Australian Medical Schools* was sent to two cancer clinicians, both of whom have extensive experience in teaching cancer to medical students
- National and international review of the *Cancer Education Framework for Australian Medical Schools* undertaken by cancer clinicians (Chapter Six)

The results of the review of the IOC, described in Chapter Four formed the starting point for the development of the *Cancer Education Framework for Australian Medical Schools*. The IOC was chosen for several reasons:

- The curriculum was designed for Australian medical students
- The curriculum was developed by cancer clinicians and academic oncologists who were actively teaching medical students, as well as consumer representatives
- Extensive consultation was undertaken with key stakeholders such as medical faculties and curriculum committees, cancer societies and professional colleges, government officials, cancer advocates and consumer groups, medical professionals, medical student associations and international reviewers.
- The curriculum was endorsed by the UICC

For pragmatic reasons, only the knowledge components of the IOC were unpacked and reviewed during phase one. This decision was based upon the volume of work associated with reviewing the knowledge items, the reliance upon a large proportion of these items to underpin many of the skills and attitudes, as well as the workload and subsequent availability of busy clinicians. The researcher drew upon the rating of the knowledge items and comments from the review sessions, as well as the available literature to incorporate skills and attitudes into the framework. Similarly, items that are reasonably expected to be covered in Australian medical school curricula were omitted from the framework in order to produce a final product that is representative of the cancer-specific educational requirements of Australian medical students, whilst not becoming too large or complex that it presents a barrier to implementation. For example, it is reasonable to expect that all medical schools produce graduates that can take a history and perform a physical examination. Similarly, critical appraisal of research literature is a generic skill that is also to be expected of medical graduates. As such, these skills will not be included in the framework.

Benstead et al. reported on a Delphi study undertaken by the Joint Collegiate Council for Oncology (JCCO) in the UK to develop a non-surgical oncology curriculum, in which the researchers made conscious decisions to exclude content that experts thought were important and include content that was viewed as unnecessary.¹⁴⁰ The authors explained that the Delphi study was “aimed at informing not determining the...curriculum”,^{140(p738)} which is congruent with the approach taken in this research.

The review of the IOC, as described in Chapter Four highlights several instances in which final ratings of items were changed when the curriculum was reconstructed. In most instances, this was due to the size of the task, which required that the IOC be unpacked and items be distributed across different groups. This process, whilst necessary, meant that content unpacked from a single variable would be reviewed separately and by different groups. Consider the following example:

Objective 1.2.a) Describe the epidemiological concepts of morbidity (incidence and prevalence), mortality, relative risk and survival in relation to common cancers.

The review of this objective focused on the four epidemiological concepts:

- morbidity (incidence and prevalence) - Moderate
- mortality - High
- relative risk - Moderate
- survival – Moderate

The four knowledge items reviewed in this objective, were reviewed by groups three, four, five and six. Mortality was considered to require a high level of understanding where the other components were deemed to require only a moderate level of understanding. However, when considering this objective it does not make sense to separate mortality from the other items, nor expect that a medical student has a higher understanding of mortality than they do morbidity. Further, one of the groups commented that these concepts should be taught in all medical curricula and do not change based upon the disease in question. Despite this item being deemed important for medical graduates, it was not considered for inclusion into the framework, as given that these concepts are not cancer-specific, they represent knowledge that would be expected in all medical schools in Australia. The rationale

for their exclusion is to keep the *Cancer Education Framework for Australian Medical Schools* as simple as possible to optimise its utility and adoption into Australian medical curricula.

Once the overarching principles of cancer management were established, the knowledge underpinning these principles were considered. As treatment decisions and prognosis are influenced by the tumour characteristics, knowledge of tumour grading and staging is required to understand the decisions that are made regarding patient management. Consider Objective 4.2.f^{11(p27)}:

“Demonstrate an understanding of the histopathological classification and staging of cancers, including the concept of TNM and the implications of staging for prognosis and treatment.”

The review of this objective focussed on four components:

- The histopathological classification of cancers, including the concept of TNM - Moderate.
- The histopathological staging of cancers, including the concept of TNM - Moderate.
- The implications of histopathological staging for treatment - High.
- The implications of histopathological staging on prognosis - High.

Whilst knowledge of the actual process of staging and classifying tumours was deemed appropriate at a moderate level of understanding, the implication of staging and classification was considered necessary at a high level of understanding. This objective was incorporated into the *Cancer Education Framework for Australian Medical Schools* supporting two outcome statements under the section *Diagnostic Process*:

- Outline the necessity of a histopathological diagnosis
- Discuss staging and grading of tumours

It is important for medical students to know that a diagnosis of cancer cannot be made without histopathological confirmation. Whilst students do not need to know how to stage tumours or grade tumours, they should have a basic understanding of the process and its implications in terms on treatment and prognosis.

The review of the literature presented in Chapter Two highlighted the commonalities across the various curriculum documents that have been published, curricula recommendations, and programs that have been implemented and evaluated. The review also provided insight into different ways in which to deliver curricula recommendations and how to present an overall product that is clear, concise and attractive to medical school curriculum committees.

Whilst the IOC was chosen as a starting point, additional cancer curricula and literature on cancer education for medical students were used to refine the *Cancer Education Framework for Australian Medical Schools*. In particular, the curricula documents produced by the International Summer School in Oncology for Medical Students (ISOMS) were noted to be concisely presented and congruent with the aim of keeping the framework manageable¹³⁴,¹³⁵. When considering the review of the IOC, the themes emergent in the literature and the aim of the framework, the basic principles of cancer management appropriate for junior doctors was considered as the foundation point. The ISOMS curriculum includes a single page summary for each of the teaching sessions,¹³⁵ which complimented the IOC and provided a means through which commonalities between traditional, comprehensive curriculum document and a teaching program aimed at cancer education for the generalist could be aligned. Further, the ISOMS document presents a curriculum that has been delivered to an international mix of medical students since 1996.¹¹⁶

Experiential learning was chosen as the top tier of the *Cancer Education Framework for Australian Medical Schools*, as this provides the clinical context in which students can observe the principles of cancer management in practice, as well as gain much needed experience through their interactions with cancer patients and their families. The five essential cancer clinical experiences outlined in the IOC¹¹ underpin this section. Experiential learning is supported by the knowledge outlined in the principle of modern cancer management (both common and discipline specific). Finally, knowledge essential to underpin the principles of cancer management would be required. With these three key levels established, content was then identified as being important to provide the necessary knowledge to support the *Cancer Education Framework for Australian Medical Schools*:

1. Clinical Exposure
2. Principles of Cancer Management

3. Cancer-specific Knowledge

5.5 The Cancer Education Framework for Australian Medical Schools

A draft version of the *Cancer Education Framework for Australian Medical Schools* was developed in Microsoft PowerPoint, with the aim of keeping the document compact and succinct, with a starting point of three slides. For simplicity and convenience, the main components of the framework are presented in this chapter under headings 5.5.1 through 5.5.5.5. The in-text references have been removed to avoid confusion with the references used elsewhere within the thesis. Footnotes have been removed, as has the list of references. The draft *Cancer Education Framework for Australian Medical Schools* document is provided in its original format in Appendix 10.

5.5.1 Background:

The impact of cancer on the Australian population and health care system cannot be overstated. Currently, half of all Australians over the age of 85 will develop a malignant neoplasm. Whilst cancer is the leading cause of death in Australia, it also has one of the highest five-year survival rates. Consequentially, more Australians are living with cancer, which places an incredible demand on the health system.

Several studies have shown that Australian medical students are ill-prepared to care for cancer patients upon graduation. Additionally, medical students and junior doctors themselves have highlighted shortcomings in their own cancer education.

The lack of a national medical curriculum results in individual medical schools with considerable diversity in teaching and clinical exposure. As such, no minimum requirements for cancer education exist in Australia. At a national level, an ideal oncology curriculum and a palliative care curriculum have been developed. To date, it is unclear as to the level of uptake of either curriculum within Australian medical schools.

There remains a lack of consensus on what content to include in a cancer curriculum and how best to deliver such a curriculum. In panel sessions conducted with Australian cancer clinicians reviewing the Ideal Oncology Curriculum for Medical Schools, it was agreed upon that medical students require a fundamental understanding of the

principles of cancer management, coupled with exposure to cancer patients in cancer service units, in order to observe this in the clinical setting. Similarly, there was agreement that medical students do not require specialist knowledge, such as drug or radiotherapy dosages. When reviewing the literature, these themes are evident.

5.5.2 Proposed Framework:

The acquisition of the basic principles of cancer management has provided the basis for the development of the Cancer Education Framework for Australian Medical Schools. Once the salient points of management were identified, the necessary knowledge required to underpin this were identified and incorporated into the framework. Knowledge that would be expected in all medical schools in Australia (such as the cell cycle, concepts of incidence and mortality and evidence-based practice) have not been included in the framework. The rationale here is to keep the framework as simple as possible to optimise its utility and adoption into Australian medical curricula.

The learning objectives presented in the framework are by no means exhaustive and provide a minimal blueprint from which to build a basic cancer curriculum within an existing medical school curriculum.

The blueprint draws heavily from the Cancer Council Australia's Ideal Oncology Curriculum for Medical Schools, and the aforementioned review by cancer clinicians. Other curricula used in the development of this framework include the Palliative Care Curriculum for Undergraduates and the International Summer School 'Oncology for Medical Students' curriculum.

5.5.3 Clinical Exposure

A cancer curriculum should include clinical placements that provide medical students with the following experiences:

- *Talking with and examining people affected by all stages of cancer*
- *Talking with and examining people affected by all common cancers*
- *Observing all components of multidisciplinary cancer care*
- *Seeing shared decision-making between people with cancer and their doctors*

- *Talking with and examining dying people*

It is recommended that clinical exposure be provided, where possible, through placements in cancer service units, including medical and radiation oncology, and palliative care.

5.5.4 Principles of Cancer Management

Upon graduation, students should be able to:

- *Discuss the difference between treatment approaches with curative and palliative intent*
- *Outline the principles of multidisciplinary management*
- *Discuss how tumour and patient factors influence the way in which patients are managed*
- *Describe the role of neo-adjuvant and adjuvant therapy*
- *Outline the roles of locoregional and systemic therapy*
- *Outline organ-sparing approaches*
- *List common oncological emergencies and outline how these are managed*
- *Discuss the principles of symptom control*
- *Discuss the role of clinical practice guidelines*
- *Discuss the role of clinical trials*

5.5.4.1 Principles of Surgery

Upon graduation, students should be able to:

- *Outline the aim of cancer surgery*
- *Describe the importance of adequate surgical margins*
- *Discuss general preoperative factors*
- *Identify common complications of cancer surgery and how these can be managed*
- *Discuss the risks of tumour spill*
- *Describe the role of surgery in staging*

5.5.4.2 Principles of Radiation Oncology

Upon graduation, students should be able to:

- *Outline the aim of radiotherapy*

- *Discuss indications for radiotherapy*
- *Describe the cellular response to radiotherapy*
- *Identify the various methods used to deliver radiotherapy*
- *Discuss why radiotherapy is delivered using fractionated doses*
- *Identify common side effects of radiotherapy and how they are managed*

5.5.4.3 Principles of Medical Oncology

Upon graduation, students should be able to:

- *Outline the role of medical oncology*
- *Discuss indications for systemic therapies*
- *Describe the method of action of systemic agents (i.e. chemotherapy, targeted therapy and hormonal therapy)*
- *Identify common side effects of systemic therapy and how they are managed*

5.5.4.4 Principles of Palliative Care

Upon graduation, students should be able to:

- *Outline the role of palliative care*
- *Discuss common end of life issues*
- *Discuss the provision of palliative care in various settings*
- *Discuss the role of other modalities in the palliative setting*
- *Identify commonly used procedures to relieve symptoms*
- *Outline the role of the GP in providing palliative care*

5.5.5 Cancer-specific Knowledge

5.5.5.1 Local context

- *Upon graduation, students should be able to:*
- *Identify the most commonly occurring cancers in men and women*
- *Identify the leading causes of cancer death in men and women*
- *Outline the differences in cancer outcomes between Indigenous and non-indigenous Australians*
- *Outline the differences in cancer outcomes between urban and rural Australians*

5.5.5.2 Cancer prevention

Upon graduation, students should be able to:

- *Describe methods of primary and secondary prevention*
- *Differentiate between population-based screening and surveillance*
- *Discuss the scientific evidence to support population-based methods of screening for cancer*
- *Identify risk factors for common cancers*

5.5.5.3 Cancer biology

Upon graduation, students should be able to:

- *Outline the concept of carcinogenesis*
- *Describe dysplasia, carcinoma in situ, invasive cancer*
- *Describe tumour types*
- *Identify important familial cancer syndromes*
- *Discuss hormonal influences and tumour markers for common cancers*
- *Describe patterns of spread of common cancers*
- *Describe recurrence patterns of common cancers*

5.5.5.4 Diagnostic process

Upon graduation, students should be able to:

- *Outline the necessity of a histopathological diagnosis*
- *Discuss staging and grading of tumours*
- *Describe the prognostic implications of differentiation*
- *Identify potential cancer presentations*
- *Describe the physical signs of cancer*
- *Discuss commonly used diagnostic investigations*

5.5.5.5 Patient-centred care

Upon graduation, students should be able to:

- *Discuss the importance of involving patients in the decision making process*
- *Identify factors that influence patient choices*
- *Outline the impact of bad news on the patient's ability to process information*

- *Discuss the psychological impact of screening and diagnostic tests*
- *Discuss the role of cancer support groups*
- *Identify reliable and accurate sources of information for patients*

5.6 Expert Group Review

The preliminary draft *Cancer Education Framework for Australian Medical Schools* was reviewed by the researcher's supervisors prior to being sent to three external reviewers for their feedback:

- Reviewer one: Surgical oncologist in the Netherlands who is the former Chair of ISOMS and a former President of the European Association for Cancer Education (EACE).
- Reviewer two: Clinical oncologist from the UK who was also a past EACE President.
- Reviewer three: Radiation oncologist from the USA who is the Director of Education for radiation oncology in one of the leading US medical schools.

The *Cancer Education Framework for Australian Medical Schools* was revised to accommodate the feedback received and was then sent to key stakeholders nationwide (Chapter Seven).

The first reviewer responded with the following comments:

Thank you for the Framework. I fully agree that it should be user friendly as a requirement for implementation. It is indeed easy to read and contains all elements of cancer management. I would be satisfied if all Australian graduates have these knowledge and competencies. Maybe you could add *Risk assessment & communication* because that is very important in this era of increasing possibilities (diagnostic & therapeutic) and decreasing budgets. However, this is important for all fields of medicine and not unique for oncology.

The reviewer also made some hand written comments on a printout of the first page, which contained the background and proposed framework text. The notations were as follows:

- One of the sentences was unclear
- A query on one statement given the age of the references

- Two lines were underlined and marked with double exclamation marks to indicate the reviewer's agreeance with them[†]
- There was a reference to the Dutch medical education framework (general, not cancer specific)
- A thank you for the reference to the ISOMS curriculum

The second reviewer responded with the following comments:

I thought your framework was excellent and I went through looking for anything to critique but basically couldn't find anything. A few minor points, if I was doing it (and I have fully realised I'm not) in the Principles of cancer Management page 4, I would add to "outline the principles of multidisciplinary management" with "including imaging and pathological diagnostic principles", I know that you have this in later under "Diagnostic Process", page 6 but it would just be to get those concepts in the overview.

Also, on page 5 "Principles of Medical Oncology" at the third bullet point I would have added "i.e. chemotherapy, targeted and hormonal therapies and immunotherapies" because immunotherapies is going to be the big thing in the next twenty years and will probably in most cancers get rid of chemotherapy. So, I think that is an important pointer to the future

The only other thing I would add would be in page 6 "patient centred" I would also add a bullet point "Be aware of the patient's own social context and how this cancer diagnosis will affect family and carers". Touchy-feely tree hugging always wins brownie points these days!

These are of course all very minor points, and I think overall it is very good indeed, succinct but comprehensive which is difficult to pull off.

[†] The exact meaning of this was queried by the researcher and subsequently clarified by the reviewer

The third reviewer responded with the following comments:

Overall, excellent. A few comments:

In the exposure to cancer units – how do you propose that? As a part of the required medicine or surgery rotations? As a separate clinical elective or rotation?

In principles of surgery, do people use the phrase “tumor spill”? Is there another surgical term that is used more frequently?

Excellent palliative care section

The feedback from all three reviewers, including the hand written comments from reviewer one are included in Appendix 11.

5.7 Response to Expert Review

The researcher agreed with the first reviewer that risk management and communication is something that is not specific to cancer and therefore chose not to specifically mention in the *Cancer Education Framework for Australian Medical Schools*, given the unpinning philosophy of keeping it cancer-specific. Whilst it could be argued that breaking bad news (BBN) is an essential skill, it should be noted that BBN should be an integral part of all medical school curricula because BBN is not limited to cancer and palliative care. The researcher modified the sentence that the reviewer queried, changing it “Currently, half of all Australians over the age of 85 will develop a malignant neoplasm” to “Currently, half of all Australians will be diagnosed with a cancer by the age of 85”. The reviewer is correct that two of the references used to support the statement that Australian medical students are ill prepared to care for cancer patients, date back to 1991 and 2003. However, the references look specifically at student knowledge, and represent the only national surveys that provide this data. They do reflect the most current sources available that provide a national picture of cancer knowledge, skills and attitudes. More recent work has been done but either look at cancer education at a single institution or are specific to a single discipline. These references were also included and support the findings of the national survey.

Whilst the researcher understood the rationale for the first suggestion by the second reviewer, this suggestion was not incorporated. The rationale for rejecting the recommendation to change the current outcome statement to read “outline the principles of multidisciplinary management, including imaging and pathological diagnostic principles” could be seen to (incorrectly) imply that these diagnostic techniques are more important than the other aspects of multidisciplinary management of cancer. Further, it would introduce repetition into the framework, which was something that the researcher wanted to avoid in the pursuit of brevity, thus making the framework more agile and likely to be implemented. The reviewer acknowledged that the content was already covered within the section on the diagnostic process, confirming that the content is already included in the preceding section of the framework. The suggestion to add “Immunotherapies” into the outcome statement on methods of action of systemic therapies was implemented. As such, the new outcome statement reads “Describe the method of action of systemic agents (i.e. chemotherapy, targeted and hormonal therapies, and immunotherapies)”. Finally, a new objective was added under the section on patient-centred care to incorporate the reviewer’s suggestion to include “Be aware of the patient's own social context and how this cancer diagnosis will affect family and carers”. The final outcome statement reads: “Discuss how the patient's own social context and how a cancer diagnosis will affect the patient, their family and carers”.

Whilst reviewer three raised a valid question regarding the provision of student exposure to cancer patients, the *Cancer Education Framework for Australian Medical Schools* can only recommend that this be offered to students and each individual medical school will have to determine if this is feasible. The following text was included as a footnote in the final draft *Cancer Education Framework for Australian Medical Schools*: “It is recommended that clinical exposure be provided, where possible, through placements in cancer service units, including medical and radiation oncology, and palliative care.” As it is possible that the reviewer missed the footnote, the text has been moved into the body of text and placed under its own heading of “Exposure to cancer service units”. The change makes the text much more prominent in the final version of the *Cancer Education Framework for Australian Medical Schools*. The researcher could not find any evidence to suggest that tumour spill (or tumour spillage) was no longer used in surgical oncology. Given that reviewer one, who is a surgical oncologist, didn’t comment on the use of this term, the researcher decided to retain the term.

Once the changes were incorporated, the researcher looked at the best format in which to present the *Cancer Education Framework for Australian Medical Schools* prior to circulating it for feedback from the wider cancer community. The initial PowerPoint layout was discarded in favour of a cleaner and more simplistic approach, using Microsoft Word. A cover page was added, along with a brief abstract and authorship details. Graphics were included to provide an overview of the framework content (Figure 5.1), which were used throughout the document for each of the three key sections. A number of web-based resources were added to support implementation of the *Cancer Education Framework for Australian Medical Schools* and potentially increase its uptake as a stand-alone module, in medical schools that are unable to otherwise include it into their existing curriculum. Further, hospital departments and hospices could similarly offer the framework to students attached to their unit to support their learning. Clearly, these resources cannot provide the clinical experience, however, they do provide the knowledge comprising the remainder of the framework. All these resources are freely available and include a mixture of text-based and video-based learning materials.

The final version of the *Cancer Education Framework for Australian Medical Schools* was distributed as an Adobe Portable Document File (PDF). The final *Cancer Education Framework for Australian Medical Schools* is provided in full in Appendix 23.

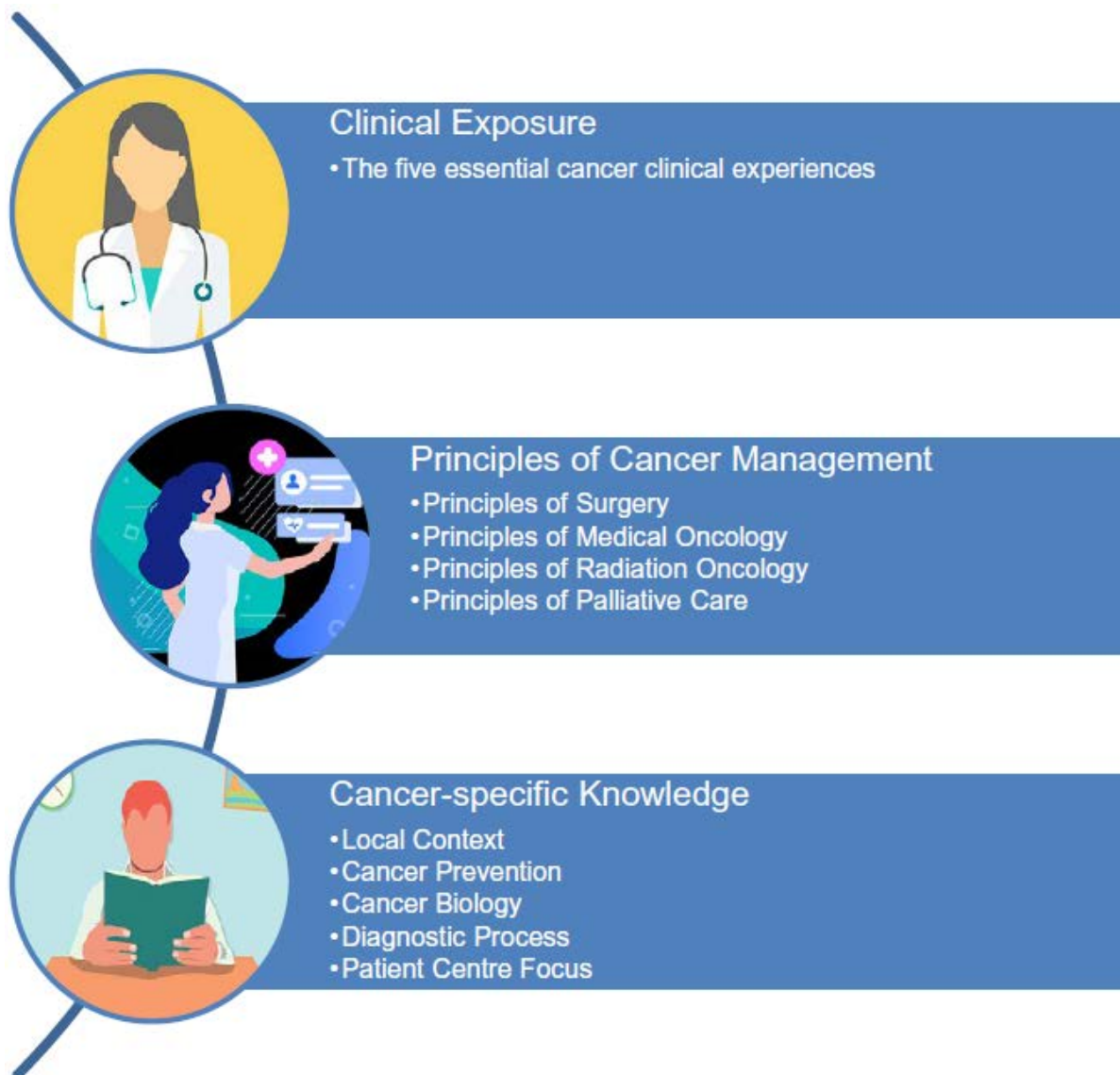


Figure 5.1: Overview of the Cancer Framework for Australian Medical Schools

5.8 Conclusion

Chapter Five has detailed the process used to develop the *Cancer Education Framework for Australian Medical Schools* using the PCD approach to facilitate input from key stakeholders. The IOC was chosen as the starting point given its relevance to Australian medical student education and the extensive stakeholder consultation that was undertaken during its development. Further stakeholder review of the IOC was undertaken to identify the level of understanding required by medical students for the knowledge items unpacked from the IOC (Chapter Four). A review of the literature was undertaken to identify other cancer curricula and research identifying content being taught to medical students, providing further input from stakeholders in medical student cancer education (Chapter Two). The draft version of

the *Cancer Education Framework for Australian Medical Schools*, as described in this chapter was reviewed by three external stakeholders, all of whom are experienced academic oncologists. Following the review, the final version of the *Cancer Education Framework for Australian Medical Schools* was completed.

Chapter Six will describe the evaluation of the *Cancer Education Framework for Australian Medical Schools*.

Chapter Six: Phase Three – Data Analysis and Findings

6.1 Introduction

In the previous chapter the development of the *Cancer Education Framework for Australian Medical Schools* was described. Chapter Six will describe the evaluation of the *Cancer Education Framework for Australian Medical Schools*. This will be followed by Chapter Seven, in which key findings are compared with the literature.

6.2 Survey Tool Development

As described in Chapter Three, an online survey was created using Qualtrics XM survey software^u to enable participants to provide feedback on the *Cancer Education Framework for Australian Medical Schools* developed in phase two (outlined in Chapter Five). The survey contained demographic questions (e.g. gender, location and discipline), questions regarding participant involvement with medical students and medical education, the cancer curriculum at the medical school with which they are affiliated, as well as questions specific to the *Cancer Education Framework for Australian Medical Schools*. A link to the framework was embedded into the survey. A participant information sheet accompanied the email. The survey and the participant information sheet are included in Appendix 13 and Appendix 14 respectively.

Face validity was confirmed by the researcher sending a draft version of the survey to four academic staff members within the School for review. The final version of the survey was generated incorporating suggested amendments and provided to the research supervisors for final approval. Copies of the feedback provided are presented in Appendix 12.

Reliability testing was not undertaken, as the survey instrument was designed for the sole purpose of evaluating the *Cancer Education Framework for Australian Medical Schools* and will not be used elsewhere or by other researchers.

^u <https://www.qualtrics.com/au>

6.3 Evaluation of the Cancer Education Framework for Australian Medical Schools

The survey was sent to past members of the Cancer Council Australia's Oncology Education Committee, as well as to haematologists, medical, radiation and surgical oncologists, palliative care physicians, and GPs. In order to maximise the number of surveys, a snowballing strategy was employed, with several participants passing on the participant information sheet (PIS), which contained the link to the survey. The survey was also distributed to GPs in rural Western Australia (WA) through the Rural Clinical School of Western Australia (RCSWA)^v. Based upon the feedback from the three external reviewers of the draft *Cancer Education Framework for Australian Medical Schools*, the researcher also sought to obtain wider feedback from an international audience. The only differences to the two surveys related to the options available for *country where trained* (Australia or overseas versus free text into which the participant enters the country), and *location of practice* (states in Australia versus free text into which the participant enters the country they are in).

The international survey is included as Appendix 15 and examples of the emails of invitation sent to clinicians are presented in Appendix 16.

6.4 Demographics

6.4.1 National Participants

A total of 28 surveys were returned from within Australia. The majority of respondents were male (61%), trained within Australia (90%), located in Western Australia (50%), had been working as a specialist for between 20 and 29 years (36%), and were directly involved with medical student education (93%). Most were employed in the public health system (75%) within a metropolitan setting (54%). Table 6.1 contains the demographic data for the national survey respondents.

^v RCSWA is a joint program partnered by the three medical schools in WA (The University of Western Australia, The University of Notre Dame Australia and Curtin University) which places medical students across several rural and remote towns for entire the penultimate year of their program.

Table 6.1: Demographic data for participants (National)

| Demographic Data (national) | Response | Total | % |
|--|-----------------------------|--------------|----------|
| Gender | Female | 11 | 39.29 |
| | Male | 17 | 60.71 |
| Country where trained | Australia | 25 | 89.29 |
| | Overseas | 2 | 7.14 |
| | Missing | 1 | 3.57 |
| Years since graduation | <10 years | 0 | 0.00 |
| | 10-19 years | 4 | 14.29 |
| | 20-29 years | 9 | 32.14 |
| | 30-39 years | 11 | 39.29 |
| | 40+ years | 4 | 14.29 |
| State/Territory of practice | ACT | 1 | 3.57 |
| | NSW | 4 | 14.29 |
| | QLD | 1 | 3.57 |
| | SA | 4 | 14.29 |
| | TAS | 1 | 3.57 |
| | VIC | 3 | 10.71 |
| | WA | 14 | 50.00 |
| Speciality | GP | 5 | 17.86 |
| | Haem | 2 | 7.14 |
| | Med Onc | 10 | 35.71 |
| | Pall Care | 4 | 14.29 |
| | Rad Onc | 3 | 10.71 |
| | Surg Onc | 4 | 14.29 |
| Years since specialisation | In training | 0 | 0.00 |
| | <10 years | 5 | 17.86 |
| | 10-19 years | 6 | 21.43 |
| | 20-29 years | 10 | 35.71 |
| | 30-39 years | 6 | 21.43 |
| | 40+ years | 1 | 3.57 |
| Practice Types & Geographic Locations (may choose more than one) | Public | 20 | 71.43 |
| | Private | 7 | 25.00 |
| | Public/Private partnership | 1 | 3.57 |
| | Metropolitan | 15 | 53.57 |
| | Rural | 8 | 28.57 |
| | Remote | 2 | 7.14 |
| | Telehealth | 6 | 21.43 |
| Involvement in Medical Student Education (may choose more than one) | Guest lecturer | 11 | 39.29 |
| | School advisor/committee | 6 | 21.43 |
| | Supervise clinical practice | 21 | 75.00 |
| | Teach in a University | 20 | 71.43 |
| | No engagement | 2 | 7.14 |
| | Other | 3 | 10.71 |

6.4.2 International Participants

A total of 22 surveys were returned from outside of Australia. The majority of respondents were female (68%), trained within the UK (59%), located in the UK (64%), had been working as a specialist for between 10 and 19 years (27%) and were directly involved with medical student education (91%). Most were employed in the public health system (82%) within a metropolitan setting (50%). Table 6.2 contains the demographic data for the international survey respondents.

Table 6.2: Demographic data for participants (International)

| Demographic Data (International) | Response | Total | % |
|-----------------------------------|-------------------------------|-----------|-------|
| Gender | Female | 15 | 68.18 |
| | Male | 7 | 31.82 |
| Country where trained | Canada | 1 | 4.55 |
| | Hungary | 1 | 4.55 |
| | The Netherlands | 1 | 4.55 |
| | UK | 13 | 59.09 |
| | USA | 4 | 18.18 |
| | Missing | 2 | 9.09 |
| | Years since graduation | <10 years | 4 |
| | 10-19 years | 7 | 31.82 |
| | 20-29 years | 4 | 18.18 |
| | 30-39 years | 4 | 18.18 |
| | 40+ years | 3 | 13.64 |
| Country of practice | The Netherlands | 2 | 9.09 |
| | UK | 14 | 63.64 |
| | USA | 6 | 27.27 |
| Speciality | Clin Onc | 3 | 13.64 |
| | GP | 0 | 0.00 |
| | Haem | 1 | 4.55 |
| | Med Onc | 3 | 13.64 |
| | Pall Care | 6 | 27.27 |
| | Rad Onc | 5 | 22.73 |
| | Surg Onc | 4 | 18.18 |
| Years since Specialization | In training | 5 | 22.73 |
| | <10 years | 5 | 22.73 |
| | 10-19 years | 6 | 27.27 |
| | 20-29 years | 2 | 9.09 |
| | 30-39 years | 3 | 13.64 |
| | 40+ years | 1 | 4.55 |

| Practice Types & Geographic Locations (may choose more than one) | Public | 18 | 81.82 |
|--|-----------------------------|-----------|--------------|
| | Private | 1 | 4.55 |
| | Public/Private partnership | 2 | 9.09 |
| | Metropolitan | 11 | 50.00 |
| | Rural | 0 | 0.00 |
| | Remote | 0 | 0.00 |
| | Telehealth | 1 | 4.55 |
| Involvement in Medical Student Education (may choose more than one) | | | |
| | Guest lecturer | 8 | 36.36 |
| | School advisor/committee | 5 | 22.73 |
| | Supervise clinical practice | 19 | 86.36 |
| | Teach in a University | 10 | 45.45 |
| | No engagement | 2 | 9.09 |
| | Other | 2 | 9.09 |

* More than one may be applicable for participant

The Two groups of participants exhibit similar demographics, with the main differences being that of gender, experience and speciality. The gender distributions were essentially reversed in the international group when compared to the Australian group, with a two-to-one ratio seen in both groups. Combined, there were 26 females (52%) and 24 males (48%) in total who took part in the survey. Whilst all of the Australian participants had completed their specialist training, five international participants (23%) were still in vocational training. When comparing the disciplines represented by participants, no GPs were present in the international group and considerably more medical oncologists were present in the Australian group. Three international participants identified themselves as clinical oncologists, which in the UK incorporates both medical and radiation oncology. The distribution of disciplines is shown in Figure 6.1.

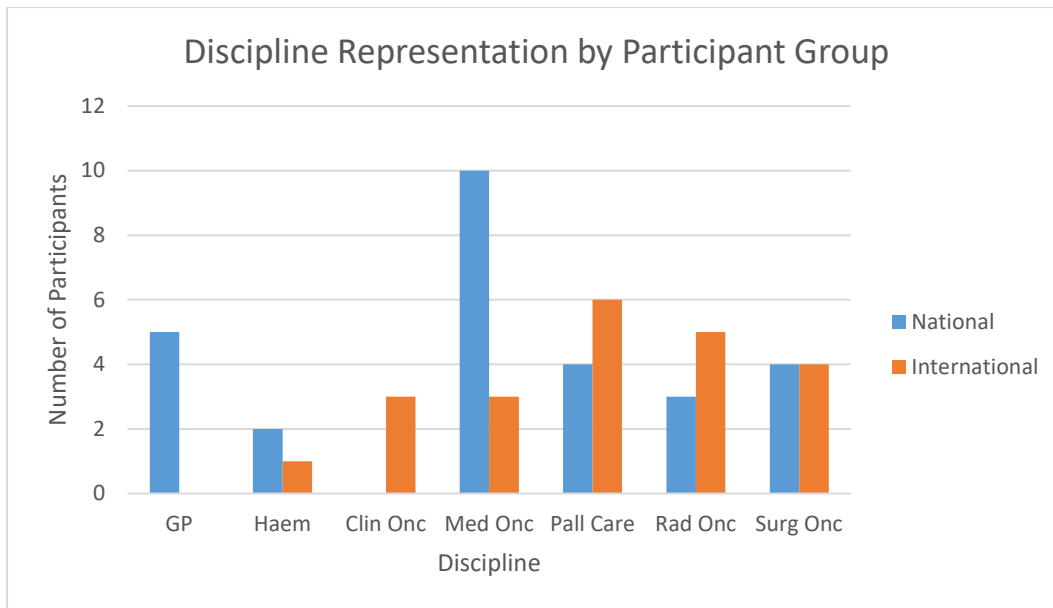


Figure 6.1: Discipline representation by participants

6.5 Survey Data

Not all participants provided a response to every question. To simplify the descriptive data presented in this chapter, responses will be reported per respondent numbers and percentages calculated after any missing data has been excluded. As reported in the preceding sections, there were 28 respondents in the national survey and 22 respondents in the international survey.

6.5.1 Oncology Education

Participants were asked about the cancer teaching at the medical school with which they are affiliated through four questions:

1. Does your medical school have a dedicated cancer curriculum?
2. Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?
3. Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines.
4. Please add any further comments you wish on cancer education for medical students at your institution

These questions were included to gather further information regarding participant involvement in cancer education at the medical school to which they are affiliated. In particular, these questions provide insight into whether the participant has knowledge of the scope of cancer education that is occurring at the school level.

Further, this information provides the context from which the participant responses can be better understood. For example, if cancer teaching is block-based in a particular university, will this influence the way in which the *Cancer Education Framework for Australian Medical Schools* is perceived. Similarly, the inclusion of GPs in the national survey data provides a more generalist perspective than that of the specialist cancer clinician. As such, there is the possibility that this particular viewpoint may influence the way in which the *Cancer Education Framework for Australian Medical Schools* is viewed at a national level.

Questions one through three included *Yes*, *No* and *Unsure* as options and provided a text box, should the participant wish to comment. Question four provided a text box only.

6.5.1.1 Does your medical school have a dedicated cancer curriculum?

As shown in Figure 6.2, most participants indicated that their medical school had a dedicated cancer curriculum.

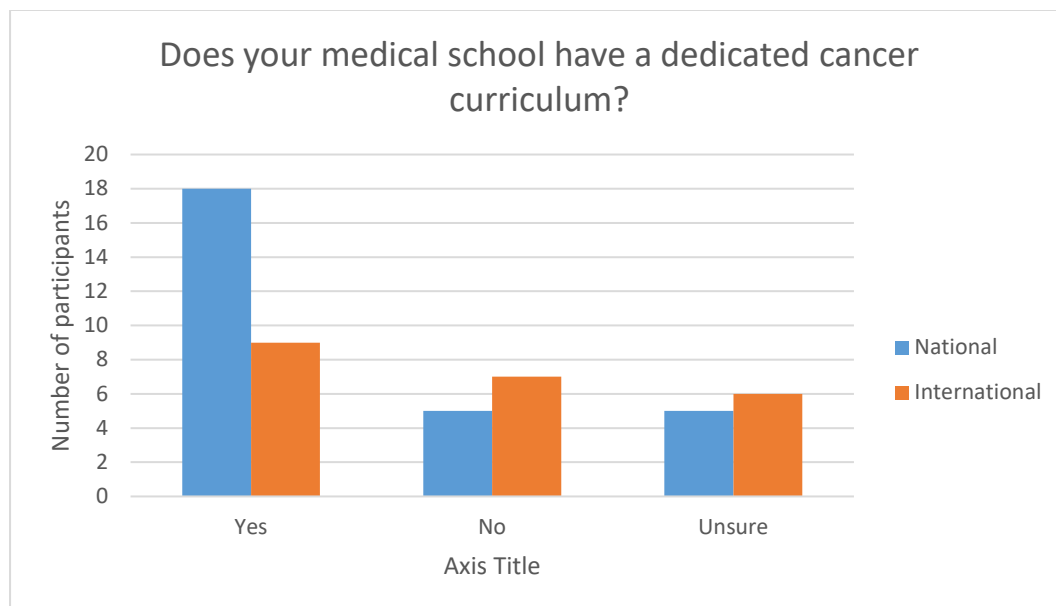


Figure 6.2: Existence of a dedicated cancer curriculum

In Australia, 18 (64%) participants indicated the presence of a dedicated cancer curriculum, with the remaining 10 (36%) equally split between those who reported that their school did not have a dedicated cancer curriculum and those who were unsure.

The distribution of answers among the international participants showed a more even distribution with 41% responding 'Yes', 32% responding 'No' and 27% who were 'unsure'.

Of the Australian participants who answered 'Yes', one provided the following comment: "very limited time - I think it is a 2 week block in the final year that includes sitting in on some clinics, a few organised tutorials, and some ward time", whilst another commented that there was very limited time, and that a two-week cancer block in final year included a mix of clinic and ward time, and tutorials. One respondent who answered 'No' stated that it was "extremely difficult to generate enthusiasm in the hierarchy to formalise this". Two participants who were unsure commented that the curriculum had changed frequently whilst the other noted that he was aware of what was taught in his discipline but not what was taught elsewhere in the curriculum.

No comments were entered by the international respondents.

The lack of comments does not provide a great deal of insight into why a number of participants are unsure of whether a dedicated cancer curriculum exists at their school. The comment above regarding a lack of knowledge of what was being taught outside of the participant's own discipline is likely to be true of a number of participants. This may be compounded by the low number of participants who reported being a member of a school committee (21% and 23% respectively) and who subsequently may not be aware of the whole program. Interestingly, four participants (two in both survey populations) indicated they had no involvement in medical student education, yet all reported the presence of a dedicated cancer curriculum. It is plausible that the views of individual participants regarding the presence of a dedicated cancer curriculum is not solely dependent upon the level of engagement with student teaching.

6.5.1.2 Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

Figure 6.3 shows the most medical schools integrated cancer education throughout the curriculum.

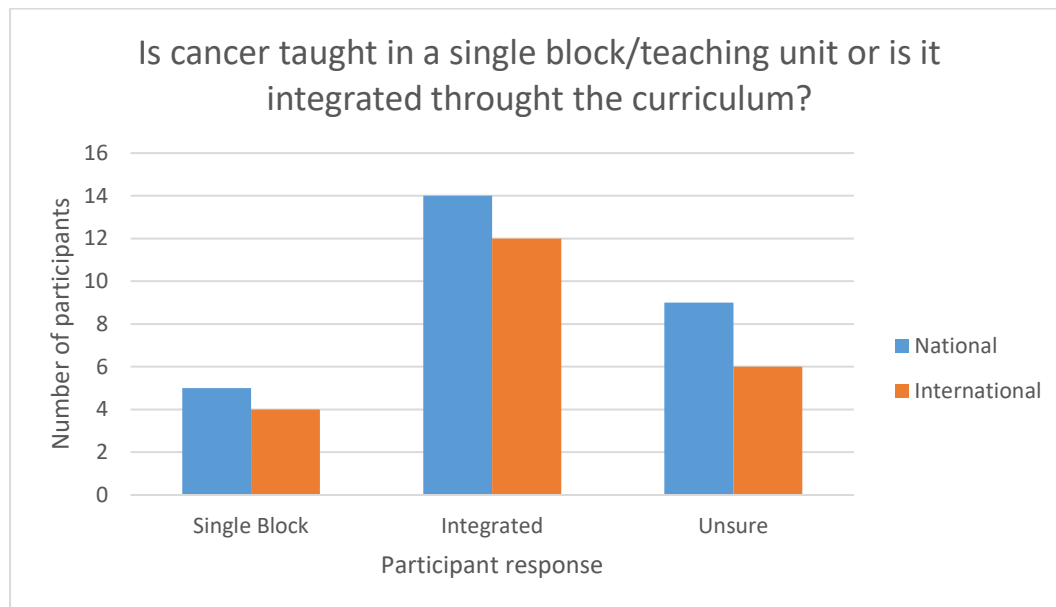


Figure 6.3: Cancer delivery as a single block or integrated curriculum

Fourteen (50%) Australian respondents indicated that cancer teaching was *'integrated'* throughout the curriculum, whilst five (18%) reported that cancer was taught in a *'single block'*. Nine (32%) were *'unsure'*.

Of the international respondents, 12 (55%) reported that cancer teaching was *'integrated'* into the curriculum, whilst six (27%) were *'unsure'*. Four (18%) reported that cancer was taught in a *'single block'*.

Comments from several Australian participants reported that teaching included lectures, problem-based learning (PBL) and case-based learning (CBL) included cancer as being possible diagnoses in case-based teaching, as well as being focussed in a particular year in conjunction to being taught throughout the curriculum.

One International respondent who reported cancer being taught in a *'single block'* commented that "Basic principles are concentrated in a single block and tumor types are

integrated in the curriculum”. One participant who reported an ‘*integrated*’ curriculum commented that teaching lacked depth and suggested a block approach would work best, whilst one who was unsure simply wished that the curriculum had been updated since his poor experience as a student.

The comments suggest that more teaching is occurring throughout the curriculum than may actually be acknowledged. The comment regarding cancer principles being taught in a block and tumour types being integrated may indicate a classification of cancer teaching based upon the discipline involved. However, it is possible that not all respondents have an overall knowledge of the curriculum outside of their area of teaching. These comments highlight the opportunistic and uncoordinated approach often seen in cancer education, and supports the argument for each medical school to have a single person who coordinates the cancer teaching throughout the whole program.

6.5.1.3 Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines.

Figure 6.4 shows the disciplines for which mandatory clinical placements exist.

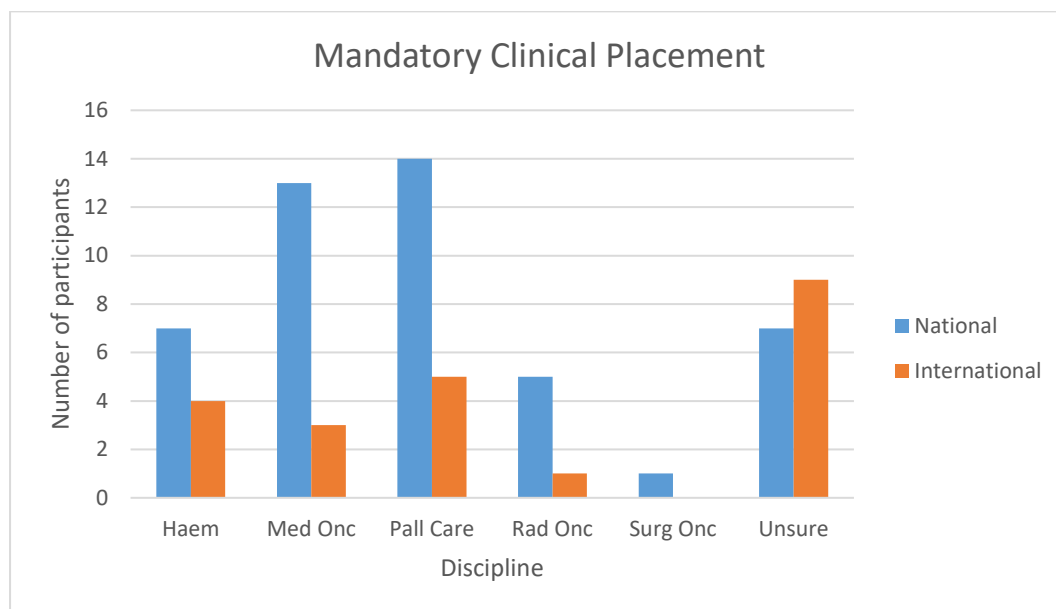


Figure 6.4: Mandatory clinical placements by discipline

Fourteen Australian respondents (50%)^w reported mandatory clinical placements in palliative care at their medical school. Mandatory placements were reported in medical oncology by 13 respondents (46%), haematology by 7 respondents (25%), radiation oncology by five respondents (18%) and surgical oncology by one respondent (4%). One-quarter were unsure as to whether mandatory clinical placements existed.

Internationally, the overall numbers were much lower as nine participants (41%) were unsure of mandatory placements. Of those who did report such placements, palliative care was reported by five participants (23%), haematology by four participants (18%), medical oncology by three (14%) participants and radiation oncology by one participant (5%). No dedicated clinical attachment in surgical oncology was reported.

One-third of respondents (30%) reported more than one discipline for which clinical placements were mandatory. Of these seven participants (14%) reported two disciplines, three participants (6%) reported three disciplines and five reported four disciplines. The combinations of disciplines with mandatory clinical placements are shown in Figure 6.5.

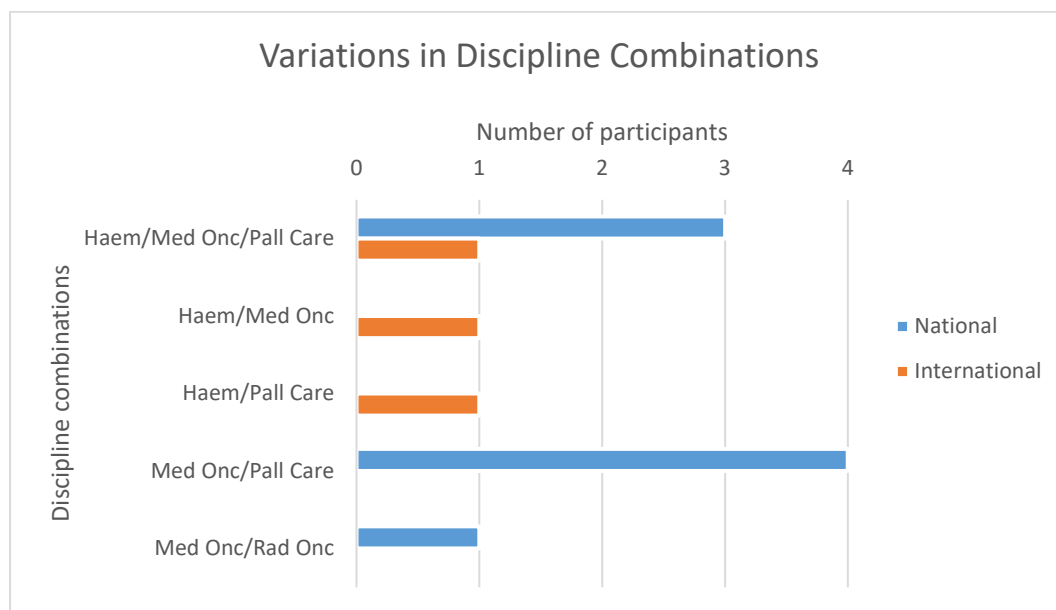


Figure 6.5: Variations in discipline combinations for which mandatory clinical placements exist

^w Percentages reported for mandatory clinical placements will exceed 100% if added, as respondents were asked to indicate all disciplines for which mandatory placements existed.

Of the Australian participants, six did not provide a response to this question but chose to provide a comment. Four stated that the disciplines were either offered as electives or likely to be encountered during their placements in larger hospitals. One participant was unsure about most disciplines but knew that radiation oncology was not offered and another knew that palliative care was mandatory but was unsure about the others. One participant who reported mandatory placements in haematology, medical and radiation oncology, and palliative care commented that these were “very short duration rotating clinical attachments” and that medical oncology offered a lecture on common cancers. The participant who reported a mandatory placement in surgical oncology commented that whilst not mandatory, many students were exposed to the other disciplines. Others commented that they were unsure about the disciplines that they had not specifically reported as having mandatory placements.

Two international participants commented that none of the disciplines listed were mandatory at their school. Similarly, one commented that surgery and internal medicine were mandatory placements but none took place in oncological sub disciplines, whilst another commented that there was “no radiation oncology exposure at all”. A clinical oncologist from the UK who answered ‘*Unsure*’, stated that whilst she believes that a weeklong oncology placement was mandatory, it is done so without oncologists input. Another who answered ‘*Unsure*’ commented that they thought it was based upon personal interest.

Palliative care attachments account for the majority of clinical placements and this is likely due to the increase focus on palliative care and EOL care over the past two decades. Further, there have been increasing requirements placed on medical schools by licensing bodies to produce graduates with palliative care and EOL knowledge and skills. The variability in the number of disciplines that have mandatory placements and in particular, the low number of mandatory clinical placements in radiation oncology is consistent with the literature. The low number of surgical oncology placements is surprising but most likely due to the fact that most cancer surgery is encountered in general surgical placements, which aligns with the comment regarding mandatory placements occurring in internal medicine and surgery.

6.5.1.4 Please add any further comments you wish on cancer education for medical students at your institution

An Australian radiation oncologist commented that “Previous reports about the problems seem to fall on deaf ears”, which appears to be in reference to issues raised in the literature regarding cancer education in Australian medical schools. One participant commented that there was “not enough” cancer education, particularly in relation to complications of “diagnosis and treatment”. Several others commented about the lack of teaching time and clinical exposure. A rural GP felt that students could meet the five essential clinical experiences through “GPs, telehealth and local physicians/surgeons, in liaison with visiting/telehealth oncologists”. Finally, a surgical oncologist stated:

“The conflicting objectives of many areas in medicine make it difficult for cancer to feature as much as is needed in the curriculum. The proportion of 'cancer' teaching is still reasonably represented, but really not as adequate as it should be.”

Only three international participants chose to provide a comment. One felt that students needed more cancer exposure and another felt that the six-week elective at their medical school should include more oncology. The final respondent commented that there were several opportunities for students to encounter cancer patients throughout their education.

These comments point to several issues with cancer education, namely insufficient teaching, particularly in the clinical setting, and problems with curriculum congestion and inability to implement curricula change. Whilst the point raised regarding cancer patient exposure through rural GP placements (and rural settings more broadly) is valid, not all students will have this experience. For example, in Western Australia approximately one-third of medical students at the three medical schools in the state undertake their penultimate year of student in a rural location.

6.5.2 Cancer Education Framework for Australian Medical Schools

Nine questions were asked regarding the *Cancer Education Framework for Australian Medical Schools*:

1. Is the organisation of the framework reasonable?
2. Does the proposed framework adequately address the cancer-related expectations of medical graduates entering their internship?
3. Is the content outlined in the framework appropriate for medical students to attain prior to graduation?
4. Would the proposed framework integrate into the curriculum at your medical school?
5. If yes, do you think it would be feasible to incorporate the curriculum?
6. What enablers would facilitate applying the framework within existing medical curricula?
7. What barriers do you envisage in applying the framework within existing medical curricula?
8. Who will likely benefit most from the adoption of the framework?
9. Do you have any further comments about the framework?

Questions one through five had 'Yes' and 'No' responses, as well as a text box for comments. In addition, question four offered 'Not sure' and 'Not applicable (I do not have an academic role)' as additional options. Questions six through nine were open-ended questions, with text boxes.

6.5.2.1 Is the organisation of the framework reasonable?

The overall response to this question was positive, with 25 Australian participants (96%) and 22 international participants (100%) answering 'Yes' to question one (Table 6.3).

Table 6.3: Responses to question – Is the organisation of the framework reasonable?

| Response | National (n=28) | | International (n=22) | |
|----------|-----------------|-------|----------------------|--------|
| | Total | % | Total | % |
| Yes | 25 | 96.15 | 22 | 100.00 |
| No | 1 | 3.85 | 0 | 0.00 |

Some of the comments from the Australian respondents who answered 'Yes' raised concern that research and the role that clinical trials play in advancing cancer treatment were lacking, as was survivorship and communication skills. The *Cancer Education Framework for Australian Medical Schools* was felt to be strong on cancer treatment and "as long as [the] desired knowledge is low-level it's adequate". One of the palliative care physicians commented "I love the framework, clear principles and outcomes". One GP felt that while the organisation of the framework was reasonable, the focus was "rather hospital specialist centric", and a haematologist commented that it did not "cover the explosion in molecular knowledge that has reached bedside medicine in haem onc". This participant also sent the researcher an email, outlining the challenges in teaching cancer education. The email is included as Appendix 24. Interestingly, the haematologists that participated in phase one were less likely to rate the content of the IOC as requiring a low level of understanding by medical students, thus less likely to omit content from the curriculum.

The participant who responded 'No' commented that she was unable to answer the question but there wasn't an option to choose other than 'Yes' or 'No'.

A palliative care trainee from the UK raised the issue that palliative care is not just for cancer patients and that this is a myth that is perpetuated by the inclusion of palliative care in an "overtly 'cancer' headed module". One participant commented that the strength was the focus on principles and not on detailed knowledge, whilst another felt that it was clear and comprehensive. One participant commented that the framework could be better structured, whilst another commented that the structure was good. The link to early exposure and career decisions was raised by a radiation oncology trainee from the UK who wrote "I would have loved to have this opportunity whilst at medical school, I may have come to love my speciality sooner and therefore I would have been able to start focussing on building my clinical/experience and CV appropriately".

The comments appear to support the organisation of the *Cancer Education Framework for Australian Medical Schools* as well as offer suggestions regarding additional content. Some of this content is implied, such as the importance of clinical trials research. Whilst not explicitly stated, it would be reasonable to expect this content covered under *General Principles of Cancer Management* under the last dot point *Discuss the role of Clinical Trials*.

The inherent difference between a framework and a curriculum is that a framework specifies an end point, whilst a curriculum details the learning required to meet that end point. It is conceivable that this particular outcome statement could include multiple aspects of clinical trials relevant for medical graduates. The comments about survivorship care are appropriate and this is something that should be more explicitly stated in the final version of the *Cancer Education Framework for Australian Medical Schools*. However, the “explosion on molecular biology”, whilst not further defined, may be stepping outside of the general principles and into that of detailed knowledge. Workforce shortages in oncology are an issue in many countries, so it is interesting to see the comment regarding early exposure and career choice from one of the international trainees. Whilst not a specific aim of the framework, it is an important consideration given the increase in both incidence and survival rates. The comment about palliative care including all patients with a life-limiting illness is an extremely valid one and the inclusion of a statement about the role of palliative and EOL care in non-cancer patients in a revised version of the *Cancer Education Framework for Australian Medical Schools* may highlight this point. However, one could argue that the diagnostic profile of palliative care patients would be mentioned when fulfilling the outcome *Outline the role of palliative care*, under the heading *Principles of Palliative Care*. Regardless of the final version of the *Cancer Education Framework for Australian Medical Schools*, it is simply not possible to produce a comprehensive cancer education framework and not include palliative care.

6.5.2.2 Does the proposed framework adequately address the cancer-related expectations of medical graduates entering their internship?

All participants agreed that the framework adequately addressed the cancer-related expectations of medical graduates entering their internship, Table 6.4.

Table 6.4: Responses to question - Does the proposed framework adequately address the cancer-related expectations of medical graduates entering their internship?

| Response | National (n=28) | | International (n=22) | |
|----------|-----------------|--------|----------------------|--------|
| | Total | % | Total | % |
| Yes | 25 | 100.00 | 21 | 100.00 |
| No | 0 | 0.00 | 0 | 0.00 |

A number of Australian participants commented on this question, with one reiterating her previous comments about the framework being strong on treatment but lacking in supportive

care. A GP stated that whilst she thought the framework was “very good”, she would like to see more of a focus on prevention and early diagnosis. Another felt that the framework would “provide a stable basis for ongoing learning”. It was commented that that the majority of cancer treatment is out-patient based and that students will require time in these clinics and service delivery areas. Finally, a haematologist provided the following comment:

“Yes, it will be comprehensive if taught in a single module or in split areas. Cancer surgery may have some common threads (avoiding tumour spill or curative surgery versus palliative surgery). All cancers have operative protocols and decision trees that are often unique to those cancers. Going through the schema, I do see a lot of merit in your approach.”

Only two comments were received from the international participants, with one simply stating that it was more than he received as a student. The other commented that “the framework equips medical students with solid fundamental knowledge to work with any cancer”.

The overall comments indicate an agreement on the suitability of the *Cancer Education Framework for Australian Medical Schools* for medical students, albeit with some recommendations on content inclusion, as noted in the previous comments.

6.5.2.3 Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

Whilst there was unanimous agreement on the adequacy of the *Cancer Education Framework for Australian Medical Schools* to address the cancer-related expectations of medical graduates entering their internship, not everyone (one Australian [4%] and two International [9%]) felt that it was appropriate for medical students to attain the content prior to graduation (Table 6.5).

Table 6.5: Responses to question - Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

| Response | National (n=28) | | International (n=22) | |
|----------|-----------------|-------|----------------------|-------|
| | Total | % | Total | % |
| Yes | 24 | 96.00 | 20 | 90.91 |
| No | 1 | 4.00 | 2 | 9.09 |

The Australian participant who responded 'No' to this question provided the following comment: "In my opinion, all curricula (not just this one) have a tendency to attempt to cover more areas of knowledge than there is time to learn during medical school". Other comments were "basic but adequate" and "aims high...so whilst I feel it is reasonable, I wonder how much of this is my bias showing". Finally, there was a suggestion to include more skills, such as empathy, communication skills and professionalism.

The only comment provided from the international participants was "I think it would be very aspirational-as much as it would be great for medical students to have this much knowledge about cancer it would be a lot-and likely at the expense of something else."

The comments highlight the issues with implementing content specific teaching into modern medical curricula, which are already attempting to achieve more in less time. The remainder of the comments, whilst useful relate to aspects of the *Cancer Education Framework for Australian Medical Schools* not specific to the question posed.

6.5.2.4 Would the proposed framework integrate into the curriculum at your medical school?

Sixteen Australian respondents (64%) indicated that the *Cancer Education Framework for Australian Medical Schools* would integrate with the curriculum at their medical school, with six participants (24%) unsure and two (8%) not in academic roles. Only one participant (4%) did not think that the curriculum would integrate (Table 6.6).

Table 6.6: Responses to question - Would the proposed framework integrate into the curriculum at your medical school?

| Response | National (n=28) | | International (n=22) | |
|-------------------------|-----------------|-------|----------------------|-------|
| | Total | % | Total | % |
| Yes | 16 | 64.00 | 5 | 22.73 |
| No | 1 | 4.00 | 1 | 4.55 |
| Unsure | 6 | 24.00 | 9 | 40.91 |
| N/A (non-academic role) | 2 | 8.00 | 7 | 31.82 |

Conversely only five international participants (23%) thought that the *Cancer Education Framework for Australian Medical Schools* would integrate with the curriculum in their

medical school. The majority were either unsure or not in academic roles (nine [41%] and seven [32%] respectively). Similarly, only one participant (5%) did not think that the curriculum would integrate.

No Australian or international participants commented on this question.

The responses to this question suggest the *Cancer Education Framework for Australian Medical Schools* has the potential to serve as a useful tool in improving the delivery of cancer education in Australian medical schools.

6.5.2.5 If yes, do you think it would be feasible to incorporate the curriculum?

The majority of Australian respondents (94%) and their international peers (89%) indicated that it would be feasible to incorporate the *Cancer Education Framework for Australian Medical Schools* into the curriculum at their medical school (Table 6.7).

Table 6.7: Responses to the question - If yes, do you think it would be feasible to incorporate the curriculum?

| Response | National (n=28) | | International (n=22) | |
|----------|-----------------|-------|----------------------|-------|
| | Total | % | Total | % |
| Yes | 16 | 94.12 | 8 | 88.89 |
| No | 1 | 5.88 | 1 | 11.11 |

Several comments were provided for the final question. One commented on the spiral curriculum at their medical school and questioned how “block teaching” might be incorporated. Several felt that elements of the *Cancer Education Framework for Australian Medical Schools* were already being taught and one participant recommended producing a list of what was already being taught elsewhere in the curriculum and then develop a cancer-focused unit to “fill in the gaps”. Some participants were concerned that time constraints and resources, particularly in light of the impact of the COVID-19 pandemic, would pose as barriers to implementation.

International participants commented that the *Cancer Education Framework for Australian Medical Schools* “looks fine” and that it was similar to what was being done, or at least what was being attempted. One participant commented that the framework didn’t clarify where items should be taught (i.e. preclinical, clinical, summer terms). The one participant who

responded 'No' to this question stated that there has been resistance to incorporate anything new into the curriculum at their medical school.

Interestingly, several of the comments were from participants who did not answer 'yes' or 'no' to this question, indicating that they may have been comments that were intended for the preceding question, to which they provided an answer but not a comment. That being said, the main barriers for implementation appear to be those related to curriculum congestion and the issues surrounding curricular change.

6.5.2.6 What enablers would facilitate applying the framework within existing medical curricula?

Some of the Australian respondents indicated that having endorsement and support from a professional body (such as the Clinical Oncological Society of Australia [COSA]), oncology champions and consumer advocacy groups would facilitate application of the *Cancer Education Framework for Australian Medical Schools*. Others added that faculty would need to accept the framework and provide resources to review and integrate the framework, with one participant stating that "enthusiasm of the Faculty Curriculum Review Committees, Faculty Dean, and Heads of Clinical Schools" was needed. One participant commented that "structural change" and "improved goodwill" would be necessary, whilst another simply commented "time tabling". Finally, a rural GP commented: "keeping the headings broad and looking at principles in common between specialties - so that students can draw on the experiences they already have - e.g. gynae clinic, surg clinic, respiratory physician etc. [as] all have cancer as differential diagnoses and diagnoses."

International participants offered similar comments, with collaboration between oncologists and general educators, and involving more oncologists in curriculum development, as well as agreement with faculty and curriculum committees deemed important factors.

The issue of endorsement is an interesting one and one that will be considered once the final version of the *Cancer Education Framework for Australian Medical Schools* is developed. Endorsement by a professional body, such as COSA (as suggested) or others such as Cancer Council Australia or Cancer Australia could add credibility to the *Cancer Education Framework for Australian Medical Schools* and increase its utility. However, increasing the input of cancer

and palliative care clinicians into medical school curricula remains an issue in Australia, where these disciplines are often not represented on curriculum committees. Of the 28 Australian participants, only six (21%) indicated that they served in either an advisory role or were a committee member. This proportion was the same for the international participants.

The comment about keeping the headings broad resonates with one of the key principles underpinning the design of the *Cancer Education Framework for Australian Medical Schools*. Keeping the framework as broad as possible should maximise its impact through increasing its flexibility and applicability.

6.5.2.7 What barriers do you envisage in applying the framework within existing medical curricula?

The majority of the comments from the Australian participants focussed on the difficulties associated with curricular change, including “curriculum crowding”, “many areas within the curriculum each vying for inclusion” and “amount of information that needs to be covered” amongst the comments. One participant commented that there was a “lack of support, dare I say rejection by the Medical School Deans” in previous attempts to overhaul cancer education in medical school curricula. Resource requirements, current workload and the amount of information to be covered were all raised as potential barriers. An academic GP commented that “the silo framework of the curriculum may be a barrier with the ‘ultraspecialists’ never being able to teach about anything except their area of ‘ultraspecialisations’”. The impact of the COVID-19 pandemic was cited as causing a lack of face-to-face teaching time in clinical placements. One of the haematologists commented that “the current workload prevents clinicians from having time to teach during busy clinics and the service demands are very high which forces teaching down the priority list. It really takes a deep commitment to do this now.” Encouragingly, the other haematologist said “none that cannot be negotiated”.

Comments from the international participants also highlighted the challenges of a full curriculum, with “time constraints” being mentioned on several occasions, as well as difficulties in finding space to accommodate more content. Similarly, failure to look more broadly was raised as a barrier by a surgical oncologist: “Super specialised oncologists who

cannot look [beyond] the borders of their specialty". Two responded that they did not know enough about their existing curriculum to comment.

There is a clear acknowledgement of the difficulties of incorporating more content into already full curricula in terms of both content and time. Whilst these issues can be resolved, there needs to be a willingness to implement change. The comments regarding specialist teaching highlights the importance of medical education providing a solid grounding in basic principles and the knowledge that underpins those principles, which is the philosophy upon which the *Cancer Education Framework for Australian Medical Schools* has been based. The workload of busy clinicians also needs to be considered, especially in light of the need for increased clinical exposure and the heavy reliance on clinicians who hold adjunct positions within medical schools.

6.5.2.8 Who will likely benefit most from the adoption of the framework?

The vast majority of Australian respondents indicated that medical student/graduates would benefit, should the *Cancer Education Framework for Australian Medical Schools* be adopted. Teaching staff, the public and patients also received multiple mentions and one participant included curriculum developers, whilst another simply said "all". One participant felt that medical schools with block teaching would also benefit. Another commented that the framework provided "nice clear guidelines to follow when studying" and that "future patients in almost any specialty including GP will benefit from a clear grounding in cancer". Finally, one of the GPs said: "Medical students will have a clearer idea of expectations. Supervising clinicians will have clearer idea of what to expect from students. Curriculum developers in medical schools will have a framework".

Students were again seen to be the primary beneficiaries of the *Cancer Education Framework for Australian Medical Schools* in the comments provided by the international participants. Patients, teachers and facilitators were also mentioned, as were "tax payers". Two participants (one from the UK and one from the USA) both commented on the positive impact that early clinical exposure can play on workforce shortages, with one stating "oncology as a workforce likely to benefit as more students may consider career in this area due to increased exposure".

The *Cancer Education Framework for Australian Medical Schools* was viewed by the majority of respondents to directly benefit students, the university, cancer patients and the population at large. The comment about tax payers highlights the savings in healthcare expenditure that could be gained by ensuring that junior doctors are able to recognise issues (such as complications of treatment) and manage these appropriately (acknowledging that seeking help is appropriate management).

6.5.2.9 Do you have any further comments about the framework?

Two Australian participants praised the “flexibility” of the curriculum and its “innovative approach”. One stated that she was “astounded if this is not already part of every medical school curriculum. It should be fundamental knowledge for all graduating medical students”, whilst another said “Great job, I really like the idea of a curriculum which allows medical schools to flexibly fit a 'stream' within their medical school which is not limited to the 'clinical oncology block' model”. Several participants indicated that content outlined in the *Cancer Education Framework for Australian Medical Schools* was already being taught within their medical school curricula. One participant commented that it was “reasonable” but also “extensive” and was concerned if it could be covered in a four-week block. Several participants acknowledged the work that went into the *Cancer Education Framework for Australian Medical Schools* with comments of “well done” and “good job”. One of the rural GP’s highlighted the applicability of the framework outside of basic medical training, stating “I like it - think it's a good idea. Something that would also be fitting for GP registrars”.

Only three international participants commented, with all providing positive comments. One simply said “much needed”, whilst another said “just start with the implementation”. A palliative care physician from the UK said “personally I think it is excellent. It covers nearly everything needed and I like the holistic nature of it.”

Overall the *Cancer Education Framework for Australian Medical Schools* appears to have been well received by the participants who chose to respond. The comments regarding the flexibility and holistic nature of the framework was particularly rewarding, as these were criteria that were clearly established when designing the framework. The comment about being able to fit the content into a four-week block suggests that the participant assumed that the framework was designed to be implemented as a single block, which is not the case.

The aim to provide outcomes that will better prepare medical graduates to care for cancer patients once they graduate. Whether these outcomes are integrated throughout the curriculum (preferred) or in a single teaching block is something that the individual medical school has to decide upon. This was highlighted by the comment about the framework offering flexibility to develop a cancer stream rather than restrict it to a teaching block. Finally, the GP that was “astounded” that the content contained in the framework is not already part of every medical curriculum shares her exasperation with the wider cancer education community. However, it is encouraging to see comments that highlight that much of the *Cancer Education Framework for Australian Medical Schools* is already being taught. The challenge now is to incorporate the remainder in a coordinated effort.

6.6 Conclusion

The demographic data shows a good mixture of experience and disciplines, with representation from medical, radiation and surgical oncology, haematology, palliative care and general practice. General practice was only represented in the Australian survey results, whilst clinical oncologists were only seen in those from the UK, where this specialty group delivers both radiotherapy and systemic therapy. Whilst the ratio of males to females was approximately 2:1 in the Australian participants, this was opposite to what was seen in the international survey, resulting in an overall gender balance.

Whilst the aim of the survey was not to explore the cancer teaching at other universities, the data collected highlights many of the issues with cancer education that were presented in Chapter Two. Of interest was the number of participants who were unsure of the cancer teaching outside of their own discipline, which may be due to the limited involvement they have in curriculum design, as is often seen with hospital clinicians who supervise students in the clinical setting but do not hold an academic appointment with the medical school. Further, guest lecturers may be invited to teach with no insight into the curriculum other than the learning objectives and/or topic they have been asked to talk to.

Overall the *Cancer Education Framework for Australian Medical Schools* was well received with positive responses in excess of 90% for questions pertaining to the organisation of the framework, its content in regards to what medical students need to know about cancer upon

graduation and that attaining this knowledge during medical school is a realistic aim. Implementing the *Cancer Education Framework for Australian Medical Schools* into the medical curricula at their institution whilst still positive, was tempered by competition for curriculum time and reluctance to engage in curriculum reform.

A number of participants commented on the content of the curriculum, with some suggesting that specific content was missing. In some instances, the content suggested was conceivably included under the outcome statements contained in the curriculum. The aim of the *Cancer Education Framework for Australian Medical Schools* was to provide broad objective statements under which specific content could be delivered. Some examples were clinical trials research and the palliative care case mix, both of which could be considered to be covered in the current framework. On the other hand, survivorship care warrants a more prominent position in the framework. However, the “explosion in molecular knowledge that has reached bedside medicine in haem onc” potentially enters into the realm of specialist knowledge. Seven haematologists reviewed the curriculum yet only one commented that this was lacking. The content specific comments highlight the lack of consensus that has plagued cancer education and supports the need for a structured approach that considers the opinions of multiple clinicians to reach a consensus on what is required for medical students.

Barriers to implementing the *Cancer Education Framework for Australian Medical Schools* were predominately identified as competition for curriculum time in already over packed medical school programs. Some identified a reluctance of their faculty to engage in curricular change, although one participant did identify this as being the only opportunity to implement new content. A number of participants indicated that they were not aware of the full scope of the curriculum.

A number of comments indicate that the intention of the *Cancer Education Framework for Australian Medical Schools* to be light and flexible may not have been clearly articulated, or possibly not understood by the participants. The aim was to cover the basics of cancer knowledge that underpin the principles of treatment and provide students with experiential learning opportunities. Further, in order to keep the *Cancer Education Framework for Australian Medical Schools* as concise as possible, certain items were deliberately omitted. For example, the concepts of incidence and mortality, evidence-based practice and taking a

history are not explicitly outlined in the framework, as these are not cancer-specific and it would be reasonable that these are taught in every Australian medical school curriculum.

Some of the comments indicated that participants did not view the *Cancer Education Framework for Australian Medical Schools* as a list of outcomes to assist in the delivery of cancer related knowledge throughout the curriculum, instead viewing it as a standalone teaching block. Further, some appeared not to view the outcomes as broad statements under which the individual school could determine the content to be covered but rather as discrete items, thus limiting the scope. Perhaps these aspects of the design of the framework were not clearly stated in the introductory text and this will be reviewed for clarity.

Upon completion of the study the final recommendations will be incorporated into a revised version of the *Cancer Education Framework for Australian Medical Schools*, prior to submitting it to professional bodies for their consideration and endorsement.

Chapter Six has provided a summary of the findings from the phase three data collection and analysis. Four significant findings emerged from the review of the *Cancer Education Framework for Australian Medical Schools* that will be explored further in Chapter Seven:

1. Curriculum oversight
2. Curriculum change
3. Exposure to cancer patients
4. Endorsement by a professional body

Chapter Seven: Discussion

7.1 Introduction

In the previous chapter the evaluation of the *Cancer Education Framework for Australian Medical Schools* was described. Chapter Seven will discuss the findings of the study with the literature. This will include a review of the theoretical framework followed by the four significant findings of the study described in Chapter 6. This will be followed by the final chapter which articulates the research implications, recommendations and conclusion.

7.2 Application of Findings to Theoretical Framework

As outlined in Chapter Three, the research presented in this thesis used a multiphase mixed methods approach, comprising three distinct phases:

- ⇒ review of the IOC
- ⇒ development of the framework
- ⇒ subsequent evaluation

Consensus development panels (CDP) were chosen to facilitate the revision of the IOC in phase one. This approach was chosen over other consensus methods (such as Delphi or nominal group) primarily due to the busy workload of practising hospital clinicians, most of whom combine service commitments with their own research and teaching commitments. Multiple surveys, such as those used in the Delphi method would likely result in low response rates due to the number of iterations that would reasonably be required to reach consensus, making survey fatigue a likely consequence. In addition, the Delphi method fails to capture the rich data that would be expected to be generated through face-to-face discussions. Similarly, the multiple face-to-face meetings use in NGT would again likely result in low participation rates, due to participant availability on multiple occasions.

Phase two combined the data generated during phase one with a review of the literature to develop the *Cancer Education Framework for Australian Medical Schools*. Finally, the single survey approach used in phase three to obtain feedback on the *Cancer Education Framework for Australian Medical Schools* enabled data to be collected from participants who were geographically dispersed. The multiphase mixed methods approach was supported by the use of a participatory curriculum development (PCD) framework, as outlined in Chapter Two.

The final phase of the PCD is an evaluation of the process in achieving the desired goals, in this case the Framework. Evaluation of the phases are outlined in Figure 7.1.



Figure 7.1: Evaluation of the 10 steps comprising the PCD model

Note: the green steps were undertaken out of sequence given the end product was a framework, not a curriculum. The grey steps were not undertaken in the development of the framework

The PCD approach supported the research process and highlighted the adaptability of the model to situations that do not follow a traditional development process from conception to accreditation. In the research presented in this thesis, an overarching framework to guide the development and inclusion of cancer education into Australian medical school curricula was developed. The process commenced with the review of a nationally produced cancer curriculum (IOC) for Australian medical schools in order to ascertain the cancer-specific knowledge required by Australian medical students upon graduation. The IOC itself underwent a process very similar to that outlined in the PCD model, including extensive stakeholder review. This is one of the primary reasons that the IOC was chosen as a starting point for the development of the *Cancer Education Framework for Australian Medical Schools*.

Step two involved local clinicians reviewing the IOC. The extent of the review was deliberately limited to clinicians teaching medical students in the clinical setting and from the disciplines involved in the multidisciplinary management of cancer patients, including GPs. This approach was pragmatic in nature, given that the IOC had already undergone extensive stakeholder review. As mentioned in the preceding section, the employment of CDPs facilitated the review of a large volume of data in a timely manner and enabled consensus to be achieved on all knowledge items unpacked from the IOC.

Steps three and five were reversed in this research, as the final outcome was a framework, not a curriculum. Unlike a curriculum in which the development of the broad learning outcomes (macro curriculum) precedes the development of the individual learning objectives (micro curriculum), the *Cancer Education Framework for Australian Medical Schools* started with the specific learning objectives that were generated from the review of the IOC and from these the broad learning outcomes that constitute the *Cancer Education Framework for Australian Medical Schools* were written. The review of the literature outlined in Chapter Two guided the development of the macro curriculum through the identification of common themes regarding essential cancer-related knowledge for medical graduates.

Step six entailed widespread consultation of the full draft of the *Cancer Education Framework for Australian Medical Schools* undertaken during phase three of this research (Chapter Six). National and international cancer clinicians and GPs were invited to participate in a Qualtrics XM survey in which specific questions were asked about the survey, as well as open feedback.

Prior to this process, an initial draft of the *Cancer Education Framework for Australian Medical Schools* was reviewed by three academic oncologists and their comments were incorporated into the final draft. Further, as the local approach used in level two facilitated the PCD sessions, the widespread review undertaken in step six enabled the step two data to be validated.

Step seven comprised a comparison of the findings of phase three with the literature, which is presented in this chapter. Final recommendations are subsequently presented in Chapter Eight.

Step 10 is the evaluation of the PCD process, which is presented in this chapter.

As outlined in Chapter Two, not all of the 10 steps outlined in the PCD model were used in this research. Step four was omitted as the framework has been developed to assist Australian medical schools, it has not been developed with a specific curriculum in mind. As such, the *Cancer Education Framework for Australian Medical Schools* has been developed to facilitate adaption into curricula that may employ various pedagogical and educational philosophies. This flexibility is essential in facilitating the use of the framework in a variety of Australian medical schools, which although all accredited by the Australian Medical Council (AMC), all have diversity within their programs.

Similarly, steps eight and nine were omitted, as the *Cancer Education Framework for Australian Medical Schools* does not require formal accreditation, as each medical school is responsible for their own accreditation process with the AMC. However, one of the recommendations to come out of step six, was the endorsement of the *Cancer Education Framework for Australian Medical Schools* by a relevant professional body.

7.3 Comparison with the Literature

Four significant findings emerged from the review of the *Cancer Education Framework for Australian Medical Schools* undertaken in phase three (Chapter Six):

1. Curriculum oversight
2. Curriculum change
3. Exposure to cancer patients

4. Endorsement by a professional body

These findings will be discussed in comparison with the literature and will be used to guide the recommendations presented in Chapter Eight.

7.3.1 Curriculum Oversight

The review of the *Cancer Education Framework for Australian Medical Schools* demonstrated that a number of participants were not aware of the cancer education that was being delivered within their medical school. This is congruent with the findings of a survey of palliative care course coordinators in the UK, where a number of respondents reported being unsure of the palliative care content being taught within their own institution.¹²³ An Australian survey reported that the curriculum in a number of medical schools did not correlate with the expectations of cancer teachers.¹²⁶ The authors felt that this was the result of longstanding attitudes towards cancer teaching and teaching departments themselves actively protecting their teaching time. Reluctance to relinquish teaching time is most likely financially motivated, as funding models for most departments are based upon teaching commitments.⁸²

Further, that the majority of survey respondents indicated that that their role was predominately clinical supervision or as a guest lecturer, indicating that very few are involved directly with curriculum development or the organisation of teaching within the school. Additionally, a number reported being unsure about the presence of a dedicated cancer curriculum, whether teaching occurred in a single block or was integrated throughout the curriculum, or if mandatory clinical placements existed. This is consistent with the available literature, in which a number of Australian medical schools may not have an oncologist on their academic staff,^{80, 166} or where very few oncologists are available in rural and remote settings.^{29, 83} The lack of academic oncologist input into curriculum development and student teaching has been reported internationally¹⁵¹ and was also reflected in the comments of international survey participants.

These findings highlight a larger issue, in which cancer teaching is generally not coordinated within medical curricula. The systems-based approach commonly used to teach medicine generally results in curricula in which cancer is taught in an uncoordinated and fragmented

nature.^{6, 123, 250-253} Mattes et al. report that whilst this approach results in students who are confident about their basic science knowledge, many feel underprepared in the area of diagnosis and treatment.⁸⁵ This may be due to the multidisciplinary model of cancer treatment that students experience in the clinical setting being incongruent with the systems-based approach to pre-clinical cancer education.⁸³ An uncoordinated approach to cancer education may also result in students receiving specialist knowledge in curricula where teaching is system or disease focused, rather than receiving the basic principles.^{6, 102}

The fragmented nature of cancer education was identified as an issue as far back as the nineteen-forties, when the US National Advisory Cancer Council recommended that each medical school appoint a single person to coordinate the teaching of cancer across departments.¹⁰¹ Almost 40 years later, the Education Committee of the European Organisation for the Research and Treatment of Cancer (EORTC) held a workshop in which it was determined that an undergraduate teaching program in oncology was of critical importance and that such a program should be coordinated by an oncologist, preferably through the appointment of a professorship.²⁵⁴ An analysis of palliative care teaching in eight European universities found that the introduction of teaching was, in many cases, heavily dependent upon an individual lead clinician drawing upon their professional and cultural credibility in order to enact curriculum change.¹⁵⁷ The authors comment that this was seen even in countries where there was a national mandate to include palliative care in medical curricula. Clinical advocacy has been reported to be the driving factor behind the introduction of a palliative and EOL care training program in the US²⁵⁵ and behind the inclusion of dedicated clinical placements in cancer and palliative care in Australia.⁸⁰ However, in many instances, the reality is that cancer teaching coordination is assumed on a voluntary basis, by a clinician who also has service and research responsibilities.¹⁰¹

7.3.2 Curriculum Change

A number of participants commented that the biggest issue would be finding the time in which to incorporate the *Cancer Education Framework for Australian Medical Schools* into curricula.

Achieving curriculum change is a time consuming task, exacerbated by the increase in medical knowledge, competition for curriculum time and the increasing number of medical schools

that have condensed traditional six-year programs into four-year equivalents.^{83, 166} The multidisciplinary nature of clinical oncology poses further challenges for those attempting to integrate cancer education with medical curricula, which have been traditionally constructed on body system and clinical disciplines.^{115, 119}

The *Cancer Education Framework for Australian Medical Schools* was designed to be flexible and light. The flexibility was a primary consideration in able to facilitate its adaption within an existing curriculum. This was achieved, in part, by organising the *Cancer Education Framework for Australian Medical Schools* around key areas and not focussing on body systems or anatomical sites. Further, the framework presents broad outcome statements that permits each school to determine how best to develop teaching and learning opportunities to meet these outcomes.

It was clear from some of the comments that the participants viewed the *Cancer Education Framework for Australian Medical Schools* as an specific cancer teaching block and whilst it could be included as such, a more pragmatic approach would be to identify what is currently present in the curriculum that meets the outcome statements in the framework and then identify means through which the remainder of the framework could be resourced. A study from the Netherlands compared progress test results for students who were exposed to a curriculum in which cancer was integrated over three years with those exposed to a dedicated single semester cancer block.¹¹⁸ Progress scores were initially higher for the integrated curriculum, however, the scores for the students undertaking the dedicated block proved higher in the end. Denunzio et al. report that students preferred a dedicated teaching block and favour this approach to cancer education.¹¹¹ In its current form, the *Cancer Education Framework for Australian Medical Schools* can be implemented as a standalone cancer block or integrated throughout the curriculum. One participant commented that the framework did not specify where in the curriculum it should be incorporated (e.g. preclinical, clinical or as an elective). This lack of directive was deliberate to best facilitate individual medical schools to adopt the *Cancer Education Framework for Australian Medical Schools* in a way that best suits their particular needs. The framework itself spans both preclinical and clinical content, and the researcher maintains that providing each school with the freedom and flexibility to implement the framework as it best suits their needs is the optimal approach.

In keeping the *Cancer Education Framework for Australian Medical Schools* light, a number of aspects of medical knowledge, skills and attitudes are assumed to already exist in the medical curricula of Australian medical schools, as all schools are accredited to the AMC and therefore produce graduates that meet the AMC graduate outcome statements. As such, these common items were excluded from the framework, thus reducing its size and overlap with existing curricula content. Areas such as epidemiological concepts, appraising the research literature, taking a history and performing an examination can all be expected to be included in the curricula of all Australian medical schools. This approach is supported by Rallis et al. who point out that breaking bad news is a skill that is relevant to all aspects of medicine²⁵⁶ and therefore, could be expected to be taught as part of a core curriculum.

Several participants called for content to be included into the *Cancer Education Framework for Australian Medical Schools*, which would be expected to be covered in all Australian medical school curricula. This may be due to their expectation that the framework would be more inclusive of such items, a failure in the presentation of the framework to adequately explain the intent to exclude such items or that participants focussed on the framework and did not read the introductory text. Some of the suggested inclusions did have merit and will be considered for inclusion in an updated version. The update may include the addition of new content or clarification of existing outcome statements. The introductory text will also be reviewed for clarity.

Haagedoorn et al. argue that reforming cancer education does not require more curricula time but instead, a revision of what it taught in that time.¹⁰¹ This approach is supported in the findings of a survey of UK medical students, which recommends that existing curricula be reviewed to ensure that knowledge pitched at a postgraduate level be replaced with knowledge that medical graduates will require as junior doctors.²⁵⁶ The authors recommend that knowledge should be “tailored to preparing students to manage common oncological presentations that they will encounter as foundation year doctors, as opposed to specific cancer treatment regimens”.^{256(p7)} Neeley et al. recommend that coordination of cancer teaching be improved to address repetition and omission, and ensure that the types of cancers covered is appropriate.¹¹⁵ This is particularly important if cancer teaching is to be integrated throughout the medical program rather than taught in a dedicated oncology block¹¹¹. Focus groups with clinical year medical students found that students wanted teaching

about the basic principles of cancer teaching yet they were subject to specialist level content in lectures and tutorials.⁶

A US medical school report on the successful implemented an EOL care curriculum through a collaborative process, in which existing departments taught components of the curriculum, thus minimising the impact of introducing a new course.¹⁵⁴ The success hinged upon an existing faculty member championing the process and recruiting faculty from existing core clinical clerkships, such as medicine, obstetrics and gynaecology, paediatrics, psychiatry and surgery. Further, collaboration was sought from other faculty within the university to include nursing, chaplaincy and social work, highlighting the benefit of multiprofessional teaching. In addition to using participant surveys, formal assessment of student performance was undertaken using reflections, an eight-case objective structured clinical exam (OSCE) and written case reports.

The optimal time to introduce a dedicated cancer curriculum would be at a time in which the existing medical school curriculum is undergoing major revision.^{79, 257} However, taking a pragmatic approach to review current cancer teaching and seeking opportunities to revise and replace needs to be considered, as major curricula reform projects do not occur regularly.

Barton supports undergraduate cancer education but questions the role of medical schools in training doctors, asserting that this is the role of the various professional colleges.⁸³ The author presents a valid point, as the role of medical schools in Australia is to produce graduates who are ready to commence their internship in an Australian hospital.⁴⁹ In other words, an undifferentiated doctor, with the necessary knowledge, skills and attitudes to pursue any medical specialty. During their internship and residency, junior doctors rotate through different medical and surgical disciplines, gaining experience before entering the training program for their desired specialty.^{44, 45, 49} These rotations will expose them to cancer patients and in many cases, they will have more direct contact with the patient and their family than the specialist whose care they are under.⁴⁸ During a conversation with a breast cancer surgeon, the researcher was told of a final year medical student undertaking her surgical placement on the breast cancer unit. At the completion of her placement, the student told the surgeon that her experience had been truly uplifting having seen all of her patients come in with breast cancer and go home cured (C. Saunders AO MBBS FRACS,

personal conversation, August 2018). This anecdote highlights a clear lack of understanding of cancer as a chronic disease and could have serious implications should this information have been conveyed to a patient.

Whilst modern medical education has evolved from a teacher-centred approach to a student-centred one in which acquisition of knowledge is a life-long endeavour, students still remember much of what they learn in medical school.¹⁰⁵ As such, regardless of their final career path, medical school remains the most appropriate place for students to gain a basic understanding about cancer.^{102, 189} A review of the cancer-related education needs of GPs in the UK found that much of the postgraduate or continuing education available is ineffective, inefficient and in need of revision.¹⁷⁹ Further, many continuing education sessions were poorly attended, despite GPs themselves identifying that their cancer-related knowledge and skills required updating. This is supported by Gaffan et al. who argues that while cancer prevention training was highly promising at the undergraduate level, equivalent training of qualified doctors tended to produce variable results.⁸⁸ Whilst all doctors will receive vocational training prior to specialising in their chosen field, several years will pass between graduation from medical school and entering a vocational training program. During this period, these doctors will not only encounter cancer patients but may be placed in a situation where their action (or inaction) could have serious consequences for the patient.^{48, 123}

7.3.3 Exposure to cancer patients

Mandatory placements in cancer service units showed wide variability among the survey respondents, particularly in the areas of radiation oncology and surgical oncology. Further, many commented that whilst some placements are offered, they are either optional or short in duration. In addition, the review of the *Cancer Education Framework for Australian Medical Schools* showed that early exposure to cancer patients was seen as being important for medical student education and that in a number of cases, it was felt that this was either absent or insufficient in the participant's institution.

Exposure to cancer patients is viewed by many as an essential component of cancer education for medical students. The literature review undertaken in Chapter Two highlighted the benefit of providing medical students with exposure to cancer patients during their training.

For this reason, the five cancer clinical experiences outlined in the Ideal Oncology Curriculum (IOC)¹¹ formed the top tier of the *Cancer Education Framework for Australian Medical Schools*.

Early exposure to terminally ill patients has been shown to positively impact upon students' perceptions of death and dying, and reduce fear of caring for terminally ill patients.¹⁸⁶ A UK study reported that most students considered cancer to be too depressing and emotionally draining prior to their participation in a three-day placement in oncology.¹¹⁹ However, follow-up surveys showed improved student perception of oncology as a career choice, as well as increasing student confidence in recognising red flags and talking with patients about their cancer, including breaking bad news. A US study of student reflections following home hospice visits demonstrated that students experienced a shift in focus from disease specific treatment to holistic, person-centred treatment, and developed a greater understanding of dying with dignity.¹⁵² Similar positive results have been reported in several other studies.^{113, 117, 158, 258, 259}

A review of the literature on teaching methods by Klufas et al. revealed that students preferred structured clinical teaching and rated highly the benefit of having access to cancer survivors in place of simulated patients.¹²⁷ The authors report correlations with clinical exposure with cancer patients and increased confidence in preparedness to practice, confidence with clinical skills and cancer-related knowledge. This association was not observed when the clinical placement was observational in nature. This finding is supported by focus groups with clinical year students who reported that observational placements were barriers to meaningful interactions with cancer patients.⁶ A survey of participants in a US radiation oncology residency program reported that whilst the presence of a didactic curriculum in radiation oncology in medical school increased their confidence, completing more than one clinical placement in radiation oncology did not.¹⁶⁵ However, the authors report that the majority of clinical placements did not include a formal didactic component. A survey of 105 medical students across all four years of two medical programs reported that undertaking a clinical placement was not associated with significantly higher test scores on five clinical vignettes included in the survey.²⁶⁰ Students felt unprepared in radiation oncology and survivorship care and this appeared to be due to a lack of standardised didactic curricula to support their learning in these clinical areas.^{165, 261} Clinical placements in radiation oncology were reported as either occurring in what is described as a 'curriculum clerkships' which

commonly included lectures specifically aimed at medical students, whereas 'non-curriculum clerkships' did not contain any lectures.²⁶¹

Attitudes towards certain disciplines or patient groups are formed early during medical education and if these attitudes are negative, patient treatment and subsequent outcomes can be adversely impacted upon.⁸¹ Should negative attitudes be formed during medical training it is unlikely these will be modified in the postgraduate setting.¹⁰² In addition to impacting patient outcomes directly, there is also an indirect consequence, as many countries are currently facing workforce shortages in the areas of oncology and palliative care and early exposure to patients has proven to increase interest in these areas as potential career options.^{119, 258, 259, 262} However, it should be noted that cancer education for medical students ought to be aimed at providing them with the basic knowledge, skills and attitudes to provide appropriate care to cancer patients upon graduation (e.g. symptom management, recognise red flags and communicate effectively), not to graduate mini-oncologists.^{105, 256, 263}

Exposing medical students to patients can also impact negatively, as shown in a one-week cancer placement for second year Israeli students, which found that whilst many expressed increased empathy towards cancer patients, they were more comfortable with death and dying, and optimistic about cancer treatment, a number were worried about not being able to cure cancer patients and concerned about increasing their suffering through the administration of cytotoxic treatments.²⁵⁸ The authors suggest providing additional discussions to assist students to examine their fears in order to reduce their anxiety. Such an approach has been proven to be successful in other instances, particularly where student reflections and structured debriefing sessions have been incorporated.^{42, 127, 154} Care must be taken to provide the necessary support services, which may be more likely to be implemented within a medical school than within the hospital environment. This will be increasingly important in medical schools that accept students directly out of high school, where death and dying may be particularly confronting.

The *Cancer Education Framework for Australian Medical Schools* recommends that exposure to cancer patient's takes place, where possible, in cancer service units. However, GP respondents felt that clinical exposure to cancer patients could be achieved in a setting outside of cancer service units and in particular, in general practice. Whilst this idea certainly

has merit, the number of new cancer patients treated by GPs per year is small²⁹. For example, consider female breast cancer, which is the most commonly diagnosed non-melanocytic cancer in Western Australia (WA) affecting approximately one in 10 women.²⁶⁴ GP workforce data is published periodically and the latest data shows that in 2019 there were 3191 GPs in WA.²⁶⁵ The total number of newly diagnosed breast cancer cases for WA in 2019 is unavailable at the time of writing this thesis, however the projected incidence was 1658 new cases.²⁶⁴ Based purely on these numbers, a GP in WA would diagnose a woman with breast cancer once every two years.

An audit of clinical log books from clinical year students at a single medical school in WA found that of the 829 cancer patients logged, only 15 (1.8%) patients were seen in a metropolitan general practice and a further 17 (2.0%) patients were seen in rural general practice.⁵² A follow up study saw general practice account for 26 out of 247 (10.5%) cancer patients logged and the results revealed that this number could have been higher, as a number of patients were being investigated for cancer but a diagnosis had not yet been confirmed.⁶ The authors highlight the variability in medical student exposure to cancer patients which occurs simply by chance.

Whilst GP placements offer students an opportunity to see cancer patients at various stages on the cancer continuum, there is no guarantee that all medical students will encounter a cancer patient during their placement, which may be of two to four weeks duration. Clearly the role of the GP encompasses much more than establishing a cancer diagnosis and medical students stand to learn a lot about patient management through GP placements. However, placements with cancer clinicians that includes access to both inpatients and outpatients not only guarantees that students will encounter cancer patients but ensures that they are also exposed to the multidisciplinary model of cancer care.

Tsui et al. reported that students who shadowed an oncologist during multidisciplinary team meetings were found to find the experience beneficial and reported greater confidence in interacting with both patients and oncology staff.²⁶⁶ However, more resources to prepare for the MDT were requested by students, who found it challenging to keep up with the discussion at times. This finding is supported by the email received by one of the haematologists that reviewed the *Cancer Education Framework for Australian Medical Schools* in phase three of

this study. The email, which is presented in Appendix 24 highlights the “language of abbreviations” that characterise MDT meetings and the level of molecular biology knowledge needed to understand modern cancer management. However, it should be pointed out that the benefit of students attending MDT meetings is to see the decision-making process and team dynamics that encompass modern cancer management. As such, understanding every aspect of the tumour profile and management decisions are not required of medical students and the role of the clinical supervisor should make clear to students what is realistically expected of them. Tsui et al. reported that one-quarter of the mentors failed to turn up to the MDT, which may have influenced the students request for more preparatory material.

The study of 36 third-year medical students pre- and post- their first clinical placement in oncology resulted in the authors making two recommendations^{119(p178)}:

1. Students should receive clinical education in oncology during their time at medical school
2. Non-traditional methods, such as patient support...centres are highly valued...as a learning experience

In addition to spending time in chemotherapy and outpatients units, and attending palliative care seminars, students also spent time in a community-based cancer support group, which was highly valued by both the students and the patients themselves and highlighted the value of patient-centred teaching.¹¹⁹ Another UK community-based initiative assigned third-year medical students to a cancer patient for a period of six months. During this time the student visited the patient at their home and accompanied them to their medical appointments (investigations, clinical appointments and hospitalisations) and maintained a reflective journal and attended small group tutorials in parallel to the patient visits.²⁶⁷ Whilst only 82 of the 213 students and 40 patients responded to follow-up questionnaire, the authors reported improvements in student confidence in communication with cancer patients and that patients themselves found the interactions to be beneficial. In the US a 10-month student led program saw third year medical students mentor first year medical students as they learned about surgical oncology disparities in underinsured and uninsured patients.²⁵⁹ The program was voluntary and supported by a didactic program in addition to the clinical

experience and resulted in positive education outcomes in a number of the American Association of Medical Colleges (AAMC) core competencies for entering medical students^x.

The issue was raised about cancer treatments occurring predominately in outpatient clinics and the shift of cancer treatment from inpatient to ambulatory care has certainly impacted on medical student access to cancer patients.^{6, 100} Survey data from Australian interns showed that the number of students reporting having examined a patient with cancer has decreased over time, despite time spent in cancer service units increasing over the same period.¹⁰⁰ Similarly, a study of clinical year student exposure to cancer patients in Western Australia found that outpatient settings and surgical inpatient settings afforded the lowest level of patient interaction, with students generally limited to an observational role.⁶ Conversely, students described non-surgical inpatient units as providing sufficient time and opportunity to allow meaningful patient interaction. Whilst the intern studies only asked if the participant had examined a patient with a specific cancer type (breast, lung, colon, prostate, lymphoma and melanoma) during their medical training,¹⁰⁰ the study of clinical year medical students asked about the level of interaction (talked with the patient, took a history or performed an examination), irrespective of the type of cancer.⁶ Of the eleven students who participated in the latter study, nine (82%) spoke with, took a history and examined a cancer patient during their clinical placements. The authors report that mandatory clinical placements only existed for palliative care and surgery (including ENT^y surgery), with exposure to medical oncology and haematology purely opportunistic, whilst no student reported any exposure to radiation oncology.⁶

An often encountered barrier to student exposure to cancer patients occurs when hospital staff determine that the patient is unsuitable to be seen by students.^{100, 183} Whilst in many instances protecting the patient is warranted, a study of UK hospice patients challenged the assertion that patients are too unwell or unsuitable to make this decision for themselves.¹⁸³ The authors reported that patients wanted to engage with medical students, found the

^x The AAMC core competencies for entering medical students comprises 15 qualities expected of students wishing to enter medicine in the US (<https://students-residents.aamc.org/applying-medical-school/article/core-competencies/>)

^y ENT is the abbreviation for ears, nose and throat (otorhinolaryngology), as surgical subspecialty involved in the treatment of cancers of the head and neck.

experience to be beneficial and were comfortable in saying no should they wish to. Patients understood the reason that staff may feel that they were not suitable to be seen by students but often disputed that they applied to them.

Finally, the use of patients in teaching outside of the clinical environment has been utilised with great success by the International Summer School in Oncology for Medical Students (ISSOMS), in which patients and their treating physician talk to students about their particular cancer journey from diagnosis to current day.^{116, 135}

7.3.4 Endorsement by a Professional Body

Participants felt that having the *Cancer Education Framework for Australian Medical Schools* endorsed by a professional body would increase its credibility. A number of professional bodies have produced their own curricula, such as Cancer Council Australia (CCA),¹¹ the Royal College of Radiologists (RCR),¹⁴² and the European Society of Medical Oncology (ESMO) and the American Society for Clinical Oncology (ASCO) joint curriculum.¹³³ Of these, CCA's IOC received endorsement by the UICC, whilst the RCR's Undergraduate non-surgical oncology curriculum is endorsed by the Royal College of Physicians. A review of cancer curricula shows that it is not just professional bodies who are seeking to validate their curricula. The curriculum used by the International Summer School in Oncology for Medical Students (ISOMS) shows endorsement from the World Health Organisation's Collaborating Centre for Cancer Education (WHO-CCCE).^{134, 135}

Within Australia there are several professional bodies and government departments that could be approached to endorse the *Cancer Education Framework for Australian Medical Schools*. These include:

- Cancer Council Australia
- The Clinical Oncology Society of Australia (COSA)
- Medical Oncology Society of Australia (MOGA)
- Trans-Tasman Radiation Oncology Group (TROG)
- Cancer Australia

As outlined in Chapter One, CCA disbanded the Oncology Education Committee (who authored the IOC) in 2016. The rationale provided was that an internal review had

determined that cancer education for medical students was no longer a remit of CCA. Currently no professional body or college is responsible for the cancer education of medical students, or junior doctors.¹⁰² As such, endorsement of the *Cancer Education Framework for Australian Medical Schools* could be sought from an overseas organisation such as:

- The International Union for Cancer Control (UICC)
- The World Health Organisation (WHO)
- American Cancer Society (ACS)
- The American Association for Cancer Education
- The European Association for Cancer Education
- European Cancer Organisation (ECCO)

Barton et al. suggest that in addition to professional bodies, government and non-government organisations, input should also be sought from consumers, students and teachers to ensure that it is representative of the needs of society.²⁹

Following Cancer Council Australia's decision to disband its Oncology Education Committee in 2017, undergraduate cancer education for medical students has lost its national voice.^{83, 166} Endorsement of the *Cancer Education Framework for Australian Medical Schools* by a national entity could return this much needed voice to cancer education for Australian medical students.

7.4 Research Questions

Research question one: In what way do medical practitioners perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care in Australia?

Research question one was answered by phase one. The use of consensus development panels (CPDs) reviewed the knowledge items contained within the IOC were unpacked and cleaned, to facilitate each item to be reviewed independently of the objective statement in which it was originally presented. The items were sequentially allocated to one of six CPD, each comprising a medical, radiation and surgical oncologist, haematologist and palliative care physician. Part one of phase one involved a survey in which each participant independently reviewed the items allocated to their group and part two involved face-to-face group meetings to achieve a consensus on each item.

The results of phase one highlighted the relevance of the IOC to the cancer-related knowledge expected of graduates from Australian medical schools, as evidenced by the retention of 83% of the knowledge items reviewed.

In summary, medical practitioners involved in the care of cancer patients in Australia perceived that the IOC provides a realistic expectation of the level of knowledge required by an intern. This is evidenced by the high proportion of items that were deemed to be required at a high or moderate level of understanding.

Research question 2: Which elements of the IOC do medical practitioners consider vital inclusions in Australian medical school curriculum?

Research question two was answered by phase one. The results of phase one guided the reconstruction of the IOC, retaining the knowledge items considered necessary for medical students to understand at either a moderate or high level of understanding. Reconstruction of the IOC required some modification of the original ratings for items where variability between group ratings were not congruent, resulting in inconsistencies between similar items. As detailed in Chapter Five, this process was undertaken due to the size and complexity of the review process undertaken in phase one, which necessitated the individual items to be sequentially allocated to one of six groups. This was done to reduce the number of items that each participant had to review and to ensure that each participant reviewed items spanning the entire breadth of the IOC.

The review of the literature undertaken in Chapter Two guided the modification process and a similar approach was reported by Benstead et al. who modified the results of a Delphi study to ensure that the end result of their process was a comprehensive and workable curriculum. The literature review uncovered the key components of cancer knowledge, skills and attitudes for which international consensus exists. Given the scope of knowledge that underpins these constructs, the essential items remaining following the phase one review of the IOC were utilised to determine the overarching outcome statements that underpin the *Cancer Education Framework for Australian Medical Schools*.

Research question 3: To what degree do medical educators and practitioners perceive that the 'Cancer Education Framework for Australian Medical Schools', provides a comprehensive resource to support the implementation of cancer curricula in Australian medical schools

Research question three was answered by phase three in which the *Cancer Education Framework for Australian Medical Schools* was sent to academic and clinical cancer clinicians and GPs both within Australia and overseas. The feedback on the *Cancer Education Framework for Australian Medical Schools* was overwhelmingly positive with the majority of respondents agreeing that the framework was well organised, contained relevant content for medical students to attain prior to graduation and that the framework could be implemented into existing medical curricula.

Whilst several participants commented on specific content they believed either should have been included in the *Cancer Education Framework for Australian Medical Schools* or more explicitly stated, most of this content would either be implicitly included as a specific component covered within a broad outcome statement, or would be expected to be contained elsewhere in an existing medical curriculum. These comments warrant a revision of the introductory text in the framework to ensure that the scope and purpose of the framework is clear. Comments regarding making survivorship care more prominent in the framework has been taken on board and will be incorporated in the recommendations for revising the *Cancer Education Framework for Australian Medical Schools* in light of phase three. Further, as the *Cancer Education Framework for Australian Medical Schools* is based upon the review of the IOC, this curriculum contains the necessary building blocks from which a school could develop their curriculum to resource the framework. For this reason, the IOC has been included as a resource within the *Cancer Education Framework for Australian Medical Schools*.

In summary the feedback from participants in phase three indicated their overall agreement that the *Cancer Education Framework for Australian Medical Schools* provided a comprehensive resource for implementing the IOC.

7.5 Research Limitations

The research presented in this thesis is not without limitations. First, the IOC which was chosen to form the basis of the research project was an existing cancer education curriculum, which is likely to have differed to the content generated had this research commenced with a clean slate. However, given the small number of academic oncologists and the high possibility of participant fatigue and subsequent withdrawal should an additional phase have been included, the use of the IOC was considered appropriate. Further, the IOC itself was compiled using a process that followed the PCD model used in this research.

The number of participants was small and may not be representative of the wider cancer community. Cancer clinicians themselves are relatively small in number within Australia and most are active in clinical service, research and teaching. Whilst the numbers were small, the participants were actively engaged in the research phases and provided rich feedback on the final draft of the *Cancer Education Framework for Australian Medical Schools*.

Phase one was undertaken by clinicians who were based solely in Western Australia. This was a pragmatic choice given that consensus development groups were used in phase one, which required face-to-face sessions to be conducted. Whilst WA clinicians may have held different opinions to their interstate peers, many had undertaken fellowships interstate and are members of the national professional organisation: the clinical oncological society of Australia (COSA). Further, specialist qualifications are awarded at a national level, not a state level, meaning they all share discipline specific national accreditation.

This research project commenced as a nationally focussed project, based primarily upon the use of the IOC and the issues inherent with cancer education in an Australian context. However, expert review of a draft version of the *Cancer Education Framework for Australian Medical Schools* indicated that there were commonalities with the international community and the local context could be changed to reflect the country in which the framework were to be applied. With this in mind, international participants were invited to participate in phase three. Whilst this participation was limited to the Netherlands, UK and US, feedback from a wider international audience could be sought following final revision of the *Cancer Education Framework for Australian Medical Schools* and this will be one of the recommendations.

7.6 Conclusion

Chapter Seven has discussed the research findings in consideration of the theoretical framework and the wider literature. The fragmented nature of cancer education remains a concern and is compounded by the multidisciplinary nature of cancer management and the traditional curricula in which students learn according to organ system and specific disciplines. Cancer curricula will benefit immensely from a single person who has oversight of the teaching across all years of the program and is able to coordinate the delivery of content. This need not necessarily entail widespread reform but rather careful examination of current teaching and revising the content to ensure that duplication and omission is addressed, and that the level is appropriate for medical students.

Exposure to cancer patients remains an important component of cancer education and one that has benefits for the student, the patient and the profession. Whilst the shift to ambulatory care has impacted upon student access to cancer patients, inpatient placements and novel approaches need to be considered to ensure that students can meaningfully interact with cancer patients as part of their learning.

Chapter Eight will conclude the research presented in this thesis and recommend future actions.

Chapter Eight: Conclusion

8.1 Introduction

In the previous chapter the findings of the *Cancer Education Framework for Australian Medical Schools* study was described in consideration of the theoretical framework and wider literature. A review of the research questions and limitations were also included. Chapter Eight will describe the implications of the research and recommendations.

8.2 Research Implications

The research presented in this thesis has highlighted the problems associated with teaching medical students about cancer in such a way that adequately prepares them to care for the society in which they will practice.

A review of the literature revealed that despite cancer being a major cause of mortality on a global level, advances in cancer prevention, screening and treatment have also seen cancer emerge as a chronic disease. More people are alive today with cancer than ever before, placing enormous demands on the health system to provide appropriate care. Regardless of their chosen professions, all doctors will care for cancer patients during their careers and many will do so in the early years following graduation from medical school.

Phase one of this research demonstrated that consensus can be reached on content that is expected of medical graduates and perhaps more importantly, content that is not appropriate at this level. Phase two shaped the *Cancer Education Framework for Australian Medical Schools* to ensure that essential cancer knowledge was included, whilst generic knowledge, skills and attitudes that one would expect to see in all Australian medical graduates were omitted. Finally, phase three returned feedback from national and international cancer clinicians and GPs.

The research implications have been separated across education, research and clinical areas, although it should be noted that overlap exists between these three realms.

8.2.1 Education

Education philosophies and curricula differ not only between countries but within them, making a single, comprehensive curriculum difficult, if not impossible, to be developed that meets the requirements of each school within each country. This research commenced with the Australian context as its focus, in which all medical schools are accredited by the same non-government organisation but in the absence of either a national curriculum or national exit exam, are free to develop their own curricula. One thing that remains constant in the Australian context is the needs of the Australian people and the *Cancer Education Framework for Australian Medical Schools* developed in this thesis has been crafted with their needs at the forefront. Whilst a national curriculum does not exist, a national set of graduate outcome statements do exist and each medical school has to demonstrate that it produces graduates that meet these outcomes in order to achieve and maintain accreditation. These outcomes include a single statement relating to palliative care but none are specific to cancer. However, many of the knowledge, skills and attitudes essential for medical graduates to care for cancer patients (such as concepts of epidemiology, history and physical examination, and communications skills) are entrenched in Australian medical school curricula. The researcher hopes that by creating a framework that encompasses the essential components of the IOC, whilst omitting the content currently being taught will eliminate some of the complexities associated with previous attempts to incorporate the IOC into Australian medical curriculum, increasing the possibility of its future utilisation.

Another consideration regarding the heterogeneity of Australian medical school curricula is the variability in teaching methods used. Whilst feedback from participants in phase three questioned the intended format of teaching (i.e. integrated or single block), and one requested guidance on whether implementation was intended for preclinical, clinical or as a summer elective, such recommendations have not been included in the *Cancer Education Framework for Australian Medical Schools*. The rationale was to produce a framework with the flexibility to allow each medical school the freedom to adapt it in a means that best suits its existing curriculum design and delivery. Such an approach facilitates the use of emerging technologies and evolving teaching methods, which will differ between medical schools and change over time. Further, flexibility is likely to become the new norm, as evidenced by the

recent requirements to implement online and/or hybrid teaching opportunities in response to the COVID-19 pandemic.

8.2.2 Research

Cancer education at a national level has not been evaluated since 2001 so the cancer-related knowledge of current medical graduates is actually unknown. However, recent publications by medical students and junior doctors suggest that little has changed in the past 20 years.

The relationship between clinical exposure to cancer patients and positive changes in attitude towards cancer and palliative care, terminal patients and future careers in these areas has been established. However, the impact on patient exposure and cancer knowledge remains an area where research is lacking.

Cancer survivors and cancer advocacy groups offer a target audience for further research into societal needs and expectations of the health system in general and medical doctors in particular. Cancer survivorship continues to improve and more services are required both in urban and rural areas.

Patients, their family members and/or carers, as well as health professionals involved in providing care are all populations that could be investigated through both qualitative and quantitative means. Survivor needs and expectations of, and satisfaction with their health care providers and the health care system overall would provide valuable insight into the service areas into which further resources are required. Similarly, these issues as seen by healthcare providers will further assist in ensuring that a complete picture is obtained. Health linkage data could also be explored to look at the provision of services, the impact of disease burden and financial cost. The educational implications of a more complete picture of survivorship at a personal and system level could then be evaluated and feed into curriculum development.

8.2.3 Clinical

Increased cancer survivorship means more patients living with cancer will be increasingly seen by non-specialist cancer doctors for such things as routine surveillance, post-treatment symptom control and end of life care. As such, all medical students will benefit from learning

the basic principles underpinning cancer prevention and care, regardless of their chosen career path.

As mentioned elsewhere in this thesis, increasing the clinical exposure of medical students to cancer patients dispels common myths and misconceptions, and positively impacts upon existing attitudes towards cancer. Whilst doctors entering vocational training will receive cancer-specific teaching relevant to their discipline, a basic knowledge not only prepares medical graduates for the years between graduation and entry into vocational training (a period in which they will encounter cancer patients), it also provides them with a well-rounded knowledge base upon which to build more specialist knowledge.

8.3 Research Recommendations

The research recommendations have been separated across education and research. The researcher makes the following recommendations:

8.3.1 Education

- That the Australian Medical Council and the Medical Deans Australia and New Zealand be asked to comment on the *Cancer Education Framework for Australian Medical Schools* in light of the discrepancies between cancer education in Australian medical schools and the impact that cancer has on the Australian community.
- A national implementation strategy be initiated to disseminate the *Cancer Education Framework for Australian Medical Schools* to all Australian medical schools.
- A national implementation strategy be initiated to enable all medical students to access the *Cancer Education Framework for Australian Medical Schools* and resources, regardless of formal adoption by medical schools.
- That medical schools give curriculum oversight to a single staff member to oversee the implementation of cancer education across the entire program to safeguard against omission, duplication and irrelevant content.
- Collaborative efforts are increased between medical schools in Australia to share curriculum content and in particular curriculum resources.
- Accreditation for the *Cancer Education Framework for Australian Medical Schools* be sought from:

- The Australian Government, through Cancer Australia
- Professional bodies within Australia, such as Cancer Council Australia (CCA) and the Clinical Oncological Society of Australia (COSA)
- Consumer advocacy groups such as Cancer Voices Australia
- International bodies, such as the World Health Organisation (WHO) and the International Union for Cancer Control (UICC)

8.3.2 Research

- That medical schools implementing the *Cancer Education Framework for Australian Medical Schools* evaluate the impact on cancer-related knowledge through such means as formative and summative assessment, surveys and focus groups. Outcomes could be linked to student learning, such as experiential learning and specific pedagogical approaches employed in curriculum delivery.
- That further research be conducted into providing novel approaches to increase medical student exposure to cancer patients.
- In situations where a core cancer curriculum is implemented, the effectiveness of specific pedagogical approaches to content delivery should be investigated.

8.4 Conclusion

This thesis presents a multiphase mixed method approach undertaken to develop a *Cancer Education Framework for Australian Medical Schools*, using a participatory curriculum design model.

The research participants in phase one have endorsed the use of the IOC as a valid starting point for cancer-specific education aimed at the level of the medical student, with a view to the necessary level of cancer knowledge, skills and attitudes required during internship.

The *Cancer Education Framework for Australian Medical Schools* has been similarly endorsed by national and international participants in phase three, as being an appropriate for medical students and adaptable to existing medical curricula.

Several comments received during phase three will be incorporated into a revised edition of the curriculum, which will be completed prior to implementing the aforementioned

recommendations and sharing the *Cancer Education Framework for Australian Medical Schools* with the wider cancer education community.

The current literature highlights a lack of consensus on how best to teach cancer and palliative care to medical students, and this is most likely influenced by the current lack of consensus on what to teach. Adaption of the *Cancer Education Framework for Australian Medical Schools* would provide consistency and define the outcomes of cancer education, facilitating further research into whether certain learning and teaching approaches yield better results than others.

Epilogue

My interest and involvement in cancer education has spanned two decades and encompassed curriculum development, teaching and assessment of both medical and nursing students.

Having used both quantitative and qualitative methods previously, I was interested in the mixed method approach in drawing on both methodologies to generate meaningful and valid data. One of the problems that I and other researchers commonly encounter in educational research is the recruitment of sufficient numbers of participants. Whilst power calculations were not applicable in this study, sufficient numbers were required to ensure that the IOC was reviewed by clinicians from all of the clinical domains that provide frontline care to cancer patients.

With a set of questions in mind, choosing a framework that would address these and provide the necessary scaffold on which to build the research phases was a key component. The mixed methods approach, with a pragmatic world view provided a design that supported research integrity and participant engagement. Initially, I had considered a Delphi-type survey approach to review the IOC. However, time constraints and the nature of the task meant that consensus development panels were used instead. Had these panels not been used, the misconceptions and issues encountered by a number of participants would not have been identified and the resulting framework would have been developed on erroneous data. The pragmatic approach, which provides flexibility in the application of methodologies in the pursuit of meaningful data, without compromising reliability or validity resulted in a more accurate and insightful review of the IOC.

The pragmatic application of a multiphase mixed methods approach in the development of a cancer education framework for Australian medical schools, utilising a participatory curriculum design model permitted the research questions to be answered more effectively than would have been possible if a solely quantitative or qualitative approach was taken. The incorporation of multiple viewpoints, across different data collection techniques, provided depth and consolidation.

Australian medical curricula engage a diverse approach to teaching and assessment, and with this in mind, this research set to establish a translational cancer curriculum framework.

Interpretation of research findings into meaningful new knowledge for end users will engage a pragmatic approach, inclusive of publishing, and discussing findings with key professional and academic institutions. The strength of the mixed method approach will provide key data to support these discussions.

References

1. Australian Institute of Health and Welfare & Australasian Association of Cancer Registries. *Cancer in Australia 2001*. AIHW cat. no. CAN 23. 2004.
<http://www.aihw.gov.au/publications/index.cfm/title/10083>
2. Australian institute of Health and Welfare, Australasian Association of Cancer Registries. *Cancer in Australia: in brief 2017*. 2017.
3. Cancer Australia. Cancer in Australia statistics. Cancer Australia. Accessed March 15, 2020. <https://canceraustralia.gov.au/affected-cancer/what-cancer/cancer-australia-statistics>
4. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2011*. 2016. *Australian Burden of Disease Study*. <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129555476>
5. Georgiou G. The changing face of cancer in Australian medical schools. *Aust Med Stud J*. 2017;8(1):53-56.
6. Starmer DL, House CL, Langworthy KM. Student Exposure to Cancer Patients: an Analysis of Clinical Logbooks and Focus Groups in Clinical Year Medical Students. *J Cancer Educ*. Apr 17 2019;35(4):760-765. doi:<https://doi.org/10.1007/s13187-019-01526-1>
7. Australian Medical Council. *Assessment and Accreditation of Medical Schools: Standards and Procedures*, 2011. Australian Medical Council.
8. Australian Medical Council. *Accreditation Standards for Primary Medical Education Providers and their Program of Study and Graduate Outcome Statements*. 2012:14.
9. Medical Deans Australia and New Zealand. About Medical Deans. MDANZ. Accessed April 15, 2020. <https://medicaldeans.org.au/about/>

10. Medical Deans Australia and New Zealand. Priorities. MDANZ. Accessed April 15, 2020. <https://medicaldeans.org.au/priorities/>
11. Oncology Education Committee. *Ideal Oncology Curriculum for Medical Schools*. vol 2007. The Cancer Council Australia; 2007.
12. Jones SB. Cancer in the developing world: a call to action. *BMJ*. 1999;319(7208):505-508. doi:10.1136/bmj.319.7208.505
13. Cancer Research UK. Worldwide cancer incidence statistics. Accessed February 9, 2020. <https://www.cancerresearchuk.org/health-professional/cancer-statistics/worldwide-cancer/incidence>
14. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. *CA: A Cancer Journal for Clinicians*. 2017;61(2):69-90. doi:10.3322/caac.20107
15. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*. 2018;68(6):394-424. doi:10.3322/caac.21492
16. Bray F, Soerjomataram I. The Changing Global Burden of Cancer: Transitions in Human Development and Implications for Cancer Prevention and Control. In: Geleband H, Jha P, Sankaranarayanan R, Horton S, eds. *Cancer: Disease Control Priorities*. Third Edition ed. The International Bank for Reconstruction and Development; 2015:chap Two.
17. International Association of Cancer Registries. GLOBOCAN. International Association of Cancer Registries,. Accessed March 27, 2019. http://www.iacr.com/fr/index.php?option=com_content&view=article&id=101&Itemid=578
18. International Agency for Research on Cancer. Cancer Today. Accessed March 8, 2020. <http://gco.iarc.fr/today/home>

19. Australian Institute of Health and Welfare. Australian Cancer Database (ACD). March 8, 2020. Accessed December 12, 2019, <https://www.aihw.gov.au/about-our-data/our-data-collections/australian-cancer-database>
20. Cancer Australia. Cancer Mortality. Cancer Australia. Accessed March 21, 2020. <https://nci.canceraustralia.gov.au/outcomes/cancer-mortality/cancer-mortality>
21. Behera P, Patro BK. Population Based Cancer Registry of India – the Challenges and Opportunities. *Asian Pacific journal of cancer prevention : APJCP*. 2018;19(10):2885-2889. doi:10.22034/apjcp.2018.19.10.2885
22. Australian institute of Health and Welfare. *Australia's health 2018*. 2018.
23. Australian Institute of Health and Welfare. *Cancer in Australia*. 2019. <https://www.aihw.gov.au/getmedia/8c9fcf52-0055-41a0-96d9-f81b0feb98cf/aihw-can-123.pdf.aspx?inline=true>
24. Cancer Council Australia. *Profile and Annual Report 2005*. 2005.
25. Australian Bureau of Statistics. Causes of Death, Australia, 2015. Excel spreadsheet. Australian Bureau of Statistics. Updated 28 September 2016. Accessed November 4, 2016. <http://www.abs.gov.au/AUSSTATS/abs.nsf/DetailsPage/3303.02015?OpenDocument>
26. Simon S. Facts & Figures 2020 Reports Largest One-year Drop in Cancer Mortality. American Cancer Society. Accessed March 20, 2020. <https://www.cancer.org/latest-news/facts-and-figures-2020.html>
27. Shah SC, Kayamba V, Peek Jr RM, Heimbürger D. Cancer Control in Low- and Middle-Income Countries: Is It Time to Consider Screening? *J Global Onco*. 2019;5(December 01, 2019):1-8. doi:10.1200/JGO.18.00200

28. Birnbaum JK, Duggan C, Anderson BO, Etzioni R. Early detection and treatment strategies for breast cancer in low-income and upper middle-income countries: a modelling study. *The Lancet Global Health*. 2018;6(8):e885-e893. doi:10.1016/s2214-109x(18)30257-2
29. Barton MB, Bell P, Sabesan S, Koczwara B. What should doctors know about cancer? Undergraduate medical education from a societal perspective. *The Lancet Oncology*. 2006;7:596-601.
30. Freyer DR, Kibrick-Lazear R. Transition of Cancer-Related Care for Older Adolescents and Young Adults. *Cancer*. 2006;107(7 suppl):1702-1709.
31. Hamood R, Hamood H, Merhasin I, Keinan-Boker L. Risk of cardiovascular disease after radiotherapy in survivors of breast cancer: A case-cohort study. *Journal of Cardiology*. 2019;73(4):280-291. doi:10.1016/j.jjcc.2018.10.009
32. Hauff M, Abel R, Hersh J, et al. Adolescent survivors' information needs for transitions to postsecondary education and employment. *Pediatric Blood & Cancer*. 2019;66(4):e27547-n/a. doi:10.1002/pbc.27547
33. Rosoff PM. The Two-Edged Sword of Curing Childhood Cancer. *The New England Journal of Medicine*. 2006;355(15):1522-1523.
34. Mitchell GK, Burrige LH, Colquist SP, Love A. General Practitioners' perceptions of their role in cancer care and factors which influence this role. *Health & Social Care in the Community*. 2012;20(6):607-616. doi:10.1111/j.1365-2524.2012.01075.x
35. Tarkowski R. Cancer Education in Surgery. *J Cancer Educ*. 10/08 2019;34:837-8. doi:10.1007/s13187-019-01615-1
36. Australian Institute of Health and Welfare. *Health system expenditure on cancer and other neoplasms in Australia: 2015-16*. 2021. *Cancer series no 131*.
37. Coats AS. Cancer control in Australia. *The Medical Journal of Australia*. 1998;169:8-9.

38. Ridolfo B, Serafino S, Somerford P, Codde J. *Health Measures for the Population of Western Australia: Trends and Comparisons*. 2000.
39. Tattersall MHN. Educating medical students about cancer. *The Medical Journal of Australia*. 1999;170(5):199-200.
40. Tattersall MHN, Thomas H. Recent advances: Oncology. *BMJ*. 1999;318:445-448.
41. National Breast Cancer Centre, National Cancer Control Initiative. *Clinical practice guidelines for psychosocial care of adults with cancer*. National Breast Cancer Centre; 2003.
42. Ha FJ, Parakh S. Novel Approaches To Undergraduate Oncology Education. *J Cancer Educ*. Jun 2018;33(3):500-504. doi:10.1007/s13187-016-1109-z
43. Roy Morgan Research. Australians Regard Cancer As Most Important Health Issue. Poll. Accessed April 12, 2006. <http://www.roymorgan.com/news/polls/2000/3357/>
44. Geffen L. A brief history of medical education and training in Australia. *Med J Aust*. Jul 7 2014;201(1 Suppl):S19-22. doi:10.5694/mja14.00118
45. Field MJ. Medical school accreditation in Australia: Issues involved in assessing major changes and new programs. *J Educ Eval Health Prof*. 2011;8:6. doi:10.3352/jeehp.2011.8.6
46. Starmer DL, Chapman E, Millward MJ. Applying global frameworks to assessment in medical education: an example of a nationally produced curriculum for cancer education. *J Cancer Educ*. Sep 2010;25(3):285-9. doi:10.1007/s13187-010-0096-8
47. McRae RJ. Oncology Education in Medical Schools: Towards an Approach that Reflects Australia's Health Care Needs. *J Cancer Educ*. Dec 2016;31(4):621-625. doi:10.1007/s13187-016-1088-0

48. Langworthy K. A Junior Doctor's Perspective on Oncology and Palliative Medicine Education in Western Australia: Comparison Between Graduation and Completion of Internship. *J Cancer Educ.* 2019;doi:10.1007/s13187-019-1479-0
49. Medical Board of Australia. Interns. Accessed 2 February, 2020. <https://www.medicalboard.gov.au/Registration/Interns.aspx>
50. Australian Medical Student Association. Internship Guide. Australian Medical Student Association,; 2020. <https://www.amsa.org.au/sites/amsa.org.au/files/Internship%20Guide%202019%20Final.pdf>
51. Medical Board of Australia. Postgraduate medical councils. Accessed 2 February, 2020. <https://www.medicalboard.gov.au/Accreditation/Postgraduate-medical-councils.aspx>
52. Starmer DL. Medical Student Exposure to Cancer Patients Whilst on Clinical Placement: a Retrospective Analyses of Clinical Log Books. *J Cancer Educ.* Apr 19 2018;doi:10.1007/s13187-018-1354-4
53. Australian Institute of Health and Welfare. *Australia's health 2016*. 2016. Cat. no. AUS 99.
54. Australian Government. How Health Insurance Works. https://www.privatehealth.gov.au/health_insurance/index.htm
55. Australian Prudential Regulation Authority. *Quarterly Private Health Insurance Statistics*. 2020.
56. Australian Prudential Regulation Authority. *Definitions and abbreviations*. 2020.
57. Australian Government. Private Health Insurance. https://www.privatehealth.gov.au/health_insurance/what_is_covered/privatehealth.htm

58. Australian Government. Health care and Medicare. Accessed April 5, 2020. <https://www.servicesaustralia.gov.au/individuals/subjects/whats-covered-medicare/health-care-and-medicare>
59. Health Direct. Australia's healthcare system. Accessed April 5, 2020. <https://www.healthdirect.gov.au/australias-healthcare-system>
60. Australian Institute of Health and Welfare. *Emergency department care 2017–18: Australian hospital statistics*. Vol. Health services series no. 89. 2018. <https://www.aihw.gov.au/getmedia/9ca4c770-3c3b-42fe-b071-3d758711c23a/aihw-hse-216.pdf.aspx?inline=true>
61. Rodwell K. Private vs public hospitals – what’s the difference? CANSTAR Pty Limited. Accessed April 6, 2020. <https://www.canstar.com.au/health-insurance/private-vs-public-hospitals/>
62. Department of Health Western Australia. *Referrals to Public Outpatient Surgical Clinics: December 2017*. 2018. https://ww2.health.wa.gov.au/~/_media/Files/Corporate/Reports%20and%20publications/Rreferrals-to-public-outpatient/Referrals-to-Public-Outpatient-Surgical-Clinics-Dec-2017.pdf
63. Government of Western Australia Department of Health. Median waiting time (days) of elective surgery cases on wait list as at end of month. Accessed April 6, 2020. https://ww2.health.wa.gov.au/Reports-and-publications/Elective-Surgery-Wait-List-ESWL-reports/Data?report=eswl_mwt
64. Tang Y. What is the difference between a public and private patient? HBF. Accessed April 6, 2020. <https://www.hbf.com.au/get-well/the-difference-between-a-public-and-private-patient>
65. Government of Western Australia Department of Health. Overview of the WA health system. Accessed April 7, 2020. https://healthywa.wa.gov.au/Articles/N_R/Overview-of-the-WA-health-system

66. The Western Australian Public Patients' Hospital Charter. Department of Health; 2012. https://healthywa.wa.gov.au/Articles/N_R/Overview-of-the-WA-health-system
67. HBF. Your health journey in a public hospital explained. Accessed April 6, 2020. <https://www.hbf.com.au/campaigns/public-vs-private-wait-times>
68. Dixit SK, Sambasivan M. A review of the Australian healthcare system: A policy perspective. *SAGE Open Medicine*. 2018;6:205031211876921. doi:10.1177/2050312118769211
69. Australian Government. Overview of Health System. https://www.privatehealth.gov.au/health_insurance/what_is_covered/index.htm
70. Lewis S, Willis K, Olson RE. If you've got private health insurance, the choice to use it in a public hospital is your own. *The Conversation*. 2019. <https://theconversation.com/if-youve-got-private-health-insurance-the-choice-to-use-it-in-a-public-hospital-is-your-own-113367>
71. Australian Government Department of Health. The Australian health system. Accessed April 6, 2020. <https://www.health.gov.au/about-us/the-australian-health-system#>
72. Australian government. Australian Commission on Safety and Quality in Health Care. Accessed April 13, 2020. <https://meteor.aihw.gov.au/content/index.phtml/itemId/646428>
73. Australian Commission on Safety and Quality in Health Care. *The state of patient safety and quality in Australian hospitals 2019*. 2019.
74. Australian Commission on Safety and Quality in Health Care. *NSQHS Standards*. 2017.
75. Australian Commission on Safety and Quality in Health Care. The NSQHS Standards. ACSQHC. Accessed April 13, 2020. <https://www.safetyandquality.gov.au/standards/nsqhs-standards>

76. Insertion and Management of Peripheral Intravenous Cannulae in Western Australian Healthcare Facilities Policy (Government of Western Australia) (2017).
77. CCP Intravenous Cannulation. Video: School of Medicine, The University of Western Australia (Fremantle)
78. Australian Commission on Safety and Quality in Health Care. Australian Health Service Safety and Quality Accreditation Scheme. Accessed April 13, 2020.
<https://www.safetyandquality.gov.au/standards/national-safety-and-quality-health-service-nsqhs-standards/assessment-nsqhs-standards/australian-health-service-safety-and-quality-accreditation-scheme>
79. Starmer D, Jamrozik K, Barton M, Miles S. Evaluating curriculum changes in undergraduate cancer education. *J Cancer Educ*. Fall 2004;19(3):156-60.
doi:10.1207/s15430154jce1903_9
80. Starmer DL, Jamrozik K, Trotter JM, et al. *Starting from Square 1: Development of an Undergraduate Curriculum in Oncology*. 2001:18.
81. Tattersall MHN, Langlands AO, Simpson JS, Forbes JF. Undergraduate Education About Cancer: a Survey in Australian Medical Schools. *Eur J Cancer Clin Oncol*. 1988;24(3):467-471.
82. Tattersall MHN, Simpson JS, Langlands AO. The Education of Medical Students About Cancer - Time for Change. *European Journal of Cancer & Clinical Oncology*. 1983;19(3):303-306.
83. Barton M. What do undergraduate doctors really need to know about radiation oncology? *Journal of medical imaging and radiation oncology*. 2018;62(6):823-825.
doi:10.1111/1754-9485.12834
84. Jones R, Higgs R, De Angelis C, Prideaux D. Changing face of medical curricula. *The Lancet*. 2001;357(9257):699-703. doi:10.1016/s0140-6736(00)04134-9

85. Mattes MD, Patel KR, Burt LM, Hirsch AE. A Nationwide Medical Student Assessment of Oncology Education. *J Cancer Educ*. Dec 2016;31(4):679-686. doi:10.1007/s13187-015-0872-6
86. Quintero GA. Medical education and the healthcare system - why does the curriculum need to be reformed? *BMC Medicine*. 2014;12(1)doi:10.1186/s12916-014-0213-3
87. Chester TE. The reorganisation of the N.H.S. Blue print and reality. *World Hosp*. Winter 1975;11(1):10-15.
88. Gaffan J, Dacre J, Jones A. Educating Undergraduate Medical Students About Oncology: A Literature Review. *Journal of Clinical Oncology*. 2006;24:1932-1939.
89. Koczwara B, Barton MB, Olver IN, Tattersall MH, Turner DR, Starmer DL. How not to effect change in curricula [letter]. *Med J Aust*. 2006;185(1):52.
90. Cancer Council Australia and the Clinical Oncological Society of Australia. *Submission to the Department of Education, Science and Training study of medical education in Australia*. 2006.
91. Oncology Education Committee. *Ideal Oncology Curriculum for Medical Schools*. The Cancer Council Australia; 1999.
92. Sabesan S, Olver I, editors. *Clinical Oncology for Medical Students*. Cancer Council Australia; 2014. Accessed January 12, 2014.
[http://wiki.cancer.org.au/oncologyformedicalstudents/Clinical Oncology for Medical Students](http://wiki.cancer.org.au/oncologyformedicalstudents/Clinical_Oncology_for_Medical_Students)
93. Starmer D. The Cancer Council Australia Medical Student Essay Competition. *J Cancer Educ*. Dec 2016;31(4):619-620. doi:10.1007/s13187-016-1099-x

94. Medical Deans Australia and New Zealand. Vision. MDANZ. Accessed April 15, 2020. <https://medicaldeans.org.au/about/vision/>
95. Medical Deans Australia and New Zealand. Medical Schools Outcomes Database. MDANZ. Accessed April 15, 2020. <https://medicaldeans.org.au/priorities/medical-schools-outcomes-database/>
96. Cnossen K, Freeman G, Jamrozik K. The Workload Related to Cancer in Primary Care. *Unpublished Observations*. 2004;
97. Medical Deans Australia and New Zealand. *Medical Schools Outcomes Database National Data Report 2019*. 2019. <https://medicaldeans.org.au/md/2019/09/2019-MSOD-National-Data-Report-2014-2018-Full-report.pdf>
98. Medical Deans Australia and New Zealand. Student Statistics Tables. MDANZ. Accessed April 15, 2020. https://medicaldeans.org.au/data/?md_year=2018&data_type=Graduates&country=AU&students=total&preview=
99. Medical Board of Australia. *Report on specialist medical colleges' specialist pathway data 2018*. 2019.
100. Starmer DL, Barton MB. Advances in cancer management: at what cost to medical student education? *J Cancer Educ*. 2009;24(3):233-7. doi:10.1080/08858190902924849
101. Haagedoorn EM, de Vries J, Robinson E. The UICC/WHO-CCCE Cancer Education project: a different approach. *J Cancer Educ*. 2000;15(4):204-208.
102. Tattersall MHN, Langlands AO. Oncology curricula in Australia. *The Medical Journal of Australia*. 1993;158:224-225.
103. Arnold M, Rutherford MJ, Bardot A, et al. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-

based study. *The Lancet Oncology*. 2019;20(11):1493-1505. doi:10.1016/S1470-2045(19)30456-5

104. Australian Institute of Health and Welfare. *Health system expenditure on cancer and other neoplasms in Australia: 2008–09*. 2013. *Cancer series no 81*.

105. Junqueira AC. Medical student cancer education: experience from projects in Sao Paulo, Brazil, and in other parts of Latin America. *Journal of Surgical Oncology*. 2001;77(1):1-4.

106. Barton MB, Tattersall MH, Butow PN, et al. Cancer knowledge and skills of interns in Australia and New Zealand in 2001: comparison with 1990, and between course types. *The Medical Journal of Australia*. 2003;178(6):285-289.

107. Smith WT, Tattersall MH, Irwig L, Langlands AO. Undergraduate education about cancer. *European Journal of Cancer*. 1991;27(11):1448-1453.

108. Bravery B. Cancer survivor and medical student urges better oncology education for doctors. ABC. Accessed March 9, 2017. <http://www.abc.net.au/news/health/2017-03-04/changing-oncology-education-for-the-better/8323380>

109. Alexander IK, Hjortsø CN. Sources of complexity in participatory curriculum development: an activity system and stakeholder analysis approach to the analyses of tensions and contradictions. *Higher Education*. 2019;77(2):301-322. doi:10.1007/s10734-018-0274-x

110. Sidebotham M, Walters C, Chipperfield J, Gamble J. Midwifery participatory curriculum development: Transformation through active partnership. *Nurse Education in Practice*. 2017;25:5-13. doi:10.1016/j.nepr.2017.04.010

111. Denunzio NJ, Joseph L, Handal R, Agarwal At, Ahuja D, Hirsch AE. Devising the Optimal Preclinical Oncology Curriculum for Undergraduate Medical Students in the United States. *J Cancer Educ*. 2013;28(2):228-236. doi:10.1007/s13187-012-0442-0

112. DeCoste-Lopez J, Madhok J, Harman S. Curricular innovations for medical students in palliative and end-of-life care: a systematic review and assessment of study quality. *J Palliat Med.* Apr 2015;18(4):338-49. doi:10.1089/jpm.2014.0270
113. Granek L, Mizrakli Y, Ariad S, Jotkowitz A, Geffen DB. Impact of a 3-Day Introductory Oncology Course on First-Year International Medical Students. *J Cancer Educ.* Sep 2017;32(3):640-646. doi:10.1007/s13187-015-0972-3
114. Warren K. The Edinburgh Declaration. *Lancet.* 1988;322(8608):462.
115. Neeley BC, Golden DW, Brower JV, Braunstein SE, Hirsch AE, Mattes MD. Student Perspectives on Oncology Curricula at United States Medical Schools. *J Cancer Educ.* Feb 2019;34(1):56-58. doi:10.1007/s13187-017-1265-9
116. de Vries J, Szabo BG, Sleijfer DT. The educational yield of the international summer school "Oncology for Medical Students". *J Cancer Educ.* 2002;17(3):115-120.
117. McKillip RP, Hahn OM, Bartkowiak B, et al. Implementation of a Novel Medical School Multidisciplinary and Interprofessional Oncology Curriculum: a Mixed Method Study. *J Cancer Educ.* Feb 2019;34(1):50-55. doi:10.1007/s13187-017-1264-x
118. Cecilio-Fernandes D, Aalders WS, de Vries J, Tio RA. The Impact of Massed and Spaced-Out Curriculum in Oncology Knowledge Acquisition. *J Cancer Educ.* Aug 2018;33(4):922-925. doi:10.1007/s13187-017-1190-y
119. Mayes J, Davies S, Harris A, Wray E, Dark GG. Impact of a 2-Week Oncology Placement on Medical Students' Perception of Cancer. *J Cancer Educ.* Feb 2018;33(1):174-179. doi:10.1007/s13187-016-1101-7
120. George M, Mandaliya H, Prawira A. A Survey of Medical Oncology Training in Australian Medical Schools: Pilot Study. *JMIR medical education.* Dec 12 2017;3(2):e23. doi:10.2196/mededu.7903

121. Lee AYS, Carlon B, Ramsay R, Thirukkumaran T. Integrating exposure to palliative care in an undergraduate medical curriculum: student perspectives and strategies. *Int J Med Educ*. Apr 26 2017;8:151-152. doi:10.5116/ijme.58cc.500c
122. Lloyd-Williams M, MacLeod RD. A systematic review of teaching and learning in palliative care within the medical undergraduate curriculum. *Medical Teacher*. 2004;26(8):683-690.
123. Walker S, Gibbins J, Barclay S, et al. Progress and divergence in palliative care education for medical students: A comparative survey of UK course structure, content, delivery, contact with patients and assessment of learning. *Palliative medicine*. Oct 2016;30(9):834-42. doi:10.1177/0269216315627125
124. Association for Palliative Medicine. 2014 Curriculum for Undergraduate Medical Education. Accessed September 28, 2020.
<https://www.apmuesif.phpc.cam.ac.uk/userfiles/APMCurriculumUESIFFeb2014.pdf>
125. Haagedoorn EM, Oldhoff J, Bender W, Clarke WD, Sleijfer DT. *Essential Oncology for Health Professionals*. Van Gorcum & Comp; 1994:405.
126. Tattersall MHN, Langlands AO, Smith W, Irwig L. Undergraduate education about cancer. A survey of clinical oncologists and clinicians responsible for cancer teaching in Australian medical schools. *European Journal of Cancer*. 1993;29(11):1639-1642.
127. Klufas A, Shin G, Raphael R, Sarfaty SC, Hirsch AE. A Thorough Analysis of the Current State of Cancer Education in Medical Schools and Application of Experimental Teaching Techniques and Their Efficacy. *Adv Med Educ Pract*. 2020;11:931-946.
doi:10.2147/AMEP.S268382
128. Koczwara B, Barton MB. The Ideal Oncology Curriculum for Medical Students [letter]. *Journal of Clinical Oncology*. 2006;24(33):5334.

129. Koczwara B, Tattersall MHN, Barton M, et al. Achieving equal standards in medical student education: is a national exit examination the answer? *Med J Aust.* 2005;182(5):228-230.
130. DeNunzio NJ, Hirsch AE. The Need for a Standard, Systematic Oncology Curriculum for U.S. Medical Schools. *Academic Medicine.* 2011;86(8)
131. Gaffan J, Darce J, Jones A. The Ideal Oncology Curriculum for Medical Students [letter]. *Journal of Clinical Oncology.* 2006;24(32):5334.
132. Hansen HH, Bajorin DF, Muss HB, Purkalne G, Schrijvers D, Stahel D. Recommendations for a Global Core Curriculum in Medical Oncology. *Journal of Clinical Oncology.* 2004;22(22):1603-1912.
133. Muss HB, Von Roenn J, Damon LE, et al. ACCO: ASCO Core Curriculum Outline. *Journal of Clinical Oncology.* 2005;23(9):2049-2077.
134. WHO Collaborating Centre for Cancer Education, Groningen University Faculty of Medical Sciences. *International Summer Schools 'Oncology for Medical Students' 1997 - 1998 Cancer care in general practice.* 1998.
135. WHO Collaborating Centre for Cancer Education, Groningen University Faculty of Medical Sciences. 8th International Summer School 'Oncology for Medical Students' Groningen, The Netherlands, 18-28 July 2006. In: de Vries J, editor. Groningen, The Netherlands: Groningen University Faculty of Medical Sciences,; 2006.
136. Fromm-Haidenberger S, Pohl G, Widder J, et al. Vienna international summer school on experimental and clinical oncology for medical students: an Austrian cancer education project. *J Cancer Educ.* Mar 2010;25(1):51-4. doi:10.1007/s13187-009-0011-3
137. Lutgendorf-Caucig C, Kaiser PA, Machacek A, Waldstein C, Potter R, Loffler-Stastka H. Vienna Summer School on Oncology: how to teach clinical decision making in a

multidisciplinary environment. *BMC Med Educ.* Jun 6 2017;17(1):100. doi:10.1186/s12909-017-0922-3

138. Pavlidis N, Vermorken JB, Costa A. Oncology for medical students: a new ESO educational avenue. *Annals of oncology.* 2005;16(5):840-841. doi:10.1093/annonc/mdi143

139. Pavlidis N, Vermorken JB, Stahel R, et al. Undergraduate training in oncology: An ESO continuing challenge for medical students. *Surgical Oncology.* 2012;(0)

140. Benstead K, Palmieri C, Brewster A, Gilson D, Jenkins P, Booth J. The Minimum Competences in Non-surgical Oncology that Medical Students Need to Acquire in Order to be Safe Foundation Year 1 (F1) Doctors: A Delphi Survey. *Clin Oncol (R Coll Radiol).* Jul 2015;27(7):373-9. doi:10.1016/j.clon.2015.03.007

141. The Royal College of Radiologists. *Medical Undergraduate Non-surgical Oncology Curriculum.* 2014.

142. The Royal College of Radiologists. *Medical Undergraduate Non-surgical Oncology Curriculum.* 2020.

143. Starmer DL, Chapman E, Millward MJ. Applying Global Frameworks to Assessment in Medical Education: an example of a nationally produced curriculum for cancer education. presented at: International Cancer Education Conference; October 15-17 2009; Houston, TX.

144. Tam VC, Berry S, Hsu T, et al. Oncology education in Canadian undergraduate and postgraduate medical programs: a survey of educators and learners. *Current oncology.* 2014;21(1):e75-e88. doi:10.3747/co.21.1667

145. Radiation Oncology Education Collaborative Study Group. Home. Accessed October 30, 2020. <https://roecsg.org/>

146. Radiation Oncology Education Collaborative Study Group. Core Curriculum. Accessed October 30, 2020. <https://roecsg.org/corecurriculum/>

147. Golden DW, Braunstein S, Jimenez RB, Mohindra P, Spektor A, Ye JC. Multi-Institutional Implementation and Evaluation of a Curriculum for the Medical Student Clerkship in Radiation Oncology. *J Am Coll Radiol*. Feb 2016;13(2):203-9. doi:10.1016/j.jacr.2015.06.036
148. Golden DW, Kauffmann GE, McKillip RP, Farnan JM, Park YS, Schwartz A. Objective Evaluation of a Didactic Curriculum for the Radiation Oncology Medical Student Clerkship. *Int J Radiat Oncol Biol Phys*. Aug 1 2018;101(5):1039-1045. doi:10.1016/j.ijrobp.2018.04.052
149. Radiation Oncology Education Collaborative Study Group. Introduction to Radiation Oncology. Accessed October 30, 2020. <https://roecsg.org/introduction-to-radiation-oncology/>
150. Agarwal A, Shah A, Shah B, Koottappillil B, Hirsch AE. The Impact of a Radiation Oncologist led Oncology Curriculum on Medical Student Knowledge. *J Cancer Educ*. May 09 2017;doi:10.1007/s13187-017-1227-2
151. Ben Mustapha S, Meijnders P, Jansen N, Lakosi F, Coucke P. The status of radiation oncology (RO) teaching to medical students in Europe. *Clinical and translational radiation oncology*. 2019;17:40-46. doi:10.1016/j.ctro.2019.04.010
152. Strano-Paul L, Lane S, Lu WH, Chandran L. Impact of a Home Hospice Visit Program on Third-Year Medical Students: A qualitative analysis of student reflections. *Journal of palliative care*. 2015;31(1):5-12. doi:10.1177/082585971503100102
153. Nakamura Y, Takamiya Y, Saito M, et al. A survey of palliative medicine education in Japan's undergraduate medical curriculum. *BMC palliative care*. Jun 7 2017;16(1):38. doi:10.1186/s12904-017-0212-1
154. Ellman MS, Fortin AH, Putnam A, Bia M. Implementing and Evaluating a Four-Year Integrated End-of-Life Care Curriculum for Medical Students. *Teaching and learning in medicine*. 2016;28(2):229-239. doi:10.1080/10401334.2016.1146601

155. Palliative Care Curriculum for Undergraduates (PCC4U) Project Team. *Implementation Guide: Core Modules and Focus Topics*. QUT; 2020.
156. Elsner F, Centeno C, Cetto G, et al. Recommendations of the European Association for Palliative Care (EAPC) for the development of undergraduate curricula in palliative medicine at European medical schools. 2013;
157. Noguera A, Bolognesi D, Garralda E, et al. How Do Experienced Professors Teach Palliative Medicine in European Universities? A Cross-Case Analysis of Eight Undergraduate Educational Programs. *J Palliat Med*. Nov 2018;21(11):1621-1626.
doi:10.1089/jpm.2018.0071
158. Eychmuller S, Forster M, Gudat H, Lutolf UM, Borasio GD. Undergraduate palliative care teaching in Swiss medical faculties: a nationwide survey and improved learning objectives. *BMC Med Educ*. Nov 27 2015;15:213. doi:10.1186/s12909-015-0485-0
159. Working Group under a Mandate of the Joint Commission of the Swiss Medical Schools. *Swiss Catalogue of Learning Objectives for Undergraduate Medical Training - June 2008*. 2008.
160. Lehto JT, Hakkarainen K, Kellokumpu-Lehtinen PL, Saarto T. Undergraduate curriculum in palliative medicine at Tampere University increases students' knowledge. *BMC palliative care*. Jan 25 2017;16(1):13. doi:10.1186/s12904-016-0182-8
161. Schulz-Quach C, Wenzel-Meyburg U, Fetz K. Can elearning be used to teach palliative care? - medical students' acceptance, knowledge, and self-estimation of competence in palliative care after elearning. *BMC Med Educ*. Apr 27 2018;18(1):82. doi:10.1186/s12909-018-1186-2
162. Bar-Sela G, Mitnik I, Zalman D, et al. Medical students' attitudes towards participating in a palliative medicine course: A new specialty in Israel. *Palliative & supportive care*. Oct 2018;16(5):528-533. doi:10.1017/s1478951517000943

163. Jeehyun C, Hoseob L, Yoonyoung K, Jihun K. Changes in Perceptions and Attitudes of Medical Students toward End-of-Life Care after Hospice and Palliative Medicine Education. *Korean Journal of Hospice & Palliative Care*. 2019;22(4):166-173.
doi:10.14475/kjhpc.2019.22.4.166
164. Royal Australian College of General Practitioners. Introduction. RACGP. Accessed June 1, 2020. <https://www.racgp.org.au/education/registrars/fellowship-pathways/standards-for-general-practice/introduction>
165. Ni L, Chmura SJ, Golden DW. National Radiation Oncology Medical Student Clerkship Trends From 2013 to 2018. *Int J Radiat Oncol Biol Phys*. May 1 2019;104(1):24-26.
doi:10.1016/j.ijrobp.2018.12.039
166. Nicholls L, Bravery B, Chelvarajah R, et al. The status of radiation oncology teaching in Australian and New Zealand medical schools. *Journal of medical imaging and radiation oncology*. Dec 2018;62(6):828-834. doi:10.1111/1754-9485.12788
167. Dennis KE, Duncan G. Radiation oncology in undergraduate medical education: a literature review. *Int J Radiat Oncol Biol Phys*. Mar 1 2010;76(3):649-55.
doi:10.1016/j.ijrobp.2009.08.038
168. Hirsch AE, Mulleady Bishop P, Dad L, Singh D, Slanetz PJ. An increase in medical student knowledge of radiation oncology: a pre-post examination analysis of the oncology education initiative. *Int J Radiat Oncol Biol Phys*. Mar 15 2009;73(4):1003-8; quiz 1008.e1-1008.e2. doi:10.1016/j.ijrobp.2008.12.012
169. Brameld KJ, Holman CD, Threlfall TJ, Lawrence D, De Klerk NH. Increasing "active prevalence" of cancer in Western Australia and its implications for health services. *Australian and New Zealand Journal of Public Health*. 2002;26(2):164-169.
170. Jamrozik K, Sadler S. *Medical and other care in Western Australia for patients with cancer*. 1998:98.

171. Boyle P. The globalisation of cancer. *The Lancet*. 2006;368(9536):629-630.
172. Hiramaneek N, McAvoy BR. Meeting the needs of patients with cancer - A GP guide to support services. *Australian Family Physician*. 2005;34(5):365-367.
173. Fidjeland HL, Brekke M, Vistad I. General practitioners' attitudes toward follow-up after cancer treatment: A cross-sectional questionnaire study. *Scand J Prim Health Care*. 2015 2015;33(4):223-232. doi:10.3109/02813432.2015.1118836
174. Meijler WJ, van Heest F, Otter R, Sleijfer DT. Educational needs of general practitioners in palliative care: outcome of a focus group study. *J Cancer Educ*. 2005;20(1):28-33.
175. Trotter J, Joseph D, Dewar J, Harper C, Fletcher D, Jamrozik K. *Development of an Integrated, Multi-disciplinary Undergraduate Curriculum in Oncology for Western Australian Medical Students*. 1998:5.
176. Voogt E, van Leeuwen AF, Visser AP, van der Heide A, van der Mass PJ. Information needs of patients with incurable cancer. *Supportive Care in Cancer*. 2005;13(11):943-948.
177. Mills ME, Davidson R. Cancer Patients' Sources of Information: Use and Quality Issues. *Psycho-Oncology*. 2002;11(5):371-378.
178. Barton MB, Gabriel GS, Sutherland D, Sundquist KJ, Girgis A. Cancer knowledge and perception of skills of general practice registrars in Australia. *J Cancer Educ*. 2007;22(4):259-265. doi:10.1007/bf03174127
179. Broomfield D, Humphries GM. Using the Delphi technique to identify the cancer education requirements of general practitioners. *Medical Education*. 2001;35:928-937.
180. Barton MB, Simons RG. A survey of cancer curricula in Australian and New Zealand medical schools in 1997. *The Medical Journal of Australia*. 1999;170(5):225-7.

181. Starmer DL. Exposure to cancer patients during clinical placement: Are we adequately preparing tomorrow's doctors? *J Cancer Educ.* 2018;33(Suppl. 1):S14.
182. Olson LG, Hill SR, Newby DA. Barriers to student access to patients in a group of teaching hospitals. *The Medical Journal of Australia.* 2005;183(9):461-463.
183. Arolker M, Barnes J, Gadoud A, Jones L, Barnes L, Johnson MJ. 'They've got to learn'-- a qualitative study exploring the views of patients and staff regarding medical student teaching in a hospice. *Palliative medicine.* 2010;24(4):419-426.
doi:10.1177/0269216310366065
184. Gadoud A, Jones L, Johnson M, Adcock Y, Arolker M, Barnes J. Medical students talking to hospice patients. Article. *Clinical Teacher.* 2012;9(1):9-13. doi:10.1111/j.1743-498X.2011.00513.x
185. Jiang X, Liao Z, Hao J, et al. Palliative care education in China: insight into one medical university. *Journal of pain and symptom management.* 2011;41(4):796-800.
doi:10.1016/j.jpainsymman.2010.07.012
186. Anneser J, Kunath N, Krautheim V, Borasio GD. Needs, expectations, and concerns of medical students regarding end-of-life issues before the introduction of a mandatory undergraduate palliative care curriculum. *J Palliat Med.* Nov 2014;17(11):1201-5.
doi:10.1089/jpm.2013.0614
187. Walker S, Gibbins J, Paes P, et al. Palliative care education for medical students: Differences in course evolution, organisation, evaluation and funding: A survey of all UK medical schools. *Palliative medicine.* Jun 2017;31(6):575-581.
doi:10.1177/0269216316671279
188. de Vries J, Haagedoorn EM. Teaching medical students oncology. *Cancer Strategy.* 1999;1:59-60.

189. Brickner H. Undergraduate Oncology Education in Scandinavia. *J Cancer Educ.* 1988;3(2):97-101.
190. Wilkes GA, Krebs WA, eds. *Collins Concise Dictionary*. Third ed. Harper Collins Publishers; 1995.
191. Turner GW, ed. *The Australian Concise Oxford Dictionary of Current English*. Second ed. Oxford University Press; 1987.
192. Bastow S, Dunleavy P, Tinkler J. The Impact of the Social Sciences: How Academics and Their Research Make a Difference. In: Bastow S, Dunleavy P, Tinkler J, eds. SAGE Publications Ltd; 2014. <https://methods.sagepub.com/book/the-impact-of-the-social-sciences>
193. Osler A. 10 reasons why we need social science. Accessed August 19, 2020. <https://www.palgrave.com/gp/campaigns/social-science-matters/10-reasons-for-social-science>
194. Creswell JW. *Research Design: qualitative, quantitative and mixed methods approaches*. Sage Publications; 2014.
195. Alzheimer Europe. Types of research: The four main approaches. Accessed 20 August, 2020. <https://www.alzheimer-europe.org/Research/Understanding-dementia-research/Types-of-research/The-four-main-approaches>
196. Kaushik V, Walsh CA. Pragmatism as a Research Paradigm and Its Implications for Social Work Research. *Social sciences (Basel)*. 2019;8(9):255. doi:10.3390/socsci8090255
197. Clarke E, Visser J. Pragmatic research methodology in education: possibilities and pitfalls. *International Journal of Research & Method in Education*. 2019;42(5):455-469. doi:10.1080/1743727x.2018.1524866

198. Nicholls D. Qualitative Research: Part Three - Methods. *International Journal of Therapy and Rehabilitation*. 2009;16(12)
199. Kumar R. *Research Methodology*. Sage Publications; 1999.
200. Graziano AM, Raulin ML. *Research Methods A Process of Inquiry*. Fifth ed. Allyn and Bacon; 2004.
201. Brace N, Kemp R, Snelgar R. *SPSS for Psychologists A Guide to Data Analysis using SPSS for Windows*. 2nd ed. Palgrave MacMillan; 2003.
202. Leard Statistics. Measures of Central Tendency. Accessed April 4, 2020. <https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php>
203. Glen S. Measures of Spread: Definitions, Examples. web page. Accessed April 4, 2020. <https://www.statisticshowto.com/measures-of-spread/>
204. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*. 4th ed. Allyn and Bacon; 2001.
205. Gravetter FJ, Wallnau LB. *Statistics for the Behavioral Sciences*. Fifth ed. Wadsworth; 2000.
206. Pagano RR. *Understanding Statistics in the Behavioral Sciences*. Third ed. West Publishing Company; 1990.
207. McLeod S. What's the difference between qualitative and quantitative research? Accessed November 6, 2020. <https://www.simplypsychology.org/qualitative-quantitative.html>
208. Nicholls D. Qualitative Research: Part Two - Methodology. *International Journal of Therapy and Rehabilitation*. 2009;16(11)

209. Nicholls D. Qualitative Research: Part One - Philosophy. *International Journal of Therapy and Rehabilitation*. 2009;16(10)
210. Humphrey-Murto S, Varpio L, Gonsalves C, Wood TJ. Using consensus group methods such as Delphi and Nominal Group in medical education research. *Med Teach*. Jan 2017;39(1):14-19. doi:10.1080/0142159X.2017.1245856
211. Heale R, Forbes D. Understanding triangulation in research. *Evid Based Nurs*. Oct 2013;16(4):98. doi:10.1136/eb-2013-101494
212. Barbour RS. Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ*. May 5 2001;322(7294):1115-7. doi:10.1136/bmj.322.7294.1115
213. Carter N, Bryant-Lukosius D, DiCenso A, Blythe J, Neville AJ. The Use of Triangulation in Qualitative Research. *Oncology Nursing Forum*. 2014;41(5):545-547.
214. Turner P, Turner S. Triangulation in practice. *Virtual Reality*. 2009;13:171-181.
215. Naeem S. Data triangulation in qualitative research. Accessed December 3, 2020. <http://researcharticles.com/index.php/data-triangulation-in-qualitative-research/>
216. Gallo L, Murphy J, Braga LH, Farrokhyar F, Thoma A. Users' guide to the surgical literature: how to assess a qualitative study. *Canadian Journal of Surgery*. 2018;61(3):208-214. doi:10.1503/cjs.013117
217. Czabanowska K, Smith T, Konings KD, et al. In search for a public health leadership competency framework to support leadership curriculum-a consensus study. *The European Journal of Public Health*. 2014;24(5):850-856. doi:10.1093/eurpub/ckt158
218. Nair R, Aggarwal R, Khanna D. Methods of formal consensus in classification/diagnostic criteria and guideline development. *Semin Arthritis Rheum*. Oct 2011;41(2):95-105. doi:10.1016/j.semarthrit.2010.12.001

219. Waggoner J, Carline JD, Durning SJ. Is There a Consensus on Consensus Methodology? Descriptions and Recommendations for Future Consensus Research. *Academic Medicine*. 2016;91(5):663–668.
220. Halcomb E, Davidson P, Hardaker L. Using the consensus development conference method in healthcare research. *Nurse Researcher*. 2008;16(1):56-71.
221. Harvey N, Holmes CA. Nominal group technique: an effective method for obtaining group consensus. *Int J Nurs Pract*. Apr 2012;18(2):188-94. doi:10.1111/j.1440-172X.2012.02017.x
222. Fink A, Kosecoff J, Chassin M, Brook RH. Consensus methods: characteristics and guidelines for use. *Am J Public Health*. Sep 1984;74(9):979-83. doi:10.2105/ajph.74.9.979
223. Fitch K, Bernstein SJ, Aguilar MD, et al. *The RAND/UCLA Appropriateness Method User's Manual*. RAND Health; 2001.
224. Potter M, Gordon S, Hamer P. The Nominal Group Technique: A useful consensus methodology in physiotherapy research. *NZ Journal of Physiotherapy*. 2004;32(2):70-75.
225. Stewart J. Is the Delphi technique a qualitative method? *Medical Education*. 2001;35:922-923.
226. Allen J, Dyas J, Jones M. Building consensus in health care: a guide to using the nominal group technique. *British Journal of Community Nursing*. 2004;9(9):110-114.
227. Hsu C, Sandford BA. The Delphi Technique: Making Sense of Consensus. *Practical Assessment, Research & Evaluation*. 2007;12(10)doi:10.7275/pdz9-th90
228. Lwin Z, Broom A, Sibbritt D, et al. The Australian Medical Oncologist Workforce Survey: The profile and challenges of medical oncology. *Seminars in Oncology*. 2018;45(5-6):284-290. doi:10.1053/j.seminoncol.2018.06.004

229. Halkett GKB, Berg MN, Breen LJ, et al. Sustainability of the Australian radiation oncology workforce: A survey of radiation therapists and radiation oncology medical physicists. *European Journal of Cancer Care*. 2018;27(2):e12804. doi:10.1111/ecc.12804
230. Blinman PL, Grimison P, Barton MB, et al. The shortage of medical oncologists: the Australian Medical Oncologist Workforce Study. *Medical Journal of Australia*. 2012;196(1):58-61. doi:10.5694/mja11.10363
231. O'Leary C. Crisis looms over lack of specialist doctors. *The West Australian*. <https://thewest.com.au/news/australia/crisis-looms-over-lack-of-specialist-doctors-ng-ya-323158>
232. Lambert J. WA facing GP workforce crisis. The Medical Republic. Accessed July 19, 2018. <https://medicalrepublic.com.au/wa-facing-gp-workforce-crisis/11286>
233. Gotzsche PC, Ioannidis JPA. Content area experts as authors: helpful or harmful for systematic reviews and meta-analyses? *BMJ*. 2012;345(nov01 1):e7031-e7031. doi:10.1136/bmj.e7031
234. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*. 2015;42(5):533-544. doi:10.1007/s10488-013-0528-y
235. Silver Chain. About Us. <https://www.silverchain.org.au/about-us/>
236. National Health and Medical Research Council (NHMRC), Australian Research Council, Universities Australia. *Australian Code for the Responsible Conduct of Research*. 2018.
237. National Health and Medical Research Council (NHMRC), Australian Research Council, Universities Australia. The National Statement on Ethical Conduct in Human

- Research. Commonwealth of Australia. <https://www.nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018>
238. National Health and Medical Research Council (NHMRC). Who are we. Accessed September 9, 2020. <https://www.nhmrc.gov.au/about-us/who-we-are>
239. The University of Notre Dame Australia. Policy: Research Data Management. 2019. https://www.notredame.edu.au/data/assets/pdf_file/0017/55052/Policy-Research-Data-Management.pdf
240. The University of Notre Dame Australia. Procedure: Research Data Management. 2019. https://www.notredame.edu.au/data/assets/pdf_file/0016/55051/Procedure-Research-Data-Management.pdf
241. National Health and Medical Research Council (NHMRC), Australian Research Council, Universities Australia. *Publication and dissemination of research: a guide supporting the Australian Code for the Responsible Conduct of Research*. 2018.
242. Bloom BS, ed. *Taxonomy of educational objectives: The classification of educational goals: Handbook 1, cognitive domain*. Longman; 1956.
243. Newsom JT. More on Chi-square. Accessed March 4, 2018. <http://web.pdx.edu/~newsomj/pa551/lectur13.htm>
244. Kim H-Y. Statistical notes for clinical researchers:post-hocmultiple comparisons. *Restorative Dentistry & Endodontics*. 2015;40(2):172. doi:10.5395/rde.2015.40.2.172
245. Moss S. Modified Bonferroni Adjustments. Accessed March 4, 2018. <https://www.sicotests.com/psyarticle.asp?id=251>
246. Keppel G. *Design and analysis: A researcher's handbook* Third ed. Prentice Hall; 1991.

247. Palliative Care Curriculum for Undergraduates (PCC4U) Project Team, ed. *PCC4U Implementation Guide*. QUT; 2014.
248. Palliative Care Curriculum for Undergraduates (PCC4U) Project Team, ed. *Principles for including palliative care in undergraduate curricula*. QUT; 2012.
249. Yates P. Newsletter. PCC4U; 2010(19).
https://www.caresearch.com.au/caresearch/Portals/4/Documents/Newsletters/PCC4U_%20newsletter_July%202010.pdf?ver=AqtBe3w0-Xoi1Bykivzmfw%3d%3d
250. Koczwara B, Barton MB, Olver IN, Tattersall MH, Turner DR, Starmer DL. Medical education in Australia: changes are needed. How not to effect change in curricula. *The Medical Journal of Australia*. 2006;185(1):52.
251. Starmer DL, Trotter JM, Dewar JM, et al. *Leading by Example: Community Driven Curriculum Reform*. Doorn drukkerji; 2001:
252. Barton MB, Bell P, Sabesan S, Koczwara B. What should doctors know about cancer? Undergraduate medical education from a societal perspective. *Lancet*. 2006;7:596-601.
253. Starmer D, Jamrozik K, Barton M, Miles S. Evaluating Curriculum Changes in Undergraduate Cancer Education. *J Cancer Educ*. 2004;19(3):156-160.
254. Peckham M. A curriculum in Oncology for medical students in Europe. *Acta Oncologica*. 1989;28(1):141-147.
255. Bush SH, Gratton V, Kabir M, et al. Building a Medical Undergraduate Palliative Care Curriculum: Lessons Learned. *J Palliat Care*. Jan 2021;36(1):29-37.
doi:10.1177/0825859720916565
256. Rallis KS, Wozniak A, Hui S, et al. Inspiring the future generation of oncologists: a UK-wide study of medical students' views towards oncology. *BMC Medical Education*. 2021;21(1)doi:10.1186/s12909-021-02506-0

257. Geller AC, Prout MN, Miller DR, et al. Evaluation of a cancer prevention and detection curriculum for medical students. *Preventive Medicine*. 2002;35(1):78-86.
258. Granek L, Lazarev I, Birenstock-Cohen S, Geffen DB, Riesenber K, Ariad S. Early exposure to a clinical oncology course during the preclinical second year of medical school. *Acad Med*. Apr 2015;90(4):454-7. doi:10.1097/acm.0000000000000521
259. Rhodin KE, Hong CS, Olivere LA, et al. Implementation of a Surgical Oncology Disparities Curriculum for Preclinical Medical Students. *The Journal of surgical research*. 2020;253:214-223. doi:10.1016/j.jss.2020.03.058
260. Oskvarek J, Braunstein S, Farnan J, et al. Medical Student Knowledge of Oncology and Related Disciplines: a Targeted Needs Assessment. *J Cancer Educ*. Sep 2016;31(3):529-32. doi:10.1007/s13187-015-0876-2
261. Oskvarek JJ, Brower JV, Mohindra P, Raleigh DR, Chmura SJ, Golden DW. Educational Impact of a Structured Radiation Oncology Clerkship Curriculum: An Interinstitutional Comparison. *J Am Coll Radiol*. Jan 2017;14(1):96-102. doi:10.1016/j.jacr.2016.07.017
262. Kozhevnikov D, Morrison L, Ellman M. Simulation training in palliative care: state of the art and future directions. *Advances in Medical Education and Practice*. 2018;Volume 9:915-924. doi:10.2147/amep.s153630
263. Haagedoorn EM, de Vries J. Topic selection in undergraduate medical education and relevance to general practice. *J Cancer Educ*. 1998;13(3):137-140.
264. Breast Cancer Care WA. Statistics: WA trends and projections on incidence. Accessed March 1, 2021. <https://www.breastcancer.org.au/education/what-is-breast-cancer/statistics/#:~:text=Breast%20cancer%20is%20the%20most%20common%20cancer%20affecting%20women&text=Breast%20cancer%20in%20men%20is,Australian%20men%20diagnosed%20in%202019.>

265. Cornerstone Health Pty Ltd. General Practitioner Workforce Report 2019. Accessed March 1, 2021.

<https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-general-practitioners-workforce-2019-021219.pdf>

266. Tsui JMG, Grewal NKS, Sivapragasam M, et al. Tumor Board Shadowing: A Unique Approach for Integrating Radiation Oncologists Into General Medical Student Education. *Int J Radiat Oncol Biol Phys*. Jul 15 2019;104(4):773-777. doi:10.1016/j.ijrobp.2019.03.042

267. Finlay I, Maughan T, Williams S. Does student teaching harm or help cancer patients? *Medical Education*. 2005;39:1143-1172.

Appendix 1: AMC graduate outcome statements



Accreditation Standards for Primary Medical Education Providers and their Program of Study and Graduate Outcome Statements

Graduate Outcome Statements

Overview

A thematic framework has been used to organise the Australian Medical Council's Graduate Outcome Statements into four domains. These domains collectively provide the requirements that students must demonstrate at graduation. The outcomes contained in each domain are necessarily interlinked when students enter clinical practice.

The domain framework is a reference for medical education providers. A number of providers have similar frameworks and it is not envisaged that all providers will necessarily organise their curriculum themes in this way. Providers will need to demonstrate how their program enables their graduates to meet the outcomes, which specify what the Australian Medical Council expects the provider to achieve and the health service employer expects the graduate to deliver. Each provider in their own context may wish to enable their graduates to demonstrate additional outcomes to the ones specified.

The four domains are:

1. *Science and Scholarship: the medical graduate as scientist and scholar*
2. *Clinical Practice: the medical graduate as practitioner*
3. *Health and Society: the medical graduate as a health advocate*
4. *Professionalism and Leadership: the medical graduate as a professional and leader*

It is important that the Graduate Outcome Statements are interpreted according to the level of training and experience that will have been gained by an entry-level practitioner. Graduates will not possess the clinical experience, leadership skills or advocacy skills of an experienced practitioner; but they will need the foundation upon which to be thoroughly prepared for internship and for building and developing their expertise in all fields of the profession.

Clearly medical education is a continuum, and many of the outcomes specified will be reflected further in outcomes expected from early postgraduate training and throughout a medical career, as new graduates continue to develop their clinical abilities.

Domain 1**Science and Scholarship: the medical graduate as scientist and scholar**

On entry to professional practice, Australian and New Zealand graduates are able to:

- 1.1 Demonstrate an understanding of established and evolving biological, clinical, epidemiological, social, and behavioural sciences.
- 1.2 Apply core medical and scientific knowledge to individual patients, populations and health systems.
- 1.3 Describe the aetiology, pathology, clinical features, natural history and prognosis of common and important presentations at all stages of life.
- 1.4 Access, critically appraise, interpret and apply evidence from the medical and scientific literature.
- 1.5 Apply knowledge of common scientific methods to formulate relevant research questions and select applicable study designs.
- 1.6 Demonstrate a commitment to excellence, evidence based practice and the generation of new scientific knowledge.

Domain 2**Clinical Practice: the medical graduate as practitioner**

On entry to professional practice, Australian and New Zealand graduates are able to:

- 2.1 Demonstrate by listening, sharing and responding, the ability to communicate clearly, sensitively and effectively with patients, their family/carers, doctors and other health professionals.
- 2.2 Elicit an accurate, organised and problem-focussed medical history, including family and social occupational and lifestyle features, from the patient, and other sources.
- 2.3 Perform a full and accurate physical examination, including a mental state examination, or a problem-focused examination as indicated.
- 2.4 Integrate and interpret findings from the history and examination, to arrive at an initial assessment including a relevant differential diagnosis. Discriminate between possible differential diagnoses, justify the decisions taken and describe the processes for evaluating these.
- 2.5 Select and justify common investigations, with regard to the pathological basis of disease, utility, safety and cost effectiveness, and interpret their results.
- 2.6 Select and perform safely a range of common procedural skills.
- 2.7 Make clinical judgements and decisions based on the available evidence. Identify and justify relevant management options alone or in conjunction with colleagues, according to level of training and experience.
- 2.8 Elicit patients' questions and their views, concerns and preferences, promote rapport, and ensure patients' full understanding of their problem(s). Involve patients in decision-making and planning their treatment, including communicating risk and benefits of management options.

- 2.9 Provide information to patients, and family/carers where relevant, to enable them to make a fully informed choice among various diagnostic, therapeutic and management options.
- 2.10 Integrate prevention, early detection, health maintenance and chronic condition management where relevant into clinical practice.
- 2.11 Prescribe medications safely, effectively and economically using objective evidence. Safely administer other therapeutic agents including fluid, electrolytes, blood products and selected inhalational agents.
- 2.12 Recognise and assess deteriorating and critically unwell patients who require immediate care. Perform common emergency and life support procedures, including caring for the unconscious patient and performing CPR.
- 2.13 Describe the principles of care for patients at the end of their lives, avoiding unnecessary investigations or treatment, and ensuring physical comfort including pain relief, psychosocial support and other components of palliative care.
- 2.14 Place the needs and safety of patients at the centre of the care process. Demonstrate safety skills including infection control, graded assertiveness, adverse event reporting and effective clinical handover.
- 2.15 Retrieve, interpret and record information effectively in clinical data systems (both paper and electronic).

Domain 3

Health and Society: the medical graduate as a health advocate

On entry to professional practice, Australian and New Zealand graduates are able to:

- 3.1 Accept responsibility to protect and advance the health and wellbeing of individuals, communities and populations.
- 3.2 Explain factors that contribute to the health, illness, disease and success of treatment of populations, including issues relating to health inequities and inequalities, diversity of cultural, spiritual and community values, and socio-economic and physical environment factors.
- 3.3 Communicate effectively in wider roles including health advocacy, teaching, assessing and appraising.
- 3.4 Understand and describe the factors that contribute to the health and wellbeing of Aboriginal and Torres Strait Islander peoples and/or Māori, including history, spirituality and relationship to land, diversity of cultures and communities, epidemiology, social and political determinants of health and health experiences. Demonstrate effective and culturally competent communication and care for Aboriginal and Torres Strait Islander peoples and/or Māori.
- 3.5 Explain and evaluate common population health screening and prevention approaches, including the use of technology for surveillance and monitoring of the health status of populations. Explain environmental and lifestyle health risks and advocate for healthy lifestyle choices.
- 3.6 Describe a systems approach to improving the quality and safety of health care.

- 3.7 Understand and describe the roles and relationships between health agencies and services, and explain the principles of efficient and equitable allocation of finite resources, to meet individual, community and national health needs.
- 3.8 Describe the attributes of the national systems of health care including those that pertain to the health care of Aboriginal and Torres Strait Islander peoples and/or Maori.
- 3.9 Demonstrate an understanding of global health issues and determinants of health and disease including their relevance to health care delivery in Australia and New Zealand and the broader Western Pacific region.

Domain 4

Professionalism and Leadership: the medical graduate as a professional and leader

On entry to professional practice, Australian and New Zealand graduates are able to:

- 4.1 Provide care to all patients according to “*Good Medical Practice: A Code of Conduct for Doctors in Australia*” and “*Good Medical Practice: A Guide for Doctors*” in New Zealand.
- 4.2 Demonstrate professional values including commitment to high quality clinical standards, compassion, empathy and respect for all patients. Demonstrate the qualities of integrity, honesty, leadership and partnership to patients, the profession and society.
- 4.3 Describe the principles and practice of professionalism and leadership in health care.
- 4.4 Explain the main principles of ethical practice and apply these to learning scenarios in clinical practice. Communicate effectively about ethical issues with patients, family and other health care professionals.
- 4.5 Demonstrate awareness of factors that affect doctors’ health and wellbeing, including fatigue, stress management and infection control, to mitigate health risks of professional practice. Recognise their own health needs, when to consult and follow advice of a health professional and identify risks posed to patients by their own health.
- 4.6 Identify the boundaries that define professional and therapeutic relationships and demonstrate respect for these in clinical practice.
- 4.7 Demonstrate awareness of and explain the options available when personal values or beliefs may influence patient care, including the obligation to refer to another practitioner.
- 4.8 Describe and respect the roles and expertise of other health care professionals, and demonstrate ability to learn and work effectively as a member of an inter-professional team or other professional group.
- 4.9 Self-evaluate their own professional practice; demonstrate lifelong learning behaviours and fundamental skills in educating colleagues. Recognise the limits of their own expertise and involve other professionals as needed to contribute to patient care.
- 4.10 Describe and apply the fundamental legal responsibilities of health professionals especially those relating to ability to complete relevant certificates and documents, informed consent, duty of care to patients and colleagues, privacy, confidentiality, mandatory reporting and notification. Demonstrate awareness of financial and other conflicts of interest.

Accreditation Standards for Primary Medical Education Providers and their Program of Study

Standard 1: The Context of the Medical Program

1.1 Governance

- 1.1.1 The medical education provider's governance structures and functions are defined and understood by those delivering the medical program, as relevant to each position. The definition encompasses the provider's relationships with internal units such as campuses and clinical schools and with the higher education institution.
- 1.1.2 The governance structures set out, for each committee, the composition, terms of reference, powers and reporting relationships, and allow relevant groups to be represented in decision-making.
- 1.1.3 The medical education provider consults relevant groups on key issues relating to its purpose, the curriculum, graduate outcomes and governance.

1.2 Leadership and Autonomy

- 1.2.1 The medical education provider has autonomy to design and develop the medical program.
- 1.2.2 The responsibilities of the academic head of the medical school for the medical program are clearly stated.

1.3 Medical Program Management

- 1.3.1 The medical education provider has a committee or similar entity with the responsibility, authority and capacity to plan, implement and review the curriculum to achieve the objectives of the medical program.
- 1.3.2 The medical education provider assesses the level of qualification offered against any national standards.

1.4 Educational Expertise

- 1.4.1 The medical education provider uses educational expertise, including that of Indigenous peoples, in the development and management of the medical program.

1.5 Educational Budget & Resource Allocation

- 1.5.1 The medical education provider has an identified line of responsibility and authority for the medical program.
- 1.5.2 The medical education provider has autonomy to direct resources in order to achieve its purpose and the objectives of the medical program.
- 1.5.3 The medical education provider has the financial resources and financial management capacity to sustain its medical program.

1.6 Interaction with Health Sector and Society

1.6.1 The medical education provider has effective partnerships with health-related sectors of society and government, and relevant organisations and communities, to promote the education and training of medical graduates. These partnerships are underpinned by formal agreements.

1.6.2 The medical education provider has effective partnerships with relevant local communities, organisations and individuals in the Indigenous health sector to promote the education and training of medical graduates. These partnerships recognise the unique challenges faced by this sector.

1.7 Research and Scholarship

1.7.1 The medical education provider is active in research and scholarship, which informs learning and teaching in the medical program.

1.8 Staff Resources

1.8.1 The medical education provider has the staff necessary to deliver the medical program.

1.8.2 The medical education provider has an appropriate profile of administrative and technical staff to support the implementation of the medical program and other activities, and to manage and deploy its resources.

1.8.3 The medical education provider actively recruits, trains and supports Indigenous staff.

1.8.4 The medical education provider follows appropriate recruitment, support, and training processes for patients and community members formally engaged in planned learning and teaching activities.

1.8.5 The medical education provider ensures arrangements are in place for indemnification of staff with regard to their involvement in the development and delivery of the medical program.

1.9 Staff Appointment, Promotion & Development

1.9.1 The medical education provider's appointment and promotion policies for academic staff address a balance of capacity for teaching, research and service functions.

1.9.2 The medical education provider has processes for development and appraisal of administrative, technical and academic staff, including clinical title holders and those staff who hold a joint appointment with another body.

Standard 2: The Outcomes of the Medical Program

Graduate outcomes are overarching statements reflecting the desired abilities of graduates in a specific discipline at exit from the degree. These essential abilities are written as global educational statements and provide direction and clarity for the development of curriculum content, teaching and learning approaches and the assessment program. They also guide the relevant governance structures that provide appropriate oversight, resource and financial allocations.

The AMC acknowledges that each provider will have graduate attribute statements that are relevant to the vision and purpose of the medical program. The AMC provides graduate outcomes specific to entry to medicine in the first postgraduate year.

A thematic framework is used to organise the AMC graduate outcomes into four domains:

1. Science and Scholarship: the medical graduate as scientist and scholar
 2. Clinical Practice: the medical graduate as practitioner
 3. Health and Society: the medical graduate as a health advocate
 4. Professionalism and Leadership: the medical graduate as a professional and leader
- 2.1 Purpose
 - 2.1.1 The medical education provider has defined its purpose, which includes learning, teaching, research, societal and community responsibilities.
 - 2.1.2 The medical education provider's purpose addresses Aboriginal and Torres Strait Islander peoples and/or Maori and their health.
 - 2.1.3 The medical education provider has defined its purpose in consultation with stakeholders.
 - 2.1.4 The medical education provider relates its teaching, service and research activities to the health care needs of the communities it serves.
 - 2.2 Medical Program Outcomes
 - 2.2.1 The medical education provider has defined graduate outcomes consistent with the AMC Graduate Outcome Statements and has related them to its purpose.
 - 2.2.2 The medical program outcomes are consistent with the AMC's goal for medical education, to develop junior doctors who are competent to practise safely and effectively under supervision as interns in Australia or New Zealand, and who have an appropriate foundation for lifelong learning and for further training in any branch of medicine.
 - 2.2.3 The medical program achieves comparable outcomes through comparable educational experiences and equivalent methods of assessment across all instructional sites within a given discipline.

Standard 3: The Medical Curriculum**3.1 Duration of the medical program**

The medical program is of sufficient duration to ensure that the defined graduate outcomes can be achieved.

3.2 The content of the curriculum

The curriculum content ensures that graduates can demonstrate all of the specified AMC graduate outcomes.

3.2.1 Science and Scholarship: The medical graduate as scientist and scholar

The curriculum includes the scientific foundations of medicine to equip graduates for evidence-based practice and the scholarly development of medical knowledge.

3.2.2 Clinical Practice: The medical graduate as practitioner

The curriculum contains the foundation communication, clinical, diagnostic, management and procedural skills to enable graduates to assume responsibility for safe patient care at entry to the profession.

3.2.3 Health & Society: The medical graduate as a health advocate

The curriculum prepares graduates to protect and advance the health and wellbeing of individuals, communities and populations.

3.2.4 Professionalism and Leadership: The medical graduate as a professional and leader

The curriculum ensures graduates are effectively prepared for their roles as professionals and leaders.

3.3 Curriculum design

There is evidence of purposeful curriculum design which demonstrates horizontal and vertical integration and articulation with subsequent stages of training.

3.4 Curriculum description

The medical education provider has developed and effectively communicated specific learning outcomes or objectives describing what is expected of students at each stage of the medical program.

3.5 Indigenous Health

The medical program provides curriculum coverage of Indigenous Health (studies of the history, culture and health of the Indigenous peoples of Australia or New Zealand).

3.6 Opportunities for choice to promote breadth and diversity

There are opportunities for students to pursue studies of choice that promote breadth and diversity of experience.

Standard 4: Learning and Teaching

- 4.1 The medical education provider employs a range of learning and teaching methods to meet the outcomes of the medical program.
- 4.2 The medical program encourages students to evaluate and take responsibility for their own learning, and prepares them for lifelong learning.
- 4.3 The medical program enables students to develop core skills before they use these skills in a clinical setting.
- 4.4 Students have sufficient supervised involvement with patients to develop their clinical skills to the required level and with an increasing level of participation in clinical care as they proceed through the medical program.
- 4.5 The medical program promotes role modelling as a learning method, particularly in clinical practice and research.
- 4.6 Learning and teaching methods in the clinical environment promote the concepts of patient centred care and collaborative engagement.
- 4.7 The medical program ensures that students work with, and learn from and about other health professionals, including experience working and learning in interprofessional teams.

Standard 5: The Curriculum – Assessment of Student Learning**5.1 Assessment Approach**

- 5.1.1 The medical education provider's assessment policy describes its assessment philosophy, principles, practices and rules. The assessment aligns with learning outcomes and is based on the principles of objectivity, fairness and transparency.
- 5.1.2 The medical education provider clearly documents its assessment and progression requirements. These documents are accessible to all staff and students.
- 5.1.3 The medical education provider ensures a balance of formative and summative assessments.

5.2 Assessment Methods

- 5.2.1 The medical education provider assesses students throughout the medical program, using fit for purpose assessment methods and formats to assess the intended learning outcomes.
- 5.2.2 The medical education provider has a blueprint to guide the assessment of students for each year or phase of the medical program.
- 5.2.3 The medical education provider uses validated methods of standard setting.

5.3 Assessment Feedback

- 5.3.1 The medical education provider has processes for timely identification of underperforming students and implementing remediation.
- 5.3.2 The medical education provider facilitates regular feedback to students following assessments to guide their learning.
- 5.3.3 The medical education provider gives feedback to supervisors and teachers on student cohort performance.

5.4 Assessment Quality

- 5.4.1 The medical education provider regularly reviews its program of assessment including assessment policies and practices such as blueprinting and standard setting, psychometric data, quality of data, and attrition rates.
- 5.4.2 The medical education provider ensures that the scope of the assessment practices, processes and standards is consistent across its teaching sites.

Standard 6: The Curriculum – Monitoring**6.1 Monitoring**

- 6.1.1 The medical education provider regularly monitors and reviews its medical program including curriculum content, quality of teaching and supervision, assessment and student progress decisions. It manages quickly and effectively concerns about, or risks to, the quality of any aspect of medical program.
- 6.1.2 The medical education provider systematically seeks teacher and student feedback, and analyses and uses the results of this feedback for monitoring and program development.
- 6.1.3 The medical education provider collaborates with other education providers in monitoring its medical program outcomes, teaching and learning methods, and assessment.

6.2 Outcome Evaluation

- 6.2.1 The medical education provider analyses the performance of cohorts of students and graduates in relation to the outcomes of the medical program.
- 6.2.2 The medical education provider evaluates the outcomes of the medical program.
- 6.2.3 The medical education provider examines performance in relation to student characteristics and feeds this data back to the committees responsible for student selection, curriculum and student support.

6.3 Feedback & Reporting

- 6.3.1 The results of outcome evaluation are reported through the governance and administration of the medical education provider and to academic staff and students.
- 6.3.2 The medical education provider makes evaluation results available to stakeholders with an interest in graduate outcomes, and considers their views in continuous renewal of the medical program.

Standard 7: Implementing the Curriculum – Students

7.1 Student Intake

- 7.1.1 The medical education provider has defined the size of the student intake in relation to its capacity to adequately resource the medical program at all stages.
- 7.1.2 The medical education provider has defined the nature of the student cohort, including targets for Aboriginal and Torres Strait Islander peoples and/or Maori students, rural origin students and students from under-represented groups, and international students.
- 7.1.3 The medical education provider complements targeted access schemes with appropriate infrastructure and support.

7.2 Admission Policy and Selection

- 7.2.1 The medical education provider has clear selection policy and processes that can be implemented and sustained in practice, that are consistently applied and that prevent discrimination and bias, other than explicit affirmative action.
- 7.2.2 The medical education provider has policies on the admission of students with disabilities and students with infectious diseases, including blood-borne viruses.
- 7.2.3 The medical education provider has specific admission, recruitment and retention policies for Aboriginal and Torres Strait Islander peoples and/or Maori.
- 7.2.4 Information about the selection process, including the mechanism for appeals is publicly available.

7.3 Student Support

- 7.3.1 The medical education provider offers a range of student support services including counselling, health, and academic advisory services to address students' financial social, cultural, personal, physical and mental health needs.
- 7.3.2 The medical education provider has mechanisms to identify and support students who require health and academic advisory services, including:
 - students with disabilities and students with infectious diseases, including blood-borne viruses.
 - students with mental health needs
 - students at risk of not completing the medical program
- 7.3.3 The medical education provider offers appropriate learning support for students with special needs including those coming from under-represented groups or admitted through schemes for increasing diversity.
- 7.3.4 The medical education provider separates student support and academic progression decision making.

7.4 Professionalism and Fitness to Practise

7.4.1 The medical education provider has policies and procedures for managing medical students whose impairment raises concerns about their fitness to practise medicine.

7.4.2 The medical education provider has policies and procedures for identifying and supporting medical students whose professional behaviour raises concerns about their fitness to practise medicine or ability to interact with patients.

7.5 Student Representation

7.5.1 The medical education provider has formal processes and structures that facilitate and support student representation in the governance of their program.

7.6 Student Indemnification and insurance

7.6.1 The medical education provider ensures that medical students are adequately indemnified and insured for all education activities.

Standard 8: Implementing the Curriculum – Learning Environment**8.1 Physical Facilities**

- 8.1.1 The medical education provider ensures students and staff have access to safe and well-maintained physical facilities in all its teaching and learning sites in order to achieve the outcomes of the medical program.

8.2 Information Resources and Library Services

- 8.2.1 The medical education provider has sufficient information communication technology infrastructure and support systems to achieve the learning objectives of the medical program.
- 8.2.2 The medical education provider ensures students have access to the information communication technology applications required to facilitate their learning in the clinical environment.
- 8.2.3 Library resources available to staff and students include access to computer-based reference systems, support staff and a reference collection adequate to meet curriculum and research needs.

8.3 Clinical Learning Environment

- 8.3.1 The medical education provider ensures that the clinical learning environment offers students sufficient patient contact, and is appropriate to achieve the outcomes of the medical program and to prepare students for clinical practice.
- 8.3.2 The medical education provider has sufficient clinical teaching facilities to provide clinical experiences in a range of models of care and across metropolitan and rural health settings.
- 8.3.3 The medical education provider ensures the clinical learning environment provides students with experience in the provision of culturally competent health care to Aboriginal and Torres Strait Islander peoples and/or Maori.
- 8.3.4 The medical education provider actively engages with other health professional education providers whose activities may impact on the delivery of the curriculum to ensure its medical program has adequate clinical facilities and teaching capacity.

8.4 Clinical Supervision

- 8.4.1 The medical education provider ensures that there is an effective system of clinical supervision to ensure safe involvement of students in clinical practice.
- 8.4.2 The medical education provider supports clinical supervisors through orientation and training, and monitors their performance.
- 8.4.3 The medical education provider works with health care facilities to ensure staff have time allocated for teaching within clinical service requirements.
- 8.4.4 The medical education provider has defined the responsibilities of hospital and community practitioners who contribute to the delivery of the medical program and the responsibilities of the medical education provider to these practitioners.

Appendix 2: Australia's PMC or Australia's national framework



Intern training – National standards for programs

Introduction

These national standards outline requirements for processes, systems and resources that contribute to good quality intern training. Health services can apply these standards to programs of diverse size and structure.

These standards are high-level, and intern training programs may demonstrate meeting the standards in a variety of ways. The Australian Medical Council (AMC) believes these features will encourage innovation in intern training.

Further, these national standards:

- Build on existing state and territory guidelines, the *Registration standard – Australian and New Zealand graduates*, and the Confederation of Postgraduate Medical Education Councils' Prevocational Medical Accreditation Framework (2009).¹
- Are structured similarly to the approved accreditation standards for other phases of medical education, but customised to intern programs.
- Do not prescribe any one program model. Explanatory notes are included to clarify meaning, but the notes are not prescriptive and do not add new criteria or requirements.
- Relate to accreditation of intern training programs, not each individual term. Intern training accreditation authorities will review a wide sample of terms to identify any significant deficiencies in the way the program selects and monitors terms. Intern training accreditation authorities, therefore, may accredit a program but disallow particular terms.

Notes on terminology: Over the years, Australian terminology for the various components of intern training has varied. These national standards use the terms specified in the glossary at the end of the document.

¹ Prevocational Medical Accreditation Framework for the Education and Training of Prevocational Doctors [Internet]. Melbourne: Confederation of Postgraduate Medical Education Councils (CPMEC); 2009 [cited 2013 Sep 23]. Available from: <http://www.cpmec.org.au/files/Revised%20PMAF%20-%20Final.pdf>

Intern training national standards

1 The context in which intern training is delivered

1.1 Governance

- 1.1.1 The governance of the intern training program and assessment roles are defined.
- 1.1.2 The health services that contribute to the intern training program have a system of clinical governance or quality assurance that includes clear lines of responsibility and accountability for the overall quality of medical practice.
- 1.1.3 The health services give appropriate priority to medical education and training relative to other responsibilities.
- 1.1.4 The intern training program complies with relevant national, state or territory laws and regulations pertaining to prevocational training.

Notes

Intern training is a mixed model of supervised practice and integrated training. While some training is specific to them, interns are also part of a wider training and service delivery system within the health service, which provides: clinical training for medical students; work-based training during internship and subsequent prevocational years; and training for doctors in specialist medical programs. This set of standards focuses on supporting interns, but recognises the importance of vertical integration across the medical training continuum.

These standards recognise that interns can complete terms and training in a variety of health care settings, including hospitals, general practices, and community-based medical services. The way these elements combine in an intern training program may vary, from training in a single health facility to a rotation program.

Teaching, training, appraising and assessing doctors are critical functions in caring for patients both now, and for developing a highly skilled workforce for the future. It is important health services recognise and resource this educational role.

The AMC recognises that intern training providers must comply with laws and regulations as businesses, employers and healthcare providers and that they have systems for audit and quality assurance processes to demonstrate compliance with laws and regulations. The policies and procedures they implement to meet these requirements will also pertain to prevocational training. Intern training providers may demonstrate they meet these National Standards for Programs by demonstrating compliance with laws and regulations through other processes².

1.2 Program management

- 1.2.1 The intern training program has a mechanism or structures with the responsibility, authority, capacity and appropriate resources to direct the planning, implementation and review of the intern training program, and to set relevant policy and procedures.
- 1.2.2 The intern training program documents and reports to the intern training accreditation authority on changes in the program, units or rotations which may affect the program delivery meeting the national standards.

² Intern training providers can provide policies and procedures demonstrating compliance with laws and regulations (such as workplace health and safety law) or evidence of having met other standards (such as the National Safety and Quality Health Service Standards or accreditation for specialist medical training) as evidence of complying with these standards.

1.2.3 The health services have effective organisational and operational structures to manage interns.

Notes

Intern training programs will have their own governance and administrative groups responsible for developing, reviewing and ratifying their policies and processes.

The organisational structure should include appropriately qualified staff, sufficient to meet the program objectives. This normally includes access to educational support personnel to plan, organise and evaluate the education and training programs.

Program management normally includes a delegated manager with executive accountability for meeting prevocational education and training standards (for example, in a hospital, the Director of Medical Services) and a Director of Clinical Training (or equivalent), responsible for the quality of the training and education program, and who works in collaboration with supervisors.

Changes in a health service, intern training program or terms may affect intern training quality, and require the intern training accreditation authority's assessment. Major changes in circumstances that normally prompt a review include:

- Absence of senior staff with significant roles in intern training for an extended period with no replacement (for example, a Director Medical Services or Supervisor of Intern Training absent for more than one month).
- Plans for significant redesign or restructure of the health service that impacts on interns (for example, a significant change to clinical services provided or a ward closure causing change to caseload and case mix for the term).
- Rostering changes that significantly alter access to supervision or exposure to educational opportunities.
- Resource changes that significantly reduce administrative support, facilities or educational programs available.

Intern training accreditation authorities also need to be informed of significant changes in a term or unit that may lead to a review.

1.3 Educational expertise

1.3.1 The intern training program is underpinned by sound medical education principles.

Notes

Education principles include an understanding of the teaching and learning practices in medical education, assessment methods in medical education, educational supervision, and common medical education terminology.

1.4 Relationships to support medical education

1.4.1 The intern training program supports the delivery of intern training through constructive working relationships with other relevant agencies and facilities.

1.4.2 Health services coordinate the local delivery of the intern training program. Health services that are part of a network or dispersed program contribute to program coordination and management across diverse sites.

Notes

Examples of other relevant agencies include the local intern training accreditation authority, the health jurisdiction, and the local health network.

1.5 Reconsideration, review and appeals processes

- 1.5.1 The intern training provider has reconsideration, review and appeals processes that provide for impartial review of decisions related to intern training. It makes information about these processes publicly available.

Notes

An appeals process that provides a fair and reasonable opportunity to challenge the decision is likely to result in decisions that are ultimately correct.

In relation to decision-making conduct, the grounds for appeal would include matters such as:

- an error in law or in due process in the formulation of the original decision
- relevant and significant information was not considered, or not properly considered, whether this information was available at the time of the original decision or became available subsequently
- irrelevant information was considered in the making of the original decision
- procedures that were required by the organisation's policies to be observed in connection with the making of the decision were not observed
- the original decision was made for a purpose other than a purpose for which the power was conferred
- the original decision was made in accordance with a rule or policy without regard to the merits of the particular case; and
- the original decision was clearly inconsistent with the evidence and arguments put before the body making the original decision.

Procedural fairness, timeliness, transparency and credibility, including requiring written reasons for decisions to be issued, are also elements of a strong and effective appeals process.

2 Organisational purpose

- 2.1 The purpose of the health services which employ and train interns includes setting and promoting high standards of medical practice and training.

3 The intern training program

3.1 Program structure and composition

- 3.1.1 The intern training program overall, and each term, is structured to reflect the requirements of the *Registration standard – Australian and New Zealand graduates* and provide experiences as described in *Intern training – Guidelines for terms*.
- 3.1.2 For each term, the health services have identified the *Intern training – Intern outcome statements* that are relevant, the skills and procedures that can be achieved, and the nature and range of clinical experience available to meet these objectives.
- 3.1.3 Interns participate in formal orientation programs, which are designed and evaluated to ensure relevant learning occurs.

Notes

These national standards take account of outcome statements developed for interns, outlined in *Intern training – Intern outcome statements*. The *Intern outcome statements* document also

describes the relationship between the outcome statements and the *Australian Curriculum Framework for Junior Doctors*.

The intern outcome statements align with the medical school graduate outcomes. The domains collectively state what medical students must demonstrate at graduation. The statements are set a higher level for internship, reflecting the additional training and experience of the junior medical officer completing their provisional registration year. During internship, what was learned in medical school should be reinforced through informal and formal education and interns should seek to apply that knowledge.

In relation to Indigenous health, medical graduates are expected to understand and describe the factors that contribute to the health and wellbeing of Aboriginal and Torres Strait Islander peoples and/or Māori, including history, spirituality and relationship to land, diversity of cultures and communities, epidemiology, social and political determinants of health and health experiences. They are also expected to demonstrate effective and culturally competent communication and care for Aboriginal and Torres Strait Islander peoples and/or Māori.

Interns are expected to apply knowledge of the culture, spirituality and relationship to land of Aboriginal and Torres Strait Islander peoples to clinical practice and advocacy. Where interactions occur with Indigenous people, interns should be encouraged to apply their knowledge to practise in culturally competent ways, for example to establish whether and how a person identifies as Indigenous. The AMC recognises that it may not be possible to observe interns meeting this outcome in every term or for assessment purposes. While an individual intern may not be able to demonstrate all the elements of caring for Aboriginal and Torres Strait Islander peoples the principles still apply.

Orientation to the overall program and site occurs at the beginning of the year.

Orientation at the start of each term is equally important and is usually supported with a written term description. Where interns enter a new site at the beginning of a term, the orientation to the site should also occur at this time. In this orientation, the health service will ensure the intern is ready to commence safe, supervised practice in the term.

Induction and orientation processes should cover employer policies and procedures, particularly in relation to rights and responsibilities, supervision, assessment and performance management, trainee welfare and support, and grievance handling procedures.

Adequate handover is essential for safe, quality clinical care. Separate processes should be defined for handover between terms and between shifts.

3.2 Flexible training

- 3.2.1 The intern training provider guides and supports supervisors and interns in implementing and reviewing flexible training arrangements. Available arrangements are consistent with the *Registration standard – Australian and New Zealand graduates*.

Flexible training means training that fits within the 'specific circumstances' described in the *Registration standard – Australian and New Zealand graduates*. This relates to part-time training and the location of training.

4 The training program – teaching and learning

- 4.1 Interns have access to a formal education program in addition to work-based teaching and learning.
- 4.2 The intern training program provides for interns to attend formal education sessions, and ensures that they are supported by senior medical staff to do so.
- 4.3 The health service ensures dedicated time for the formal education program.

4.4 The health service reviews the opportunities for work-based teaching and training.

Notes

Training programs normally include:

- A formal intern education program which is guided by the *Intern training – Intern outcome statements*
- Sessions with senior medical practitioners and other health professionals.
- Team and/or unit based activities, such as: mortality and morbidity audits, other quality assurance activities, case presentations and seminars, journal club, radiology and pathology meetings.
- Multidisciplinary meetings.
- One-to-one teaching with supervising medical practitioners in the course of patient clinical care.
- Opportunities to develop and practice clinical skills within a simulated environment.
- Medical/surgical and/or hospital-wide grand rounds.
- A formal intern education program.

In addition to clinical teaching, there should be opportunities for interns to develop skills in self-care and peer support, including time management, and identifying and managing stress and burn-out.

5 Assessment of learning

5.1 Assessment approach

- 5.1.1 The intern training program implements assessment consistent with the Registration standard – Australian and New Zealand graduates.
- 5.1.2 Intern assessment is consistent with the guidelines in *Intern training – Assessing and certifying completion*, and based on interns achieving outcomes stated in *Intern training – Intern outcome statements*.
- 5.1.3 Supervisors and interns understand the assessment program.
- 5.1.4 Intern assessment data is used to improve the intern training program.

Notes

Requirements for the assessment process can be found in the document *Intern training – Assessing and certifying completion*. This includes regular performance assessment against the *Intern Training – Intern outcome statements*, managing progression and remediation, and certifying completion of internship.

An *Intern training – Term assessment form* is also available. At a minimum, any locally developed assessment forms must fulfil the requirements given in the *Intern Training – Assessing and certifying completion* document.

At the term orientation, interns should receive an outline of the term assessment processes, including who is responsible for giving feedback and performing appraisals, and how this information will be collated. For example, direct observation, reports from supervisors, and information from co-workers such as nursing and allied health staff. There should be opportunities for input from a variety of sources, including other relevant medical, nursing and healthcare practitioners.

Assessment processes should apply equally to all interns and occur at appropriate intervals. Assessment must include observation of clinical skills.

5.2 Feedback and performance review

- 5.2.1 The intern training program provides regular, formal and documented feedback to interns on their performance within each term.
- 5.2.2 Interns receive timely, progressive and informal feedback from term supervisors during every term.
- 5.2.3 The intern training program documents the assessment of the intern's performance consistent with the *Registration standard – Australian and New Zealand graduates*.
- 5.2.4 Interns are encouraged to take responsibility for their own performance, and to seek their supervisor's feedback on their performance.
- 5.2.5 The intern training program has clear procedures to immediately address any concerns about patient safety related to intern performance, including procedures to inform the the employer and the regulator, where appropriate.
- 5.2.6 The intern training program identifies early interns who are not performing to the expected level and provides them with remediation.
- 5.2.7 The intern training program establishes assessment review groups, as required, to assist with more complex remediation decisions for interns who do not achieve satisfactory supervisor assessments.

Notes

Feedback and progress reviews can be assisted by interns keeping a log or a learning portfolio, which they discuss and review with their supervisor.

There should be a documented process for managing poor performance which will ensure patient safety and intern welfare.

When decisions about the performance of individual interns needs review, the document *Intern training – Assessing and certifying completion* outlines processes to be followed. The intern training providers must establish review groups to assist with more complex decisions on remediation. The document *Intern training – Assessing and certifying completion* , provides further advice about the requirements of the assessment review group.

Interns' performance is assessed and reviewed to meet both the requirements of their provisional registration and employment requirements. It is important that there are clear procedures for the individuals responsible for the intern training program to inform the employer as well the regulator, where appropriate, when safety concerns are raised.

The requirement under national standard 5.2.5 to immediately address concerns about patient safety may require action beyond remediation, including possible withdrawal of an intern from the clinical context. Intern training providers must be aware of the Health Practitioner Regulation National Law. This requires registered health practitioners and employers to make notifications about registered medical practitioners who have engaged in 'notifiable conduct' as defined in the National Law.

5.3 Assessors' training

- 5.3.1 The intern training program has processes for ensuring those assessing interns have relevant capabilities and understand the required processes.

Notes

Intern training providers may offer training for intern training supervisors in performance management and communication skills.

6 Monitoring and evaluation

- 6.1 The intern training provider regularly evaluates and reviews its intern training program and terms to ensure standards are being maintained. Its processes check program content, quality of teaching and supervision, assessment and trainees' progress.
- 6.2 Supervisors contribute to monitoring and to program development. Their feedback is sought, analysed and used as part of the monitoring process.
- 6.3 Interns have regular structured mechanisms for providing confidential feedback about their training, education experiences and the learning environment in the program overall, and in individual terms.
- 6.4 The intern training program acts on feedback and modifies the program as necessary to improve the experience for interns, supervisors and health care facility managers.

7 Implementing the education and training framework – interns

7.1 Appointment to program and allocation to term

- 7.1.1 The processes for intern appointments:
 - are based on the published criteria and the principles of the program concerned
 - are transparent rigorous and fair.

Notes

These standards deal only with the processes for allocating interns to terms and specific health services within the intern training program. The processes for selecting interns for employment purposes are outside the scope of these standards.

7.2 Welfare and support

- 7.2.1 The intern training provider promotes strategies to enable a supportive learning environment.
- 7.2.2 The duties, rostering, working hours and supervision of interns are consistent with delivering high-quality, safe patient care.
- 7.2.3 The intern training provider has policies and procedures aimed at identifying, addressing and preventing bullying, harassment and discrimination. These policies and procedures are publicised to interns, their supervisors, and other team members.
- 7.2.4 The intern training provider makes available processes to identify and support interns who are experiencing personal and professional difficulties that may affect their training, as well as career advice and confidential personal counselling. These services are publicised to interns, their supervisors, and other team members.
- 7.2.5 The procedure for accessing appropriate professional development leave is published, fair and practical.

Notes

Ensuring interns can meet their educational goals and service delivery requirements within safe working hours is the responsibility of all parties. This protects both the intern's wellbeing and patient safety. The *Good Medical Practice* guide discusses fatigue management and expectations for safe working hours.

Intern training providers can provide a supportive learning environment by promoting strategies to maintain health and wellbeing, including mental health and cultural safety, providing professional development activities to enhance understanding of wellness and

appropriate behaviours, and ensuring availability of confidential support and complaint services. The intern training provider should have mechanisms for identification, management and support for interns who have experienced or witnessed discrimination, bullying and sexual harassment. The provider should include information about these mechanisms in their education program.

Intern training providers should provide access to support for interns that is free from conflicts of interest such as involvement in assessment, progression and employment decisions.

The intern training provider should consider the needs of groups of interns that may require additional support to complete training, such as Aboriginal and Torres Strait Islander interns.

7.3 Intern participation in governance of their training

7.3.1 Interns are involved in the governance of their training.

7.4 Communication with interns

7.4.1 The intern training program informs interns about the activities of committees that deal with intern training.

7.4.2 The intern training program provides clear and easily accessible information about the training program.

7.5 Resolution of training problems and disputes

7.5.1 The intern training provider supports interns in addressing problems with training supervision and training requirements, and other professional issues. The processes are transparent and timely, and safe and confidential for interns.

7.5.2 The intern training provider has clear, impartial pathways for timely resolution of professional and/or training-related disputes between interns and supervisors, or interns and the health service.

Notes

Interns need clear advice on what they should do in the event of conflict with their supervisor or any other person involved in their training. Clear statements concerning the supervisory relationship can avert problems for both interns and supervisors.

Processes that allow interns to raise difficulties safely would typically be processes that give interns confidence that the provider will act fairly and transparently, that interns will not be disadvantaged by raising legitimate concerns, and that their complaint will be acted upon in a timely manner.

Interns who experience difficulties often feel vulnerable in raising questions about their training, assessment or supervision, even anonymously, and can be concerned about being identified and potentially disadvantaged as a consequence. Often the same individuals hold positions in the intern training provider and senior supervisory positions in hospitals and health services, which may lead to conflicts of interest, especially if the intern has a grievance about either their employment or training. Clear procedures are required to remove the disincentives for interns to raise concerns about their training or employment.

8 Delivering the training – supervision and educational resources

8.1 Supervisors

8.1.1 Interns are supervised at all times and at a level appropriate to their experience and responsibilities.

- 8.1.2 Supervision is provided by qualified medical staff with appropriate competencies, skills, knowledge, authority, time and resources to participate in training and/or orientation programs.
- 8.1.3 Intern supervisors understand their roles and responsibilities in assisting interns to meet learning objectives, and demonstrate a commitment to intern training.
- 8.1.4 The intern training program regularly evaluates the adequacy and effectiveness of intern supervision.
- 8.1.5 Staff involved in intern training have access to professional development activities to support quality improvement in the intern training program.

Notes

Each term should have clear and explicit supervision arrangements. The following roles should be covered in the intern supervision structure, although an individual clinician might perform more than one of these roles:

- A *Primary Clinical Supervisor*, who should be a consultant or senior medical practitioner with experience in managing patients in the relevant discipline.
- A *Term Supervisor*, who is responsible for orientation and assessment. There may also be an immediate supervisor who has direct responsibility for patient care and who would normally be at least at postgraduate-year-three level.

Other members of the healthcare team may also contribute to supervising the intern's work.

All those who teach, supervise, counsel, employ or work with interns are responsible for patient safety. Patient safety will be protected through explicit and accountable supervision.

Supervision includes more senior medical staff directly and indirectly monitoring interns. It also refers to providing training and feedback to assist interns to meet the *Registration standard – Australian and New Zealand graduates*.

There are advantages for interns in establishing mentoring relationships with more senior colleagues.

8.2 Clinical experience

- 8.2.1 The intern training program provides clinical experience consistent with the Registration standard – Australian and New Zealand graduates. The intern training program conforms to guidelines on opportunities to develop knowledge and skills, as outlined in Intern training – Guidelines for terms.
- 8.2.2 In identifying terms for training, the intern training program considers the following:
 - complexity and volume of the unit's workload
 - the intern's workload
 - the experience interns can expect to gain
 - how the intern will be supervised, and who will supervise them.

Notes

Training can take place in a variety of health care settings, including hospitals, general practices, and community-based medical services, all of which may provide a good learning experience for the intern. In each case the quality of the experience depends on the support the unit or service provides.

Clinical experience in the intern year involves supervised terms in units that provide medical, surgical and emergency care, together with opportunities for wide clinical experience in hospital and community settings. All these terms offer opportunities to enhance skills and

knowledge through supervised practice. At the end of the year, interns will possess clinical, professional and personal skills and competences (described in *Intern training – Intern outcome statements*) that will prepare them for general registration, and allow them to further develop skills and competencies in subsequent training.

Programs should include placements that are long enough to allow interns to become members of the team and allow team members to make reliable judgements about the intern's abilities, performance and progress.

8.3 Facilities

8.3.1 The intern training program provides the educational facilities and infrastructure to deliver intern training, such as access to the internet, library, journals and other learning facilities, and continuing medical education sessions.

8.3.2 The intern training program provides a safe physical environment and amenities that support the intern.

Supporting documents

The following references are mentioned specifically within this document.

- Registration standard – Australian and New Zealand graduates
- Australian Curriculum Framework for Junior Doctors
- Intern training – Intern outcome statements
- Intern training – Guidelines for terms
- Intern training – Assessing and certifying completion
- Intern training – Term assessment form

Full information for all documents relevant to the intern training suite is available below.

Intern training reference documents

| Document | Full reference |
|---|--|
| AMC documents | |
| Intern training – Intern outcome statements | Intern training – Intern outcome statements [Internet]. Canberra: Australian Medical Council; 2014 [cited 2014 Sept 24]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Intern training – National standards for programs | Intern training – National standards for programs [Internet]. Canberra: Australian Medical Council; 2013 [cited 2013 Dec 18]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Intern training – Guidelines for terms | Intern training – Guidelines for terms [Internet]. Canberra: Australian Medical Council; 2013 [cited 2013 Dec 18]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Intern training – Term assessment form | Intern training – Term assessment form [Internet]. Canberra: Australian Medical Council; 2014 [cited 2014 Sept 24]. Available from: http://www.amc.org.au/index.php/ar/psa . |
| Intern training – Assessing and certifying completion | Intern training – Assessing and certifying completion [Internet]. Canberra: Australian Medical Council; 2014 [cited 2014 Sept 24]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Intern training – Domains for assessing accreditation authorities | Intern training – Domains for assessing accreditation authorities [Internet]. Canberra: Australian Medical Council; 2015 [cited 2015 Jun 24]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Guide to intern training in Australia | Guide to intern training in Australia [Internet]. Canberra: Australian Medical Council; 2013 [cited 2013 Dec 18]. Available from: http://www.amc.org.au/index.php/ar/psa . Joint publication of the Medical Board of Australia. |
| Other documents | |
| Australian Curriculum Framework for Junior Doctors | Australian Curriculum Framework for Junior Doctors [Internet]. Melbourne: Confederation of Postgraduate Medical Education Councils (CPMEC); 2012 [cited 2013 Sep 09]. Available from: http://curriculum.cpmec.org.au/index.cfm |
| Registration standard – Australian and New Zealand graduates | Registration standard – Granting general registration as a medical practitioner to Australian and New Zealand medical graduates on completion of intern training [Internet]. Canberra: Medical Board of Australia; 2012 [cited 2013 Sep 09]. Available from: http://www.medicalboard.gov.au/Registration-Standards.aspx |
| Good Medical Practice: A Code of Conduct for Doctors in Australia | Good Medical Practice: A Code of Conduct for Doctors in Australia [Internet]. Canberra: Medical Board of Australia; 2010 [cited 2013 Sep 09]. Available from: http://www.medicalboard.gov.au/Codes-Guidelines-Policies.aspx |
| National Law | Health Practitioner Regulation National Law, as enacted in each state and territory [Internet]. Available from: http://www.abpra.gov.au/Legislation-and-Publications/Legislation.aspx |

Review of this document

By December 2016.

AMC will review clarity after each accreditation assessment.

Approval

Australian Medical Council – 21 November 2016

Medical Board of Australia – 14 December 2016

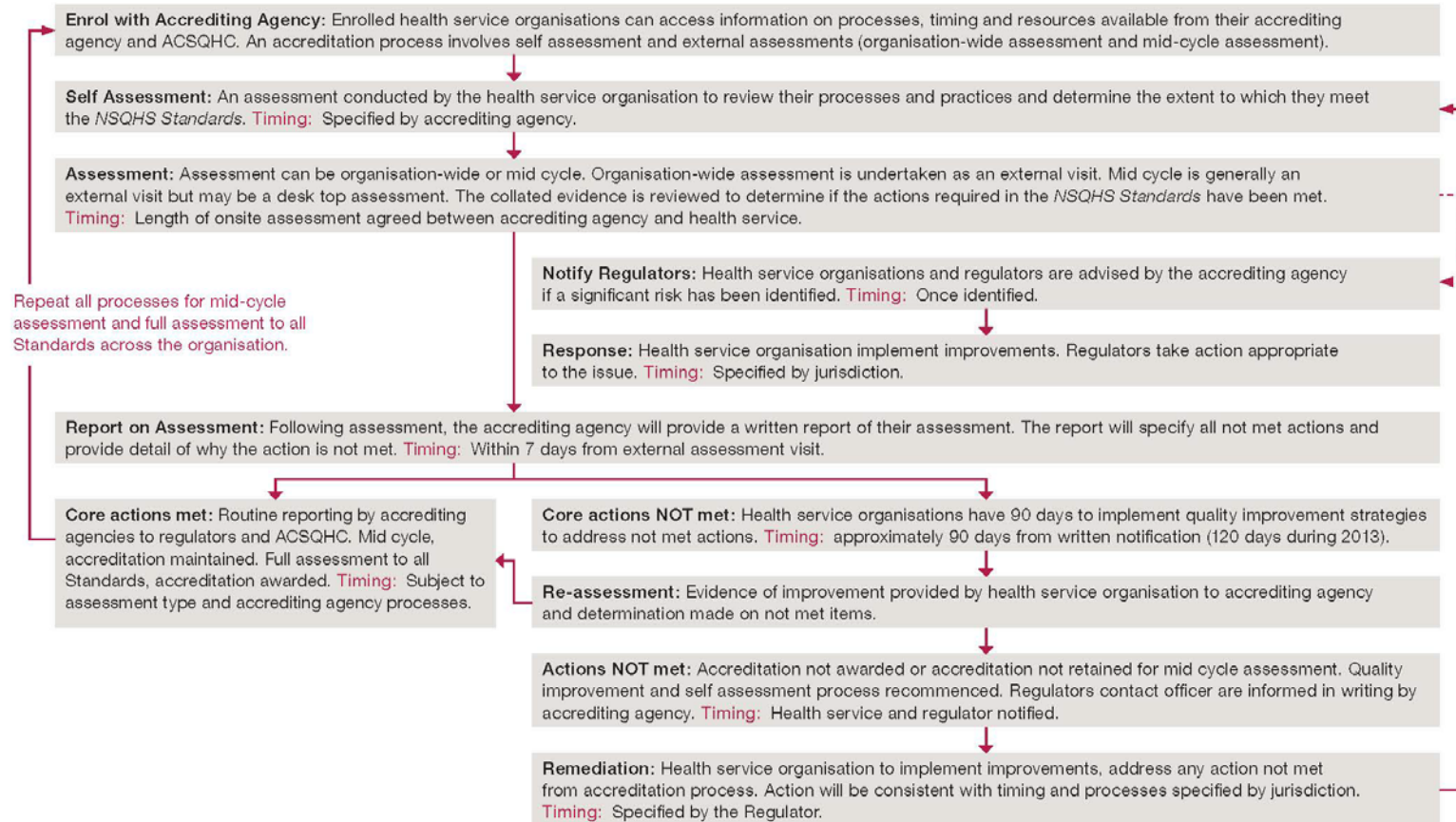
Glossary

| | |
|--------------------------------------|---|
| Assessment | The systematic process for measuring and providing feedback on the intern's progress or level of achievement. This assessment occurs in each term against defined criteria. |
| Certification | The final sign-off to the Medical Board of Australia that the intern has completed the statutory requirements for general registration. |
| Clinical supervisor | A medical practitioner who supervises the intern while they are assessing and managing patients. The AMC defines a suitable immediate clinical supervisor as someone with general registration and at least three years' postgraduate experience. The Primary Clinical Supervisor should be a consultant or senior medical practitioner. |
| Director of Clinical Training | A senior clinician with delegated responsibility for implementing the intern training program, including planning, delivery and evaluation at the facility. The Director of Clinical Training also plays an important role in supporting interns with special needs and liaising with term supervisors on remediation. Also known as the Director of Prevocational Education and Training (DPET) in some states. Other terms may be used in community or general practices. |
| Director of Medical Services | A senior medical administrator who leads the medical workforce at a facility. Also known as the Executive Director of Medical Services (EDMS). Other terms may be used in community or general practices. |
| Formal education program | An education program the intern training facility provides and delivers as part of the intern training program curriculum. Sessions are usually weekly and involve a mixture of interactive and skills-based face-to-face or online training. |
| Intern | A doctor in their first postgraduate year and who holds provisional registration with the Medical Board of Australia. |
| Intern training program | A period of 47 weeks of mandatory, supervised, work-based clinical training that includes medicine, surgery and emergency medical care terms to meet regulatory requirements. The program also includes orientation, formal and informal education sessions and assessment with feedback, and it may be provided by one or more intern training providers. Also called PGY1. |
| Intern training provider | The organisation that provides supervised clinical practice, education and training, and that is responsible for the standard of the intern training program. Providers may be a hospital, community, general practice setting, or a combination of these. |
| Employer | Interns complete their work-based training and formal education while employed to practise as a medical practitioner. Where the standards use the term employer it means the person or persons, usually in the intern training provider, who have a formal line management responsibility for the intern's work role and performance. |
| PGY | Postgraduate year, usually used with a number to indicate the number of years after graduation from medical school. For example, PGY1 is the first postgraduate year, also known as internship. |
| Term | A component of the intern training program, usually a nominated number of weeks in a particular area of practice. Also called clinical rotation, post, or placement. |

Term Supervisor The person responsible for intern orientation and assessment during a particular term. They may also provide clinical supervision of the intern along with other medical colleagues.

Appendix 3: ACSQHC flowchart assessment to the NSQHS standards

Figure 1: The accreditation process



Australian Commission on Safety and Quality in Health Care | Hospital Accreditation Workbook | 5

Source:

<https://www.safetyandquality.gov.au/sites/default/files/migrated/The-Accreditation-Process-Flowchart.pdf>

Appendix 4: A phased model of participatory curriculum development

| Phase | Function | Action |
|---|---|---|
| Phase 1 Identify project lead and commence information gathering | Identify the, strengths and challenges of the current curriculum and the drivers influencing the development of a new curriculum with the academic team involved in the current curriculum | Gather all data sources containing evaluative material on current program e.g.; Program Mapping, internal program review, student experience data, course quality improvement reports; to perform SWOT analysis in accordance with a review of the current curriculum |
| Phase 2 Identify and invite appropriate stakeholder involvement representative of all curriculum drivers | Create commitment, ownership, and be representative and inclusive of the real world of practice | Using an inclusive transparent process establish Steering Group; Project Group; and where required sub-committees and additional expert contribution. |
| Phase 3 Develop macro curriculum outline | Provide overview of macro curriculum to steering group to provide feedback and guidance to project group and sub committees | Project Group develop macro framework based on SWOT analysis and data for review by Steering Group |
| Phase 4 Program alignment to professional values, pedagogical and educational philosophy | Ensure the pedagogical and philosophical drivers, and program values are visibly prominent and remain central to the process of micro development | Agree framework within which the micro detail of curriculum will be developed. Create framework model to which all courses will be aligned. |
| Phase 5 Micro curriculum development | Establish first draft micro curriculum document guided by framework model and meeting accreditation standards | Iterative consultation between Sub-Committees, Project Group and Steering Committee including Sub-Committees detail mapping of Learning Outcomes, Aligned Assessment, Graduate outcomes, Pedagogy |
| Phase 6 Widespread consultation on full draft | To produce an Aligned Mapped Curriculum that all stakeholders feel connected and committed to, that is representative and inclusive of the real world of practice and meets accreditation standards | Feedback sought via project group and steering group members from their peer networks on final draft. Feedback collated by project lead and presented to steering group. |

| | | |
|---|---|--|
| Phase 7 Final Curriculum agreed | Agreement from all stakeholders that curriculum ready for submission for accreditation | Steering group review feedback. Consensus agreement reached. Recommendations for changes based on feedback to final submission document made. Final document produced |
| Phase 8 Program accreditation process | Submit curriculum for external review against national standards and respond to regulator requests made up to the point of final accreditation | Retain Stakeholder and Project Group engagement through regular updates. Respond to initial regulator queries. Prepare for accreditation visit involving full curriculum development team Respond to post accreditation visit reviewer comments, queries and feedback Share accreditation report with full team in an open transparent way |
| Phase 9 Accreditation approval Program implementation | Ensure newly accredited program delivered by a well prepared faculty teaching team and student feedback is sought | Resource staff to prepare new materials Develop ongoing process of student and staff evaluation |
| Phase 10 Evaluation of Participatory Curriculum Development Process | Develop an evaluation framework of the PCD process to determine the effectiveness of the model in achieving the stated aims. | Invite participants representative of each stakeholder group attend for interview to discuss their experience. Analyse interview data and identify common themes |

Source: Sidebotham M, Walters C, Chipperfield J, Gamble J. Midwifery participatory curriculum development: Transformation through active partnership. *Nurse Education in Practice*. 2017;25:5-13. (p.8).

Appendix 5: List of author affiliations and consultations from the Ideal Oncology Curriculum for Medical Schools (IOC)

APPENDIX 1

OEC Executive and Ideal Curriculum Editorial Committee

A/Professor Michael Barton (*Chair*)
 Professor Ken Donald (*Executive Secretary*)
 Dr Brendon Coventry
 A/Professor Konrad Jamrozik
 Dr David Joseph
 Dr Rob Simons (*Secretariat*)
 Mr Richard Thode (*Project Officer*)

Oncology Education Committee (OEC) Membership – April 1999

| | University | Speciality |
|--|--------------------|---------------------|
| Professor Roger Allison | Queensland | Radiation Oncology |
| Dr Chris Atkinson | Otago | Radiation Oncology |
| A/Prof Michael Barton (<i>Chair</i>) | UNSW | Radiation Oncology |
| Professor Jim Bishop | Sydney | Medical Oncology |
| Dr Phyllis Butow | Sydney | Communications |
| Dr Brendon Coventry | Adelaide | Surgery |
| Professor Ken Donald (<i>Executive Secretary</i>) | Queensland | Pathology |
| A/ Professor Konrad Jamrozik | Western Australia | Public Health |
| Dr David Joseph | Western Australia | Radiation Oncology |
| Dr Mark McKeage | Auckland | Pharmacology |
| Professor Ian Olver | Adelaide | Medical Oncology |
| Professor Lester Peters | Melbourne | Radiation Oncology |
| Professor Peter Ravenscroft | Newcastle | Palliative Care |
| Professor Alan Rodger | Monash | Radiation Oncology |
| Dr Michael Rozenbils | Flinders | Pathology |
| Dr Susan Russell | UNSW | Paediatric Oncology |
| A/Professor Max Schwarz | Monash | Medical Oncology |
| Professor Allan Spigelman | Newcastle | Surgery |
| Professor Robert Thomas | Melbourne | Surgery |
| Dr Damien Thomson | Queensland | Medical Oncology |
| Dr David Turner | Flinders | Genetics |
| Dr Gerry Wain | Sydney | Gynaecology |
| Mr Stephen Wilkinson | Tasmania | Surgery |
| Dr Rosemary Young | Tasmania | Medical Oncology |
| Dr Rob Simons (<i>Secretariat</i>) | NSW Cancer Council | Education |
| Mr Richard Thode (<i>Project Officer</i>) | | |

APPENDIX 2

Consultation Responses - Ideal Oncology Curriculum

Medical Faculties & Curriculum Committees

| | | |
|--|---|---|
| Dr David Ball | U Melb Oncology Standing Committee (Head, Lung Unit, Division of Radiation Oncology) | Peter MacCallum Cancer Institute |
| Dr Glyn Brokensha | Senior Lecturer, Medical Education Unit | University of Adelaide |
| Prof Bryan Campbell | Head, Graduate School of Medicine | University of Queensland |
| A/Prof Brendan Crotty | U Melb Oncology Standing Committee (Clinical Dean, Northern Clinical School) | Austin and Repatriation Medical Centre, Melbourne |
| Prof S. Bruce Dowton | Dean, Faculty of Medicine | University of New South Wales |
| Dr Andrew Elefanty | U Melb Oncology Standing Committee (Division of Cancer & Haematology) | Walter and Eliza Hall Institute of Medical Research |
| A/Prof Susan Elliott | Director, Faculty Education Unit, Faculty of Medicine, Dentistry & Health Sciences | University of Melbourne |
| A/Prof Jill Gordon | Head, Dept Educational Development and Evaluation, Faculty of Medicine | University of Sydney |
| Dr Fiona Lake | Associate Dean, Teaching and Learning, Faculty of Medicine and Dentistry | University of Western Australia |
| Professor Louis Landau | Executive Dean, Faculty of Medicine and Dentistry | University of Western Australia |
| Mr Mike Lewenberg | Director, Academic Programs, Faculty of Medicine | Monash University |
| Prof Lester Peters | Chairman, Oncology Standing Committee | University of Melbourne |
| Prof Rob Sanson-Fisher | Dean, Faculty of Medicine and Health Sciences | University of Newcastle |
| Prof Ian J Simpson | Assoc Dean, Medical Programmes, Faculty of Medicine & Health Sciences | University of Auckland |
| Dr James Trotter (Chair); Mr Darren Starmer (Coordinator) | Scientific Basis of Medicine Working Group – Cancer, Faculty of Medicine and Dentistry | University of Western Australia |
| Dr Tim Wilkinson | Chair, Faculty Curriculum Evaluation & Assessment Committee and Assoc Dean, Undergraduate Education | University of Otago |
| Prof LHM Wing | Dean, School of Medicine | Flinders University of South Australia |
| Prof Neville Yeoman | U Melb Oncology Standing Committee (Assoc Dean of Academic Programs, Dept of Medicine) | Western Hospital, Footscray VIC |
| Dr Rosemary Young | Senior Lecturer (for Faculty of Health Sciences Medical Education Committee) | University of Tasmania |

IDEAL ONCOLOGY CURRICULUM FOR MEDICAL SCHOOLS

Cancer Societies & Professional Colleges

| | | |
|------------------------|--|--|
| Dr Stephen Ackland | Chairman | Medical Oncology Group of Australia (MOG) |
| Prof Bruce Armstrong | Director, Cancer Research and Registers Division, NSW Cancer Council | Australian Association of Cancer Registries |
| Prof Michael Ashby | Convenor, Undergraduate Curriculum Group | Australia & New Zealand Society of Palliative Medicine |
| Dr Mary Brooksbank | Director, Mary Potter Hospice, Royal Adelaide Hospital | Australia & New Zealand Society of Palliative Medicine |
| Prof Alan Coates | CEO | Australian Cancer Society |
| Ms Lillian Daly | Chair, NSW Branch of Cancer Nurses Society of Australia | NSW College of Nursing |
| Ms Jill Davis | Chairman, Committee of Speciality Practice (COSP) in Oncology | Society of Hospital Pharmacists |
| Prof Jim Denman | Honorary President | Trans-Tasman Radiation Oncology Group (TROG) |
| Dr Graeme Dickie | Secretary | Faculty of Radiation Oncology, RANZCR |
| A/Prof Kerry Kirke | Hon Secretary | Australasian Faculty of Public Health Medicine, RACP |
| Prof Alan Langlands | Consultant | NSW Breast Cancer Institute |
| Prof John McCaffrey | Chairman, QCF Medical & Scientific Advisory Committee | Queensland Cancer Fund |
| A/Prof Richard Millard | Chairman | Board of Urology, RACS |
| Prof Sally Redman | Director | NHMRC National Breast Cancer Centre |
| A/Prof David Roder | Chairman, Central Cancer Registry Unit, SA Health Commission | Australian Association of Cancer Registries |
| Mrs Joan Sheales | CEO | Australian & New Zealand College of Anaesthetists |
| Dr Jennifer Thomson | Medical Consultant, Health Services | Australian Medical Association |
| Dr Tim Threlfall | Senior Medical Officer, Western Australian Cancer Registry | Australian Association of Cancer Registries |
| Ms Theanne Walters | Deputy Exec Officer | Australian Medical Council |
| Dr Rod Wellard | Director of Education & Evaluation | Royal Australian College of General Practitioners |

International Consultants

| | | |
|--------------------------|---|---|
| Dr Arturo Beltran Ortega | Chair, UICC Professional Education on Cancer | Instituto Nacional de Cancerologia MEXICO |
| Prof Adrian Harris | Professor of Clinical Oncology, Institute of Molecular Medicine | University of Oxford UK |
| Dr Douglas L Weed | Director, Cancer Prevention Fellowship Program | National Cancer Institute USA |

IDEAL ONCOLOGY CURRICULUM FOR MEDICAL SCHOOLS

Medical Student Associations

| | | |
|-------------------|---|--|
| Mr Brandon Adams | President Students Association | Otago University Medical |
| Mr Stefan Kane | President | Melbourne University Medical Students Society |
| Ms Chien-Li Liew | Medical Student Representative on Univ Adelaide Curriculum Committee | Adelaide Medical Students Society |
| Ms Kathryn Murphy | Academic Vice-President Medical Society | University of Queensland |

Medical Professionals

| | | |
|--|---|--|
| A/Prof Sanchia Aranda | Deputy Head, School of Postgraduate Nursing, University of Melbourne | Centre for Palliative Care, St Vincent's Hospital Melbourne |
| Ms Silvana Dimaria | Clinical Nurse Consultant, Breast and Endocrine Surgical Oncology Unit | Royal Adelaide Hospital Cancer Centre |
| Dr Simon Jakobovits | Medical Intern | The Alfred Hospital, Melbourne |
| Dr Justin Welsh | Medical Intern | The Alfred Hospital, Melbourne |
| Two unidentified RAH Intern Representatives | (per Dr Brendon Coventry, RAH) | Royal Adelaide Hospital |

Cancer Advocates & Consumers

| | | |
|---------------------|--|-----------------|
| Ms Carol Bishop | Coordinator, Breast Cancer Support Services WA | Subiaco WA |
| Mr Darren Carr | Ewing's Sarcoma survivor & NSW Cancer Council Community Development Officer | Parramatta NSW |
| Ms Sally Crossing | Chair, Breast Cancer Action Group NSW | Greenwich NSW |
| Mr Peter Dornan | Convenor, Brisbane Prostate Cancer Support Group | Brisbane QLD |
| Ms Karen Finch | Breast cancer consumer & advocate | Leanyer NT |
| Ms Jenifer Fletcher | Rural cancer consumer & member of SA Breast Cancer Support Service | Port Lincoln SA |
| Ms Olive McMahon | Breast cancer survivor & QCF volunteer | Brisbane QLD |
| Mrs Julie Ryan | Nurse Supervisor, CanConnect Volunteers WA | Mundaring WA |
| Ms Susan Tulley | Breast cancer consumer | Darwin NT |
| Mrs Denise Wehnert | President, Action for Breast Cancer SA | Adelaide SA |
| Ms Leonie Young | Member, ANZ Breast Cancer Trials Group Consumer Advisory Panel, QCF volunteer & QLD Representative Breast Cancer Network of Aust | Brisbane QLD |

Government

| | | |
|----------------------------------|---|---------------|
| The Honourable Dean Brown | SA Minister for Human Services | Adelaide SA |
| The Honourable Wyatt Creech | Deputy Prime Minister & Minister of Health | Wellington NZ |
| The Honourable Wendy Edmond | Queensland Minister for Health | Brisbane QLD |
| The Honourable Judy Jackson | Tasmanian Minister for Health and Human Services | Hobart TAS |
| The Honourable Craig Knowles | NSW Minister for Health | Sydney NSW |
| The Honourable Robert Knowles | Victorian Minister for Health and the Aged | Melbourne VIC |
| Mr Michael Moore | ACT Minister for Health and Community Care | Canberra ACT |

Appendix 6: Key text from the consultation document provided to participants who reviewed the IOC in phase one of this research

In Phase I of the project we aim to identify the level of understanding required of a junior doctor in terms of cancer-related knowledge and to establish the required breadth of this knowledge.

Panel Sessions:

Panel sessions will be organised once the tasks have been completed and the data analysed. During the panel session, any items for which a consensus has not been reached will be discussed.

Consultation Tasks:

You have been invited to participate in the expert panel review process, to make comment on the following key elements:

1. The level of understanding expected of a junior doctor for each item, and
2. The appropriate level of breadth/specificity for each item.

Item Specific Tasks:

You will be asked to review approximately 50 of the total number of knowledge items². Table 1 shows an example of how the data will be presented.

Table 1: Data presentation for expert panel members

| Unpacked knowledge items from the IOC | | Understanding | | | Specificity | | |
|---------------------------------------|--|---------------|----------|------|-------------|--------|------|
| | | Minimal (N/A) | Moderate | High | Low | Medium | High |
| 1.1.a.1 | The significance of cancer as a health problem in Australia. | | | ✓ | ✓ | | |
| 1.1.a.2 | The significance of cancer as a health problem throughout the world. | ✓ | | | ✓ | | |
| 1.2.a.2 | The epidemiological concepts of mortality in relation to common cancers | | | | | | |
| 1.2.a.3 | the epidemiological concepts of relative risk in relation to common cancers | | | | | | |
| 1.2.a.1 | The epidemiological concepts of morbidity (incidence and prevalence) in relation to common cancers | | | | | | |
| 1.2.a.4 | The epidemiological concepts of survival in relation to common cancers | | | | | | |
| 1.2.b.1 | The role of statistical information, including surveillance and monitoring data. | | | | | | |
| 1.2.b.2 | The medical practitioner's need to be able to access numerical information. | | | | | | |
| 1.2.c.1 | The purpose of cancer registries | | | | | | |

² A total of 301 knowledge items have been generated. A full list will be available to any panel member who wishes to view all items.

The three columns under the heading of understanding relate to Task 1 and those under the heading of specificity to Task 2.

Task 1. Level of understanding:

To determine the level of understanding necessary for a junior doctor to perform his/her duties with competence. Each knowledge item should be scored at one of three possible levels:

- Minimal/Not required – an understanding of the item content is not required.
- Moderate level – a broad conceptual grasp of underlying principles relating to the item content is required.
- High level – an in-depth understanding of the content of the item (e.g., mechanisms of action and their relationship to other factors) is required.

Therefore, please indicate Minimal (N/A), Moderate or High for each knowledge item.

Example:

| | |
|-------------------------|--|
| Knowledge Item: | 5.3.f.2. Short-term side effects of radiotherapy. |
| Level of understanding: | Minimal/Not applicable – the junior doctor is aware that radiotherapy may cause side effects, but is unable to provide any insight as to what these are or how they are caused. |
| | Moderate level of understanding – the junior doctor possesses a basic understanding of common side effects of radiotherapy and can apply this knowledge to treat the symptoms and offer some suggestions on how to reduce them. |
| | High level of understanding – the junior doctor possesses a sound knowledge of the natural course of radiotherapy side effects, the types of reactions and the underlying tissues affected, and can apply this knowledge to implement preventative measures, treat side effects and weigh up their severity on treatment decisions and cost benefit of treatment. |
| Recommendation: | Moderate. |

| | |
|------------|---|
| Reasoning: | It would be reasonable to expect a junior doctor to have a basic understanding of the common short-term side effects of radiotherapy. |
|------------|---|

It may be helpful to consider the types of questions that could be developed based on the level of understanding ascribed to a particular item.

Given the example above, the minimal/not applicable level of understanding would not be assessed. However, both the moderate and high levels would require assessment. As the level of understanding is going to affect the difficulty of the question(s) asked, it is clearly important to ensure that assessment occurs at the appropriate level. Too easy and it will not be possible to identify individuals who do not understand the content. On the other hand, if the question is too difficult, it may discriminate those who actually do understand the content at the desired level.

A question assessing a moderate understanding of the short-term side effects of radiotherapy would be:

Which of the following short-term side effects of radiotherapy would you expect to see in a patient receiving radiotherapy to the chest wall?

- a) Telangiectasia
- b) Alopecia
- c) Pulmonary fibrosis
- a) Skin erythema
- b) Peripheral neuropathy

Correct answer: d.

Skin erythema is a common short-term side effect of radiotherapy. Whilst radiotherapy can cause alopecia, it only does so when the hair is within the treatment field. The remaining conditions are all long-term side effects.

A question assessing a high understanding of the short-term side effects of radiotherapy would be:

Mrs Jones is an otherwise well 56 year-old patient, receiving radiotherapy following a lumpectomy and lymphatic clearance. She is experiencing a burning pain over the upper outer area of her breast and most of her axilla. O/E you note that there is marked erythema and some oedema. No other abnormalities are evident.

Which of the following courses of action would you take?

- a) Explain to the Mrs Jones that this is a common side effect, which should resolve within a few weeks of her treatment finishing.
- b) Discuss these findings with her consultant, as radiotherapy should be postponed until these symptoms have resolved.
- c) Advise Mrs Jones not to use deodorants, perfumed soaps or creams during her treatment, as this will exacerbate her symptoms.
- d) Explain to Mrs Jones that the pain she is experiencing may not be associated with the erythema and that it may persist for some time after her skin returns to normal.
- e) Suggest the use of analgesia to help control the pain.
- f) Explain to Mrs Jones that the swelling is due to lymphoedema, which is a side effect of her surgery, not her radiotherapy.

Choose **ALL** options you consider to be correct:

Correct answers: a, c, d and e.

Skin changes such as erythema are common short-term side effects of radiotherapy, most of which will resolve shortly after treatment is ceased. Skin care, such as avoiding the use of deodorants, perfumed soaps, lotions and powders to reduce further irritation to the skin should be advocated. Pain can occur in the absence of erythema and will reduce once treatment is completed. Analgesic use is appropriate. The severity of this side effect would not warrant the cessation of radiotherapy. Whilst the oedema may be lymphoedema, it should be noted that radiotherapy can also cause this problem. However, not enough clinical information is presented to determine the origin of the oedema.

Task 2. Item specificity:

To determine the level of specify required to assess each item (i.e., does it cover a broad range of knowledge or is it focussed on a single aspect?). It may assist you to think in terms of the sort of questions you would ask to assess each item when undertaking this task. We propose the use of a 3-point scale to indicate the breadth/specificity of each item, as shown below. Here, we have provided some examples relating to screening:

| | | | |
|-----------------|---|---|--|
| Low (broad) | 1 | + | Discuss the concept of screening for cancer and the evidence supporting current and proposed screening programmes. |
| Medium | 2 | + | What are the controversial issues surrounding screening for prostate cancer? |
| High (specific) | 3 | + | At what age should cervical screening commence? |

Using this example will permit you to compare each item and determine where it should sit on this scale. In doing so, please check the corresponding box on the item grid (1, 2 or 3).

Example:

| | |
|------------------|---|
| Knowledge items: | 3.3.g.1. understanding of clinical trials 3.3.g.2. understanding of the importance of clinical trials |
| Options: | 1 + Low (broad) 2 + Medium 3 + High (specific) |
| Recommendation: | 3.3.g.1. understanding of clinical trials: Low 3.3.g.2. understanding of the importance of clinical trials: Medium |
| Reasoning: | The first item is clearly of a low specificity (broad), as it encompasses all aspects of clinical trials. On the other hand, the second item is more specific, requiring only an understanding of the importance of clinical trials, without requiring an understanding of other issues relevant to clinical trials or their use. However, the second item does require a broad knowledge of a specific component of clinical trials, therefore it would not be classed as having a high specificity but rather a medium level. |

Appendix 7: Participation information and consent forms - phase one



THE UNIVERSITY OF
WESTERN AUSTRALIA

Research Project Information Sheet

Mr. Darren Starmer is currently completing his Ph.D. on assessing the key cancer-related attributes of medical graduates. I am the project supervisor as a staff member of the University of Western Australia. To assist in the development of the assessment content, we are requesting your input as a member of an expert consultative panel for this phase. Members for these panels will comprise representative experts from the areas of medical and radiation oncology, haematology, palliative care, psycho-oncology, surgery, and general practice.

There will be two major components of this research phase. In Component I, you will be asked to complete a survey. The items in the survey will ask you to indicate the level of understanding of cancer-related knowledge necessary for junior doctors and the specificity of the items. A few weeks after the surveys are completed, you will receive by email the results collated across all survey participants.

In Component II, you will be invited to participate in a panel discussion of approximately six members. Each discussion should last no more than two hours. The discussions will focus on (i) obtaining more broad-ranging views regarding the proposed framework and methods for developing the assessment protocol, and (ii) resolving any marked discrepancies in the ratings given to individual items in the Component I survey.

Participation in this study is entirely voluntary. Even if you agree to participate at this stage, you are free to withdraw from the study at any time prior to, or during the data collection

phase of the study. Further, you are welcome to participate in Component I of the research but decline to participate in Component II.

Please be aware that it will not be possible for you to remain anonymous to the researchers. Your name will not, however, appear in any resulting publications or reports unless you request that this occur.

If, having read this information sheet, you wish to participate in this research, please indicate your willingness by return email.

If you have any inquiries about the project, please contact either:

Mr. Darren Starmer

The University of Western Australia

Crawley, W.A. 6009

Telephone: +61 417 845 835

Facsimile: +61 8 9295 3088

Email: [REDACTED]

Dr. Elaine Chapman

The University of Western Australia

Crawley, W.A. 6009

Telephone: +61 8 6488 2384

Facsimile: +61 8 6488 1052

Email: [REDACTED]



THE UNIVERSITY OF WESTERN AUSTRALIA

Research Project Consent Form

I (the participant) have read the information provided and any questions I have asked have been answered to my satisfaction. I agree to participate in this activity, realizing that I may withdraw at any time without reason and without prejudice during the data collection phase of the study.

I understand that all information provided is treated as strictly confidential and will not be released by the investigator unless required to by law. I have been advised as to the nature of data being collected, what the purpose of the study is, and what will be done with the data upon completion of the research.

I agree that research data gathered for the study may be published provided my name or other identifying information is not used without my express permission.

Name: _____

Signature: _____

Date: _____

The Human Research Ethics Committee at the University of Western Australia requires that all participants are informed that, if they have any complaint regarding the manner, in which a research project is conducted, it may be given to the researcher or, alternatively to:

The Secretary, Human Research Ethics Committee
Registrar's Office, The University of Western Australia
35 Stirling Highway, Crawley, W.A., 6009.
Telephone: +61 8 6488 3703
Facsimile: +61 8 6488 1075
Email: [REDACTED]

Appendix 8: Survey instrument - Phase one (group five)

| Participant Questionnaire | |
|--|---|
| Name: | _____ |
| Gender: | Male <input type="checkbox"/> Female <input type="checkbox"/> |
| Speciality: | _____ |
| City: | _____ |
| State/Province: | _____ |
| Country: | _____ |
| Year of Graduation: | _____ |
| University from which you graduated: | _____ |
| No of Years since Specialization: | _____ In training <input type="checkbox"/> Retired <input type="checkbox"/> |
| Is your practice: (please tick all that apply) | Public <input type="checkbox"/> Private <input type="checkbox"/> Metropolitan <input type="checkbox"/> Regional <input type="checkbox"/> Remote <input type="checkbox"/> |
| Are you involved in cancer education? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| If YES, as what level? (please tick all that apply) | Student <input type="checkbox"/> Post Grad <input type="checkbox"/> Adv Trainee <input type="checkbox"/> Other _____ |
| Please note that your name will not be published in any reports or publications arising from this study, unless you specifically request to be acknowledged by name. Your name has been requested to facilitate clarification of any data if required. | |
| Please click on the "Distribution list 5" tab to continue onto the knowledge items. | |
| Thank you | |

Instructions:

- 1 For each knowledge item, please mark the box that best represents the highest level of understanding required (Medium or High). Mark any knowledge items that you feel are not relevant, as being not required.
- 2 For each knowledge item that you have indicated requires a moderate or high level of understanding, please indicate the level of specificity of that item (please refer to the consultation document for further information).

| Knowledge Items (Knowledge of... or Understanding of...) | Task 1 | | | Task 2 | | |
|--|------------------|--------|------|--------|--------|------|
| | Minimal (N/A) | Medium | High | Low | Medium | High |
| 1.2.a.3 | | | | | | |
| 1.2.d.2 | | | | | | |
| 1.2.e.6 | | | | | | |
| 1.2.g.2 | | | | | | |
| 1.3.b.1 | | | | | | |
| 1.3.d.2 | | | | | | |
| 2.1.a.3 | | | | | | |
| 2.3.c.1 | | | | | | |
| 2.4.a.2 | | | | | | |
| 2.4.c.1 | | | | | | |
| 2.4.d.3 | | | | | | |
| 3.1.c.1 | | | | | | |
| 3.1.i.3 | | | | | | |
| 3.2.c.1 | | | | | | |
| 3.2.f.2 | | | | | | |
| 3.2.f.8 | | | | | | |
| 3.2.f.14 | | | | | | |
| 3.3.a.1 | | | | | | |

| Knowledge Items (Knowledge of... or Understanding of...) | Task 1 | | | Task 2 | | |
|--|--|--------|------|--------|--------|------|
| | Minimal (N/A) | Medium | High | Low | Medium | High |
| 3.3.h.2 | basic elements of cohort studies. | | | | | |
| 3.3.k.2 | unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their costs in a critical manner. | | | | | |
| 4.2.a.1 | the wide range of potential presentations of cancer. | | | | | |
| 4.2.f.4 | the implications of histopathological staging on prognosis. | | | | | |
| 5.1.b.2 | the principles of palliative treatment. | | | | | |
| 5.1.f.2 | how the treatment of malignancies by different modalities of treatment is guided by the findings of staging evaluations. | | | | | |
| 5.1.j.1 | the patho-physiology of oncology emergencies eg. compressive, obstructive, coagulation and metabolic syndromes. | | | | | |
| 5.2.d.1 | the efficacy of outcomes of surgery. | | | | | |
| 5.2.e.2 | the specific pre-operative factors that influence surgical decision making. | | | | | |
| 5.2.h.2 | post-operative interactions with other modalities of therapy. | | | | | |
| 5.3.c.3 | the use of treatment simulators in relation to radiotherapy. | | | | | |
| 5.3.e.1 | recognise the clinical indications for radiotherapy. | | | | | |
| 5.3.g.1 | the common complications of radiotherapy. | | | | | |
| 5.4.a.1 | the principles of chemotherapy. | | | | | |
| 5.4.c.1 | the efficacy of systemic therapy outcomes. | | | | | |
| 5.4.d.2 | the influences that affect patient choices in the decision making process. | | | | | |
| 5.5.b.2 | the role and structure of supportive care in the multidisciplinary management of advanced cancer. | | | | | |
| 5.5.f.1 | "end of life issues" that confront the patient in relation to the Physical effects of advanced cancer. | | | | | |
| 5.5.f.7 | "end of life issues" that confront the physician in relation to the Physical effects of advanced cancer. | | | | | |
| 5.6.a.2 | the aims of follow-up in relation to recognition and management of distant recurrence. | | | | | |
| 5.6.c.3 | the outcomes for management of recurrences. | | | | | |

| Knowledge Items (Knowledge of... or Understanding of...) | Task 1 | | | Task 2 | | |
|--|--|--------|------|--------|--------|------|
| | Minimal (N/A) | Medium | High | Low | Medium | High |
| 6.1.a.1 | cultural factors influencing presentation for screening. | | | | | |
| 6.1.b.4 | the psychosocial impact of cancer diagnosis on the patient and how they adjust in the long-term. | | | | | |
| 6.1.c.1 | the economic impact of cancer on the patient. | | | | | |
| 6.1.f.1 | resources offering appropriate patient support information. | | | | | |
| 6.2.d.2 | how to explain the risks and benefits of options for management to the patient's significant others, so that active participation in the management process is encouraged. | | | | | |
| 6.3.f.1 | the benefits to ongoing patient care that result from utilising a multidisciplinary team including health professionals and others. | | | | | |
| 6.4.a.5 | the role of psychosocial supports available for the patient's family. | | | | | |
| 6.4.b.3 | available financial resources. | | | | | |
| 7.1.b.1 | the bioethics of issues such as access, equity and resource allocation. | | | | | |
| 7.1.c.4 | the key medico-legal issues in evidence-based guidelines. | | | | | |
| 7.1.d.1 | the principles of informed consent in patient decision making. | | | | | |

Thank you for your participation.

Appendix 9: Examples of emails to clinicians – phase one

From: Darren Starmer [REDACTED]
To: [REDACTED]
Subject: PhD - Expert panel

Dear [REDACTED]

I am undertaking a PhD and would like to invite you to participate in a small panel session to review knowledge item lists I have unpacked from the IOC.

I have prepared six sets of items, each containing approximately 50 of the total 301 items. Your task would be to look at one of these item lists and indicate the level of understanding required of a new grad (Low/Mod/High) and whether or not the item is broad or specific (it is all check-box). A consultation document will also be provided that contains instructions on these tasks.

I will review the responses and then convene a panel session for each group to discuss any issues. The revised item lists will then be circulated nationally. Given that each group will need a participant from each discipline, I want to allocate people an item list based on when they are able to participate in a panel session.

If you are happy to participate in the panel session, could you indicate days/times that would generally be suitable for you? I envisage these will not take any longer than one hour.

If you are unable to attend a panel session, would you be happy to be included in the large scale collection, which will take place after comments and recommendations from the expert panels have been incorporated into the documents? There would be no panel sessions associated with the second round, only the tasks listed above.

Please do not hesitate to contact me if you require any additional information,

Best wishes,
Darren.

Darren Starmer
PhD Candidate
The University of Western Australia
[REDACTED]

From: Darren Starmer [REDACTED]

To: [REDACTED]

Subject: PhD Consultation Document

Dear [REDACTED]

I am currently undertaking my PhD developing a protocol to assess the cancer related knowledge of medical graduates and would like to ask for your assistance.

I am seeking expert feedback on a selection of the knowledge items to establish the level of understanding and specificity of the assessment items that will be generated for the final protocol. In order to achieve this, I will be sending out a list of 50 items for review, and then convening a panel session to discuss any items for which agreement on the ratings were not reached. The list of items will be presented in a grid, with tick-boxes. I will keep the panel sessions to an hour.

I would like to invite you to participate if you are interested and able to give up an hour of your time. I currently need a surgeon on Monday PM, Tuesday PM, Wednesday AM and Friday PM. Unfortunately I cannot specify an exact time or the dates but expect the sessions to take place at the end of June or the 1st week in July. If one of these sessions is genuinely good for you, please let me know. If not, and if you are still interested in giving your feedback on the items, I will include you in the second phase, which will not require a panel session.

I have attached the consultation document, which outlines the tasks, provides a rationale for these and also elaborated on the aims of my study.

Please do not hesitate to contact me if you have any questions.

Yours sincerely,
Darren.

Darren Starmer
PhD Candidate
The University of Western Australia
[REDACTED]

Appendix 10: Draft version of framework for review

Cancer Education Framework for Australian Medical Schools

Background:

The impact of cancer on the Australian population and health care system cannot be overstated. Currently, half of all Australians over the age of 85 will develop a malignant neoplasm (1). Whilst cancer is the leading cause of death in Australia, it also has one of the highest five-year survival rates (2). Consequentially, more Australians are living with cancer, which places an incredible demand on the health system (3). Several studies have shown that Australian medical students are ill-prepared to care for cancer patients upon graduation (4-7). Additionally, medical students and junior doctors themselves have highlighted shortcomings in their own cancer education (7-11). The lack of a national medical curriculum results in individual medical schools with considerable diversity in teaching and clinical exposure (4, 12). As such, no minimum requirements for cancer education exist in Australia. At a national level, an ideal oncology curriculum (13, 14) and a palliative care curriculum have been developed (15). To date, it is unclear as to the level of uptake of either curriculum within Australian medical schools (7, 10). There remains a lack of consensus on what content to include in a cancer curriculum (16, 17) and how best to deliver such a curriculum (18). In panel sessions conducted with Australian cancer clinicians reviewing the Ideal Oncology Curriculum for Medical Schools (14), it was agreed upon that medical students require a fundamental understanding of the principles of cancer management, coupled with exposure to cancer patients in cancer service units, in order to observe this in the clinical setting. Similarly, there was agreement that medical students do not require specialist knowledge, such as drug or radiotherapy dosages. When reviewing the literature, these themes are evident (19-23).

Proposed Framework:

The acquisition of the basic principles of cancer management has provided the basis for the development of the Cancer Education Framework for Australian Medical Schools. Once the salient points of management were identified, the necessary knowledge required to underpin this were identified and incorporated into the framework. Knowledge that would be expected in all medical schools in Australia (such as the cell cycle, concepts of incidence and mortality and evidence-based practice) have not been included in the framework. The rationale here is to keep the framework as simple as possible to optimise its utility and adoption into Australian medical curricula. The learning objectives presented in the framework are by no means exhaustive and provide a minimal blueprint from which to build a basic cancer curriculum within an existing medical school curriculum. The blueprint draws heavily from the Cancer Council Australia's Ideal Oncology Curriculum for Medical Schools (14), and the aforementioned review by cancer clinicians. Other curricula used in the development of this framework include the Palliative Care Curriculum for Undergraduates (15) and the International Summer School 'Oncology for Medical Students' curriculum (24).

Cancer Education Framework for Australian Medical Schools

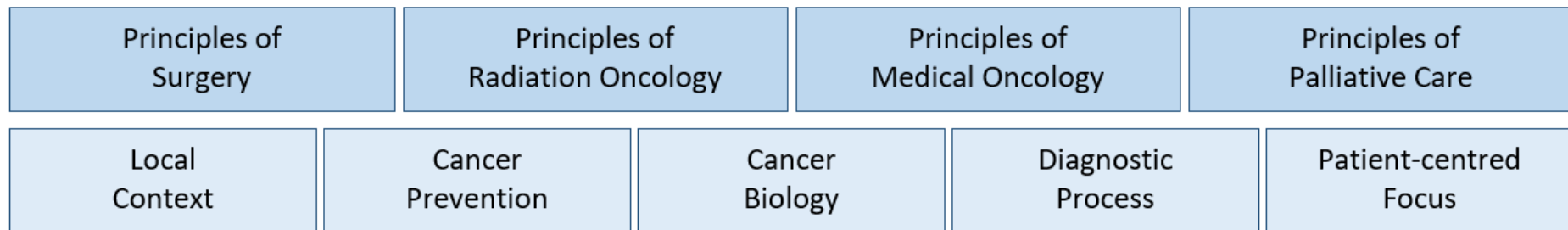
Clinical Exposure

A cancer curriculum should include clinical placements that provide medical students with the following experiences*:

- Talking with and examining people affected by all stages of cancer
- Talking with and examining people affected by all common cancers
- Observing all components of multidisciplinary cancer care
- Seeing shared decision-making between people with cancer and their doctors
- Talking with and examining dying people

It is recommended that clinical exposure be provided, where possible, through placements in cancer service units, including medical and radiation oncology, and palliative care.

Principles of Cancer Management



* Five essential cancer clinical experiences as published in the Oncology Education Committee. Ideal Oncology Curriculum for Medical Schools [Electronic document]. Sydney: The Cancer Council Australia; 2007 [Available from: <http://www.cancer.org.au/policy/Publications/IdealOncology.htm>].

Cancer Education Framework for Australian Medical Schools

Clinical Exposure

Principles of Cancer Management

Upon graduation, students should be able to:

- Discuss the difference between treatment approaches with curative and palliative intent
- Outline the principles of multidisciplinary management
- Discuss how tumour and patient factors influence the way in which patients are managed
- Describe the role of neo-adjuvant and adjuvant therapy
- Outline the roles of locoregional and systemic therapy
- Outline organ-sparing approaches
- List common oncological emergencies and outline how these are managed
- Discuss the principles of symptom control
- Discuss the role of clinical practice guidelines
- Discuss the role of clinical trials

Principles of
Surgery

Principles of
Radiation Oncology

Principles of
Medical Oncology

Principles of
Palliative Care

Local
Context

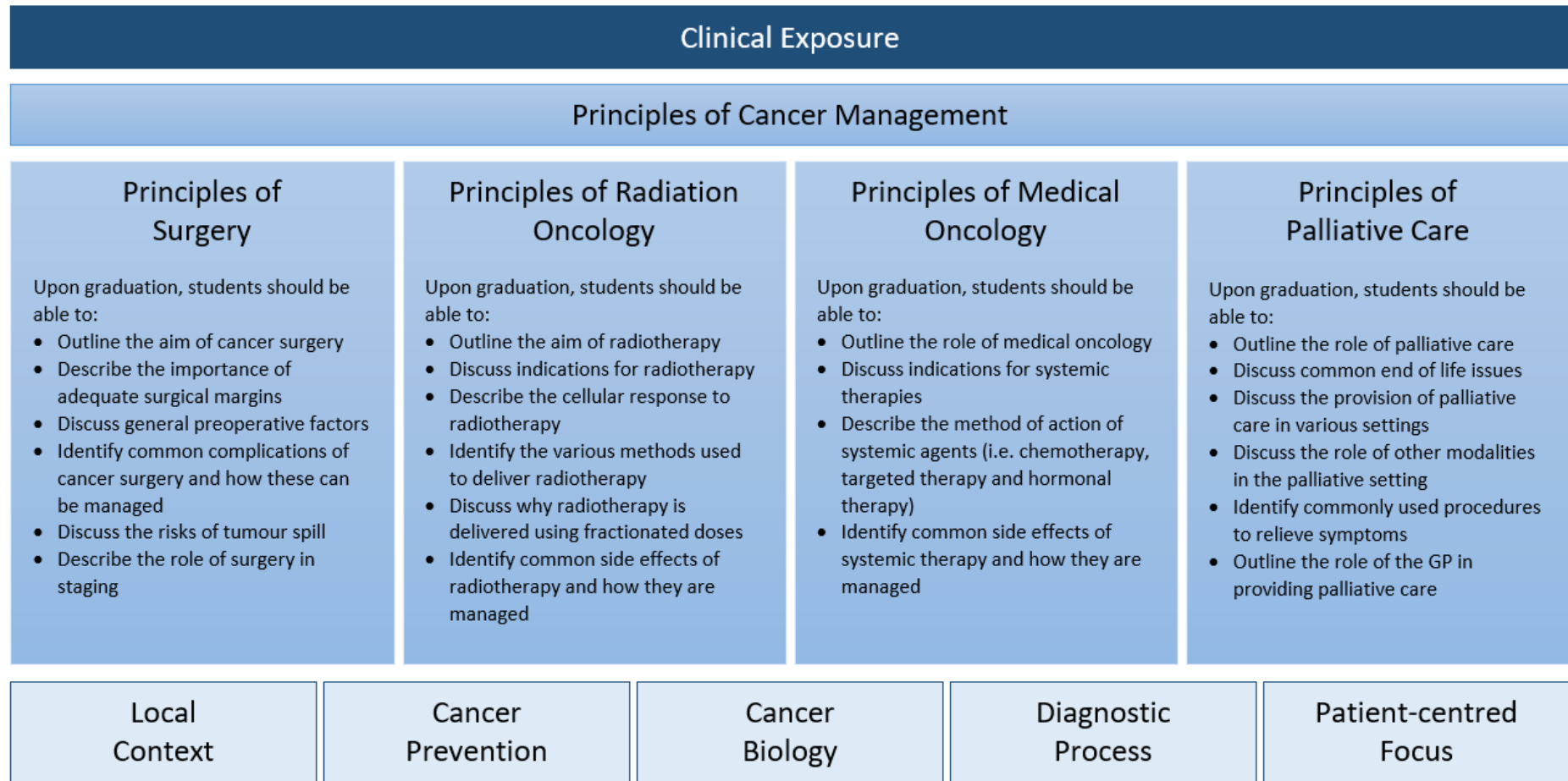
Cancer
Prevention

Cancer
Biology

Diagnostic
Process

Patient-centred
Focus

Cancer Education Framework for Australian Medical Schools



Cancer Education Framework for Australian Medical Schools

| Clinical Exposure | | | | |
|---|--|---|---|---|
| Principles of Cancer Management | | | | |
| Principles of Surgery | Principles of Radiation Oncology | Principles of Medical Oncology | Principles of Palliative Care | |
| <p>Local Context</p> <p>Upon graduation, students should be able to:</p> <ul style="list-style-type: none"> • Identify the most commonly occurring cancers in men and women • Identify the leading causes of cancer death in men and women • Outline the differences in cancer outcomes between Indigenous and non-Indigenous Australians • Outline the differences in cancer outcomes between urban and rural Australians | <p>Cancer Prevention</p> <p>Upon graduation, students should be able to:</p> <ul style="list-style-type: none"> • Describe methods of primary and secondary prevention • Differentiate between population-based screening and surveillance • Discuss the scientific evidence to support population-based methods of screening for cancer • Identify risk factors for common cancers | <p>Cancer Biology</p> <p>Upon graduation, students should be able to:</p> <ul style="list-style-type: none"> • Outline the concept of carcinogenesis • Describe dysplasia, carcinoma in situ, invasive cancer • Describe tumour types • Identify important familial cancer syndromes • Discuss hormonal influences and tumour markers for common cancers • Describe patterns of spread of common cancers • Describe recurrence patterns of common cancers | <p>Diagnostic Process</p> <p>Upon graduation, students should be able to:</p> <ul style="list-style-type: none"> • Outline the necessity of a histopathological diagnosis • Discuss staging and grading of tumours • Describe the prognostic implications of differentiation • Identify potential cancer presentations • Describe the physical signs of cancer • Discuss commonly used diagnostic investigations | <p>Patient-centred Focus</p> <p>Upon graduation, students should be able to:</p> <ul style="list-style-type: none"> • Discuss the importance of involving patients in the decision making process • Identify factors that influence patient choices • Outline the impact of bad news on the patient's ability to process information • Discuss the psychological impact of screening and diagnostic tests • Discuss the role of cancer support groups • Identify reliable and accurate sources of information for patients |

Cancer Education Framework for Australian Medical Schools

References:

1. Cancer Australia. Cancer in Australia statistics Sydney: Cancer Australia; 2019 [Available from: <https://canceraustralia.gov.au/affected-cancer/what-cancer/cancer-australia-statistics>.
2. Arnold M, Rutherford MJ, Bardot A, Ferlay J, Andersson TML, Myklebust TÅ, et al. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-based study. *The Lancet Oncology*. 2019;20(11):1493-505.
3. Australian Institute of Health and Welfare. Health system expenditure on cancer and other neoplasms in Australia: 2008–09. Canberra: AIHW; 2013.
4. Barton MB, Tattersall MH, Butow PN, Crossing S, Jamrozik K, Jalaludin B, et al. Cancer knowledge and skills of interns in Australia and New Zealand in 2001: comparison with 1990, and between course types. *The Medical Journal of Australia*. 2003;178(6):285-9.
5. Smith WT, Tattersall MH, Irwig L, Langlands AO. Undergraduate education about cancer. *European Journal of Cancer*. 1991;27(11):1448-53.
6. Starmer DL, Barton MB. Advances in cancer management: at what cost to medical student education? *J Cancer Educ*. 2009;24(3):233-7.
7. Starmer DL, House CL, Langworthy KM. Student Exposure to Cancer Patients: an Analysis of Clinical Logbooks and Focus Groups in Clinical Year Medical Students. *J Cancer Educ*. 2019;35(4):760-5.
8. Bravery B. Cancer survivor and medical student urges better oncology education for doctors: ABC; 2017 [Available from: <http://www.abc.net.au/news/health/2017-03-04/changing-oncology-education-for-the-better/8323380>.
9. McRae RJ. Oncology Education in Medical Schools: Towards an Approach that Reflects Australia's Health Care Needs. *J Cancer Educ*. 2016;31(4):621-5.
10. Georgiou G. The changing face of cancer in Australian medical schools. *Aust Med Stud J*. 2017;8(1):53-6.
11. Langworthy K. A Junior Doctor's Perspective on Oncology and Palliative Medicine Education in Western Australia: Comparison Between Graduation and Completion of Internship. *J Cancer Educ*. 2019.
12. Starmer DL, Chapman E, Millward MJ. Applying global frameworks to assessment in medical education: an example of a nationally produced curriculum for cancer education. *J Cancer Educ*. 2010;25(3):285-9.
13. Oncology Education Committee. Ideal Oncology Curriculum for Medical Schools. Sydney: The Cancer Council Australia; 1999.
14. Oncology Education Committee. Ideal Oncology Curriculum for Medical Schools [Electronic document]. Sydney: The Cancer Council Australia; 2007 [Available from: <http://www.cancer.org.au/policy/Publications/IdealOncology.htm>].
15. Palliative Care Curriculum for Undergraduates (PCC4U) Project Team, editor. PCC4U Implementation Guide. Brisbane: QUT; 2014.
16. Cancer Council Australia and the Clinical Oncological Society of Australia. Submission to the Department of Education, Science and Training study of medical education in Australia. 2006.
17. Koczwara B, Barton MB, Olver IN, Tattersall MH, Turner DR, Starmer DL. How not to effect change in curricula [letter]. *Med J Aust*. 2006;185(1):52.
18. Gaffan J, Dacre J, Jones A. Educating Undergraduate Medical Students About Oncology: A Literature Review. *Journal of Clinical Oncology*. 2006;24:1932-9.
19. Junqueira AC. Medical student cancer education: experience from projects in Sao Paulo, Brazil, and in other parts of Latin America. *Journal of Surgical Oncology*. 2001;77(1):1-4.
20. Barton MB, Bell P, Sabesan S, Koczwara B. What should doctors know about cancer? Undergraduate medical education from a societal perspective. *The Lancet Oncology*. 2006;7:596-601.
21. de Vries J. Essentials in Cancer Education. *J Cancer Educ*. 1999;14(4):198-202.
22. Haagedoorn EM, de Vries J, Robinson E. The UICC/WHO-CCCE Cancer Education project: a different approach. *J Cancer Educ*. 2000;15(4):204-8.
23. Haagedoorn EM, Oldhoff J, Bender W, Clarke WD, Sleijfer DT. Essential Oncology for Health Professionals. Assen: Van Gorcum & Comp; 1994. 405 p.
24. WHO Collaborating Centre for Cancer Education, Groningen University Faculty of Medical Sciences. 8th International Summer School 'Oncology for Medical Students' Groningen, The Netherlands, 18-28 July 2006. 2006.

Appendix 11: Feedback on the draft framework

[REDACTED]
To: Darren Starmer;

This message originated from outside your organisation

Dear Darren,

Thank you for the Framework. I fully agree that it should be user friendly as a requirement for implementation.

It is indeed easy to read and contains all elements of cancer management. I would be satisfied if all Australian graduates have these knowledge and competencies. Maybe you could add *Risk assessment & communication* because that is very important in this era of increasing possibilities (diagnostic & therapeutic) and decreasing budgets. However this is important for all fields of medicine and not unique for oncology.

I made some remarks on the first page

[REDACTED]

Best wishes,

[REDACTED]

Cancer Education Framework for Australian Medical Schools

Background:

The impact of cancer on the Australian population and health care system cannot be overstated. Currently, half of all Australians ^{estimated?} ~~over the age of 85~~ ^{in the world?} will develop a malignant neoplasm (1). Whilst cancer is the leading cause of death in Australia, it also has one of the highest five-year survival rates (2). Consequentially, more Australians are living with cancer, which places an incredible demand on the health system (3). Several studies have shown that Australian medical students are ill-prepared to care for cancer patients upon graduation (4-7). Additionally, medical students and junior doctors themselves have highlighted shortcomings in their own cancer education (7-11). The lack of a national medical curriculum results in individual medical schools with considerable diversity in teaching and clinical exposure (4, 12). As such, no minimum requirements for cancer education exist in Australia. At a national level, an ideal oncology curriculum (13, 14) and a palliative care curriculum have been developed (15). To date, it is unclear as to the level of uptake of either curriculum within Australian medical schools (7, 10). There remains a lack of consensus on what content to include in a cancer curriculum (16, 17) and how best to deliver such a curriculum (18). In panel sessions conducted with Australian cancer clinicians reviewing the Ideal Oncology Curriculum for Medical Schools (14), it was agreed upon that medical students require a fundamental understanding of the principles of cancer management, coupled with exposure to cancer patients in cancer service units, in order to observe this in the clinical setting. Similarly, there was agreement that medical students do not require specialist knowledge, such as drug or radiotherapy dosages. When reviewing the literature, these themes are evident (19-23). !!

Proposed Framework:

The acquisition of the basic principles of cancer management has provided the basis for the development of the Cancer Education Framework for Australian Medical Schools. Once the salient points of management were identified, the necessary knowledge required to underpin this were identified and incorporated into the framework. Knowledge that would be expected in all medical schools in Australia (such as the cell cycle, concepts of incidence and mortality and evidence-based practice) have not been included in the framework. The rationale here is to keep the framework as simple as possible to optimise its utility and adoption into Australian medical curricula. The learning objectives presented in the framework are by no means exhaustive and provide a minimal blueprint from which to build a basic cancer curriculum within an existing medical school curriculum. The blueprint draws heavily from the Cancer Council Australia's Ideal Oncology Curriculum for Medical Schools (14), and the aforementioned review by cancer clinicians. Other curricula used in the development of this framework include the Palliative Care Curriculum for Undergraduates (15) and the International Summer School 'Oncology for Medical Students' curriculum (24).

thanks

[REDACTED]
To: Darren Starmer;

This message originated from outside your organisation

Darren,

I thought your framework was excellent and I went through the looking for anything to critique but basically couldn't find anything. A few minor points, if I was doing it (and I have fully realise I'm not) in the Principles of cancer Management page 4, I would add to "outline the principles of multidisciplinary management" with " including imaging and pathological diagnostic principles", I know that you have this in later under "Diagnostic Process", page 6 but it would just be to get those concepts in the overview.

Also on page 5 "Principles of Medical Oncology" at the third bullet point I would have added ("i.e. chemotherapy, targeted and hormonal therapies and immunotherapies" because immunotherapies is going to the be the big thing in the next twenty years and will probably in most cancers get rid of chemotherapy. So I think that is an important pointer to the future

The only other thing I would add would be in page 6 "patient centred" I would also add a bullet point "Be aware of the patient's own social context and how you this cancer diagnosis will affect family and carers". Touchy-feely tree hugging always wins brownie points these days!

These are of course all very minor points, and I think overall it is very good indeed, succinct but comprehensive which is difficult to pull off.

Cheers, [REDACTED]

[REDACTED]

To: Darren Starmer;

This message originated from outside your organisation

Hello Darren,

Overall, excellent. A few comments:

In the introduction, you say the themes are evident in references 20-25. We have previously written about this – see if this is helpful at all

[REDACTED]

In the exposure to cancer units – how do you propose that? As a part of the required medicine or surgery rotations? As a separate clinical elective or rotation?

In principles of surgery, do people use the phrase “tumor spill”? Is there another surgical term that is used more frequently?

Excellent palliative care section

Best, [REDACTED]

Appendix 12: Feedback on the survey instrument – phase three

Cancer Education Framework for Australian Medical Schools, Research Project

Dear Colleague,

Thank you for agreeing to participate as a member of the expert group for this PhD research project. You will be asked, on agreement, to review an online survey that will be sent to a group of specialist educators in relation to cancer education in medical schools. I am seeking your feedback in relation to the formatting and survey design.

Key aims of the project

The purpose of this descriptive mixed method study is to provide a rich source of data that describes understanding of the Cancer Council Australia, Australian Oncology Education Committee (OEC), Ideal Oncology Curriculum for Medical Schools (IOC) to support the development and evaluation of an Oncology Medical Curriculum Guide for Australian Medical Schools.

Research questions

1. Do medical practitioners in Western Australia perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care?
2. What elements of the IOC are vital inclusions in Australian medical school curriculum?
3. Do research participants perceive that the '*Cancer Education Framework for Australian Medical Schools*', provides a comprehensive resource for implementation of the IOC?

Benefit of the project

- Establish consensus regarding the fundamental cancer-related knowledge required for medical students prior to graduation
- Validate the utility of the '*Cancer Education Framework for Australian Medical Schools*' for integration within Australian medical school curricula.

If you agree to participate in this process, please review the attached online survey, and provide feedback in the Feedback Form. Please email the completed form to:

Darren Starmer
PhD Candidate
The University of Notre Dame, Australia



1/09/2020

EXPERT GROUP FEEDBACK FORM

Thank you for agreeing to participate as an expert member for the review of the online survey for this study. Please use this form to provide your feedback. Please email to –

[REDACTED]

If you have any questions, please do not hesitate to contact Darren Starmer via email

[REDACTED]

SURVEY FEEDBACK (please consider the clarity of the tool, was it easy to comprehend, was it unambiguous, did you find it easy to answer)

(please type in your response)

Time taken to complete the survey: _____

Do you believe the survey will assist in answering the research questions?

“Do research participants perceive that the ‘Cancer Education Framework for Australian Medical Schools’, provides a comprehensive resource for implementation of the IOC?”

(please type in your response)

Thank you for your time and expertise in assisting with this research.

Survey – Cancer Education

Participant Characteristics

Gender

Mark only one oval.

- Female
- Male
- Other

Where did you undertake your basic medical training?

- Australia
- Overseas

How many years since you graduated?

- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

What state/territory are you located in?

Mark only one oval.

- ACT
- NSW
- SA
- Tasmania
- NT
- Victoria
- WA

What is your medical discipline? (other..... option?)

Mark only one oval.

- Medical Oncology
- Radiation Oncology
- Haematology
- Palliative Care
- Surgical Oncology
- General Practice

How many years have you been a consultant?

- Still in training
- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In what setting(s) do you practice?

Mark all that apply

- Public
- Private
- Urban
- Rural
- Remote

What engagement do you have with medical students? (otheroption?)

Mark all those that are applicable.

- Teach in the university
- Supervise in clinical practice
- Guest lecturer/speaker
- School advisor/committee member
- Medical degree accreditation

- No engagement

Oncology Education

Does your medical school have a dedicated cancer curriculum?

- Yes
- No
- Unsure
- Comment

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum? (I think this question can cause confusing, it is 2 small questions in one big question)

- Yes
- No
- Unsure
- Comment

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines?

- Haematology
- Medical Oncology
- Palliative Care
- Radiation Oncology
- Surgical Oncology
- Unsure
- Comments

Would you like to comment on cancer education for medical students at your institution?

Comment

Framework

Is the organisation of the framework reasonable? (it is hard to judge - the answer might be bias)

- Yes
- No
- Comment:

Does the proposed framework adequately address the expectations of medical graduates entering their internship?

- Yes
- No
- Comment:

Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

- Yes
- No
- Comment:

Is the alignment of the framework within the AMC graduates outcomes useful?

- Yes
- No
- Not sure
- Comment:

Would the proposed framework integrate into the curriculum at your medical school?

- Yes
- No
- Not sure
- Not applicable (I do not have an academic role)
- Comment:

What barriers do you envisage in applying the framework within existing medical curricula?
(is it worth to have a question about what motivates or promotes in applying the framework?)

Comment:

Who will likely benefit most from the adoption of the framework?

Comment:

Do you have any further comments about the framework?

Comment:

Cancer Education Framework for Australian Medical Schools, Research Project

Dear Colleague,

Thank you for agreeing to participate as a member of the expert group for this PhD research project. You will be asked, on agreement, to review an online survey that will be sent to a group of specialist educators in relation to cancer education in medical schools. I am seeking your feedback in relation to the formatting and survey design.

Key aims of the project

The purpose of this descriptive mixed method study is to provide a rich source of data that describes understanding of the Cancer Council Australia, Australian Oncology Education Committee (OEC), Ideal Oncology Curriculum for Medical Schools (IOC) to support the development and evaluation of an Oncology Medical Curriculum Guide for Australian Medical Schools.

Research questions

4. Do medical practitioners in Western Australia perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care?
5. What elements of the IOC are vital inclusions in Australian medical school curriculum?
6. Do research participants perceive that the '*Cancer Education Framework for Australian Medical Schools*', provides a comprehensive resource for implementation of the IOC?

Benefit of the project

- Establish consensus regarding the fundamental cancer-related knowledge required for medical students prior to graduation
- Validate the utility of the '*Cancer Education Framework for Australian Medical Schools*' for integration within Australian medical school curricula.

If you agree to participate in this process, please review the attached online survey, and provide feedback in the Feedback Form. Please email the completed form to:

Darren Starmer
PhD Candidate
The University of Notre Dame, Australia
[REDACTED]

1/09/2020

EXPERT GROUP FEEDBACK FORM

Thank you for agreeing to participate as an expert member for the review of the online survey for this study. Please use this form to provide your feedback. Please email to –

████████████████████

If you have any questions, please do not hesitate to contact Darren Starmer via email

████████████████████

SURVEY FEEDBACK (please consider the clarity of the tool, was it easy to comprehend, was it unambiguous, did you find it easy to answer)

(please type in your response)

Time taken to complete the survey: _____

Do you believe the survey will assist in answering the research questions?

“Do research participants perceive that the ‘Cancer Education Framework for Australian Medical Schools’, provides a comprehensive resource for implementation of the IOC?”

(please type in your response)

This is a closed question – yes/no – but you want a comment. Would it be better to ask the initial? And then ask how, or why not – for the comment.

Thank you for your time and expertise in assisting with this research.

Survey – Cancer Education

Participant Characteristics

Gender

Mark only one oval.

- Female
- Male
- Other

Where did you undertake your basic medical training?

- Australia
- Overseas

How many years since you graduated?

- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

What state/territory are you located in?

Mark only one oval.

- ACT
- NSW
- SA
- Tasmania
- NT
- Victoria
- WA

Are you after where they live? Or where they work? As the answers may be different – especially if they provide telehealth?

What is your medical discipline?

Mark only one oval.

- Medical Oncology
- Radiation Oncology
- Haematology
- Palliative Care
- Surgical Oncology
- General Practice

[Do you need an other here?](#)

How many years have you been a consultant?

- Still in training
- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In what setting(s) do you practice?

Mark all that apply

- Public
- Private
- Urban
- Rural
- Remote

[Do you need to ask about telehealth here?](#)

What engagement do you have with medical students?

Mark all those that are applicable.

- Teach in the university
- Supervise in clinical practice
- Guest lecturer/speaker

- School advisor/committee member
- Medical degree accreditation
- No engagement

Do you require an other box here – eg Dean’s role – or is that executive committee member?

Oncology Education

Does your medical school have a dedicated cancer curriculum?

- Yes
- No
- Unsure
- Comment

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

- Yes
- No
- Unsure
- Comment

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines?

- Haematology
- Medical Oncology
- Palliative Care
- Radiation Oncology
- Surgical Oncology
- Unsure
- Comments

Would you like to comment on cancer education for medical students at your institution?

Comment

Framework

Is the organisation of the framework reasonable?

- Yes
- No
- Comment:

Would it be better as a Likert statement and scale?

Does the proposed framework adequately address the expectations of medical graduates entering their internship? Yes

- No
- Comment:

This is a big question? None of what we do does this in some respects ... perhaps does it provide an inclusive, evidence based foundation on which to build their intern practice

Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

- Yes
- No
- Comment:

Is the alignment of the framework within the AMC graduates outcomes useful?

- Yes
- No
- Not sure
- Comment:

Would the proposed framework integrate into the curriculum at your medical school?

- Yes
- No
- Not sure
- Not applicable (I do not have an academic role)
- Comment:

Would it be feasible to integrate the proposed ...

What barriers do you envisage in applying the framework within existing medical curricula?

Comment:

You ask about barriers but there is no equivalent question about the enablers? Doesn't have to be but just something to think about.

Who will likely benefit most from the adoption of the framework?

Comment:

Do you have any further comments about the framework?

Comment:

Cancer Education Framework for Australian Medical Schools, Research Project

Dear Colleague,

Thank you for agreeing to participate as a member of the expert group for this PhD research project. You will be asked, on agreement, to review an online survey that will be sent to a group of specialist educators in relation to cancer education in medical schools. I am seeking your feedback in relation to the formatting and survey design.

Key aims of the project

The purpose of this descriptive mixed method study is to provide a rich source of data that describes understanding of the Cancer Council Australia, Australian Oncology Education Committee (OEC), Ideal Oncology Curriculum for Medical Schools (IOC) to support the development and evaluation of an Oncology Medical Curriculum Guide for Australian Medical Schools.

Research questions

7. Do medical practitioners in Western Australia perceive the IOC provides a realistic expectation of intern knowledge in relation to cancer care?
8. What elements of the IOC are vital inclusions in Australian medical school curriculum?
9. Do research participants perceive that the '*Cancer Education Framework for Australian Medical Schools*', provides a comprehensive resource for implementation of the IOC?

Benefit of the project

- Establish consensus regarding the fundamental cancer-related knowledge required for medical students prior to graduation
- Validate the utility of the '*Cancer Education Framework for Australian Medical Schools*' for integration within Australian medical school curricula.

If you agree to participate in this process, please review the attached online survey, and provide feedback in the Feedback Form. Please email the completed form to:

██

Darren Starmer
PhD Candidate
The University of Notre Dame, Australia

1/09/2020

EXPERT GROUP FEEDBACK FORM

Thank you for agreeing to participate as an expert member for the review of the online survey for this study. Please use this form to provide your feedback. Please email to –

[REDACTED]

If you have any questions, please do not hesitate to contact Darren Starmer via email

[REDACTED]

SURVEY FEEDBACK (please consider the clarity of the tool, was it easy to comprehend, was it unambiguous, did you find it easy to answer)

(please type in your response)

Numbered questions would have been helpful to provide feedback.

Q What is your medical discipline - ? other or is this the definitive list?

Q In what setting do you practice – metropolitan may be a better term than urban and add Public Private Partnership – they are becoming more common

Q Would you like to comment on Ca education for med students at your institution?
Perhaps better if – Please comment on Ca education for med students at your institution....
More likely to get a response.

Q Is the alignment of the framework within the AMC graduates outcomes... A bit clunky, does read better without the 's' on graduates

Time taken to complete the survey: 10 minutes though didn't make comments!

Do you believe the survey will assist in answering the research questions?

“Do research participants perceive that the ‘Cancer Education Framework for Australian Medical Schools’, provides a comprehensive resource for implementation of the IOC?”

(please type in your response)

Yes, you have provided plenty of opportunity for comments if the participant has another or alternative view or wants to contribute more on the topic.

Thank you for your time and expertise in assisting with this research.

Survey – Cancer Education

Participant Characteristics

Gender

Mark only one oval.

- Female
- Male
- Other

Where did you undertake your basic medical training?

- Australia
- Overseas

How many years since you graduated?

- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

What state/territory are you located in?

Mark only one oval.

- ACT
- NSW
- SA
- Tasmania
- NT
- Victoria

- WA

What is your medical discipline?

Mark only one oval.

- Medical Oncology
- Radiation Oncology
- Haematology
- Palliative Care
- Surgical Oncology
- General Practice

How many years have you been a consultant?

- Still in training
- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In what setting(s) do you practice?

Mark all that apply

- Public
- Private
- Urban
- Rural
- Remote

What engagement do you have with medical students?

Mark all those that are applicable.

- Teach in the university
- Supervise in clinical practice
- Guest lecturer/speaker
- School advisor/committee member

- Medical degree accreditation
- No engagement

Oncology Education

Does your medical school have a dedicated cancer curriculum?

- Yes
- No
- Unsure
- Comment

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

- Yes
- No
- Unsure
- Comment

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines?

- Haematology
- Medical Oncology
- Palliative Care
- Radiation Oncology
- Surgical Oncology
- Unsure
- Comments

Would you like to comment on cancer education for medical students at your institution?

Comment

Framework

Is the organisation of the framework reasonable?

- Yes
- No
- Comment:

Does the proposed framework adequately address the expectations of medical graduates entering their internship?

- Yes
- No
- Comment:

Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

- Yes
- No
- Comment:

Is the alignment of the framework within the AMC graduates outcomes useful?

- Yes
- No
- Not sure
- Comment:

Would the proposed framework integrate into the curriculum at your medical school?

- Yes
- No
- Not sure
- Not applicable (I do not have an academic role)
- Comment:

What barriers do you envisage in applying the framework within existing medical curricula?

Comment:

Who will likely benefit most from the adoption of the framework?

Comment:

Do you have any further comments about the framework?

Comment:

Appendix 13: Survey instrument – phase three

Survey – Cancer Education^{aa}

Participant Characteristics

Gender

Mark only one.

- Female
- Male
- Other

Where did you undertake your basic medical training?

Mark only one.

- Australia
- Overseas

How many years since you graduated?

Mark only one.

- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In which state/territory do you primarily practice?

Mark only one.

- ACT
- NSW

^{aa} The survey was administered using Qualtrics XM survey software and the version shown in this appendix was created to instruct the developer. Text response boxes were inserted into the online survey wherever “comment” appears in this document. A screen capture of part of the survey is included at the end of this appendix.

- NT
- QLD
- SA
- TAS
- VIC
- WA

What is your medical discipline?

Mark only one.

- Medical Oncology
- Radiation Oncology
- Haematology
- Palliative Care
- Surgical Oncology
- General Practice

How many years have you been a consultant?

Mark only one.

- Still in training
- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In what setting(s) do you practice?

Mark all that apply

- Public
- Private
- Public/private partnership
- Metropolitan

- Rural
- Remote
- Telehealth

What engagement do you have with medical students?

Mark all that apply

- Teach in the university
- Supervise in clinical practice
- Guest lecturer/speaker
- School advisor/committee member
- Medical degree accreditation
- No engagement
- Other – please comment

Oncology Education

Does your medical school have a dedicated cancer curriculum?

Mark only one.

- Yes
- No
- Unsure
- Comment

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

Mark only one.

- Yes
- No
- Unsure
- Comment

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines?

Mark all that apply

- Haematology
- Medical Oncology
- Palliative Care
- Radiation Oncology
- Surgical Oncology
- Unsure
- Comments

Please comment on cancer education for medical students at your institution?

Comment

Cancer Education Framework for Australian Medical Schools

Is the organisation of the framework reasonable?

Mark only one.

- Yes
- No
- Comment:

Does the proposed framework adequately address the cancer-related expectations of medical graduates entering their internship?

Mark only one.

- Yes
- No
- Comment:

Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

Mark only one.

- Yes
- No
- Comment:

Would the proposed framework integrate into the curriculum at your medical school?

Mark only one.

- Yes

- No
- Not sure
- Not applicable (I do not have an academic role)
- Comment:

If yes, do you think it would be feasible to incorporate the curriculum?

Mark only one.

- Yes
- No
- Comment:

What enablers would facilitate applying the framework within existing medical curricula?

Comment:

What barriers do you envisage in applying the framework within existing medical curricula?

Comment:

Who will likely benefit most from the adoption of the framework?

Comment:

Do you have any further comments about the framework?

Comment:

Screen capture from online survey administered using Qualtrics XM survey software.

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

Single block/teaching unit

Integrated

Unsure

Any comments

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines? (Please mark all that apply)

Haematology

Medical Oncology

Palliative Care

Radiation Oncology

Surgical Oncology

Unsure

Appendix 14: Participant information sheet – phase three



PARTICIPANT INFORMATION SHEET

Development of a cancer education framework for Australian medical schools

You are invited to participate in the research project described below.

What is the project about?

The research project will investigate the cancer-related knowledge required of medical students upon graduation. The researchers have developed a cancer education framework for Australian medical schools. This is the final stage of the research project, in which the researchers are seeking feedback on the framework.

Who is undertaking the project?

This project is being conducted by Mr. Darren Starmer as part of a PhD that he is completing at The University of Notre Dame Australia, under the supervision of Associate Professor Kylie Russell and Dr. Dianne Juliff.

What will I be asked to do?

You are asked to complete an online survey, which will ask you questions about a cancer education framework that the researcher has developed for Australian medical schools. The survey will also include some background information, such as your gender, discipline, the year in which you graduated from medical school and your clinical and teaching commitments. It should take you about 10 minutes to complete and you will be completely anonymous.

Are there any risks associated with participating in this project?

We don't anticipate any risk to you in participating in this research project.

What are the benefits of the research project?

The development of a cancer education framework for Australian medical schools has the potential to have a positive impact upon the cancer-related knowledge of Australian medical graduates.

What if I change my mind?

Participation in this study is completely voluntary. Even if you begin the survey, you are free to withdraw by simply not completing it. However, once you complete the survey and submit it back to us, you won't be able to withdraw it because we will have no way of knowing which one is yours.

Will anyone else know the results of the project?

Completed surveys will be stored securely on a password protected computer and only the researchers will have access to this information during the project.

Once the study is completed, the survey information will be stored securely in the School of Medicine at The University of Notre Dame Australia for at least a period of five years. The data may be used in future research but you will remain completely anonymous (if applies).

The results of the research project will be published as a thesis and journal article.

Will I be able to find out the results of the project?

Once we have analysed the information from the surveys we will email a summary of our findings to those that were sent the email invitation. You can expect to receive this feedback in 6-9 months.

Who do I contact if I have questions about the project?

If you have any questions about this project, please feel free to contact Mr. Darren Starmer at 08 9433 0184 or [REDACTED]. Alternatively, you can contact Associate Professor Kylie Russell at [REDACTED]. We are happy to discuss with you any concerns you may have about this study.

What if I have a concern or complaint?

The study has been approved by the Human Research Ethics Committee at The University of Notre Dame Australia (approval number 2020-153F). If you have a concern or complaint regarding the ethical conduct of this research project and would like to speak to an independent person, please contact Notre Dame's Research Ethics Officer at [REDACTED]. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

How do I sign up to participate?

If you are happy to participate, please click on the following link to the survey:

[Cancer Education Framework Survey](#)

Thank you for your time. This sheet is for you to keep.

Yours sincerely,

Darren Starmer

Assoc Prof Kylie Russell

Dr Dianne Juliff

Appendix 15: International version of the survey instrument

Survey – Cancer Education^{bb}

Participant Characteristics

Gender

Mark only one.

- Female
- Male
- Other

Where did you undertake your basic medical training?

- Comment

How many years since you graduated?

Mark only one.

- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In which country do you primarily practice?

- Comment

What is your medical discipline?

Mark only one.

- Medical Oncology
- Radiation Oncology
- Haematology
- Palliative Care

^{bb} The survey was administered using Qualtrics XM survey software and the version shown in this appendix was created to instruct the developer. Text response boxes were inserted into the online survey wherever “comment” appears in this document.

- Surgical Oncology
- General Practice

How many years have you been a consultant/attending?

Mark only one.

- Still in training
- < 10 years
- 10-19 years
- 20-29 years
- 30-39 years
- 40+ years

In what setting(s) do you practice?

Mark all that apply

- Public
- Private
- Public/private partnership
- Metropolitan
- Rural
- Remote
- Telehealth

What engagement do you have with medical students?

Mark all that apply

- Teach in the university
- Supervise in clinical practice
- Guest lecturer/speaker
- School advisor/committee member
- Medical degree accreditation
- No engagement
- Other – please comment

Oncology Education

Does your medical school have a dedicated cancer curriculum?

Mark only one.

- Yes
- No
- Unsure
- Comment

Is cancer taught within a single block/teaching unit or is it integrated throughout the curriculum?

Mark only one.

- Yes
- No
- Unsure
- Comment

Please indicate if medical students at your university undertake a mandatory clinical placement in any of the following disciplines?

Mark all that apply

- Haematology
- Medical Oncology
- Palliative Care
- Radiation Oncology
- Surgical Oncology
- Unsure
- Comments

Please comment on cancer education for medical students at your institution?

Comment

Cancer Education Framework for Australian Medical Schools – applicability to an international setting

Whilst the framework has been written for the Australian context, we believe that it could be readily adapted to an international setting through modification of the *Local Context* section.

Is the organisation of the framework reasonable?

Mark only one.

- Yes
- No
- Comment:

Does the proposed framework adequately address the cancer-related expectations of medical graduates entering their first year of clinical employment post-graduation (internship/residency)?

Mark only one.

- Yes
- No
- Comment:

Is the content outlined in the framework appropriate for medical students to attain prior to graduation?

Mark only one.

- Yes
- No
- Comment:

Would the proposed framework integrate into the curriculum at your medical school?

Mark only one.

- Yes
- No
- Not sure
- Not applicable (I do not have an academic role)
- Comment:

If yes, do you think it would be feasible to incorporate the curriculum?

Mark only one.

- Yes
- No

- Comment:

What enablers would facilitate applying the framework within existing medical curricula?

Comment:

What barriers do you envisage in applying the framework within existing medical curricula?

Comment:

Who will likely benefit most from the adoption of the framework?

Comment:

Do you have any further comments about the framework?

Comment:

Appendix 16: Examples of emails to clinicians – phase three

Cancer Education Survey
Darren Starmer

To: [REDACTED]

Dear [REDACTED]

I hope that this email finds you well.

I am reaching out to all former Oncology Education Committee members, seeking their participation in a survey to evaluate a cancer education framework for medical schools that I have developed as part of my PhD. It draws heavily on the ideal oncology curriculum and the results of a local review of the IOC that I undertook.

An email will be sent to you within the next 24 hours via the survey software (Qualtrics) and although it will have my name on it, the email will come from "noreply@qemailserver.com". As such, it is likely to be intercepted as SPAM, so please check if you haven't received anything in the next two days. The email will contain all the necessary information, including a participant information sheet and a link to the survey and framework.

Best wishes,
Darren

Darren Starmer
Head of Assessment
School of Medicine
The University of Notre Dame Australia
PO Box 1225
Fremantle WA 6959
Australia
Phone: +61 8 9433 0184



Cancer Education Survey

Darren Starmer

To: [REDACTED]

Dear [REDACTED]

Lucy Gilkes suggested that I contact you to see if you would be willing to pass on a survey to some rural GPs for me? The survey is the final part of my PhD which is looking at the necessary cancer knowledge required by medical students upon graduation. The link to the survey is below:

[Cancer Education Survey](#)

The cancer education framework is contained in the survey (accessible via a link). I have attached the participant information sheet, which outlines the study and my HREC approval.

Please contact me at any time should you have any questions or concerns.

Best wishes,
Darren

Darren Starmer
Head of Assessment
School of Medicine
The University of Notre Dame Australia
PO Box 1225
Fremantle WA 6959
Australia
Phone: +61 8 9433 0184



From: [REDACTED]
To: [REDACTED]
Subject: Cancer education survey

Dear All,

I apologise for the group email and not reaching out to each of you individually. However, I need your assistance. As many of you know, I am in the process of finishing up my PhD but I am short on respondents for the final stage, which is an online survey to provide feedback on a cancer education framework that I have developed. In particular, I have low numbers of haematologists and surgeons.

Time is also against me, as I am hoping to begin work on this particular chapter in a week or so and I appreciate that this may not provide you with sufficient time. The survey should take no more than 10 minutes to complete and it will likely take similar time to review the framework. The document totals 12 pages but the actual curriculum content is only five pages. The survey is completely anonymous and I would be happy for you to pass it on to any of your colleagues.

I have attached the participant information sheet. The framework is accessible from within the survey, the link for which is below:

https://notredame.qualtrics.com/jfe/form/SV_01dvSCcFSD2XLIF?

Happy New Year to you all. I hope that 2021 is a vast improvement on 2020.

Best wishes,
Darren

Darren Starmer
Head of Assessment
School of Medicine
The University of Notre Dame Australia
PO Box 1225
Fremantle WA 6959
Australia
Phone: +61 8 9433 0184



Appendix 17: HREC approval letter from UWA



THE UNIVERSITY OF
WESTERN AUSTRALIA

Research Ethics
Research Services
M459

35 Stirling Highway, Crawley, WA 6009
Telephone: (08) 6488 3703
Facsimile: (08) 6488 8775
Email: kkirk@admin.uwa.edu.au
http://www.research.uwa.edu.au/human_ethics

Our Ref: RA/4/3/1223

16 July 2007

Dr E Chapman
Graduate School of Education - M428
UWA

PhD 07

Project: Development and validation of an instrument to measure key cancer-related generic attributes for medical graduates

Student: Darren Starmer - PhD - [REDACTED]

Please be advised that ethical approval of the above project has been granted in accordance with the procedures of the Human Research Ethics Committee at the University of Western Australia.

It is the responsibility of the researcher to advise the Committee of any departure from the original protocol. The Committee requires that all Chief Investigators report **immediately** any adverse or unexpected events that might affect ethical approval of the project.

Approval should be sought in writing **in advance** from the Human Research Ethics Committee if any change to the procedures or the number of participants in the original application is envisaged. Should this change require amendments to an Information Sheet or Consent Form related to the project, the amended version of the forms should be submitted for review. The application for the amendment should give the rationale behind and justification for the amendment. You are also required to inform the Committee, giving reasons, if the research project is discontinued before the expected date of completion. Correspondence should be submitted to the Secretary, Human Research Ethics Committee, Research Services.

The Committee is bound by NHMRC Guidelines to monitor the progress of all approved projects until completion to ensure that they continue to conform to approved ethical standards. An Annual Report form will be sent to you twelve months after the initial approval date.

Please note that approval has been granted for a period of four years. Initial approval is for a period of one year, and, thereafter for future periods of one year at a time subject to the receipt of satisfactory annual reports. At the end of the four-year period you will be required to complete a new "Application to Undertake Research Involving Human Subjects" should you wish to continue with your research. However, in special circumstances, the Chair has the authority to extend the approval period in order to complete a project. . **Failure to submit a final report may result in delays for future applications.**

Please quote Project No RA/4/3/1223 on all correspondence associated with this study.

Yours sincerely

[REDACTED]

KATE KIRK
Executive Officer
(Human Research Ethics Committee)

ccs: Head of School
Admin Officer

Appendix 18: HREC approval letter from UNDA



19 Mouat St (PO Box 1225) Fremantle WA 6959
+61 8 9433 0555 | enquiries@nd.edu.au

30 September 2020

A/Prof Kylie Russell & Darren Starmer
School of Nursing & Midwifery
The University of Notre Dame Australia
Fremantle Campus

Dear Kylie and Darren,

Reference Number: 2020-153F

Project Title: "Development of a cancer education framework for Australian medical schools."

Thank you for submitting the above project for Low Risk ethical review. Your application has been reviewed by a sub-committee of the University of Notre Dame Human Research Ethics Committee (HREC) in accordance with the *National Statement on Ethical Conduct in Human Research* (2007, updated 2018). I am pleased to advise that ethics approval has been granted for this proposed study.

Other researchers identified as working on this project are:

| Name | School/Centre | Role |
|-----------------|-------------------------------|---------------|
| Dr Diane Juliff | School of Nursing & Midwifery | Co-Supervisor |

**All research projects are approved subject to standard conditions of approval.
Please read the attached document for details of these conditions.**

On behalf of the Human Research Ethics Committee, I wish you well with your study.

Yours sincerely,



Dr Natalie Giles
Research Ethics Officer
Research Office

cc: Prof Caroline Bulsara, SRC Chair, School of Nursing & Midwifery

Broome Campus 88 Guy St (PO Box 2287) Broome WA 6725
Sydney Campus 140 Broadway (PO Box 944) NSW 2007



ABN 69 330 643 210 | CRICOS Provider Code: 01032F

nd.edu.au

Appendix 19: The final list of 301 knowledge items

1. Public Health

1.1 The role of cancer in population health and illness

- 1.1.a.1 the significance of cancer as a health problem in Australia.
- 1.1.a.2 the significance of cancer as a health problem throughout the world.

1.2 Cancers – epidemiology, risk factors

- 1.2.a.1 the epidemiological concepts of morbidity (incidence and prevalence) in relation to common cancers
- 1.2.a.2 the epidemiological concepts of mortality in relation to common cancers
- 1.2.a.3 the epidemiological concepts of relative risk in relation to common cancers
- 1.2.a.4 the epidemiological concepts of survival in relation to common cancers
- 1.2.b.1 the role of statistical information, including surveillance and monitoring data.
- 1.2.b.2 the medical practitioner's need to be able to access numerical information.
- 1.2.c.1 the purpose of cancer registries
- 1.2.d.1 the genetic risk factors for various malignancies.
- 1.2.d.2 the non-genetic risk factors for various malignancies.
- 1.2.e.1 the most frequently diagnosed malignancies in Australia.
- 1.2.e.2 the most frequently diagnosed malignancies globally.
- 1.2.e.3 the most common causes of cancer death in Australia.
- 1.2.e.4 the most common causes of cancer death globally

- 1.2.e.5 in a general way how the most frequently diagnosed malignancies differ between Australia and different parts of the world.
- 1.2.e.6 in a general way how the most common causes of cancer death differ between Australia and different parts of the world.
- 1.2.f.1 the differential rates of cancers in Indigenous Australians and the reasons behind them.
- 1.2.f.2 the differential rates of cancers in non-Indigenous Australians and the reasons behind them.
- 1.2.f.3 the outcome for differential rates of cancers in Indigenous Australians and the reasons behind them.
- 1.2.f.4 the outcome for differential rates of cancers and non-Indigenous Australians and the reasons behind them.
- 1.2.g.1 the differing outcomes of cancers, in general, in urban populations.
- 1.2.g.2 the differing outcomes of cancers, in general, in rural.
- 1.2.g.3 the reasons behind the differing outcomes of cancers between rural and urban populations.

1.3 Prevention, screening and family risk

- 1.3.a.1 methods for the primary prevention of cancer, including measures that employ a public health approach.
- 1.3.a.2 methods for the primary prevention of cancer, including measures depending on individuals and their doctors.
- 1.3.a.3 methods for the secondary prevention of cancer, including measures that employ a public health approach.

- 1.3.a.4 methods for the secondary prevention of cancer, including measures depending on individuals and their doctors.
- 1.3.b.1 the methods of screening for cancer.
- 1.3.b.2 the methods of screening for pre-malignant conditions.
- 1.3.c.1 the scientific evidence for the utility of screening.
- 1.3.c.2 the difference between population-based screening and surveillance of individuals.
- 1.3.c.3 the cost-effectiveness issues related to screening.
- 1.3.d.1 environmental control approaches to the prevention of cancer.
- 1.3.d.2 behavioural approaches to the prevention of cancer.
- 1.3.d.3 chemical approaches to the prevention of cancer.
- 1.3.d.4 the psychosocial impact of screening on the patient.
- 1.3.d.5 the psychosocial impact of staging investigations on the patient.

2. Cancer Biology

2.1 Functional Anatomy

- 2.1.a.1 the anatomical basis of cancer assessment such as vascular supply (eg. liver) in relation to oncology (eg. pelvis).
- 2.1.a.2 the anatomical basis of cancer assessment such as lymphatic drainage patterns (eg. breast) in relation to oncology (eg. pelvis).
- 2.1.a.3 the anatomical basis of cancer assessment such as the anatomical relationships of relevance to oncology (eg. pelvis).
- 2.2.a.1 the principles of handling of chemicals (by cells) in relation to drug metabolism.

2.2 Physiology

- 2.2.a.2 the principles of handling of chemicals (by cells) in relation to handling of carcinogens.

2.3 Pathology

- 2.3.a.1 the concept of carcinogenesis
- 2.3.b.1 for the common cancers, macroscopic findings, including pathological features from pre-malignant to malignant stages of cancer.
- 2.3.b.2 for the common cancers, microscopic findings, including pathological features from pre-malignant to malignant stages of cancer.
- 2.3.c.1 patterns of spread of common cancers.
- 2.3.c.2 the role of molecular pathology.
- 2.3.c.3 the purpose of molecular pathology.
- 2.3.c.4 the prognostic and/or predictive values of receptors in relation to molecular pathology.
- 2.3.c.5 the prognostic and/or predictive values of other targets in relation to molecular pathology.

2.4 Molecular Biology

- 2.4.a.1 the molecular genetics of cancer in relation to the role of protooncogenes.
- 2.4.a.2 the molecular genetics of cancer in relation to tumour suppressor genes.
- 2.4.a.3 the molecular genetics of cancer in relation to DNA and RNA viruses.
- 2.4.a.4 the molecular genetics of cancer in relation to controls of apoptosis.
- 2.4.a.5 the molecular genetics of cancer: role of protooncogenes in relation to angiogenesis.

- 2.4.a.6 the molecular genetics of cancer in relation to elements of molecular genetic techniques.
- 2.4.b.1 the molecular correlates of the pathological progression of cancer in a model system.
- 2.4.c.1 hormonal influences relevant to tumour type.
- 2.4.c.2 hormonal influences relevant to prognosis.
- 2.4.c.3 tumour markers relevant to tumour type.
- 2.4.c.4 tumour markers relevant prognosis.
- 2.4.d.1 important familial cancer syndromes.
- 2.4.d.2 the molecular basis for important familial cancer syndromes.
- 2.4.d.3 the mode of inheritance for important familial cancer syndromes.
- 2.4.d.4 the associated risk of disease for important familial cancer syndromes.
- 2.4.d.5 the implications for family counselling for important familial cancer syndromes.

3. Patient Management

3.1 Patient management including referral and multidisciplinary management

- 3.1.a.1 awareness of clinical practice guidelines, where available, for appropriate referral patterns.
- 3.1.a.2 the need for evidence based medicine.
- 3.1.b.1 effective means of communication to enhance the clinical management of patients with cancer.
- 3.1.c.1 the need to recognise psychological distress in the patient.

- 3.1.c.2 the need to address psychological distress in the patient.
- 3.1.c.3 the need to manage psychological distress in the patient.
- 3.1.d.1 the importance of coordinated care in optimising overall management of patients.
- 3.1.e.2 that help from those with better specialist knowledge can be sought.
- 3.1.h.1 the integration of treatment modalities.
- 3.1.i.3 the distinction between unproven/experimental therapies and alternative therapies.
- 3.1.j.1 the range of medical health professionals involved in cancer care.
- 3.1.j.2 the range of non-medical health professionals involved in cancer care.
- 3.1.k.1 the effective use of a multidisciplinary management team.

3.2 Quality of life, therapeutic ratio and resource costs

- 3.2.a.1 how quality of life is assessed.
- 3.2.b.1 the balance of risks and benefits of treatment as a key consideration in making treatment decisions.
- 3.2.c.1 the concepts of cost effectiveness.
- 3.2.c.2 the concepts of cost benefits.
- 3.2.c.3 the concepts of opportunity costs.
- 3.2.d.1 the principles of measurement of quality of life.
- 3.2.e.1 the concept of therapeutic ratio.
- 3.2.f.1 unproven/experimental therapies.

- 3.2.f.2 distinguish between unproven/experimental therapies and alternative therapies.
- 3.2.f.3 the effects of clinical decisions about treatment on the patient in terms of quality of life.
- 3.2.f.4 the effects of clinical decisions about treatment on the patient's family in terms of the patient's quality of life.
- 3.2.f.5 the effects of clinical decisions about treatment on the health care system in terms of the patient's quality of life.
- 3.2.f.6 the effects of clinical decisions about treatment on the patient's burden of disease.
- 3.2.f.7 the effects of clinical decisions about treatment on the patient's family on the patient's burden of disease.
- 3.2.f.8 the effects of clinical decisions about treatment on the health care system on the patient's burden of disease.
- 3.2.f.9 the effects of clinical decisions about treatment on the patient's disease process.
- 3.2.f.10 the effects of clinical decisions about treatment on the patient's family in relation to the patient's disease process.
- 3.2.f.11 the effects of clinical decisions about treatment on the health care system in relation to the patient's disease process.
- 3.2.f.12 the effects of clinical decisions about treatment on the patient in relation to treatment costs.
- 3.2.f.13 the effects of clinical decisions about treatment on the patient's family in relation to treatment costs.

- 3.2.f.14 the effects of clinical decisions about treatment on the health care system in relation to treatment costs.
- 3.2.f.15 the effects of clinical decisions about treatment on the patient in terms of the patient's location v treatment location.
- 3.2.f.16 the effects of clinical decisions about treatment on the patient's family in terms of the patient's location v treatment location.
- 3.2.f.17 the effects of clinical decisions about treatment on the health care system in terms of the patient's location v treatment location.
- 3.2.g.1 incorporate measurements of quality of life in assessment of performance status.
- 3.2.h.1 an awareness of supportive care networks.

3.3 Uncertainty and information management

- 3.3.a.1 the importance of evidence based medical practice.
- 3.3.b.1 the need to be able to critically appraise evidence.
- 3.3.g.1 clinical trials.
- 3.3.g.2 the importance of clinical trials.
- 3.3.g.3 the value of clinical trials to patients.
- 3.3.h.1 basic elements of clinical trials.
- 3.3.h.2 basic elements of cohort studies.
- 3.3.h.3 basic elements of case control studies.
- 3.3.j.1 the limits of evidence.
- 3.3.j.2 the broad application of evidence.

- 3.3.j.3 the advancement of evidence over time.
- 3.3.k.1 unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their claimed benefits in a critical manner.
- 3.3.k.2 unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their costs in a critical manner.

4. Diagnosis

4.1 Clinical examination

- 4.1.a.1 clinical manifestations of cancer, considering broad aspects of functional anatomy (vascular supply, lymphatic drainage, oncological anatomical relationships).
- 4.1.a.2 clinical manifestations of cancer, considering broad aspects of oncological pathophysiology.
- 4.1.a.3 clinical manifestations of cancer, considering broad aspects of pathology.
- 4.1.b.1 the components of the clinical examination of common cancers.
- 4.1.d.1 the results of clinical examination.
- 4.2 The diagnostic process
 - 4.2.a.1 the wide range of potential presentations of cancer.
 - 4.2.a.2 unusual presentations of cancer.
 - 4.2.d.1 the differential diagnosis of common cancers based on specific oncological findings.
 - 4.2.f.1 the histopathological classification of cancers, including the concept of TNM.
 - 4.2.f.2 the histopathological staging of cancers, including the concept of TNM.
 - 4.2.f.3 the implications of histopathological staging for treatment.

- 4.2.f.4 the implications of histopathological staging on prognosis.
- 4.2.g.1 common complications of malignant disease, eg. superior vena cava obstruction, spinal cord compression, bone involvement.
- 4.2.h.1 cost effectiveness of investigations.

5. Treatment

5.1 General principles of treatment

- 5.1.a.1 the importance of the patient in the decision-making process.
- 5.1.a.2 the influences that affect the choices that patients make in the decision-making process.
- 5.1.b.1 the principles of treatment with intent to cure.
- 5.1.b.2 the principles of palliative treatment.
- 5.1.c.1 the role of multidisciplinary management of the patient.
- 5.1.d.1 that tailoring of standard treatment protocols may be an appropriate component of patient focused care.
- 5.1.e.1 process and outcome measures including concepts of self audit to minimise deviation from best practice.
- 5.1.e.2 process and outcome measures including quality assurance to minimise deviation from best practice.
- 5.1.f.1 how the treatment of malignancies by different modalities of treatment is guided by the natural history of the malignancy.
- 5.1.f.2 how the treatment of malignancies by different modalities of treatment is guided by the findings of staging evaluations.
- 5.1.g.1 the unique features of the management of cancer in children.

- 5.1.g.2 the unique features of the management of cancer in adolescents.
- 5.1.g.3 the unique features of the management of cancer in the elderly.
- 5.1.h.1 the management of potential complications of cancer treatments eg. febrile neutropenia, mucositis, radiation skin injury.
- 5.1.i.1 the management of common oncological emergencies eg. spinal cord compression, hypercalcaemia.
- 5.1.j.1 the patho-physiology of oncology emergencies eg. compressive, obstructive, coagulation and metabolic syndromes.

5.2 Principles of surgery

- 5.2.a.1 the aims of surgical treatment of cancers.
- 5.2.a.2 the general principles of common procedures.
- 5.2.b.1 the range of surgical options.
- 5.2.b.2 how surgical options are affected by the integration into multi-modality care.
- 5.2.c.1 the clinical indications for surgery of common cancers.
- 5.2.d.1 the efficacy of outcomes of surgery.
- 5.2.d.2 the short-term side-effects of surgery.
- 5.2.d.3 the long-term side-effects of surgery.
- 5.2.d.4 the financial costs in relation to surgical outcomes.
- 5.2.d.5 the outcomes of surgery in relation to quality of life.
- 5.2.e.1 the general pre-operative factors that influence surgical decision making.
- 5.2.e.2 the specific pre-operative factors that influence surgical decision making.
- 5.2.f.1 the effect surgery may have on body image.

- 5.2.f.2 the role of reconstructive surgery.
- 5.2.g.1 the common complications of cancer surgery.
- 5.2.g.2 the management common complications of cancer surgery.
- 5.2.h.1 pre-operative interactions with other modalities of therapy.
- 5.2.h.2 post-operative interactions with other modalities of therapy.

5.3 Principles of radiotherapy

- 5.3.a.1 the principles of radiobiology.
- 5.3.b.1 the principles of radiotherapy in relation to loco-regional treatment with a curative intent (e.g., primary therapy or adjuvant to the primary modality).
- 5.3.b.2 the principles of radiotherapy in relation to loco-regional treatment with a palliative intent.
- 5.3.c.1 the salient features of delivering radiation treatment using linear accelerators.
- 5.3.c.2 the salient features of delivering radiation treatment using brachytherapy.
- 5.3.c.3 the use of treatment simulators in relation to radiotherapy.
- 5.3.c.4 the role of bunkers in relation to radiotherapy.
- 5.3.c.5 the role of treatment planning departments in radiotherapy
- 5.3.d.1 the general features of brachytherapy treatment.
- 5.3.d.2 the different isotopes used in brachytherapy treatment.
- 5.3.d.3 the variety of techniques of brachytherapy treatment in various anatomic sites (most prominently for ca cervix and ca prostate).
- 5.3.e.1 recognise the clinical indications for radiotherapy.
- 5.3.f.1 the efficacy of radiotherapy outcomes.

- 5.3.f.2 the short-term side effects of radiotherapy.
- 5.3.f.3 the long-term side effects of radiotherapy.
- 5.3.f.4 costs of radiotherapy.
- 5.3.f.5 the outcomes of radiotherapy in relation to quality of life.
- 5.3.g.1 the common complications of radiotherapy.
- 5.3.g.2 the management of common complications of radiotherapy.
- 5.3.h.1 the integration of radiotherapy with surgical treatment.
- 5.3.h.2 the integration of radiotherapy with systemic treatment.
- 5.3.i.1 the access problems associated with radiotherapy.
- 5.3.i.2 the access problems associated with radiotherapy may affect patient choice.

5.4 Principles of systemic therapy

- 5.4.a.1 the principles of chemotherapy.
- 5.4.a.2 the principles of hormone therapy.
- 5.4.a.3 the principles of immunotherapy biological therapies (including immunomodulators, signal transduction inhibitors and monoclonal antibodies).
- 5.4.a.4 the principles of gene therapy.
- 5.4.b.1 clinical indications for use of systemic therapy in early disease.
- 5.4.b.2 clinical indications for use of systemic therapy in advanced disease.
- 5.4.c.1 the efficacy of systemic therapy outcomes.
- 5.4.c.2 the short-term side effects of systemic therapy.

- 5.4.c.3 the long-term side effects of systemic therapy.
- 5.4.c.4 costs of systemic therapy.
- 5.4.c.5 the outcomes of systemic therapy in relation to quality of life.
- 5.4.d.1 the importance of the patient in the decision making processes.
- 5.4.d.2 the influences that affect patient choices in the decision making process.
- 5.4.e.1 the common complications of systemic therapy.
- 5.4.e.2 the management of common complications of systemic therapy.
- 5.4.f.1 ability to manage toxicities and adverse reactions to systemic therapy e.g. emesis, febrile neutropenia.

5.5 Principles of Palliative care

- 5.5.a.1 the integration of systemic therapy with other modalities.
- 5.5.b.1 the role and structure of palliative care in the multidisciplinary management of advanced cancer.
- 5.5.b.2 the role and structure of supportive care in the multidisciplinary management of advanced cancer.
- 5.5.c.1 considerations of when palliative care should be introduced.
- 5.5.c.2 considerations of how palliative care should be introduced.
- 5.5.e.1 principles of pharmacological pain relief.
- 5.5.e.2 principles of non-pharmacological pain relief.
- 5.5.e.3 principles of the palliative management of other symptoms.
- 5.5.f.1 "end of life issues" that confront the patient in relation to the Physical effects of advanced cancer.

- 5.5.f.2 "end of life issues" that confront the patient in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement.
- 5.5.f.3 "end of life issues" that confront the patient in relation to ethical aspects of "end of life" decision-making.
- 5.5.f.4 "end of life issues" that confront the family in relation to the Physical effects of advanced cancer.
- 5.5.f.5 "end of life issues" that confront the family in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement.
- 5.5.f.6 "end of life issues" that confront the family in relation to ethical aspects of "end of life" decision-making.
- 5.5.f.7 "end of life issues" that confront the physician in relation to the Physical effects of advanced cancer.
- 5.5.f.8 "end of life issues" that confront the physician in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement.
- 5.5.f.9 "end of life issues" that confront the physician in relation to ethical aspects of "end of life" decision-making.
- 5.5.g.1 understanding of the Palliative Care Act(s).
- 5.5.j.1 understanding of utility of procedures to relieve symptoms eg. ascitic and pleural taps.

5.6 Follow-up and relapse

- 5.6.a.1 the aims of follow-up in relation to recognition and management of local recurrence.

- 5.6.a.2 the aims of follow-up in relation to recognition and management of distant recurrence.
- 5.6.a.3 the aims of follow-up in relation to complications of treatment.
- 5.6.a.4 the aims of follow-up including in relation to the detection of new primaries.
- 5.6.b.1 manifestations of recurrence of common cancers.
- 5.6.c.1 the aim of management of recurrences.
- 5.6.c.2 the treatments used in the management of recurrences.
- 5.6.c.3 the outcomes for management of recurrences.
- 5.6.d.1 the psychosocial impact of expected recurrences.
- 5.6.d.2 the psychosocial impact of unexpected recurrences.
- 5.6.e.1 the limitations of follow-up itself.
- 5.6.e.2 the cost effectiveness of follow-up itself.
- 5.6.f.1 recurrence patterns of common cancers.

6. Communication Skills

6.1 Psychological and cultural significance of cancer

- 6.1.a.1 cultural factors influencing presentation for screening.
- 6.1.a.2 psychosocial factors influencing presentation for screening.
- 6.1.b.1 cultural factors influencing presentation for diagnosis.
- 6.1.b.10 the psychosocial impact of cancer treatment on the patient's family and how they adjust in the long-term.
- 6.1.b.2 psychosocial factors influencing presentation for diagnosis.

- 6.1.b.3 the psychosocial impact of cancer diagnosis on the patient and how they adjust in the short-term.
- 6.1.b.4 the psychosocial impact of cancer diagnosis on the patient and how they adjust in the long-term.
- 6.1.b.5 the psychosocial impact of cancer treatment on the patient and how they adjust in the short-term.
- 6.1.b.6 the psychosocial impact of cancer treatment on the patient and how they adjust in the long-term.
- 6.1.b.7 the psychosocial impact of cancer diagnosis on the patient's family and how they adjust in the short-term.
- 6.1.b.8 the psychosocial impact of cancer diagnosis on the patient's family and how they adjust in the long-term.
- 6.1.b.9 the psychosocial impact of cancer treatment on the patient's family and how they adjust in the short-term.
- 6.1.c.1 the economic impact of cancer on the patient.
- 6.1.c.2 the economic impact of cancer on the patient's family.
- 6.1.d.1 the impact of cancer on sexuality.
- 6.1.d.2 the impact of cancer on fertility.
- 6.1.e.1 significant cultural differences in the population that frame the challenge of breaking of bad news effectively.
- 6.1.e.2 significant religious differences in the population that frame the challenge of breaking of bad news effectively.
- 6.1.f.1 resources offering appropriate patient support information.
- 6.1.f.2 resources offering reliable patient support information.

- 6.1.h.1 significant cultural differences within the society.
- 6.1.h.2 significant spiritual (rather than religious) differences within the society.

6.2 Communication and counselling

- 6.2.b.1 the impact of receiving bad news interferes with patients' ability to comprehend fully the important information being presented to them.
- 6.2.d.1 how to explain the risks and benefits of options for management to the patient, so that active participation in the management process is encouraged.
- 6.2.d.2 how to explain the risks and benefits of options for management to the patient's significant others, so that active participation in the management process is encouraged.

6.3 Education of patients

- 6.3.a.1 the principles of educating patients to be actively involved in their care.
- 6.3.b.1 resources available to patients and the public (eg. Cancer Councils, cancer support groups, books, brochures, internet, Medline, search engines, clinical alerts, databases, chat lines, commercial helpdesks, media, family, friends etc.).
- 6.3.b.2 the limitations of resources available to patients and the public (i.e.. peer reviewed journals vs. popular press).
- 6.3.c.1 the doctor's role in patient education about self-examination.
- 6.3.c.2 the doctor's role in patient education about worrying signs.
- 6.3.f.1 the benefits to ongoing patient care that result from utilising a multidisciplinary team including health professionals and others.
- 6.3.f.2 the benefits to ongoing patient education that result from utilising a multidisciplinary team including health professionals and others.

6.4 Family and community

- 6.4.a.1 the role of psychosocial supports available for patients.
- 6.4.a.2 the role of physical supports available for patients.
- 6.4.a.3 the role of financial supports available for patients.
- 6.4.a.4 the role of information supports available for patients.
- 6.4.a.5 the role of psychosocial supports available for the patient's family.
- 6.4.a.6 the role of physical supports available for the patient's family.
- 6.4.a.7 the role of financial supports available for the patient's family.
- 6.4.a.8 the role of information supports available for the patient's family.
- 6.4.b.1 available information resources.
- 6.4.b.2 available community resources.
- 6.4.b.3 available financial resources.
- 6.4.b.4 additional available physical supports.
- 6.4.c.1 the means by which doctors can facilitate the provision of these services.
- 6.4.d.1 the impact on the family of a shift to home care.

7. Ethics

7.1 Ethics and personal development

- 7.1.a.1 the effects on health professionals of caring for patients with cancer.
- 7.1.a.2 ways in which the stresses of caring for cancer patients can be managed appropriately.
- 7.1.b.1 the bioethics of issues such as access, equity and resource allocation.

- 7.1.b.2 the bioethics of medical care at the end of life.
- 7.1.c.1 the key medico-legal issues in diagnosis.
- 7.1.c.10 the key medico-legal issues in euthanasia.
- 7.1.c.2 the key medico-legal issues in screening/early detection.
- 7.1.c.3 the key medico-legal issues in management.
- 7.1.c.4 the key medico-legal issues in evidence-based guidelines.
- 7.1.c.5 the key medico-legal issues in defensive medicine.
- 7.1.c.6 the key medico-legal issues in commutative justice.
- 7.1.c.7 the key medico-legal issues in distributive justice.
- 7.1.c.8 the key medico-legal issues in social justice.
- 7.1.c.9 the key medico-legal issues in physician-assisted suicide.
- 7.1.d.1 the principles of informed consent in patient decision making.
- 7.1.d.2 the role of informed consent in patient decision making.
- 7.1.d.3 the elements of informed consent in patient decision making.

Appendix 20: SPSS output for discipline by items excluded Chi-square tests

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 1351 | 100.0% | 0 | 0.0% | 1351 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| Discipline | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Radiation Oncology | 48 | 253 | 301 |
| | Surgical Oncology | 44 | 156 | 200 |
| | Haematology | 8 | 192 | 200 |
| | Palliative Care | 30 | 270 | 300 |

| | | | |
|------------------|-----|------|------|
| General Practice | 6 | 44 | 50 |
| Total | 203 | 1148 | 1351 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2- sided) |
|------------------------------|---------------------|----|--|
| Pearson Chi-Square | 45.702 ^a | 5 | .000 |
| Likelihood Ratio | 50.884 | 5 | .000 |
| Linear-by-Linear Association | 24.965 | 1 | .000 |
| N of Valid Cases | 1351 | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.51.

DATASET ACTIVATE DataSet1.

USE ALL.

COMPUTE filter_\$=(Disc = 1 or Disc = 2).

VARIABLE LABELS filter_\$ 'Disc = 1 or Disc = 2 (FILTER)'.
'

VALUE LABELS filter_\$ 0 'Not Selected' 1 'Selected'.
'

FORMATS filter_\$ (f1.0).

FILTER BY filter_\$.

EXECUTE.

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 601 | 100.0% | 0 | 0.0% | 601 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Radiation Oncology | 48 | 253 | 301 |
| Total | | 115 | 486 | 601 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 3.961 ^a | 1 | .047 | | |
| Continuity Correction ^b | 3.559 | 1 | .059 | | |
| Likelihood Ratio | 3.975 | 1 | .046 | | |
| Fisher's Exact Test | | | | .049 | .029 |
| Linear-by-Linear Association | 3.954 | 1 | .047 | | |
| N of Valid Cases | 601 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 57.40.

b. Computed only for a 2x2 table

COMPUTE filter_\$(Disc = 1 or Disc = 3).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 500 | 100.0% | 0 | 0.0% | 500 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | |
|------------|-------------------|----------|---------|-------|
| | | Exclude | Include | Total |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Surgical Oncology | 44 | 156 | 200 |
| Total | | 111 | 389 | 500 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|-------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | .008 ^a | 1 | .930 | | |
| Continuity Correction ^b | .000 | 1 | 1.000 | | |
| Likelihood Ratio | .008 | 1 | .930 | | |
| Fisher's Exact Test | | | | 1.000 | .510 |
| Linear-by-Linear Association | .008 | 1 | .930 | | |
| N of Valid Cases | 500 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 44.40.

b. Computed only for a 2x2 table

COMPUTE filter_\$(= (Disc = 1 or Disc = 4)).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 500 | 100.0% | 0 | 0.0% | 500 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Haematology | 8 | 192 | 200 |
| Total | | 75 | 425 | 500 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|---------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 31.634 ^a | 1 | .000 | | |
| Continuity Correction ^b | 30.212 | 1 | .000 | | |
| Likelihood Ratio | 36.875 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 31.571 | 1 | .000 | | |
| N of Valid Cases | 500 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 30.00.

b. Computed only for a 2x2 table

COMPUTE filter_\$(Disc = 1 or Disc = 5).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 600 | 100.0% | 0 | 0.0% | 600 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | Palliative Care | 30 | 270 | 300 |
| Total | | 97 | 503 | 600 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|---------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 16.835 ^a | 1 | .000 | | |
| Continuity Correction ^b | 15.937 | 1 | .000 | | |
| Likelihood Ratio | 17.201 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 16.807 | 1 | .000 | | |
| N of Valid Cases | 600 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 48.50.

b. Computed only for a 2x2 table

COMPUTE filter_\$=(Disc = 1 or Disc = 6).

COMPUTE filter_\$=(Disc = 1 or Disc = 6).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 350 | 100.0% | 0 | 0.0% | 350 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | |
|------------|------------------|----------|---------|-------|
| | | Exclude | Include | Total |
| Discipline | Medical Oncology | 67 | 233 | 300 |
| | General Practice | 6 | 44 | 50 |
| Total | | 73 | 277 | 350 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 2.772 ^a | 1 | .096 | | |
| Continuity Correction ^b | 2.182 | 1 | .140 | | |
| Likelihood Ratio | 3.091 | 1 | .079 | | |
| Fisher's Exact Test | | | | .131 | .065 |
| Linear-by-Linear Association | 2.764 | 1 | .096 | | |
| N of Valid Cases | 350 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.43.

b. Computed only for a 2x2 table

COMPUTE filter_\$(= (Disc = 2 or Disc = 3)).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 501 | 100.0% | 0 | 0.0% | 501 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Radiation Oncology | 48 | 253 | 301 |
| | Surgical Oncology | 44 | 156 | 200 |
| Total | | 92 | 409 | 501 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 2.937 ^a | 1 | .087 | | |
| Continuity Correction ^b | 2.547 | 1 | .111 | | |
| Likelihood Ratio | 2.898 | 1 | .089 | | |
| Fisher's Exact Test | | | | .099 | .056 |
| Linear-by-Linear Association | 2.931 | 1 | .087 | | |
| N of Valid Cases | 501 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.73.

b. Computed only for a 2x2 table

COMPUTE filter_\$=(Disc = 2 or Disc = 4).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 501 | 100.0% | 0 | 0.0% | 501 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Radiation Oncology | 48 | 253 | 301 |
| | Haematology | 8 | 192 | 200 |
| Total | | 56 | 445 | 501 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|---------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 17.274 ^a | 1 | .000 | | |
| Continuity Correction ^b | 16.092 | 1 | .000 | | |
| Likelihood Ratio | 19.586 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 17.240 | 1 | .000 | | |
| N of Valid Cases | 501 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.36.

b. Computed only for a 2x2 table

COMPUTE filter_\$(Disc = 2 or Disc = 5).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 601 | 100.0% | 0 | 0.0% | 601 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Radiation Oncology | 48 | 253 | 301 |
| | Palliative Care | 30 | 270 | 300 |
| Total | | 78 | 523 | 601 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 4.705 ^a | 1 | .030 | | |
| Continuity Correction ^b | 4.193 | 1 | .041 | | |
| Likelihood Ratio | 4.743 | 1 | .029 | | |
| Fisher's Exact Test | | | | .039 | .020 |
| Linear-by-Linear Association | 4.697 | 1 | .030 | | |
| N of Valid Cases | 601 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 38.94.

b. Computed only for a 2x2 table

COMPUTE filter_\$(= (Disc = 2 or Disc = 6)).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 351 | 100.0% | 0 | 0.0% | 351 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|--------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Radiation Oncology | 48 | 253 | 301 |
| | General Practice | 6 | 44 | 50 |
| Total | | 54 | 297 | 351 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|-------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | .513 ^a | 1 | .474 | | |
| Continuity Correction ^b | .255 | 1 | .614 | | |
| Likelihood Ratio | .542 | 1 | .461 | | |
| Fisher's Exact Test | | | | .672 | .317 |
| Linear-by-Linear Association | .512 | 1 | .474 | | |
| N of Valid Cases | 351 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.69.

b. Computed only for a 2x2 table

COMPUTE filter_\$(Disc = 3 or Disc = 4).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 400 | 100.0% | 0 | 0.0% | 400 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | |
|------------|-------------------|----------|---------|-------|
| | | Exclude | Include | Total |
| Discipline | Surgical Oncology | 44 | 156 | 200 |
| | Haematology | 8 | 192 | 200 |
| Total | | 52 | 348 | 400 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|---------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 28.647 ^a | 1 | .000 | | |
| Continuity Correction ^b | 27.078 | 1 | .000 | | |
| Likelihood Ratio | 31.169 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 28.576 | 1 | .000 | | |
| N of Valid Cases | 400 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.00.

b. Computed only for a 2x2 table

COMPUTE filter_\$(Disc = 3 or Disc = 5).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 500 | 100.0% | 0 | 0.0% | 500 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | |
|------------|-------------------|----------|---------|-------|
| | | Exclude | Include | Total |
| Discipline | Surgical Oncology | 44 | 156 | 200 |
| | Palliative Care | 30 | 270 | 300 |
| Total | | 74 | 426 | 500 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|---------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 13.704 ^a | 1 | .000 | | |
| Continuity Correction ^b | 12.769 | 1 | .000 | | |
| Likelihood Ratio | 13.411 | 1 | .000 | | |
| Fisher's Exact Test | | | | .000 | .000 |
| Linear-by-Linear Association | 13.676 | 1 | .000 | | |
| N of Valid Cases | 500 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.60.

b. Computed only for a 2x2 table

COMPUTE filter_\$(= (Disc = 3 or Disc = 6)).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 250 | 100.0% | 0 | 0.0% | 250 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|-------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Surgical Oncology | 44 | 156 | 200 |
| | General Practice | 6 | 44 | 50 |
| Total | | 50 | 200 | 250 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 2.500 ^a | 1 | .114 | | |
| Continuity Correction ^b | 1.914 | 1 | .167 | | |
| Likelihood Ratio | 2.746 | 1 | .098 | | |
| Fisher's Exact Test | | | | .165 | .079 |
| Linear-by-Linear Association | 2.490 | 1 | .115 | | |
| N of Valid Cases | 250 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.00.

b. Computed only for a 2x2 table

COMPUTE filter_\$=(Disc = 4 or Disc = 5).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 500 | 100.0% | 0 | 0.0% | 500 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|-----------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Haematology | 8 | 192 | 200 |
| | Palliative Care | 30 | 270 | 300 |
| Total | | 38 | 462 | 500 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 6.152 ^a | 1 | .013 | | |
| Continuity Correction ^b | 5.327 | 1 | .021 | | |
| Likelihood Ratio | 6.662 | 1 | .010 | | |
| Fisher's Exact Test | | | | .015 | .009 |
| Linear-by-Linear Association | 6.139 | 1 | .013 | | |
| N of Valid Cases | 500 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.20.

b. Computed only for a 2x2 table

COMPUTE filter_\$=(Disc = 4 or Disc = 6).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 250 | 100.0% | 0 | 0.0% | 250 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | |
|------------|------------------|----------|---------|-------|
| | | Exclude | Include | Total |
| Discipline | Haematology | 8 | 192 | 200 |
| | General Practice | 6 | 44 | 50 |
| Total | | 14 | 236 | 250 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|--------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | 4.843 ^a | 1 | .028 | | |
| Continuity Correction ^b | 3.448 | 1 | .063 | | |
| Likelihood Ratio | 4.038 | 1 | .044 | | |
| Fisher's Exact Test | | | | .039 | .039 |
| Linear-by-Linear Association | 4.823 | 1 | .028 | | |
| N of Valid Cases | 250 | | | | |

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.80.

b. Computed only for a 2x2 table

COMPUTE filter_\$(= (Disc = 5 or Disc = 6)).

CROSSTABS

/TABLES=Disc BY Exc

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT

/COUNT ROUND CELL.

Case Processing Summary

| | Cases | | | | | |
|-----------------------|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Discipline * Excluded | 350 | 100.0% | 0 | 0.0% | 350 | 100.0% |

Discipline * Excluded Crosstabulation

Count

| | | Excluded | | Total |
|------------|------------------|----------|---------|-------|
| | | Exclude | Include | |
| Discipline | Palliative Care | 30 | 270 | 300 |
| | General Practice | 6 | 44 | 50 |
| Total | | 36 | 314 | 350 |

Chi-Square Tests

| | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) |
|------------------------------------|-------------------|----|---|--------------------------|--------------------------|
| Pearson Chi-Square | .186 ^a | 1 | .666 | | |
| Continuity Correction ^b | .032 | 1 | .857 | | |
| Likelihood Ratio | .179 | 1 | .672 | | |
| Fisher's Exact Test | | | | .620 | .411 |
| Linear-by-Linear Association | .185 | 1 | .667 | | |
| N of Valid Cases | 350 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.14.

b. Computed only for a 2x2 table

Appendix 21: Spreadsheet containing participant rankings – phase one

Level of Understanding Required of Australian Medical Students: Individual Participant ratings, mode score and final rating

Key: MO = Medical Oncology; RO = Radiation Oncology; SO = Surgical Oncology; H = Haematology; PC = Palliative Care; M = Mode following survey (BM = bimodal); F = Final Rating following panel session

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 1 | 1.1.a.1 | the significance of cancer as a health problem in Australia. | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 2 | 1.1.a.2 | the significance of cancer as a health problem throughout the world. | 2 | 2 | . | 3 | 3 | . | BM | 2 |
| 3 | 1.2.a.1 | the epidemiological concepts of morbidity (incidence and prevalence) in relation to common cancers | 2 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 4 | 1.2.a.2 | the epidemiological concepts of mortality in relation to common cancers | 3 | 2 | 3 | . | 3 | . | 3 | 3 |
| 5 | 1.2.a.3 | the causative factors for common cancers | 2 | 2 | . | 2 | 1 | 2 | 2 | 2 |
| 6 | 1.2.a.4 | the epidemiological concepts of survival in relation to common cancers | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 1 | 1.2.b.1 | the role of statistical information, including surveillance and monitoring data. | 1 | 1 | 2 | . | 2 | . | BM | 2 |
| 2 | 1.2.b.2 | the medical practitioner's need to be able to access numerical information. | 3 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 1.2.c.1 | the purpose of cancer registries | 2 | 1 | 1 | 2 | 3 | . | BM | 1 |
| 4 | 1.2.d.1 | the genetic risk factors for various malignancies. | 2 | 2 | 2 | . | 2 | . | 2 | 2 |
| 5 | 1.2.d.2 | the non-genetic risk factors for various malignancies. | 2 | 3 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 1.2.e.1 | the most frequently diagnosed malignancies in Australia. | 2 | 2 | 3 | 3 | 3 | . | 3 | 3 |
| 1 | 1.2.e.2 | the most frequently diagnosed malignancies globally. | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 2 | 1.2.e.3 | the most common causes of cancer death in Australia. | 2 | 3 | . | 2 | 3 | . | BM | 3 |
| 3 | 1.2.e.4 | the most common causes of cancer death globally | 2 | 1 | 2 | 3 | 2 | . | 2 | 2 |
| 4 | 1.2.e.5 | in a general way how the most frequently diagnosed malignancies differ between Australia and different parts of the world. | 1 | 2 | 1 | . | 2 | . | BM | 1 |
| 5 | 1.2.e.6 | in a general way how the most common causes of cancer death differ between Australia and different parts of the world. | 2 | 1 | . | 2 | 1 | 2 | 2 | 1 |
| 6 | 1.2.f.1 | the differential rates of cancers in Indigenous Australians and the reasons behind them. | 1 | 1 | 1 | 2 | 2 | . | 1 | 1 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 1 | 1.2.f.2 | the differential rates of cancers in non-Indigenous Australians and the reasons behind them. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 2 | 1.2.f.3 | the outcome for differential rates of cancers in Indigenous Australians and the reasons behind them. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 1.2.f.4 | the outcome for differential rates of cancers and non-Indigenous Australians and the reasons behind them. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 4 | 1.2.g.1 | the differing outcomes of cancers, in general, in urban populations. | 2 | 2 | 2 | . | 3 | . | 2 | 1 |
| 5 | 1.2.g.2 | the differing outcomes of cancers, in general, in rural. | 1 | 1 | . | 2 | 2 | 2 | 2 | 1 |
| 6 | 1.2.g.3 | the reasons behind the differing outcomes of cancers between rural and urban populations. | 2 | 1 | 1 | 2 | 2 | . | 2 | 2 |
| 1 | 1.3.a.1 | methods for the primary prevention of cancer, including measures that employ a public health approach. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 2 | 1.3.a.2 | methods for the primary prevention of cancer, including measures depending on individuals and their doctors. | 3 | 2 | . | 3 | 3 | . | 3 | 3 |
| 3 | 1.3.a.3 | methods for the secondary prevention of cancer, including measures that employ a public health approach. | 2 | 2 | 2 | 1 | 2 | . | 2 | 2 |
| 4 | 1.3.a.4 | methods for the secondary prevention of cancer, including measures depending on individuals and their doctors. | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 5 | 1.3.b.1 | the methods of screening for cancer. | 2 | 3 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 1.3.b.2 | the methods of screening for pre-malignant conditions. | 2 | 2 | 3 | 3 | 3 | . | 3 | 2 |
| 1 | 1.3.c.1 | the scientific evidence for the utility of screening. | 1 | 1 | 2 | . | 2 | . | BM | 2 |
| 2 | 1.3.c.2 | the difference between population-based screening and surveillance of individuals. | 2 | 2 | . | 3 | 3 | . | BM | 2 |
| 3 | 1.3.c.3 | the cost-effectiveness issues related to screening. | 2 | 2 | 1 | 1 | 1 | . | 1 | 1 |
| 4 | 1.3.d.1 | environmental control approaches to the prevention of cancer. | 2 | 2 | 1 | . | 2 | . | 2 | 1 |
| 5 | 1.3.d.2 | behavioural approaches to the prevention of cancer. | 2 | 3 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 1.3.d.3 | chemical approaches to the prevention of cancer. | 1 | 1 | 1 | 2 | 1 | . | 1 | 1 |
| 1 | 1.3.d.4 | the psychosocial impact of screening on the patient. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 1.3.d.5 | the psychosocial impact of staging investigations on the patient. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 2.1.a.1 | the anatomical basis of cancer assessment such as vascular supply (eg. liver) in relation to oncology (eg. pelvis). | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 4 | 2.1.a.2 | the anatomical basis of cancer assessment such as lymphatic drainage patterns (eg. breast) in relation to oncology (eg. pelvis). | 3 | 2 | 3 | . | 2 | . | BM | 3 |
| 5 | 2.1.a.3 | the anatomical basis of cancer assessment such as the anatomical relationships of relevance to oncology (eg. pelvis). | 2 | 2 | . | 2 | 3 | 3 | 2 | 2 |
| 6 | 2.2.a.1 | the principles of handling of chemicals (by cells) in relation to drug metabolism. | 1 | 1 | 1 | 2 | 2 | . | 1 | 1 |
| 1 | 2.2.a.2 | the principles of handling of chemicals (by cells) in relation to handling of carcinogens. | 2 | 1 | 2 | . | 2 | . | 2 | 2 |
| 2 | 2.3.a.1 | the concept of carcinogenesis | 2 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 2.3.b.1 | for the common cancers, macroscopic findings, including pathological features from pre-malignant to malignant stages of cancer. | 3 | 3 | 1 | 2 | 2 | . | BM | 3 |
| 4 | 2.3.b.2 | for the common cancers, microscopic findings, including pathological features from pre-malignant to malignant stages of cancer. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 5 | 2.3.c.1 | patterns of spread of common cancers. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 2.3.c.2 | the role of molecular pathology. | 2 | 1 | 2 | 3 | 1 | . | BM | 2 |
| 1 | 2.3.d.1 | the purpose of molecular pathology. | 1 | 1 | 1 | . | 1 | . | 1 | 1 |
| 2 | 2.3.d.2 | the prognostic and/or predictive values of receptors in relation to molecular pathology. | 2 | 2 | . | 1 | 1 | . | BM | 1 |
| 3 | 2.3.d.3 | the prognostic and/or predictive values of other targets in relation to molecular pathology. | 2 | 3 | 1 | 2 | 1 | . | BM | 1 |
| 4 | 2.4.a.1 | the molecular genetics of cancer in relation to the role of protooncogenes. | 2 | 1 | 2 | . | 2 | . | 2 | 2 |
| 5 | 2.4.a.2 | the molecular genetics of cancer in relation to tumour suppressor genes. | 2 | 1 | . | 2 | 1 | 1 | 1 | 1 |
| 6 | 2.4.a.3 | the molecular genetics of cancer in relation to DNA and RNA viruses. | 1 | 1 | 2 | 2 | 1 | . | 1 | 1 |
| 1 | 2.4.a.4 | the molecular genetics of cancer in relation to controls of apoptosis. | 1 | 1 | 2 | . | 1 | . | 1 | 1 |
| 2 | 2.4.a.5 | the molecular genetics of cancer: role of protooncogenes in relation to angiogenesis. | 2 | 2 | . | 1 | 2 | . | 2 | 2 |
| 3 | 2.4.a.6 | the molecular genetics of cancer in relation to elements of molecular genetic techniques. | 2 | 2 | 1 | 2 | 1 | . | 2 | 2 |
| 4 | 2.4.b.1 | the molecular correlates of the pathological progression of cancer in a model system. | 1 | 1 | 2 | . | 2 | . | BM | 2 |
| 5 | 2.4.c.1 | hormonal influences relevant to tumour type. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 2.4.c.2 | hormonal influences relevant to prognosis. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 1 | 2.4.c.3 | tumour markers relevant to tumour type. | 3 | 2 | 3 | . | 3 | . | 3 | 3 |
| 2 | 2.4.c.4 | tumour markers relevant prognosis. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 2.4.d.1 | important familial cancer syndromes. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 4 | 2.4.d.2 | the molecular basis for important familial cancer syndromes. | 1 | 1 | 1 | . | 2 | . | 1 | 1 |
| 5 | 2.4.d.3 | the mode of inheritance for important familial cancer syndromes. | 2 | 1 | . | 2 | 2 | 2 | 2 | 1 |
| 6 | 2.4.d.4 | the associated risk of disease for important familial cancer syndromes. | 2 | 1 | 3 | 2 | 2 | . | 2 | 2 |
| 1 | 2.4.d.5 | the implications for family counselling for important familial cancer syndromes. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 3.1.a.1 | awareness of clinical practice guidelines, where available, for appropriate referral patterns. | 3 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 3.1.a.2 | the need for evidence based medicine. | 3 | 3 | 3 | 3 | 3 | . | 3 | 3 |
| 4 | 3.1.b.1 | effective means of communication to enhance the clinical management of patients with cancer. | 2 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 3.1.c.1 | the need to recognise psychological distress in the patient. | 2 | 3 | . | 2 | 3 | 3 | 3 | 3 |
| 6 | 3.1.c.2 | the need to address psychological distress in the patient. | 3 | 2 | 2 | 3 | 3 | . | 3 | 3 |
| 1 | 3.1.c.3 | the need to manage psychological distress in the patient. | 3 | 2 | 2 | . | 3 | . | BM | 2 |
| 2 | 3.1.d.1 | the importance of coordinated care in optimising overall management of patients. | 3 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 3.1.e.2 | that help from those with better specialist knowledge can be sought. | 3 | 2 | 3 | 3 | 3 | . | 3 | 3 |
| 4 | 3.1.h.1 | the integration of treatment modalities. | 2 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 3.1.i.3 | the distinction between unproven/experimental therapies and alternative therapies. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 3.1.j.1 | the range of medical health professionals involved in cancer care. | 3 | 3 | 3 | 2 | 3 | . | 3 | 3 |
| 1 | 3.1.j.2 | the range of non-medical health professionals involved in cancer care. | 1 | 2 | 2 | . | 3 | . | 2 | 2 |
| 2 | 3.1.k.1 | the effective use of a multidisciplinary management team. | 2 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 3.2.a.1 | how quality of life is assessed. | 3 | 3 | 2 | 3 | 3 | . | 3 | 3 |
| 4 | 3.2.b.1 | the balance of risks and benefits of treatment as a key consideration in making treatment decisions. | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 5 | 3.2.c.1 | the concepts of cost effectiveness. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 3.2.c.2 | the concepts of cost benefits. | 3 | 1 | 1 | 2 | 2 | . | BM | 2 |
| 1 | 3.2.c.3 | the concepts of opportunity costs. | 1 | 1 | 1 | . | 2 | . | 1 | 1 |
| 2 | 3.2.d.1 | the principles of measurement of quality of life. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 3.2.e.1 | the concept of therapeutic ratio. | 2 | 3 | 2 | 2 | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|----------|--|----|----|----|---|----|----|----|---|
| 4 | 3.2.f.1 | differentiate between unproven/experimental therapies. | 2 | 2 | 1 | . | 1 | . | BM | 2 |
| 5 | 3.2.f.2 | distinguish between unproven/experimental therapies and alternative therapies. | 2 | 2 | . | 3 | . | 1 | 2 | 2 |
| 6 | 3.2.f.3 | the effects of clinical decisions about treatment on the patient in terms of quality of life. | 2 | 1 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 3.2.f.4 | the effects of clinical decisions about treatment on the patient's family in terms of the patient's quality of life. | 3 | 2 | 3 | . | 3 | . | 3 | 3 |
| 2 | 3.2.f.5 | the effects of clinical decisions about treatment on the health care system in terms of the patient's quality of life. | 1 | 3 | . | 3 | 2 | . | 3 | 1 |
| 3 | 3.2.f.6 | the effects of clinical decisions about treatment on the patient's burden of disease. | 3 | 3 | 1 | 2 | 3 | . | 3 | 1 |
| 4 | 3.2.f.7 | the effects of clinical decisions about treatment on the patient's family on the patient's burden of disease broadly. | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 5 | 3.2.f.8 | the effects of clinical decisions about treatment on the health care system on the patient's burden of disease. | . | 1 | . | 2 | 2 | 2 | 2 | 1 |
| 6 | 3.2.f.9 | the effects of clinical decisions about treatment on the patient's disease process. | 3 | 1 | 3 | 3 | 2 | . | 3 | 3 |
| 1 | 3.2.f.10 | the effects of clinical decisions about treatment on the patient's family in relation to the patient's disease process. | 3 | 1 | 1 | . | 3 | . | BM | 1 |
| 2 | 3.2.f.11 | the effects of clinical decisions about treatment on the health care system in relation to the patient's disease process. | 1 | 2 | . | 2 | 2 | . | 2 | 1 |
| 3 | 3.2.f.12 | the effects of clinical decisions about treatment on the patient in relation to treatment costs. | 2 | 3 | 1 | 2 | 3 | . | BM | 3 |
| 4 | 3.2.f.13 | the effects of clinical decisions about treatment on the patient's family in relation to treatment costs. | 2 | 2 | 2 | . | 3 | . | 2 | 1 |
| 5 | 3.2.f.14 | the effects of clinical decisions about treatment on the health care system in relation to treatment costs. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 3.2.f.15 | the effects of clinical decisions about treatment on the patient in terms of the patient's location v treatment location. | 1 | 1 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 3.2.f.16 | the effects of clinical decisions about treatment on the patient's family in terms of the patient's location v treatment location. | 2 | 1 | 1 | . | 2 | . | BM | 1 |
| 2 | 3.2.f.17 | the effects of clinical decisions about treatment on the health care system in terms of the patient's location v treatment location. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 3 | 3.2.g.1 | incorporate measurements of quality of life in assessment of performance status. | 3 | 3 | 1 | 3 | 3 | . | 3 | 3 |
| 4 | 3.2.h.1 | an awareness of supportive care networks. | 2 | 3 | 2 | . | 2 | . | 2 | 3 |
| 5 | 3.3.a.1 | the importance of evidence based medical practice. | 3 | 2 | . | 3 | 3 | 3 | 3 | 3 |
| 6 | 3.3.b.1 | the need to be able to critically appraise evidence. | 3 | 3 | 3 | 3 | 3 | . | 3 | 3 |
| 1 | 3.3.g.1 | clinical trials. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 2 | 3.3.g.2 | the importance of clinical trials. | 2 | 2 | . | 3 | 3 | . | BM | 3 |
| 3 | 3.3.g.3 | the value of clinical trials to patients. | 3 | 3 | 2 | 2 | 3 | . | 3 | 3 |
| 4 | 3.3.h.1 | basic elements of clinical trials. | 2 | 2 | 2 | . | 3 | . | 2 | 3 |
| 5 | 3.3.h.2 | basic elements of cohort studies. | 2 | 1 | . | 2 | 1 | 2 | 2 | 1 |
| 6 | 3.3.h.3 | basic elements of case control studies. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 3.3.j.1 | the limits of evidence. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 3.3.j.2 | the broad application of evidence. | 2 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 3.3.j.3 | the advancement of evidence over time. | 2 | 3 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 3.3.k.1 | unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their claimed benefits in a critical manner. | 2 | 2 | 2 | . | 1 | . | 2 | 1 |
| 5 | 3.3.k.2 | unproven or alternative/complementary cancer therapies in a way that encourages patients to appraise their costs in a critical manner. | 1 | 2 | . | 3 | 2 | 2 | 2 | 1 |
| 6 | 4.1.a.1 | clinical manifestations of cancer, considering broad aspects of functional anatomy (vascular supply, lymphatic drainage, oncological anatomical relationships). | 3 | 2 | 3 | 3 | 2 | . | 3 | 2 |
| 1 | 4.1.a.2 | clinical manifestations of cancer, considering broad aspects of oncological pathophysiology. | 3 | 3 | 3 | . | 3 | . | 3 | 3 |
| 2 | 4.1.a.3 | clinical manifestations of cancer, considering broad aspects of pathology. | 2 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 4.1.b.1 | the components of the clinical examination of common cancers. | 3 | 3 | 2 | 3 | 3 | . | 3 | 3 |
| 4 | 4.1.d.1 | the results of clinical examination. | 3 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 4.2.a.1 | the wide range of potential presentations of cancer. | 2 | 3 | . | 3 | 3 | 3 | 3 | 3 |
| 6 | 4.2.a.2 | unusual presentations of cancer. | 1 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 1 | 4.2.d.1 | the differential diagnosis of common cancers based on specific oncological findings. | 3 | 3 | 3 | . | 2 | . | 3 | 3 |
| 2 | 4.2.f.1 | the histopathological classification of cancers, including the concept of TNM. | 2 | 3 | . | 3 | 2 | . | BM | 2 |
| 3 | 4.2.f.2 | the histopathological staging of cancers, including the concept of TNM. | 2 | 3 | 2 | 2 | 3 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 4 | 4.2.f.3 | the implications of histopathological staging for treatment. | 3 | 3 | 3 | . | 2 | . | 3 | 3 |
| 5 | 4.2.f.4 | the implications of histopathological staging on prognosis. | 2 | 2 | . | 2 | 3 | 3 | 2 | 3 |
| 6 | 4.2.g.1 | common complications of malignant disease, eg. superior vena cava obstruction, spinal cord compression, bone involvement. | 2 | 3 | 3 | 3 | 3 | . | 3 | 3 |
| 1 | 4.2.h.1 | cost effectiveness of investigations. | 1 | 2 | 1 | . | 2 | . | BM | 1 |
| 2 | 5.1.a.1 | the importance of the patient in the decision-making process. | 3 | 2 | . | 3 | 3 | . | 3 | 3 |
| 3 | 5.1.a.2 | the influences that affect the choices that patients make in the decision-making process. | 3 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.1.b.1 | the principles of treatment with intent to cure. | 3 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 5.1.b.2 | the principles of palliative treatment. | 3 | 3 | . | 3 | 3 | 3 | 3 | 3 |
| 6 | 5.1.c.1 | the role of multidisciplinary management of the patient. | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 1 | 5.1.d.1 | that tailoring of standard treatment protocols may be an appropriate component of patient focused care. | 2 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.1.e.1 | process and outcome measures including concepts of self audit to minimise deviation from best practice. | 2 | 2 | . | 3 | 3 | . | BM | 2 |
| 3 | 5.1.e.2 | process and outcome measures including quality assurance to minimise deviation from best practice. | 2 | 3 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.1.f.1 | how the treatment of malignancies by different modalities of treatment is guided by the natural history of the malignancy. | 3 | 3 | 3 | . | 2 | . | 3 | 3 |
| 5 | 5.1.f.2 | how the treatment of malignancies by different modalities of treatment is guided by the findings of staging evaluations. | 2 | 2 | . | 3 | 3 | 2 | 2 | 2 |
| 6 | 5.1.g.1 | the unique features of the management of cancer in children. | 1 | 1 | 1 | 2 | 2 | . | 1 | 1 |
| 1 | 5.1.g.2 | the unique features of the management of cancer in adolescents. | 2 | 1 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.1.g.3 | the unique features of the management of cancer in the elderly. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 5.1.h.1 | the management of potential complications of cancer treatments eg. febrile neutropenia, mucositis, radiation skin injury. | 2 | 3 | 2 | 3 | 3 | . | 3 | 3 |
| 4 | 5.1.i.1 | the management of common oncological emergencies eg. spinal cord compression, hypercalcaemia. | 3 | 3 | 3 | . | 3 | . | 3 | 3 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 5 | 5.1.j.1 | the recognition and basic management of oncology emergencies eg. compressive, obstructive, coagulation and metabolic syndromes. | 2 | 3 | . | 2 | 3 | 1 | BM | 3 |
| 6 | 5.2.a.1 | the aims of surgical treatment of cancers. | 2 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 5.2.a.2 | the general principles of common procedures. | 1 | 3 | 3 | . | 3 | . | 3 | 3 |
| 2 | 5.2.b.1 | the range of surgical options. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.2.b.2 | how surgical options are affected by the integration into multi-modality care. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 4 | 5.2.c.1 | the clinical indications for surgery of common cancers. | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 5 | 5.2.d.1 | the efficacy of outcomes of surgery. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 5.2.d.2 | the short-term side-effects of surgery. | 2 | 3 | 2 | 3 | 2 | . | 2 | 3 |
| 1 | 5.2.d.3 | the long-term side-effects of surgery. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.2.d.4 | the financial costs in relation to surgical outcomes. | 1 | 2 | . | 2 | 1 | . | BM | 2 |
| 3 | 5.2.d.5 | the outcomes of surgery in relation to quality of life. | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.2.e.1 | the general pre-operative factors that influence surgical decision making. | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 5 | 5.2.e.2 | the specific pre-operative factors that influence surgical decision making. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 5.2.f.1 | the effect surgery may have on body image. | 2 | 1 | 1 | 2 | 2 | . | 2 | 2 |
| 1 | 5.2.f.2 | the role of reconstructive surgery. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.2.g.1 | the common complications of cancer surgery. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.2.g.2 | the management common complications of cancer surgery. | 2 | 3 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.2.h.1 | pre-operative interactions with other modalities of therapy. | 2 | 3 | 2 | . | 2 | . | 2 | 2 |
| 5 | 5.2.h.2 | post-operative interactions with other modalities of therapy. | 2 | 1 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 5.3.a.1 | the principles of radiobiology. | 1 | 1 | 1 | 2 | 1 | . | 1 | 1 |
| 1 | 5.3.b.1 | the principles of radiotherapy in relation to loco-regional treatment with a curative intent (e.g., primary therapy or adjuvant to the primary modality). | 3 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.3.b.2 | the principles of radiotherapy in relation to loco-regional treatment with a palliative intent. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.3.c.1 | the salient features of delivering radiation treatment using linear accelerators. | 2 | 2 | 1 | 3 | 2 | . | 2 | 2 |
| 4 | 5.3.c.2 | the salient features of delivering radiation treatment using brachytherapy. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 5 | 5.3.c.3 | the use of treatment simulators in relation to radiotherapy. | 1 | 1 | . | 2 | 2 | 1 | 1 | 1 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 6 | 5.3.c.4 | the role of bunkers in relation to radiotherapy. | 1 | 1 | 1 | 2 | 1 | . | 1 | 1 |
| 1 | 5.3.c.5 | the role of treatment planning departments in radiotherapy | 1 | 1 | 1 | . | 1 | . | 1 | 1 |
| 2 | 5.3.d.1 | the general features of brachytherapy treatment. | 2 | 2 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.3.d.2 | the different isotopes used in brachytherapy treatment. | 1 | 2 | 1 | 1 | 1 | . | 1 | 1 |
| 4 | 5.3.d.3 | the variety of techniques of brachytherapy treatment in various anatomic sites (most prominently for ca cervix and ca prostate). | 1 | 2 | 2 | . | 1 | . | BM | 1 |
| 5 | 5.3.e.1 | recognise the clinical indications for radiotherapy. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 5.3.f.1 | the efficacy of radiotherapy outcomes. | 2 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 5.3.f.2 | the short-term side effects of radiotherapy. | 3 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.3.f.3 | the long-term side effects of radiotherapy. | 2 | 2 | . | 2 | 3 | . | 2 | 2 |
| 3 | 5.3.f.4 | costs of radiotherapy. | 1 | 2 | 1 | 1 | 2 | . | 1 | 1 |
| 4 | 5.3.f.5 | the outcomes of radiotherapy in relation to quality of life. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 5 | 5.3.g.1 | the common complications of radiotherapy. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 5.3.g.2 | the management of common complications of radiotherapy. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 5.3.h.1 | the integration of radiotherapy with surgical treatment. | 3 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.3.h.2 | the integration of radiotherapy with systemic treatment. | 2 | 3 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.3.i.1 | the access problems associated with radiotherapy. | 2 | 2 | 1 | 2 | 3 | . | 2 | 2 |
| 4 | 5.3.i.2 | the access problems associated with radiotherapy may affect patient choice. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 5 | 5.4.a.1 | the principles of chemotherapy. | 2 | 2 | . | 3 | 3 | 2 | 2 | 2 |
| 6 | 5.4.a.2 | the principles of hormone therapy. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 5.4.a.3 | the principles of immunotherapy biological therapies (including immunomodulators, signal transduction inhibitors and monoclonal antibodies). | 2 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.4.a.4 | the principles of gene therapy. | 1 | 2 | . | 2 | 1 | . | BM | 1 |
| 3 | 5.4.b.1 | clinical indications for use of systemic therapy in early disease. | 3 | 3 | 2 | 2 | 3 | . | 3 | 3 |
| 4 | 5.4.b.2 | clinical indications for use of systemic therapy in advanced disease. | 2 | 2 | 3 | . | 3 | . | BM | 2 |
| 5 | 5.4.c.1 | the efficacy of systemic therapy outcomes. | 2 | 2 | . | 3 | 2 | 2 | 2 | 2 |
| 6 | 5.4.c.2 | the short-term side effects of systemic therapy. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 5.4.c.3 | the long-term side effects of systemic therapy. | 3 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.4.c.4 | costs of systemic therapy. | 1 | 2 | . | 2 | 1 | . | BM | 1 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 3 | 5.4.c.5 | the outcomes of systemic therapy in relation to quality of life. | 3 | 3 | 2 | 2 | 3 | . | 3 | 3 |
| 4 | 5.4.d.1 | the importance of the patient in the decision making processes. | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 5 | 5.4.d.2 | the influences that affect patient choices in the decision making process. | 2 | 1 | . | 2 | 3 | 3 | BM | 3 |
| 6 | 5.4.e.1 | the common complications of systemic therapy. | 2 | 2 | 3 | 3 | 2 | . | 2 | 3 |
| 1 | 5.4.e.2 | the management of common complications of systemic therapy. | 3 | 3 | 3 | . | 3 | . | 3 | 3 |
| 2 | 5.4.f.1 | ability to manage toxicities and adverse reactions to systemic therapy e.g. emesis, febrile neutropenia. | 3 | 2 | . | 3 | 3 | . | 3 | 3 |
| 4 | 5.5.b.1 | the role of palliative care in the multidisciplinary management of advanced cancer. | 2 | 2 | 3 | . | 2 | . | 2 | 3 |
| 5 | 5.5.b.2 | the role and structure of supportive care in the multidisciplinary management of advanced cancer. | 2 | 2 | . | 3 | 3 | 2 | 2 | 2 |
| 6 | 5.5.c.1 | considerations of when palliative care should be introduced. | 2 | 2 | 2 | 3 | 3 | . | 2 | 3 |
| 1 | 5.5.c.2 | considerations of how palliative care should be introduced. | 2 | 3 | 3 | . | 3 | . | 3 | 3 |
| 2 | 5.5.e.1 | principles of pharmacological pain relief. | 3 | 3 | . | 3 | 3 | . | 3 | 3 |
| 3 | 5.5.e.2 | principles of non-pharmacological pain relief. | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.5.e.3 | principles of the palliative management of other symptoms. | 2 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 5.5.f.1 | "end of life issues" that confront the patient in relation to the Physical effects of advanced cancer. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 5.5.f.2 | "end of life issues" that confront the patient in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 5.5.f.3 | "end of life issues" that confront the patient in relation to ethical aspects of "end of life" decision-making. | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 2 | 5.5.f.4 | "end of life issues" that confront the family in relation to the Physical effects of advanced cancer. | 3 | 2 | . | 3 | 3 | . | 3 | 3 |
| 3 | 5.5.f.5 | "end of life issues" that confront the family in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement. | 3 | 2 | 3 | 3 | 3 | . | 3 | 3 |
| 4 | 5.5.f.6 | "end of life issues" that confront the family in relation to ethical aspects of "end of life" decision-making. | 2 | 3 | 3 | . | 3 | . | 3 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 5 | 5.5.f.7 | "end of life issues" that confront the physician in relation to the Physical effects of advanced cancer. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 5.5.f.8 | "end of life issues" that confront the physician in relation to Psychosocial aspects of terminal cancer, support (religious, cultural, spiritual, existential), loss and bereavement. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 5.5.f.9 | "end of life issues" that confront the physician in relation to ethical aspects of "end of life" decision-making. | 3 | 2 | 2 | . | 3 | . | BM | 2 |
| 2 | 5.5.g.1 | understanding of the Palliative Care Act(s). | 1 | 2 | . | 3 | 1 | . | 1 | 1 |
| 3 | 5.5.j.1 | understanding of utility of procedures to relieve symptoms eg. ascitic and pleural taps. | 2 | 3 | 2 | 3 | 3 | . | 3 | 3 |
| 4 | 5.6.a.1 | the aims of follow-up in relation to recognition and management of local recurrence. Broad aims | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 5 | 5.6.a.2 | the aims of follow-up in relation to recognition and management of distant recurrence. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 5.6.a.3 | the aims of follow-up in relation to complications of treatment. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |
| 1 | 5.6.a.4 | the aims of follow-up including in relation to the detection of new primaries. | 1 | 3 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.6.b.1 | manifestations of recurrence of common cancers. | 2 | 3 | . | 3 | 2 | . | BM | 3 |
| 3 | 5.6.c.1 | the aim of management of recurrences. | 2 | 3 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 5.6.c.2 | the treatments used in the management of recurrences. Broad | 2 | 3 | 3 | . | 2 | . | BM | 2 |
| 5 | 5.6.c.3 | the outcomes for management of recurrences. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 5.6.d.1 | the psychosocial impact of expected recurrences. | 1 | 1 | 1 | 2 | 2 | . | 1 | 1 |
| 1 | 5.6.d.2 | the psychosocial impact of unexpected recurrences. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 5.6.e.1 | the limitations of follow-up itself. | 2 | 3 | . | 2 | 2 | . | 2 | 2 |
| 3 | 5.6.e.2 | the cost effectiveness of follow-up itself. | 2 | 2 | 1 | 1 | 3 | . | BM | 1 |
| 4 | 5.6.f.1 | recurrence patterns of common cancers. | 2 | 3 | 3 | . | 3 | . | 3 | 3 |
| 5 | 6.1.a.1 | cultural factors influencing presentation for screening. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 6.1.a.2 | psychosocial factors influencing presentation for screening. | 2 | 1 | 1 | 2 | 1 | . | 1 | 1 |
| 1 | 6.1.a.3 | cultural factors influencing presentation for diagnosis. | 2 | 2 | 2 | . | 1 | . | 2 | 2 |
| 3 | 6.1.a.4 | psychosocial factors influencing presentation for diagnosis. | 3 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 6.1.b.1 | the psychosocial impact of cancer diagnosis on the patient and how they adjust in the short-term. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|---|----|----|----|---|----|----|----|---|
| 5 | 6.1.b.2 | the psychosocial impact of cancer diagnosis on the patient and how they adjust in the long-term. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 6.1.b.3 | the psychosocial impact of cancer treatment on the patient and how they adjust in the short-term. | 2 | 1 | 1 | 2 | 2 | . | 2 | 2 |
| 1 | 6.1.b.4 | the psychosocial impact of cancer treatment on the patient and how they adjust in the long-term. | 2 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 6.1.b.5 | the psychosocial impact of cancer diagnosis on the patient's family and how they adjust in the short-term. | 2 | 2 | . | 3 | 3 | . | BM | 3 |
| 3 | 6.1.b.6 | the psychosocial impact of cancer diagnosis on the patient's family and how they adjust in the long-term. | 3 | 2 | 2 | 3 | 3 | . | 3 | 3 |
| 4 | 6.1.b.7 | the psychosocial impact of cancer treatment on the patient's family and how they adjust in the short-term. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 2 | 6.1.b.8 | the psychosocial impact of cancer treatment on the patient's family and how they adjust in the long-term. | 2 | 2 | . | 3 | 3 | . | BM | 3 |
| 5 | 6.1.c.1 | the economic impact of cancer on the patient. | 2 | 2 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 6.1.c.2 | the economic impact of cancer on the patient's family. | 1 | 1 | 1 | 2 | 2 | . | 1 | 1 |
| 1 | 6.1.d.1 | the impact of cancer on sexuality. | 2 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 6.1.d.2 | the impact of cancer on fertility. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 6.1.e.1 | significant cultural differences in the population that frame the challenge of breaking of bad news effectively. | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 6.1.e.2 | significant religious differences in the population that frame the challenge of breaking of bad news effectively. | 2 | 2 | 3 | . | 2 | . | 2 | 2 |
| 5 | 6.1.f.1 | resources offering appropriate patient support information. | 2 | 3 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 6.1.f.2 | resources offering reliable patient support information. | 3 | 2 | 1 | 2 | 2 | . | 2 | 2 |
| 1 | 6.1.h.1 | significant cultural differences within the society. | 1 | 1 | 2 | . | 2 | . | BM | 2 |
| 2 | 6.1.h.2 | significant spiritual (rather than religious) differences within the society. | 1 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 6.2.b.1 | the impact of receiving bad news interferes with patients' ability to comprehend fully the important information being presented to them. | 2 | 2 | 2 | 3 | 3 | . | 2 | 2 |
| 4 | 6.2.d.1 | how to explain the risks and benefits of options for management to the patient, so that active participation in the management process is encouraged. Importance of | 2 | 2 | 3 | . | 3 | . | BM | 3 |
| 5 | 6.2.d.2 | consequences of sharing information with the patient and family. | 2 | 1 | . | 3 | 2 | 2 | 2 | 2 |
| 6 | 6.3.a.1 | the principles of educating patients to be actively involved in their care. | 2 | 2 | 2 | 3 | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|---------|--|----|----|----|---|----|----|----|---|
| 1 | 6.3.b.1 | resources available to patients and the public (eg. Cancer Councils, cancer support groups, books, brochures, internet, Medline, search engines, clinical alerts, databases, chat lines, commercial helpdesks, media, family, friends etc.). | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 6.3.b.2 | the limitations of resources available to patients and the public (i.e.. peer reviewed journals vs. popular press). | 1 | 2 | . | 3 | 3 | . | 3 | 3 |
| 3 | 6.3.c.1 | the doctor's role in patient education about self-examination. | 3 | 2 | 1 | 2 | 3 | . | BM | 2 |
| 4 | 6.3.c.2 | the doctor's role in patient education about worrying signs. | 1 | 2 | 3 | . | 3 | . | 3 | 3 |
| 5 | 6.3.f.1 | the benefits to ongoing patient care that result from utilising a multidisciplinary team including health professionals and others. | 2 | 3 | . | 3 | 2 | 2 | 2 | 2 |
| 6 | 6.3.f.2 | the benefits to ongoing patient education that result from utilising a multidisciplinary team including health professionals and others. | 1 | 2 | 1 | 2 | 3 | . | BM | 1 |
| 1 | 6.4.a.1 | the role of psychosocial supports available for patients. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 6.4.a.2 | the role of physical supports available for patients. | 2 | 2 | . | 3 | 3 | . | BM | 2 |
| 3 | 6.4.a.3 | the role of financial supports available for patients. | 2 | 2 | 2 | 2 | 3 | . | 2 | 2 |
| 4 | 6.4.a.4 | the role of information supports available for patients. | 1 | 2 | 3 | . | 2 | . | 2 | 3 |
| 5 | 6.4.a.5 | the role of psychosocial supports available for the patient's family. | 2 | 3 | . | 2 | 2 | 2 | 2 | 2 |
| 6 | 6.4.a.6 | the role of physical supports available for the patient's family. | 3 | 2 | 3 | 2 | 2 | . | 2 | 2 |
| 1 | 6.4.a.7 | the role of financial supports available for the patient's family. | 1 | 2 | 1 | . | 2 | . | BM | 1 |
| 2 | 6.4.a.8 | the role of information supports available for the patient's family. | 2 | 2 | . | 3 | 3 | . | BM | 2 |
| 3 | 6.4.b.1 | available information resources. | 3 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 4 | 6.4.b.2 | available community resources. | 2 | 3 | 3 | . | 2 | . | BM | 3 |
| 5 | 6.4.b.3 | available financial resources. | 2 | 2 | . | 2 | 1 | 2 | 2 | 1 |
| 6 | 6.4.b.4 | additional available physical supports at home. | 1 | 2 | 2 | 2 | 1 | . | 2 | 2 |
| 1 | 6.4.c.1 | the means by which doctors can facilitate the provision of these services. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 2 | 6.4.d.1 | the impact on the family of a shift to home care. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 7.1.a.1 | the effects on health professionals of caring for patients with cancer. | 3 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 4 | 7.1.a.2 | ways in which the stresses of caring for cancer patients can be managed appropriately. | 1 | 3 | 2 | . | 2 | . | 2 | 2 |

| Group | ID | Objective | MO | RO | SO | H | PC | GP | M | F |
|-------|----------|---|----|----|----|---|----|----|----|---|
| 5 | 7.1.b.1 | the bioethics of issues such as access, equity and resource allocation. | 2 | 1 | . | 2 | 1 | 1 | 1 | 1 |
| 6 | 7.1.b.2 | the bioethics of medical care at the end of life. | 2 | 2 | 1 | 2 | 2 | . | 2 | 2 |
| 1 | 7.1.c.1 | the key medico-legal issues in diagnosis. | 1 | 2 | 2 | . | 2 | . | 2 | 2 |
| 3 | 7.1.c.2 | the key medico-legal issues in screening/early detection. | 2 | 3 | 1 | 1 | 2 | . | BM | 1 |
| 4 | 7.1.c.3 | awareness of medico-legal issues in management. | 1 | 2 | 3 | . | 2 | . | 2 | 3 |
| 5 | 7.1.c.4 | the key medico-legal issues in evidence-based guidelines. | 2 | 1 | . | 2 | 2 | 1 | 2 | 1 |
| 6 | 7.1.c.5 | the key medico-legal issues in defensive medicine. | 1 | 2 | 2 | 2 | 2 | . | 2 | 2 |
| 1 | 7.1.c.6 | the key medico-legal issues in commutative justice. | 1 | 1 | 2 | . | 1 | . | 1 | 1 |
| 2 | 7.1.c.7 | the key medico-legal issues in distributive justice. | 2 | 2 | . | 3 | 2 | . | 2 | 2 |
| 3 | 7.1.c.8 | the key medico-legal issues in social justice. | 2 | 2 | 1 | 2 | 2 | . | 2 | 2 |
| 4 | 7.1.c.9 | awareness of medico-legal issues in physician-assisted suicide. | 1 | 2 | 1 | . | 2 | . | BM | 2 |
| 2 | 7.1.c.10 | the key medico-legal issues in euthanasia. | 1 | 2 | . | 3 | 2 | . | 2 | 2 |
| 5 | 7.1.d.1 | the principles of informed consent in patient decision making. | 2 | 2 | . | 2 | 3 | 2 | 2 | 2 |
| 6 | 7.1.d.2 | the role of informed consent in patient decision making. | 3 | 3 | 3 | 3 | 3 | . | 3 | 3 |
| 1 | 7.1.d.3 | the elements of informed consent in patient decision making. | 2 | 2 | 3 | . | 3 | . | BM | 3 |

Appendix 22: Objectives from the IOC that were not included in the review process

Public Health

Objective 1.3: Prevention, screening and family risk

- f) Demonstrate ability to take family history.

Patient Management

Objective 3.1: Patient management including referral and multidisciplinary management

- e) Recognise their own clinical limitations and understand that help from those with better specialist knowledge can be sought.
- f) Demonstrate an ability to seek help at an appropriate level of urgency, using appropriate methods of communication, from appropriate sources.
- g) Demonstrate an attitude of accepting responsibility for ensuring continuity of care for patients over the long-term, and at all hours.

Objective 3.3: Uncertainty and information management

- c) Appraise information from patients and other subjective sources critically, and record in a way that allows the information to be retrieved and communicated effectively for optimal management.
- d) Critically appraise the available information guiding the management of common cancers and be able to distinguish different levels of evidence.
- e) Locate published high quality evidence and guidelines for practitioners and patients using electronic literature searches, both locally and from overseas.
- f) Adapt and apply information to the management of individual cases and to the formulation of management options in the absence of definitive information (tolerating uncertainty).

g) Demonstrate an understanding of clinical trials and their importance; explain their value to patients and encourage patients to participate in trials.

i) Appraise studies of treatment, prevention, diagnosis, prognosis, causation and harm, systematic reviews, clinical practice guidelines and cost-effectiveness studies.

Diagnosis

Objective 4.1: Clinical examination

c) Demonstrate effective clinical examination relevant to common cancers.

Objective 4.2: The diagnostic process

b) Take history and conduct a physical examination, tailoring the latter to natural history and patterns of spread of common cancers.

c) Assess performance status.

Treatment

Objective 5.4: Principles of systemic therapy

d) Demonstrate ability to assess response to systemic therapy both clinically and radiologically.

Objective 5.5: Principles of palliative care

d) Demonstrate the assessment of pain and other symptoms, including nausea, fatigue, confusion, drowsiness and cachexia.

h) Demonstrate appreciation of cultural aspects of end of life care.

i) Demonstrate adequate communication skills, including breaking bad news and discussion of end of life care.

Communication Skills

Objective 6.1: Psychosocial and cultural significance of cancer

g) Demonstrate ability to assess the psychosocial state.

Objective 6.2: Communication and counselling

a) Illustrate an ability to communicate the bad news of a diagnosis of cancer to a patient, their family and “significant others” in a sensitive manner, addressing concerns, fears and expectations, while making sure a realistic prognosis is explained and ensuring that appropriate confidentiality is observed.

b) Be aware that the impact of receiving bad news interferes with patients’ ability to comprehend fully the important information being presented to them. Illustrate the ability to assess a patient’s realistic understanding of their situation and to individually tailor verbal and written information provided according to patient preferences and understanding.^{cc}

c) Provide supportive counselling for the patient and carers, both personally and by referral to expert help.

e) Facilitate informed consent for participation in clinical trials.

Objective 6.3: Education of patients

d) Promote preventive medicine and appropriate early detection practices and encourage patients to educate others about these aspects.

e) Develop a partnership approach to cancer care and information acquisition (e.g., willingness to learn from all sources including patients).

g) Demonstrate ability to provide patient education relating to general effects of cancer treatment (symptom management and recognition of symptoms that require medical review).

Ethics

^{cc} Only the second part of this objective was excluded from the review process, as it relates to a skill. The first part was reviewed and is presented in Chapter 4.

Appendix 23: Survey version of the Framework



CANCER EDUCATION FRAMEWORK FOR AUSTRALIAN MEDICAL SCHOOLS

Framework

Abstract

This framework draws upon national and international cancer curricula to identify the essential cancer-related learning outcomes for Australian medical students. The framework incorporates feedback from medical, radiation and surgical oncologists, hematologists and palliative care physicians on what medical graduates need to know about cancer – a basic understanding of the principles of cancer management. The framework assumes that certain knowledge, skills and attitudes are already covered in Australian medical schools, presenting instead only the core cancer content to provide a clear and concise framework designed to maximize integration into existing curricula.

Darren Starmer

Cancer Education Framework for Australian Medical Schools

Framework

This Framework has been created for the use of Australian Medical Schools.

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Darren Starmer

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The University of Notre Dame, Australia

First Edition September 2020

The framework has been developed as a result of intensive consultation with medical practitioners and education consultants in Australia, in review of the:

Oncology Education Committee. Ideal Oncology Curriculum for Medical Schools [Electronic document]. Sydney: The Cancer Council Australia; 2007 [Available from: https://wiki.cancer.org.au/oncologyformedicalstudents/Ideal_Oncology_Curriculum]

The images used in the graphics contained within the framework are royalty free stock images sourced from Pixabay. <https://pixabay.com/service/license/>

Introduction

This framework has been designed to assist medical schools to incorporate important components of cancer education into an existing medical curriculum. The framework aims to provide a minimal set of clinical experiences and learning outcomes, which if resourced, will provide Australian medical students with a basic understanding of the knowledge and principles underpinning current cancer management.

Background

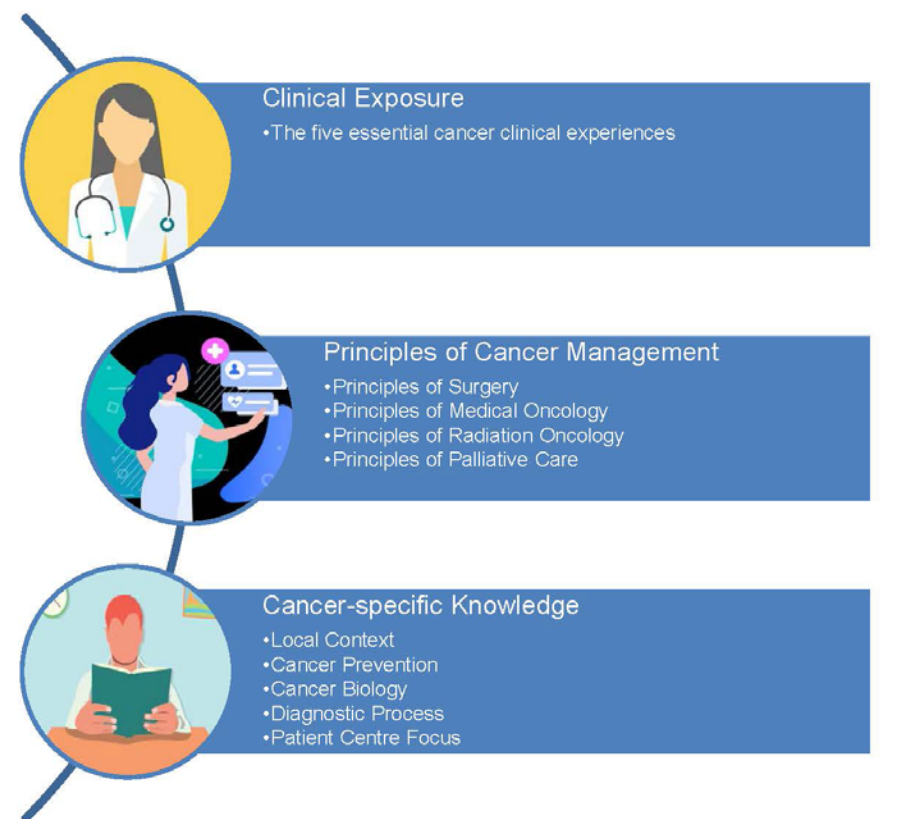
The impact of cancer on the Australian population and health care system cannot be overstated. Currently, half of all Australians will be diagnosed with a cancer by the age of 85 (1, 2). Whilst cancer is the leading cause of death in Australia, more than two-thirds of patients are alive five years after their diagnosis (3). Consequentially, there are more Australians living with cancer, placing an incredible demand on the health system (4). Several studies have shown that Australian medical students are ill-prepared to care for cancer patients upon graduation (5-8). Additionally, medical students and junior doctors themselves have highlighted shortcomings in their own cancer education (8-12). The lack of a national medical curriculum results in individual medical schools with considerable diversity in teaching and clinical exposure (5, 13). As such, no minimum requirements for cancer education exist in Australia. At a national level, an ideal oncology curriculum (14, 15) and a palliative care curriculum have been developed (16). To date, it is unclear as to the level of uptake of either curriculum within Australian medical schools (8, 10). There remains a lack of consensus on what content to include in a cancer curriculum (17, 18) and how best to deliver such a curriculum (19). In panel sessions conducted with Australian cancer clinicians reviewing the Ideal Oncology Curriculum for Medical Schools (15), it was agreed that medical students require a fundamental understanding of the principles of cancer management, coupled with exposure to cancer patients in cancer service units, in order to observe this in the clinical setting. Similarly, there was agreement that medical students do not require specialist knowledge, such as drug or radiotherapy dosages. When reviewing the literature, these themes are evident (20-25).

Proposed Framework

The acquisition of the basic principles of cancer management has provided the basis for the development of the Cancer Education Framework for Australian Medical Schools. Once the salient points of management were identified, the necessary knowledge required

to underpin this were identified and incorporated into the framework. Knowledge that would be expected in all medical schools in Australia (such as the cell cycle, concepts of incidence and mortality and evidence-based practice) have not been included in the framework. The rationale here is to keep the framework as simple as possible to optimise its utility and adoption into Australian medical curricula. The learning objectives presented in the framework are by no means exhaustive and provide a minimal blueprint from which to build a basic cancer curriculum within an existing medical school curriculum. The blueprint draws heavily from the Cancer Council Australia's Ideal Oncology Curriculum for Medical Schools (15), and the aforementioned review by cancer clinicians. Other curricula used in the development of this framework include the Palliative Care Curriculum for Undergraduates (16) and the International Summer School 'Oncology for Medical Students' curriculum (25).

The framework is comprised of three sections: one focusing on clinical exposure to cancer patients and clinical cancer service units, whilst the other two focus on the principles of cancer management and cancer-specific knowledge.





Clinical Exposure

The five essential cancer clinical experiences

A cancer curriculum should include clinical placements that provide medical students with the five clinical cancer experiences, as outlined in the Cancer Council Australia's Ideal Oncology Curriculum for Medical Schools (15, p.45):

- Talking with and examining people affected by all stages of cancer
- Talking with and examining people affected by all common cancers
- Observing all components of multidisciplinary cancer care
- Seeing shared decision-making between people with cancer and their doctors
- Talking with and examining dying people

Exposure to cancer service units

It is recommended that clinical exposure be provided, where possible, through placements in cancer service units, including medical and radiation oncology, and palliative care.



Principles of Cancer Management

General Principles of Cancer Management

Upon graduation, students should be able to:

- Discuss the difference between treatment approaches with curative and palliative intent
- Outline the principles of multidisciplinary management
- Discuss how tumour and patient factors influence the way in which patients are managed
- Describe the role of neo-adjuvant and adjuvant therapy
- Outline the roles of locoregional and systemic therapy
- Outline organ-sparing approaches
- List common oncological emergencies and outline how these are managed
- Discuss the principles of symptom control
- Discuss the role of clinical practice guidelines
- Discuss the role of clinical trials

Principles of Surgery

Upon graduation, students should be able to:

- Outline the aim of cancer surgery
- Describe the importance of adequate surgical margins
- Discuss general preoperative factors
- Identify common complications of cancer surgery and how these can be managed
- Discuss the risks of tumour spill
- Describe the role of surgery in staging

Principles of Radiation Oncology

Upon graduation, students should be able to:

- Outline the aim of radiotherapy
- Discuss indications for radiotherapy
- Describe the cellular response to radiotherapy
- Identify the various methods used to deliver radiotherapy
- Discuss why radiotherapy is delivered using fractionated doses
- Identify common side effects of radiotherapy and how they are managed

Principles of Medical Oncology

Upon graduation, students should be able to:

- Outline the role of medical oncology
- Discuss indications for systemic therapies
- Describe the method of action of systemic agents (i.e. chemotherapy, targeted and hormonal therapies and immunotherapies)
- Identify common side effects of systemic therapy and how they are managed

Principles of Palliative Care

Upon graduation, students should be able to:

- Outline the role of palliative care
- Discuss common end of life issues
- Discuss the provision of palliative care in various settings
- Discuss the role of other modalities in the palliative setting
- Identify commonly used procedures to relieve symptoms
- Outline the role of the GP in providing palliative care



Cancer-specific Knowledge

Local context

Upon graduation, students should be able to:

- Identify the most commonly occurring cancers in men and women in Australia
- Identify the leading causes of cancer death in men and women in Australia
- Outline the differences in cancer outcomes between Indigenous and non-Indigenous Australians
- Outline the differences in cancer outcomes between urban and rural Australians

Cancer prevention

Upon graduation, students should be able to:

- Describe methods of primary and secondary prevention
- Differentiate between population-based screening and surveillance
- Discuss the scientific evidence to support population-based methods of screening for cancer
- Identify risk factors for common cancers

Cancer biology

Upon graduation, students should be able to:

- Outline the concept of carcinogenesis
- Describe dysplasia, carcinoma in situ, invasive cancer
- Describe tumour types
- Identify important familial cancer syndromes
- Discuss hormonal influences and tumour markers for common cancers
- Describe patterns of spread of common cancers
- Describe recurrence patterns of common cancers

Diagnostic process

Upon graduation, students should be able to:

- Outline the necessity of a histopathological diagnosis
- Discuss staging and grading of tumours
- Describe the prognostic implications of differentiation
- Identify potential cancer presentations
- Describe the physical signs of cancer
- Discuss commonly used diagnostic investigations

Patient-centred care

Upon graduation, students should be able to:

- Discuss the importance of involving patients in the decision making process
- Identify factors that influence patient choices
- Outline the impact of bad news on the patient's ability to process information
- Discuss the psychological impact of screening and diagnostic tests
- Consider the patient's own social context and how a cancer diagnosis will affect the patient, their family and carers
- Discuss the role of cancer support groups
- Identify reliable and accurate sources of information for patients

Resources

There are a number of resources that can be used to underpin the learning objectives presented in the framework, which relate to cancer-specific knowledge and the principles of cancer management. In many instances, medical schools will already have suitable resources, or will wish to create their own. Some schools may wish to incorporate external resources or simply provide the framework to students as an extracurricular learning opportunity. Given that the five essential cancer clinical experiences represent experiential learning, these will require resourcing by the school. To assist schools and students in addressing the learning outcomes comprising the knowledge components of the framework, some suggested resources are included below.

It should be noted that none of these resources are exactly matched to the learning outcomes in the framework. In many cases, they cover content at a greater depth than required, or extend beyond the scope of the framework. However, these resources provide a good starting point and are freely available on the Internet, making them accessible to all Schools and students.

Ideal Oncology Curriculum for Medical Schools (IOC) was published by Cancer Council Australia and used as the basis for the development of this Cancer Education Framework for Australian Medical Schools:

https://wiki.cancer.org.au/oncologyformedicalstudents/Ideal_Oncology_Curriculum

Clinical Oncology for Medical Students, is an e-book produced by Cancer Council Australia as a resource to support the IOC:

https://wiki.cancer.org.au/oncologyformedicalstudents/Clinical_Oncology_for_Medical_Students

Palliative Care Curriculum for Undergraduates (PCC4U) is a joint collaboration between Queensland University of Technology, the Queensland Government, Flinders University and Curtin University of Technology, with funding provided by the Australian Government Department of Health. The PCC4U curriculum provides a number of resources including several online modules:

<https://pcc4u.org.au/learning/modules-landing/>

Oncology for Medical Students is one of several YouTube channels covering cancer-related topics. This channel has 26 videos that cover many of the basic principles outlined in the framework:

<https://www.youtube.com/channel/UC4o5maOsEr7erAVgZGDKsJg>

Cancer Concepts: A Guidebook for the Non-oncologist as an e-book produced by the University of Massachusetts Medical School. Relevant chapters can be downloaded and contain multimedia and questions.

https://escholarship.umassmed.edu/cancer_concepts/

Learn Oncology is a Canadian web-based resource developed to underpin the Canadian Oncology Goals and Objectives for Medical Students, which was written by the Canadian Oncology Education Group. The web site contains learning modules, videos, virtual patients and quizzes.

<https://www.learnoncology.ca/>

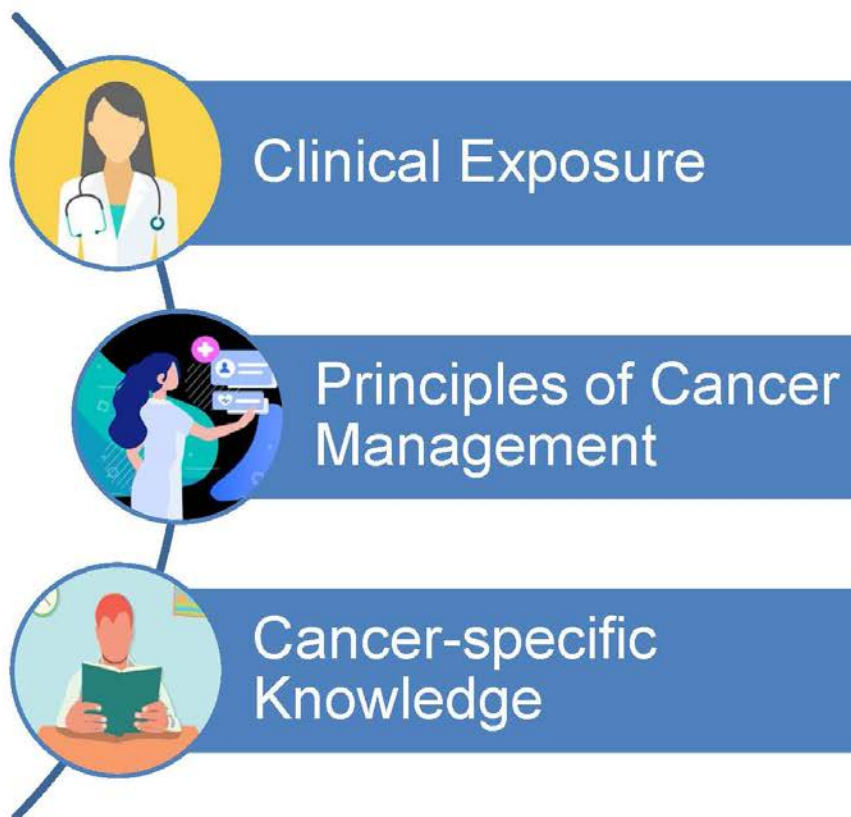
References

1. Cancer Australia. Cancer in Australia statistics Sydney: Cancer Australia; 2019 [Available from: <https://canceraustralia.gov.au/affected-cancer/what-cancer/cancer-australia-statistics>].
2. Australian institute of Health and Welfare. Australia's health 2018. Canberra: AIHW; 2018. Contract No.: AUS 221.
3. Arnold M, Rutherford MJ, Bardot A, Ferlay J, Andersson TML, Myklebust TÅ, et al. Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-based study. *The Lancet Oncology*. 2019;20(11):1493-505.
4. Australian Institute of Health and Welfare. Health system expenditure on cancer and other neoplasms in Australia: 2008–09. Canberra: AIHW; 2013.
5. Barton MB, Tattersall MH, Butow PN, Crossing S, Jamrozik K, Jalaludin B, et al. Cancer knowledge and skills of interns in Australia and New Zealand in 2001: comparison with 1990, and between course types. *The Medical Journal of Australia*. 2003;178(6):285-9.
6. Starmer DL, Barton MB. Advances in cancer management: at what cost to medical student education? *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2009;24(3):233-7.
7. Smith WT, Tattersall MH, Irwig L, Langlands AO. Undergraduate education about cancer. *European Journal of Cancer*. 1991;27(11):1448-53.
8. Starmer DL, House CL, Langworthy KM. Student Exposure to Cancer Patients: an Analysis of Clinical Logbooks and Focus Groups in Clinical Year Medical Students. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2019;35(4):760-5.
9. Bravery B. Cancer survivor and medical student urges better oncology education for doctors: ABC; 2017 [Available from: <http://www.abc.net.au/news/health/2017-03-04/changing-oncology-education-for-the-better/8323380>].
10. Georgiou G. The changing face of cancer in Australian medical schools. *Aust Med Stud J*. 2017;8(1):53-6.
11. Langworthy K. A Junior Doctor's Perspective on Oncology and Palliative Medicine Education in Western Australia: Comparison Between Graduation and Completion of Internship. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2019.
12. McRae RJ. Oncology Education in Medical Schools: Towards an Approach that Reflects Australia's Health Care Needs. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2016;31(4):621-5.
13. Starmer DL, Chapman E, Millward MJ. Applying global frameworks to assessment in medical education: an example of a nationally produced curriculum for cancer

- education. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2010;25(3):285-9.
14. Oncology Education Committee. *Ideal Oncology Curriculum for Medical Schools*. Sydney: The Cancer Council Australia; 1999.
 15. Oncology Education Committee. *Ideal Oncology Curriculum for Medical Schools* [Electronic document]. Sydney: The Cancer Council Australia; 2007 [Available from: https://wiki.cancer.org.au/oncologyformedicalstudents/Ideal_Oncology_Curriculum].
 16. Palliative Care Curriculum for Undergraduates (PCC4U) Project Team, editor. *PCC4U Implementation Guide*. Brisbane: QUT; 2014.
 17. Cancer Council Australia and the Clinical Oncological Society of Australia. *Submission to the Department of Education, Science and Training study of medical education in Australia*. 2006.
 18. Koczwara B, Barton MB, Olver IN, Tattersall MH, Turner DR, Starmer DL. How not to effect change in curricula [letter]. *Med J Aust*. 2006;185(1):52.
 19. Gaffan J, Dacre J, Jones A. Educating Undergraduate Medical Students About Oncology: A Literature Review. *Journal of Clinical Oncology*. 2006;24:1932-9.
 20. Barton MB, Bell P, Sabesan S, Koczwara B. What should doctors know about cancer? Undergraduate medical education from a societal perspective. *The Lancet Oncology*. 2006;7:596-601.
 21. de Vries J. Essentials in Cancer Education. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 1999;14(4):198-202.
 22. Haagedoorn EM, de Vries J, Robinson E. The UICC/WHO-CCCE Cancer Education project: a different approach. *Journal of cancer education : the official journal of the American Association for Cancer Education*. 2000;15(4):204-8.
 23. Haagedoorn EM, Oldhoff J, Bender W, Clarke WD, Sleijfer DT. *Essential Oncology for Health Professionals*. Assen: Van Gorcum & Comp; 1994. 405 p.
 24. Junqueira AC. Medical student cancer education: experience from projects in Sao Paulo, Brazil, and in other parts of Latin America. *Journal of Surgical Oncology*. 2001;77(1):1-4.
 25. WHO Collaborating Centre for Cancer Education, Groningen University Faculty of Medical Sciences. *8th International Summer School 'Oncology for Medical Students' Groningen, The Netherlands, 18-28 July 2006*. 2006.



CANCER EDUCATION FRAMEWORK FOR AUSTRALIAN MEDICAL SCHOOLS



Appendix 24: Email feedback from a survey participant (clinical haematologist)

From: [REDACTED]

Sent: Monday, 7 December 2020 16:15

To: Darren Starmer [REDACTED]

Subject: Re: Cancer Education Survey

Hello Darren,

Lovely to hear from you and good on you for doing this work. This has become a rather difficult area to teach, because (1) so much cancer care is now ambulatory; (2) the rapidly increasing emphasis upon molecular and genomic information for diagnosis and treatment; (3) the rather in-house and arcane world of MDTs, which are invariably busy, spoken in a language of abbreviations and may neglect the voice of the patient and the wishes of the patients (at a non-patient face to face MDT);¹ and most recently of course, impact of CV19. A lot of our advanced trainees in rad onc and med onc and haematology are struggling with all the mountains of molecular information now required to understand cancer classification and (thankfully increasingly) cancer treatment. The undergraduate (or post grad) medical degree needs to include sufficient molecular biology to understand genomic diagnosis, PCR monitoring of minimal residual disease, and some training on the differences between overall survival, progression-free survival, time to next treatment and Kaplan-Meier survival curves (in my view). Medical graduates have little understanding of flow cytometry but perhaps this is more FRACP level.

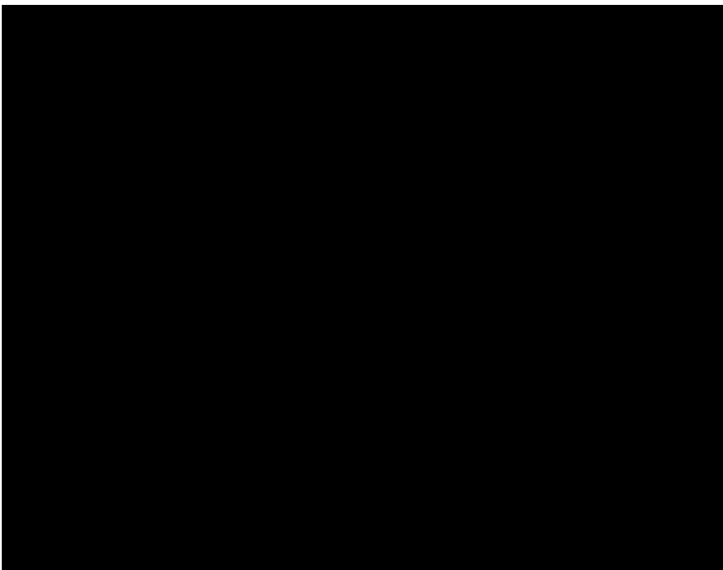
The survey is good if brief and could go back to asking questions that elicit how close to the proposed framework the respondent's experience has been. So maybe questions on the five moments more specifically, exposure to palliative care principles and pain management. WRT to the framework, again my bias perhaps but there must be some content pertaining to what good survivorship means and how it is practised; survivorship care is coming to Australia and will be vital that GPs understand these concepts involved. I can provide more info ... there will have to be some content on Patient Reported Outcomes as this is the next big thing in various national forums to be rolled out as standard of care in cancer medicine.

(eg COSA, National Blood Cancers Task Force). I can direct you to some reviews.

Chemotherapy and the Golde hypothesis for cycles of chemo and why we do it; more on immunotherapy (some basics on antibody based therapies and on PD1 checkpoint inhibitors; molecular concepts such as acquired mutations drivers of clonal cell populations and clinical evolution; synthetic lethality of combination therapies; and now perhaps some very very basic intro to CAR T cells but again this may be more FRACP level. And going back to basics, something on social determinants of (ill) health and how these promote many cancers.

I am sorry these are rather disorganised first reactions, but pass these ideas by some others and see what feedback you get perhaps?

Happy to talk further.



Please note that the identity of this participant has been redacted to ensure anonymity, as per the participant information sheet and conditions of participation in phase three of this research.