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Knowledge translation intervention to improve evidence-based practice behaviour of allied health professionals: A cluster randomised controlled trial and 2-year follow-up study

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CHAPTER 2

LITERATURE REVIEW

Overview

This chapter reviews the published literature and has six components:

- 1) Definition of EBP and KT
- 2) Summary of the theories and models underpinning EBP behaviour change
- 3) Consideration of the barriers to EBP use
- 4) Summary of the effectiveness of KT strategies to change behaviour
- 5) Ways to measure EBP behaviour
- 6) Rationale for the research.

There were a number of systematic reviews available related to knowledge translation and as a result, this chapter provides a broad overview of the available literature, rather than being a systematic review itself.

Evidence-based practice

The term 'evidence-based practice' is more commonly used than 'evidence-based medicine' (EBM) in the allied health professions. EBP has its roots in EBM, and the terms are often used interchangeably.^{18,19} This section will therefore begin with a definition and history of EBM however, the term EBP will be used from the Section *EBP in the allied health professions* onwards.

Definition of evidence-based medicine

Evidence-based medicine is the "conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual clients. The practice of EBM means integrating individual clinical expertise with the best available external clinical evidence from systematic research".²⁰

Figure 1 illustrates the integration of clinical expertise, client values and the best evidence into the decision-making process for client care.

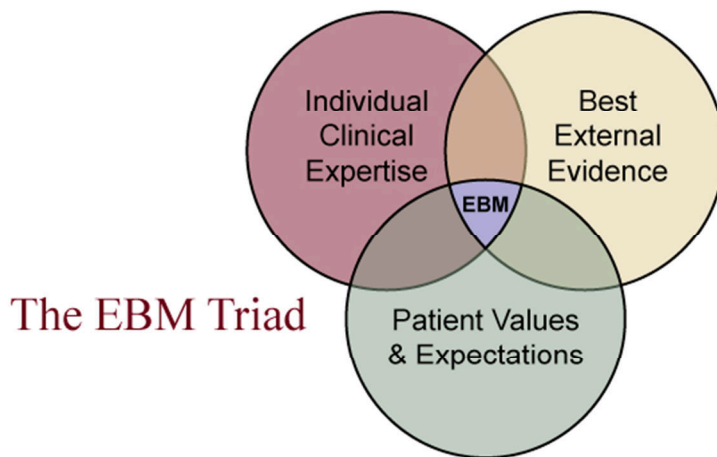


Figure 1: The evidence-based medicine triad

Source: Florida State University, College of Medicine.

<<http://med.fsu.edu/index.cfm?page=medicalinformatics.ebmTutorial>> Retrieved 10.12.11

History of evidence-based medicine

The philosophy of EBM dates back to the 19th century; however, Gordon Guyatt first used the term 'evidence-based medicine' in 1992 for the JAMA user guides.^{10,21} These guides were designed to integrate research findings into bedside clinical decision-making. Inclusion of research papers in discussing client care was integrated into the ward round system at McMaster teaching hospitals in the early 1990s.¹⁰ By the late 1990s information technology had improved and Sackett and Straus²² described the usefulness of an "evidence cart" used on ward rounds at John Radcliffe Hospital in Oxford. It is now almost 20 years on and EBM has become accepted as best practice with few practitioners debating the need to base clinical decisions on the best available evidence.^{13,23-25} In some ways, the focus has changed from whether research should be included in clinical decision-making to the ways that this can best occur. At a fundamental level EBM has changed the way in which health professionals approach clinical questions and has changed the landscape of our health care system.

“Perhaps one of the most important contributions of EBM has been to drive us from ‘do this do that’ medicine to the justification of ‘why to do this or that’ ”.²⁶

Why use EBM?

There is little doubt that EBM has become the new paradigm in health care, as Sackett et al.²⁰ suggested it would. Although there is widespread support of EBM in the Australian health-care system, there are researchers and health professionals who maintain that our health-care system should not rely on the principles of EBM.²⁷ The need to use EBM in our health-care setting is however driven by compelling medical ethics. First, there is an ethical obligation to do no harm by providing clients with treatment options that research suggests will be most likely to work.²⁸ Second, with increasing demands on our health-care system, policy makers need to ensure that funding is allocated to effective treatments that have a strong evidence base, and that funds are not directed to those that have been proven to be ineffective.^{2,29-32} Physicians, nursing staff, AHPs, managers and policy makers ethically must therefore embrace EBM.³³

EBP in the allied health professions

The term ‘evidence-based practice’ was coined to accommodate the wide range of services that AHPs provide (apart from medical interventions). Considering its origins in hospital-based medicine, there has been ongoing discussion in the literature about how the allied health professions can appropriately apply the principles of EBP to their professions.³³⁻³⁶ Some authors question whether the conceptual and philosophical framework is suitable for the allied health professions, however most AHPs are supportive of the underlying principles.^{34,37-39} The way in which each professional group interprets and applies EBP varies greatly.^{10,25} This is due in part to the fact that each profession has unique EBP implementation challenges. For example, Reilly⁴⁰ noted that in speech pathology literature, there are few RCTs – the gold standard for measuring effectiveness. This is particularly

true in sub-specialties where the client groups are often heterogeneous and case series design is often a more realistic methodology even though it is considered a lower level of evidence.^{36,39} Reilly⁴⁰ argued that rather than being a reason not to engage with EBP, it is simply a challenge to researchers (to produce the highest quality evidence possible), clinicians (to access the highest quality evidence and use valid outcome measures) and professional bodies (to educate and create clinical guidelines).

The research–practice gap

The implementation of research findings into practice are often haphazard and delayed.^{1,37,41,42} This problem is referred to as the research-to-practice gap⁴³ or the gap between “what is known” and “what is currently done”.² For example, two areas of medicine where the research–practice gap has been quantified are hypertension management and respiratory care. Each year, 68,000 deaths from hypertension in the USA have been deemed preventable.⁴⁴ Furthermore, people with hypertension only received 64.7% of the optimal care recommended by national and hospital guidelines. Mularski et al.⁴⁴ examined the medical records of 260 asthma clients and 169 clients with obstructive lung disease. Alarming, asthma clients received only 53.5% of recommended care, and clients with obstructive lung disease only 58% of recommended care when the quality of care provided was compared to national evidence-based guidelines.

The research–practice gap is worldwide. Widespread variation exists in the use of non-steroidal anti-inflammatory drugs in Europe, the United States and Canada,⁴⁵ despite clear, consistent guidelines regarding their best use.^{46,47} The research–practice gap also exists in allied health such as speech pathology,^{15,40,48} physiotherapy^{9,42,49} and occupational therapy.⁵⁰

The need to redress the research–practice gap has given rise to a growing body of research focusing on the processes of how to move research findings

into clinical care as quickly, accurately and sustainably as possible. This new research field is most commonly known as knowledge translation.

Knowledge translation

As strategies to narrow the research–practice gap have evolved and changed, so too has the terminology used to describe this field.⁵¹ In Europe the terms implementation science and research utilisation have been used, whereas in the United States knowledge transfer, dissemination and uptake have been more commonly used. The term knowledge translation originated in Canada and is now more widely used. The Canadian Institutes of Health Research (the federal agency that funds health research) described KT as “a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve Canadians’ health, provide more effective health services and products, and strengthen the health care system”.³ KT ultimately aims to improve client outcomes via smoothing the transition of EBP into clinical practice. This process is achieved by strategies such as continuing medical education, organisational change and guideline implementation.⁴⁶

The term knowledge translation will be used from this point forward to describe a range of activities, including research utilisation, innovation diffusion, knowledge transfer, research implementation, research uptake and evidence-based decision-making.^{51,52} The term also suggests a dynamic, two-way process as opposed to a top-down, one-way process.^{46,52}

Theories and models underpinning knowledge translation

KT theories are grounded in theories of behaviour change.⁴³ The theoretical underpinnings of KT are important as they can assist to test, modify and inform whether change is possible, and highlight the complexities of attempting to induce change. Literature suggests that theoretical

perspectives should be carefully considered prior to developing an educational intervention as different theoretical assumptions lead to different intervention strategies.⁵³ Theoretical models and approaches are often selected from potentially biased beliefs about human behaviour and change.⁵⁴ A systematic approach to considering underlying theoretical assumptions can reduce this bias and generate testable hypotheses.

However, authors rarely document the role of theory underpinning their KT strategies,⁵⁵ making it difficult for others to replicate successful strategies and build evidence supporting or refuting the effectiveness of strategies aligned with a given theory. KT theories and models draw on theories in other areas such as public health,⁵⁶ organisational change,⁵⁷ business⁵⁸ and mental health.⁵⁹ The body of theoretical literature regarding KT is extensive and complex,⁶⁰ however there are some helpful models that synthesise a range of theories and have been adapted for KT in health settings.

A theoretical-informed approach offers the advantage of a generalizable framework to: inform the development and delivery of interventions; guide evaluation; explore moderating factors and causal mechanisms; and facilitate a better understanding of the generalizability and replicability of implementation interventions.¹⁶

Conceptual KT models

A number of KT models have been proposed, that incorporate key theories suited for various target settings and professional groups.^{51,52,61-63}

Knowledge-to-Action process

The Knowledge-to-Action (KTA) process model selected for the present study provides a guideline on how to implement change.⁶⁴ The KTA model⁵¹ was developed to assist research implementation and is particularly well suited for community-based organisations such as the study site in the present study. It provides a comprehensive and cohesive basis to underpin the multifaceted KT strategy described in this thesis.

Graham et al.⁵¹ reviewed thirty-one planned-action theories resulting in the development of the KTA process. As outlined in Figure 2 the KTA process has two distinct but interacting components:

- 1) Knowledge creation is at the centre of the model and includes 3 phases, knowledge inquiry, knowledge synthesis and knowledge tools/products. It involves gathering and synthesising research information leading to tools that are to be used by health professionals. The inverted cone shape represents the distillation of knowledge tailored to the knowledge users. The circle of arrows represents the ongoing process of knowledge creation.
- 2) Action cycle, which has 7 steps and revolves around activities that may be needed for knowledge application. The phases are not linear but rather dynamic and interact with the knowledge-creation funnel at the centre of the model.

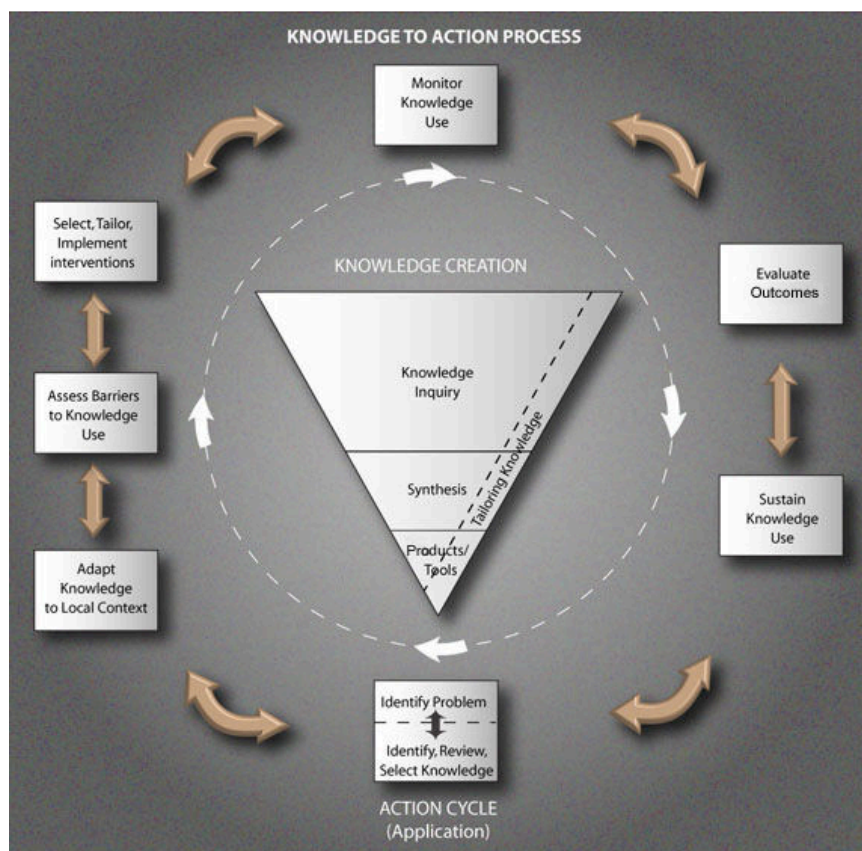


Figure 2: Knowledge-to-Action (KTA) process

Used with permission: Graham et al., 2006⁵¹.

5S model for seeking evidence-based information

Central to the KTA process is knowledge creation, involving inquiry, synthesis and tools. This process involves tailoring knowledge (evidence-based information) for a group of users and is a cornerstone to any KT strategy.^{13,65} Evidence-based information may take the form of systematic reviews, research summaries, clinical guidelines or clinical decision-making tools.

Straus and Haynes¹³ described a hierarchy of evidence-based information resources in the 5S model (Figure 3). The model is depicted by a pyramid with 5 levels (studies, syntheses, synopses, summaries, systems) that aim to be increasingly readable, reliable and relevant as one moves up the pyramid. Straus and Haynes recommend a top-down approach for answering clinical questions. According to the top-down approach, when faced with a clinical question, an AHP would ideally be able to rely on clinical decision-making support systems linked to client data and the process of care (Level 5). In the absence of decision support systems, the next level of evidence-based information resource would be sought (customised summaries), and so on. Levels 4 and 5 could also be referred to as KT tools. Figure 3 provides examples of evidence-based information resources available to AHPs at each level of the pyramid.

The top-down approach to answering clinical questions is in stark contrast to the bottom-up approach commonly used in EBP education of AHPs.⁶⁶ An example of the bottom-up approach is workshops that aim to teach AHPs the stepwise process of EBP involving: (1) developing an answerable clinical question, (2) searching for relevant information using databases and journals, (3) appraising articles, and (4) synthesising the information gathered in appraised articles. The reasons for EBP being taught the bottom-up approach may partly be due to (1) the lack of availability of information resources such as evidence summaries and clinical decision support systems, (2) the fact that AHPs report that they lack confidence and skill in searching and appraising

research, so education has aimed to overcome this barrier, and (3) for historical reasons. This approach may have been more feasible in the past, when there were vastly smaller numbers of original studies to synthesise.

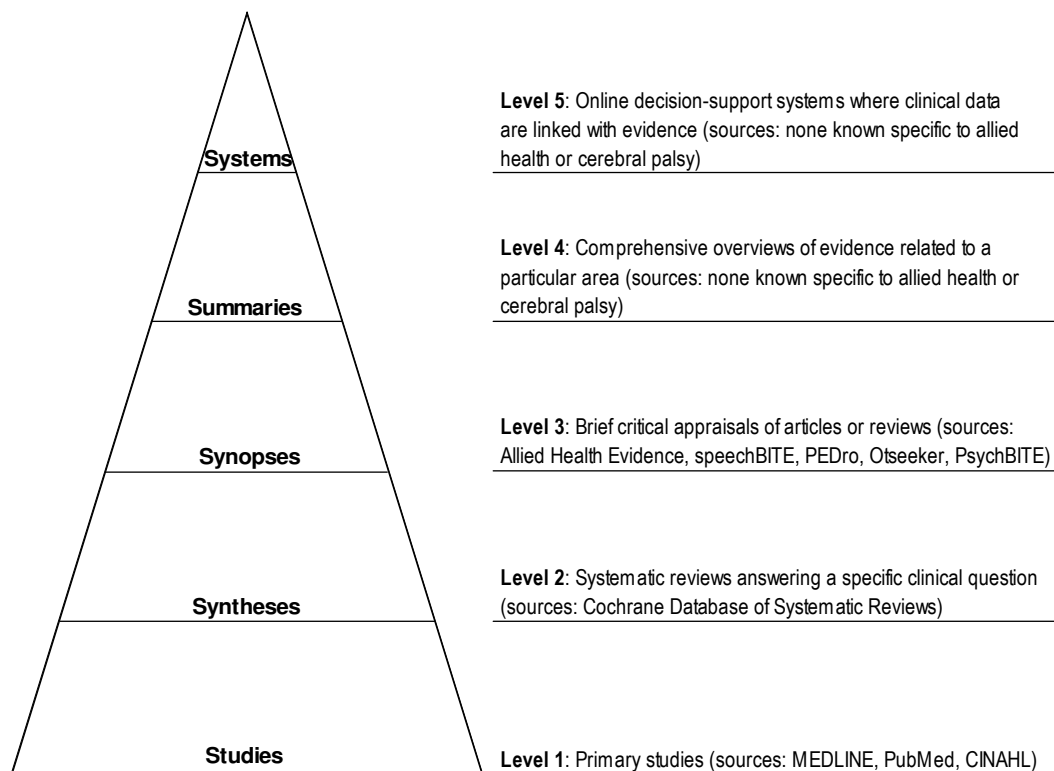


Figure 3: The 5S pyramid model of evidence-based information resources

A description of each level of the 5S pyramid and its application to AHPs follows.

Level 1 – Studies

Level 1 encompasses all primary studies. Within primary studies, there is a hierarchy of the levels of evidence (refer to Appendix 1 – Oxford Levels of Evidence) relating to the evidence quality of published research. AHPs report that they lack confidence and skill in appraising primary studies.^{7,9}

Level 2 – Syntheses

Level 2 includes primary studies that are synthesised in the form of systematic reviews answering a specific clinical question. AHPs prefer systematic reviews over individual studies,⁶⁷ however they still report that

systematic reviews do not always answer their clinical questions.^{13,68} Additionally, systematic review literature may not always be interpreted correctly.⁶⁹ A study conducted by Lai and colleagues⁷⁰ found that only 30% of health professionals were able to correctly identify both the direction of effect and strength of recommendation from four systematic reviews.

Level 3 – Synopses

Synopses provide brief critical appraisal of studies or topic areas. In the allied health professions the available synopses are discipline-based. These include free sites such as PEDro (The Physiotherapy Evidence Database, <http://www.pedro.org>), OTseeker (Occupational Therapy Systematic Evaluation of Evidence, <http://www.otseeker.com>) and SpeechBITE (Speech Pathology Database for Best Interventions and Treatment Efficacy, <http://www.speechbite.com>). Each of these resources includes searchable databases (according to keyword or topic area) and contains the highest level of research evidence available. All RCTs on the sites are rated for evidence quality (e.g. PEDro resource uses the PEDro scale, SpeechBITE uses a modified version of PEDro called the PEDro-P). These are invaluable resources, however it is outside their scope to provide clinically useful summaries and recommendation for specific interventions within every diagnostic area. There are no known resources at this level (level 3, synopses) that pertain specifically to cerebral palsy.

Level 4 – Summaries

Summaries collate the information from the lower levels (studies, syntheses and synopses). This would normally be presented according to a clinical problem such as upper limb spasticity. There are no resources of summaries known in the allied health professions. Examples in medicine include Dynamed (www.ebscohost.com/dynamed) and ClinicalEvidence (<http://clinicalevidence.bmj.com/cweb/index.jsp>). A key component of our study involved the development of a level 4 evidence-based information resource (the EAS).

Level 5 – Systems

At this level, electronic health information/clinical data would be linked to relevant evidence and incorporate a decision-making aid. These are rare (and none exist for AHPs or are related to cerebral palsy) so the top-down approach recommended normally begins at Level 4.^{13,65,71,72}

KT theories

KT is primarily concerned with changing what health professionals do, with the ultimate aim of improving outcomes for clients and the wider community. The KTA process⁵¹ defines a number of stages in the KT process. Each phase in this process draws on different theoretical assumptions as the factors and outcomes for each stage are different.⁷³ For this reason it is necessary to consider the many theories in more detail as each theory has relevance for different aspects of the stages of the KT strategy in the present study.^{53,73} The focus of the KT strategy may be directed towards any combination of the following: the individual health professional, the social context, the organisational context, or the political context.⁷³ The theories below are summarised according to those domains and are all relevant to the KT strategies applied in this doctoral program of research. Table 4 describes the way in which each theory influenced the choice of KT strategies in the present study.

Theories related to individual professionals

Educational theories

Educational approaches include adult learning theories such as problem-based learning⁷⁴ and learning styles. The underlying assumption of these theories is that change occurs as a result of an individual striving for competence. The emphasis is therefore less on cognitive or rational processes and more on the motivation to learn.⁵⁴ These theories are relevant for consideration in the action cycle component of the KTA process. The resultant interventions and educational strategies include strategies such as small group interactive learning, problem-based learning and a bottom-up

approach. These strategies are often used in medical education⁷⁴ such as workshops and seminars. There is low-level evidence for the effectiveness of strategies such as problem-based learning, self-directed learning and portfolio learning⁷⁵ and the impact of educational theory remains largely untested.^{54,76} These theories suggest that a KT strategy needs to focus on: attitudes, the idea that motivation to change is crucial to success, and that people change as a result of real problems experienced.

Cognitive theories

Cognitive theories focus on human rational processes and the choices that result. These theories consider the provision of accurate, convincing information as a cornerstone to change.^{54,73} The other types of theories that are applied in epidemiological approaches include theories that describe how rational thinking may be prevented. The purpose of preventing rational thinking to elicit behaviour change rests on the belief that people make choices based on context and previous experience or to fit the individual's beliefs, needs and behaviour.⁵³ The theory of confirmation bias is an example, where the human tendency to look for evidence that supports the hypotheses we personally favour and to consciously, or unconsciously disregard the ones that we disagree with.⁷⁷ Although there is limited evidence that this group of theories is effective in isolation, it is possible that they have contributed to the push towards high quality, accurate and rigorous research summaries. The strategies that have evolved from these theories include evidence-based guidelines, journals, and other research dissemination channels.

Motivational theories

Motivation theories have been primarily used in the field of health promotion and suggest that implementation of change needs to focus on health professionals' attitudes, perceptions and intentions.⁷⁸ According to these theories, EBP behaviour such as using outcome measures, are determined by the AHPs attitudes and perceived positive or negative

consequences from using outcome measures. Strategies resulting from motivation theory can be incorporated into different stages of the KT strategy. For example, convincing managers, AHPs and clinical seniors of the importance of using outcome measures and developing a positive culture may increase desired performance.

Theories related to social context

Communication theories

Communication theories regard effective communication as being important to change an individual's attitudes, beliefs and behaviour. Both the credibility of the source of the message and the recipient are key factors in the extent to which an individual may change. Repetition of information, novelty, adaptability to an individual's context, personal relevance and perceived validity are factors dictating the relative success of a communication interaction.⁷⁹ Communication theories can be applied to many phases of a KT strategy. Ensuring that messages are clear, presented multiple times, are clinically relevant and from a credible source may maximise the success of a KT strategy.

Social learning theory

Bandura developed social cognitive theory as an extension to classic behavioural theories in the mid-1980s. Social learning theory suggests that there is a dynamic interplay between personal behaviour and context-related factors that reinforce and inhibit behaviour change in an ongoing way.⁸⁰ Important context-related factors include modelling and reinforcement. For example, certain behaviour may be reinforced by material rewards, or non-material rewards such as positive feedback from a clinical senior. Encouraging senior staff to model EBP behaviour, such as checking levels of evidence for client treatment, or overtly using an outcome measure is an example of modelling.

Many of the strategies that have strong evidence to increase EBP use (even if to a small extent) are related to social learning theory. Examples include outreach visits,⁵ opinion leaders,⁸¹ and small group support – all of which draw on social networks within an organisation. Strong professional relationships are a key feature of these theories and often the strategies that result focus on creating and strengthening networks within an organisation or professional body.

Social network theories

Diffusion and innovation theory^{82,83} considered the networks between individuals, and how these effect dissemination of information and ideas. Network characteristics that influence knowledge dissemination include the strength of the networks between individuals, the proportion of the group who have already adopted an innovation and the differences between individuals within the network.⁸⁴ Network theories recommend studying local team interaction and influencing identified opinion leaders (who may or may not be senior staff).

Professional development theories

Professional development theories are about development of specific disciplines and professionals, and how this influences behaviour. Health professionals have expertise in their fields, and their identities and loyalties are often tied to their professions as opposed to their workplaces.⁸⁵

Professional bodies can influence behaviour by introducing clinical guidelines and standards, and by discipline specific training that they offer both at undergraduate and postgraduate levels. KT strategies that are consistent with a professional group are more likely to be successful. Tapping into professional pride and loyalty can be effective tools to inducing behaviour change.

Leadership theories

Effective leaders, either formal or informal can promote or block a new innovation. Leaders may be managers, however they can also be respected

for their professional expertise, or may be respected socially within a network. Different types of leaders are useful for bringing about different types of change.⁸⁶ For KT strategies to be successful, education and ‘buy-in’ from formal and informal leaders can be key factors.

Theories related to organisational context

Organisational theories do not focus on the individual but rather on changing the environment to be conducive for change. Key theories relevant to the present study are summarised below.

Marketing approaches

Marketing approaches assume that different groups have different needs, goals and barriers to success.⁵² The focus is on producing an attractive product or message that will appeal to the target group and spread it through numerous channels (for example media, or networks). These approaches lead to KT strategies based on needs assessment and emphasise a number of channels for dissemination, using a stepwise approach. Elements of the marketing approach have been incorporated into a number of recent conceptual models of change such as the KTA process that assesses individual and group needs – continually reviewing, and adapting the intervention to produce a highly customised intervention.

Total quality management theory

Total quality management (TQM) theory emphasises the importance of continuous improvement in multidisciplinary processes to improve client care.⁸⁷ Substandard client care is viewed as a failure of the systems and processes rather than the individual. Important aspects of this theory include identifying leaders, building strong teams and influencing workplace culture. TQM is a client centred, whole organisation model encouraging periods of implementing change followed by periods of relative stability. TQM encourages a long-term view of changing health professionals’ behaviours, and elements of this theory can be the backbone of a KT strategy.

Organisational learning theory

Organisational learning theory says that the interaction between the organisation and the individual is looked at as a symbiotic relationship, where the individual and organisation learn from one another. Ortenblad⁸⁸ described the process as individuals learning as agents for an organisation and that knowledge then being stored as embedded routines in the organisation. Organisational change theory says that in order for an organisation to learn and change, the individuals within the context must be willing to change. The concept of a climate for optimal learning is therefore important in organisational theory⁵⁴ and includes leadership theories.⁸⁹

Theories related to political context

Theories included in this category are reimbursement theories, contracting theories, and accreditation and licensing theories. Reimbursement theories focus on how health care is paid for at a political level. A number of reviews have looked at the effect of different payment methods for client care with mixed results.⁹⁰ Although an organisation rarely has direct control over these aspects it can still be important to consider them in the whole system when developing an intervention for changing behaviour.

Summary of theories

Critical analyses and syntheses of KT theories^{43,53,91} reported that there is little evidence to suggest the superiority of one theory over another, it is in fact the choice of KT strategies tailored to overcome the local barriers that matter. Some types of theories lend themselves towards specific contexts and interventions. For example, cognitive theories are particularly useful to change simple, routine behaviour in highly structured environments (for example, hand washing).⁵³ Organisational theories are often useful in chronic care, or community settings. To assist in planning effective KT strategies, there are a number of conceptual models combining elements of different theories. Table 1 summarises potential application of the different theories to

the present study context. The KTA process combines aspects of a number of the theories summarised above. When using the KTA process the combination of theories and extent to which one theory is utilised over another, depends on what the specific barriers to EBP are in the given setting. Using a theory informed approach, in response to context specific barriers results in a highly tailored, targeted intervention.

Table 1: Underpinning theories of KT

Theory	Potential interventions for the present KT study
Individual professionals	
Educational	Involve AHPs in the problem-solving process during workshops, mentoring sessions; provide mentoring to set customised personal goals.
Cognitive	Provide accurate, easily accessible research evidence on cerebral palsy assessment and treatment.
Motivational	Convince AHPs of the need for EBP in cerebral palsy treatment via workshop, mentoring and online KT tool.
Social context	
Communication	Credible staff to facilitate EBP workshops and provide mentoring; cohesive, convincing EBP message based on the online KT tool.
Social learning	Ensure that clinical seniors and managers are modelling target EBP behaviours (management training, strategic planning, system changes to support this).
Professional development	Use professional pride to motivate EBP use within specific disciplines via workshop, mentoring, clinical seniors and specific interventions targeting professional groups on online KT tool.
Leadership	Management 'buy-in' and endorsement from executive to support changes throughout the organisation.
Organisational context	
Marketing	Produce an appealing product and disseminate the information regarding the product in a variety of ways (intranet, workshop, supervision, written guidelines, memos and reminders).
Total quality management	Reorganise client documentation and work processes to support clinical decision-making; introduce a standard, organisation-wide process and monitor/adapt as necessary.
Organisational learning	Ensure that all staff members at every level of the organisation have access to current cerebral palsy evidence and ensure exchange of information via team meetings and mentoring sessions.
Political and economic context	
Reimbursement	Provide paid, protected time for AHPs to engage in EBP activities.
Contracting	Modify job descriptions to reflect engagement in EBP activities.

Barriers to EBP implementation

Real and perceived barriers hinder evidence being embedded into clinical practice.^{73,92} A complex interplay exists between the numerous barriers and this will affect whether or not a health professional uses research evidence in their planning, decision-making and treatment. Literature suggests that clinicians have a high level of awareness of EBP value⁹³⁻⁹⁶ and believe that clinical decision-making should be evidence-based.^{93,96,97} The process of identifying and categorising barriers is considered to be an important phase in developing tailored, effective interventions.^{7,51,73,98}

Seven categories of barriers to KT have been proposed in systematic review literature.¹

- Support/resource barriers
 - Time
 - Resource barriers
 - Support
 - Costs/funding issues
- Cognitive/behavioural barriers
 - Knowledge
 - Awareness
 - Skill/expertise
- Attitudinal/rational-emotive barriers
 - Efficacy/perceived competence
 - Accurate self-assessment
- Clinical Practice guidelines/evidence barriers
 - Clinical usefulness
 - Evidence/disagree content
 - Access
- Client barriers
 - Client characteristics/factors
 - Client adherences
- Health care professional/physician barriers
 - Characteristics
 - Professional boundaries

- Gender
- Inertia
- System/process barriers
 - Organisational
 - System
 - Workload
 - Referral process.

Literature about barriers to EBP use has research methodology limitations.¹ The studies are mostly survey design, few are based on any existing framework or model, and they are mostly closed questions. Nevertheless, stronger methodology is emerging, reflecting the complexity of KT, and reported barriers in the existing literature can assist in developing effective interventions.

Support/resource barriers

Lack of time is the most commonly perceived barrier concerning the use of EBP for occupational therapists,^{8,50,99} speech pathologists,^{7,96} physiotherapists^{9,24,93} and physicians.^{100,101} Lack of time may have multiple dimensions, and can overlap with issues related to workplace support for paid EBP time and extra time being required due to low skill level. Some studies report that the issue is lack of paid, protected time for EBP^{9,102} – only 8% of participants in one study having paid time for EBP activities.⁹ Speech pathologists in one survey reported that they did not have enough time to read literature and implement research findings.⁷ Perceived lack of time can also be a proxy for other issues such as difficulty synthesising information or lack of clear, quality evidence summaries.^{93,100,101} A study by Young and Ward¹⁰¹ using a questionnaire along with in-depth interviews with GPs, found that the completed questionnaire indicated that lack of time was the major barrier to EBP use. However when the participants were interviewed, it became clear that lack of time was obscuring more complex barriers. The barriers that emerged were lack of skill to quickly understand and synthesise

research studies and a lack of time to carefully consider a client's demands for non-evidence-based treatments. This finding may be specific to physicians and it is difficult to say whether this study can be generalised to other professional groups.

Cognitive/behavioural barriers

Most health professionals report inadequate skill levels to search, critically appraise, synthesise and implement research findings as a significant barrier to EBP implementation.^{7-9,50,97,100,101,103-105} This is not surprising as performing these tasks requires a complex skill set, even for academic researchers,⁹⁶ and is borne out in research studies that have found educating health professionals to perform these skills increases knowledge but does not carry over to changing practice.^{14,15} The degree to which lack of knowledge and skill level are barriers may be related to professional discipline,¹⁰⁶ and varies between studies.

Attitudinal/rational-emotive barriers

Attitudes to EBP are often considered to be a key barrier – a finding that is supported by systematic reviews in the literature.^{94,104,107} The most recent systematic review looking at individual determinants to research use in allied health found that overcoming negative attitudes toward EBP may be important in reducing the research–practice gap. Attitudes to EBP and feelings of confidence appear to vary according to profession and background.¹⁰⁸ This may be important in a workplace whose staff have vastly different levels of background training and are a mix of professional groups. Different strategies for different professions and level of training may be necessary to induce change.

Clinical practice guideline/evidence barriers

Although Internet and library access have been major barriers to EBP use in the past, access to computers and Internet resources have increased significantly in recent years.¹⁰⁹ Ten years ago, Internet access rates for doctors

in developed countries were reported to be between 13–17%^{100,101} compared to 60–70% in 2008.¹¹⁰ There seems to be considerable differences in ease of access between rural and metropolitan areas^{111,112} and between different organisations and professional groups.¹¹³ Internet access available at key clinical decision-making points in time could be a factor in whether or not client care is evidence-based. Mixed results from studies may reflect the trend towards better access to the Internet in health care – some studies reported adequate access to research^{93,96} and other studies reported access as a barrier to EBP⁸.

Internet access does not however imply full access to journals, systematic reviews, evidence-based guidelines or research summaries. Even when an AHP does have adequate access, the enormous quantity of research studies that are published¹¹⁴⁻¹¹⁶ means that searching and appraising research evidence can be time consuming. Additionally, AHPs believe that research does not always translate well into practice^{50,99} and that methodological inadequacies are a barrier.^{7,8,40} Despite recent efforts by professional organisations to customise research evidence with tools such as PEDro for physiotherapists,¹¹⁷ there is consensus that it is still difficult to access reliable, easy to read summaries.^{9,40,97,100,118}

Client barriers

Clients are now far more likely to research their own health-care needs using the Internet.¹¹⁹ This has changed the client-health professional relationship in terms of EBP since clients have access to a range of health information not all of which is reliable.¹²⁰ This may result in increased use of research in practice, however it can potentially create an EBP barrier. Some studies have reported that client demands for treatments that may not be evidence-based are a barrier to EBP use.¹⁰¹ Family-centred practice is considered best practice in disability organisations, and the interplay between family-centred practice and EBP is complex.¹²¹ This complexity is also reflected in the EBP triad (see

Figure 1) with client preferences representing one of the three overlapping circles.

Health care professional/physician barriers

Qualification and years of experience are known barriers to EBP use.⁹⁴ Seniority of qualification is positively correlated with self-reported uptake of research findings.^{94,106} In other words, health professionals with a university degree are more likely than colleagues without a degree to use research evidence in their clinical decision-making. Conversely, more years of clinical experience are negatively correlated with EBP use.^{50,96} Health professionals who have been practicing for more than 10 years report lower skill, confidence and implementation rates.^{108 107 108 108 108} McEvoy et al.¹⁰⁸ reported that males had a higher level of confidence towards EBP than females, and females had more positive attitudes towards EBP than males. The other professional boundary reported in the literature is health professionals' belief that searching and synthesising research findings should not be a part of their professional role.^{9,101} This view is supported by Vallino-Napoli⁴⁸ who encouraged academics to publish systematic reviews on topics of high clinical relevance. The present study sought to address this barrier by creating customised topic summaries based on the best available research evidence, avoiding the need for AHPs to search for research evidence.

System/process barriers

Workplace factors such as systems and organisational culture can significantly facilitate or hinder EBP use,^{23,122} and are commonly reported barriers.¹ Even if quality evidence is available, systems and processes in a workplace may halt the dissemination of research evidence and prevent it from flowing on to benefit clients. In fact, lack of organisational, system, referral, work or team structures or processes have been reported in 62 studies as the primary reason that guidelines and evidence are not implemented.¹²³ Specific barriers may include information not being

available quickly, at the right time²³ or systems may not be in place to remind and support evidence-based clinical decisions.¹⁰⁶

The culture of an organisation and interactions between staff can either foster EBP use or inhibit it.¹²⁴ A recent systematic review found that medical residents cited lack of support from other staff members along with a belief that there was a low possibility for change, as major barrier to EBP use.¹⁰⁴ More experienced staff have lower rates of EBP use^{50,96} and may intentionally or unintentionally be hindering implementation of research evidence.

Strategies aiming to change health professionals' EBP behaviour

The following information presents findings from literature that included a systematic review and meta-analysis reporting on the effectiveness of key KT strategies in the following order: face-to-face educational meetings, retrieval of electronic health information, printed educational materials, outreach visits, opinion leaders, audit and feedback, journal clubs, financial incentives, organisational change, tailored interventions, and multifaceted interventions. Table 2 provides a summary of information presented in the research literature along with estimated effect sizes.

It is difficult to compare the relative effect of one KT strategy to another due to research studies having different outcomes, varying degrees of methodological quality of studies, and poorly reported interventions.^{16,65} That said, the effect sizes for many interventions have been calculated by meta-analysis (see Table 2) and reveal similar absolute median effect sizes across KT strategies.⁶⁵ This could indicate that the choice of KT components is not important but rather that any intervention is better than no intervention. Grimshaw and colleagues¹²⁵ however do not believe this is the case as many KT studies are cluster RCTs, powered to detect a change of 10 to 20 per cent improvement, and similarity of absolute effect sizes is therefore unsurprising; and although the absolute median effect sizes are

remarkably similar, the range is wide both within, and between KT strategies. For example, on-screen point of care computerised reminders had a range in improvement scores of +0.8% to +18.8%. This may suggest that different KT strategies are indeed more effective than others, and the relative effectiveness may be related to whether or not a KT strategy is tailored to overcome a specific barrier.⁶⁵ Considering the similarity in effect sizes between KT strategies along with an incomplete evidence base, current research literature is unable to provide information about whether one KT strategies is more effective than another.^{16,65} Personnel involved in planning KT strategies therefore need to design the intervention in response to a barriers assessment and use professional judgement.⁶⁵

Details about the barriers assessment and KT strategies that were chosen in response to the specific EBP barriers in our context are in Chapter 3.

Face-to-face educational meetings

Face-to-face educational meetings include lectures, courses and workshops in various formats with the number of participants, intensity, frequency and content being highly variable in nature. Educational meetings have been heavily adopted as a strategy for improving health professionals EBP knowledge, awareness and skills. Systematic review evidence⁴ showed that educational meetings have small to moderate benefit on improving health professionals' EBP behaviour. The lessons learned from this review of 81 EBP implementation intervention trials were that a mixture of didactic and interactive styles were more effective than either alone, and targeting simple behaviour led to the greatest behaviour change and the magnitude of the resultant change in behaviour lessened as the target behaviour increased in complexity. The authors concluded that although educational meetings had an effect on behaviour (either alone or in combination with other approaches), educational meetings alone were unlikely to change complex EBP behaviour. Educational interventions are most likely to be effective as a component of a multifaceted KT strategy, targeting context specific EBP

barriers (such as lack of knowledge), although relying solely on face-to-face education is unlikely to result in complex behaviour change.

The multifaceted KT strategy in the RCT in this thesis included a 3-day face-to-face workshop.

Retrieval of electronic health information

Electronic health information refers to using a computer with an Internet connection to read research articles, evidence-based guidelines or other material. Health professionals need to have access to health information to ensure that their clinical decision-making is evidence based. A systematic review examining whether retrieval of electronic health information had an impact on practices or client care was inconclusive and recommended that further research be conducted.¹²⁶ Only two studies met eligibility and “neither study found evidence that electronic retrieval of health-care information changed professional behaviour; one study found that knowledge was improved”.¹²⁶ A RCT detected no difference between paper-based and electronic forms but suggested that “other factors should be considered when choosing the method of presentation of guidelines, such as information-seeking time, ease of use during the consultation, ability to update, production costs, and the physicians’ own preferences”.¹²⁷

The present study utilised intranet-based clinical algorithms or pathways, and a highly customised evidence-based information resource (as one part of a multifaceted strategy) in an attempt to change AHPs’ EBP behaviour.

Printed educational materials

Educational materials refer to printed, hard copy information and may include clinical guidelines, position papers and peer-reviewed journals. Educational materials are one of the most frequently used passive dissemination strategies.^{128,129} Systematic review evidence suggested that printed educational materials can change health professionals’ behaviour, with active strategies being more effective than passive strategies.¹³⁰ There

are many factors that influence whether printed educational materials may lead to a change in knowledge, attitudes of behaviour of health professionals. These include clinical applicability of the information, the health professional's perceptions about the importance of the information and readiness to adopt and apply new information.¹³⁰

The present study chose to provide educational material with active support, integrated into the health professional's workflow.

Outreach visits (mentoring)

Educational outreach visits (also referred to as academic detailing) are defined as a face-to-face meeting where trained people provide health professionals with information and strategies about how they can change their practice.⁵ Systematic review data suggested that outreach visits consistently lead to small effects on prescribing patterns whereas the effect sizes for changes other aspects of professional practice are more variable.⁵ The small to moderate effect size was considered to be similar to other types of continuing medical education on behaviour change, for example, audit and feedback or educational outreach visits.

A form of outreach visits (referred to as mentoring in our study) was employed as a KT strategy in the present study.

Opinion leaders

Opinion leaders are defined in systematic review literature as people who are influential, likeable and respected amongst colleagues. Opinion leaders may hold a senior management or clinical role, however any health professional may be an informal opinion leader. According to systematic review data opinion leaders may promote EBP, although the best techniques to utilise opinion leaders remain unclear.¹³¹ Studies included in the systematic reviews rarely described the role of the opinion leader, and studies varied in terms of type of intervention and outcomes measured.

Opinion leaders were chosen to facilitate the 3-day workshops that formed a part of the KT strategy in the RCT reported in this thesis.

Audit and feedback

Audit and feedback involve providing direct feedback to health professionals regarding their practice as compared to peers and evidence-based guidelines. Audit and feedback can have a small to moderate effect on behaviour.¹³² The change is likely to be greater when the baseline practices are low and feedback is more intensive. It is unclear whether certain audit and feedback techniques are more effective than others.¹³² Audit and feedback are potentially useful tools in monitoring professional performance and may be helpful in planning when efforts to change practice are needed.¹³²

Audit and feedback were not used as a KT strategy in the RCT in our study, due to pragmatic constraints of data collection across a wide geographical area.

Journal clubs

Journal clubs are defined as “a group of individuals who meet regularly to discuss the clinical applicability of articles in current medical journals”.¹³³ Although journal clubs are a frequently used interactive research dissemination tool there is no firm evidence supporting or refuting their effectiveness to change clinical decision making.¹³⁴ A systematic review was unable to pool results due to heterogeneity of interventions.¹³⁴ That said, some studies report improvements in health professionals’ reading behaviour and increased confidence in critically appraising research; however there is no evidence suggesting that this reading behaviour translates into EBP behaviour change.

Journal clubs were therefore not included in our multifaceted KT strategy.

Financial Incentives

Financial incentives are “an extrinsic source of motivation and exist when an individual can expect monetary transfer which is made conditional on acting in a particular way”.⁹⁰ In health care, financial incentives can be used to stimulate behaviour change thus facilitating the transfer of evidence into practice. Systematic review data found that financial incentives may change behaviour, however the findings are difficult to generalise due to methodological shortcomings. Rigorous evaluation of the effect of an intervention including financial incentives is recommended, as the evidence supporting or refuting its effectiveness is limited.⁹⁰

In our RCT participants were provided with paid, protected time for EBP activities. This could be considered to be an indirect form of financial incentive.

Organisational change – strategic planning, management training

Organisational culture refers to shared characteristics (beliefs, values, routines, traditions) of those in the same social or organisational group. There is increasing emphasis placed on the importance of organisational culture to improve health-care performance. Although workplace culture may change as a flow-on effect from other KT strategies, no rigorous evidence exists to support interventions aimed directly at changing culture within an organisation.¹³⁵ Even if change was induced, there is no evidence that links improvement in workplace culture to improved client outcomes.^{53,136}

In our study meetings with researchers, knowledge brokers, policy makers and managers were held in the year preceding the RCT and management training along with policy changes that formed part of the KT strategy.

Tailored interventions

Tailored interventions are defined as interventions that are developed following investigation into current practices and factors that may be blocking a new innovation. A recent systematic review conducted a meta-analysis of 26 studies that tailored interventions to prospectively identified barriers of change. The review found that tailored interventions were more likely to improve professional practice than no intervention or dissemination of guidelines.¹²³ Although optimal methods for conducting barriers assessments and designing interventions remain unclear, tailoring interventions to overcome known barriers is increasingly considered to be an integral first step in a KT strategy. In our study a comprehensive assessment of barriers was done as a part of the RCT, and KT strategies were designed in response to the identified barriers. See Chapter 3 for details.

Multifaceted KT strategies

Multifaceted interventions involve “a combination of methods including two or more interventions”.¹³⁷ There is no firm evidence that multifaceted strategies are more or less effective than KT strategies with only one component. Additionally, the effect size of more components in a multifaceted intervention does not seem to increase along with the number of components.^{138,139} It is however theoretically plausible that a multifaceted KT strategy designed in response to a thorough barriers assessment would be more effective than a single intervention.¹²⁵ A systematic review (without meta-analysis) examining the benefits of multifaceted KT strategies amongst physiotherapists and occupational therapists concluded that active multifaceted KT strategies may lead to improved self-reported knowledge and EBP behaviour.⁶

A multifaceted KT strategy was the chosen approach in the present study as a number of KT strategies were required to adequately address the identified EBP barriers. Chapter 3 provides more detail regarding the barriers assessment and selection of the components of the multifaceted KT strategy.

Table 2: Systematic review evidence for the effectiveness of KT strategies

Intervention	Reference	Effect sizes – median absolute improvement (unless otherwise stated)	Number of studies/ individual participants	Comments
Face-to-face educational meetings – workshops, seminars, lectures, symposia	Forsetlund et al., 2009 ⁴ Flores-Mateo & Argimon, 2007 ¹⁴⁰	6.0% (range 1.8% to 15.3%)	81 RCTs	Median absolute improvement similar to other KT strategies. Greater effect sizes with mixed interactive/didactic sessions, higher attendance and interactive sessions. Impact on more complex behaviours is less certain.
Retrieval of electronic health information including research articles, summaries	McGowan et al., 2009 ¹²⁶	Meta-analysis unable to be performed	2 RCTs	No improvement in practices in either study were detected.
Printed educational materials – research articles in journals, evidence-based guidelines	Farmer et al., 2008 ¹³⁰ Francke et al., 2008 ¹⁴¹ Giguère et al., 2012 ¹⁴²	4.3% (range -8.0% to +9.6%) for process outcomes (e.g. ordering x-rays, prescribing) Median absolute risk difference 0.13 compared to no treatment (range -0.16 to +0.36)	12 RCTs 11 nonrandomised studies 45 studies (14 RCTs and 31 time series)	
Outreach visits (mentoring) – where trained	O'Brien et al., 2007 ⁵	Prescribing behaviour 4.8% (range 3.0% to 6.5%) Other behaviour 6.0% (range 3.6% to 16.0%)	17 RCTs 17 RCTs	Effects on more complex behaviours not certain.
Journal clubs	Harris et al., 2011 ¹³⁴	No meta-analysis due to heterogeneity of interventions	18 studies (no RCTs)	No firm evidence supporting or refuting effectiveness of journal clubs.
Financial incentives	Flodgren et al., 2011 ⁹⁰	Meta-analysis unable to be performed	32 studies	Very low level evidence with serious methodological issues.

Intervention	Reference	Effect sizes – median absolute improvement (unless otherwise stated)	Number of studies/ individual participants	Comments
Organisational change	Parmelli et al., 2011 ¹³⁵	Meta-analysis unable to be performed	No studies met inclusion criteria	No evidence to support or refute the effectiveness of changing organisational culture.
Tailored interventions	Baker et al., 2010 ¹²³ Cheater et al., 2005 ¹⁴³	Meta-regression (12 RCTs). Pooled odds ratio 1.52 (95% CI 1.27, 1.82; p < 0.001)	26 RCTs	More likely to improve professional practice than no intervention or dissemination of guidelines.
Reminders				
(a) Computer generated reminders delivered on paper	Arditi et al., 2012 ¹⁴⁴	7.0% (+3.9% to +16.4%)	32 RCTs	Two features associated with greater effect size were: <ul style="list-style-type: none"> • providing space for a response on the form • providing an explanation for the content or advice.
(b) On-screen, point of care computerised reminders	Shojania et al., 2009 ¹⁴⁵	4.2% (+0.8% to +18.8%)	28 RCTs	Most studies have investigated effect on simple reminders. Impact on more complex systems, such as decision support for clinical decision making are less certain, with some studies showing no change.
Multifaceted interventions	Menon et al., 2009 ⁶	Meta-analysis not attempted	12 studies (4 RCTs)	Improvements in knowledge, skill and behaviour. No change in attitudes.

Knowledge translation in the allied health professions

The majority of KT research has occurred in the fields of medicine and nursing.¹⁶ A recent systematic review examining the effect of KT strategies on the allied health professions identified only five RCTs. Four of these were in physiotherapy and one in speech pathology. No RCTs were found in the fields of occupational therapy, social work or psychology. A description and findings of these studies summarised from the research literature are detailed in Table 3. A systematic review conducted by Menon and colleagues⁶ suggested that multifaceted KT strategies may change EBP behaviour. The more recent and comprehensive systematic review by Scott and colleagues¹⁶ however concluded that no clear inferences can be made about the effectiveness of KT strategies in the allied health professions due to low methodological quality, reporting bias and equivocal results. The majority of KT strategies relied solely on educational approaches (n = 23/32 included studies in the systematic review), a trend which is mirrored in nursing¹⁴⁶ and medicine.¹³⁸ Scott et al.¹⁶ suggested that for EBP behaviour to change, the KT intervention needs to be based on a solid theoretical framework, to target multiple levels (AHPs, decision makers), and to have significant resources to support the change.

Table 3: Evidence table – KT strategies in the allied health professions

Reference	Study design	Area	Intervention (EPOC)	Specific intervention	Outcomes measured	Outcomes and comments
Bekkering et al. (2005) ¹⁴⁷	RCT 113 physiotherapists (500 clients) Individually randomised to receive passive KT strategy (guidelines by mail) or active multifaceted intervention	Low back pain	1. Educational materials 2. Educational meetings	Multifaceted KT strategy – education, discussion, role playing, feedback and reminders	Adherence to guidelines measured by patient forms recording treatments. Number of treatments sessions, goals, interventions and patient education were recorded.	Moderate improvement adhering to guidelines
Hoeijenbox et al. (2005) ¹⁴⁸	RCT 113 physiotherapists	Low back pain	1. Educational materials 2. Educational meetings	Multifaceted KT strategy – education, discussion, role playing, feedback and reminders	Cost of care Direct medical costs, productivity costs and quality of life were calculated.	Passive strategy more cost-effective than active strategy
Rebbeck et al (2006) ¹⁴⁹	Cluster RCT 27 physiotherapists	Acute whiplash	1. Educational meetings 2. Educational outreach visits 3. Educational materials	Multifaceted KT strategy – education by opinion leaders, 1-day workshop, educational materials (guidelines & algorithms) and 2-hr follow-up visit	Adherence to guidelines (self-report and file audit) Knowledge of guidelines (exams) Patient outcomes (Functional Rating Index) Cost of care	Experimental group adhered to guidelines more (small-mod effect) & increased knowledge No difference between groups for patient outcomes or cost of care
Stevenson et al (2006) ¹⁵⁰	Cluster RCT (2 clusters) 30 physiotherapists	Low back pain	1. Educational meetings 2. Local opinion leaders	Educational meeting led by local opinion leader (5 hrs)	Treatments offered to clients. Data collected from a discharge summary where participants self-reported the various treatments that were offered	No significant differences between groups

Reference	Study design	Area	Intervention (EPOC)	Specific intervention	Outcomes measured	Outcomes and comments
Pennington et al (2005) ¹⁵	Cluster RCT (17 clusters) 34 speech pathologists	Swallowing post-stroke	1. Educational meetings	Group A – 2.5 day workshop on critical appraisal compared to Group B – 5 day workshop on critical appraisal + change management	Adherence to clinical guidelines, and engagement in research activities via audit tool + file audit	Group B engaged in more research related activity, but 6 mths later no discernible difference between groups with regard to clinical practice was detected. Differences between departments was clear – advise to have local opinion leaders/more customised individualised approach

Measuring the outcomes of multifaceted KT strategies

Measuring outcomes of KT strategies is a complex, multidimensional process.¹⁵¹ In a multifaceted KT strategy, the measurement tools depend upon each target outcome. For example, measuring change in health professional behaviour, skill and knowledge, organisational responsiveness to change or client outcomes will each require different techniques.

Domains of evaluation

Shaneyfelt et al.¹⁵² conducted a systematic review and categorised evaluation domains into:

- 1) EBP knowledge
- 2) EBP skills
- 3) EBP attitudes
- 4) EBP behaviours
- 5) Client outcomes.

These categories overlap with Kirkpatrick's¹⁵³ four levels of training evaluation:

Level 1 – Reaction

- Satisfaction and opinions
- Often practical aspects, e. g. venue, food, basic course content

Level 2 – Learning, measuring changes in:

- Knowledge
- Skills
- Attitudes

Level 3 – Transfer

- Lasting behaviour change
- Did the change in knowledge, skills or attitudes carry over to another setting (work)

Level 4 - Effect

- Client outcomes
- Costs
- Organisational benefits.

Measurement of outcomes can occur at the client level, health professional level and organisational level.¹⁵⁴ Although Shaneyfelt et al.¹⁵² found that there were some evaluation tools with strong psychometric properties, only 20% of the studies included in the systematic review reported on reliability or validity of the instrument used.¹⁵² Additionally, these evaluation tools only measured knowledge, skill or satisfaction (Kirkpatrick Levels 1 and 2) and most others measured compliance to guidelines. Shaneyfelt et al.¹⁵² emphasise the need for future studies to use valid, reliable outcome measurement tools, ideally measuring how EBP skills are used in actual practice (Kirkpatrick Level 3). The present study aimed to measure change in behaviour, knowledge and attitudes.

Behaviour

Audit tools with proven validity and reliability were used by Straus et al.¹⁵⁵ and Lucas et al.¹⁵⁶ to measure EBP behaviour/practices (Kirkpatrick Level 3). These tools however, only measured a narrow domain of context specific EBP practice behaviour – rating of evidence levels supporting interventions by hospital doctors. There are no evaluation tools that comply with all of the following points:

- 1) Designed to measure EBP behaviour
- 2) Strong psychometric properties
- 3) Developed for AHPs
- 4) Flexible enough to be customised to specific contexts
- 5) Measure a broad range of EBP behaviour and domains.¹⁵⁷

For this reason a flexible, adaptable and individualised measurement tool was selected to measure change in practice behaviour.

Goal attainment scale

The measurement we undertook in this study was aimed at Kirkpatrick Levels 2, 3 and 4. Our primary aim was to change EBP behaviour. GAS is an individualised outcome measurement tool that measures individual progress towards pre-defined goals. These goals may pertain to client outcomes, service outcomes or health professional outcomes. Its most common use now is as an individualised tool to evaluate client outcomes, although it was initially developed to measure change in community mental health programs and has been used in a wide variety of areas.¹⁵⁸⁻¹⁶⁰ GAS has been used to evaluate the outcomes of educational programs, although it has not been tested for psychometric properties in these contexts.^{161,162} It is designed to evaluate whether pre-established goals have been attained. GAS measures change in a target behaviour using a 5-point ordinal scale describing 5 different potential outcomes. More detail about GAS is found in Chapter 3.

Psychometric properties

GAS was chosen as the primary outcome measurement tool for the following reasons:

- 1) Responsivity – GAS has established validity, reliability, and high responsivity to change, whereas systematic review evidence indicated that for nearly all valid and reliable EBP instruments, test responsivity is unknown¹⁵²
- 2) Tailoring – GAS is an individualised measure of change, and so progress towards any target behaviour (including health professional behaviours)¹⁶³ could be validly, reliably and sensitively measured, including tailored EBP behaviours unique to the study site, such as notifications to the Cerebral Palsy Register
- 3) Comprehensive measurement – GAS is an individualised measure of change, and so we could comprehensively measure all desired EBP

behaviours, whereas systematic review evidence indicated that other psychometrically sound EBP instruments measure knowledge instead of behaviour, or are limited because they only measure one discrete aspect of EBP behaviour^{152,155,156,164,165}

- 4) Lack of gold standard tool – Accurate, flawless measurement of EBP behaviour is not yet established in the literature.¹⁶⁶ Even though direct observation of EBP behaviour (such as simulated patients, video/audio recordings of practice) is perceived as methodologically preferable to indirect (proxy) reports of EBP behaviour (such as chart audit, patient report, self-report, or peer-report), systematic review evidence indicated that direct measures often fail validity testing.¹⁶⁶ This could have introduced other flaws to our clinical trial. Moreover, collecting direct measures throughout NSW, being a state-wide service, would have introduced prohibitive trial costs (NSW's landmass is 3.25 times larger than the United Kingdom, and is larger than California and New Mexico combined), when the cost-benefit of a potentially invalid measure is weighed up. Even though self-report proxy measures are an imperfect measure of actual behaviour,¹⁶⁷ leading KT agencies, such as the Canadian Institutes of Health Research advocate for self-report because the process of self reflection plays a critical role in initiating behavioural changes within organisations.

In light of current EBP behaviour measurement limitations, GAS offered the best way forward since it was psychometrically sound, it comprehensively measured EBP behaviour, was practical across an entire state and could be tailored to the study site.

Knowledge and skill

Although there are EBP evaluation tools that measure knowledge and skill^{168,169}, we only needed to measure knowledge. A key component in our KT strategy was the development of an evidence-based resource that

summarised cerebral palsy research and this bypassed the need for EBP skills. We therefore developed an exam with correct/incorrect answers that was specific to the knowledge and skill base required for the participants.

Attitudes

Evidence-based practice attitude scale

The evidence-based practice attitude scale (EBPAS) is a tool developed by Gregory Aarons.¹²⁴ Aarons developed this tool for mental health professionals working in community settings. It has strong validity and reliability and has published normative data.¹⁷⁰ Allied health professionals (working in mental health or social services) formed part of the normative sampling, however only social workers (40.7%) and psychologists (32%) were explicitly mentioned. The EBPAS has been used to measure change in EBP attitudes in other areas such as autism.¹⁷¹ The EBPAS was chosen in our RCT as a secondary outcome measurement. It is designed to measure change in attitudes towards EBP across four main domains:

- 1) Requirements for the use of EBP by government, management
- 2) Appeal (item examples: makes sense, intuitively appealing, colleagues like it)
- 3) Openness to change (item examples: would follow guidelines, research use is OK, like trying new things)
- 4) Divergence of EBP with usual practice (item examples: research not useful, clinical expertise more important than research).

Gaps in the literature

Although there is a growing body of research studying the effectiveness of KT strategies, there are still a number of knowledge gaps in the evidence base and these will now be described.¹³⁷

1. No RCTs with an evidence-based information resource as a key element of a KT strategy

Research has indicated that synthesising research in an evidence-based information resource (such as the EAS) should result in increased access.¹⁷² Gülmezoglu et al. conducted a cluster RCT with doctors, midwives and students working in obstetrics to measure the impact of a multifaceted intervention including an evidence-based information resource. Participants' use of the evidence-based information resource increased, however the intervention did not affect the 10 target obstetric practices. There have been no RCTs to date using an evidence-based information resource as a key component of a KT strategy. This research program aims to fill this gap in literature by ensuring that the KT strategy is the result of careful design according to the KTA process, with 'knowledge creation' as a essential component. The result is a RCT that tests the effectiveness of a KT strategy centred around a highly customised information resource.

2. No studies involving AHPs have attempted to measure a wide range of EBP behaviour

The RCT and 2-year follow-up study aimed to measure a range of EBP behaviour considered to represent the activities of an evidence-based practitioner. Previous studies have either used self-developed measures^{147,149,150} or have only measured a narrow domain of EBP behaviour.^{168,169} Previous studies have targeted simple behaviour by either:

- 1) Measuring one specific intervention area, e.g. whiplash¹⁴⁹ or low back pain.^{147,150}
- 2) Measuring more interventions, but only measuring adherence to guidelines, e.g. obstetrics,¹⁷² speech pathology.¹⁵

This research program used a measurement tool with strong psychometric properties, and applied this tool to the study context with the aim of measuring the broader, more complex behaviours that lead to EBP.

3. No RCTs sampling a range of professional groups

The majority of KT research has involved physicians, with AHPs forming a much smaller portion.¹³⁷ Multifaceted KT strategies have been tested using RCTs with speech pathologists,¹⁵ physiotherapists,^{147,150} however there are no RCTs sampling occupational therapists,⁶ social workers or psychologists. Both studies conducted as a part of this doctoral programme sampled speech pathologists, physiotherapists, occupational therapists, social workers and psychologists.

4. No RCTs with AHPs that have used a strong KT theoretical framework

Very few theories have been tested in robust research⁵³ and those that have been tested have had mixed results. It is therefore recommended that a combination of different theoretical perspectives be considered to develop a sound plan.² Interventions that are solidly based on theoretical frameworks or conceptual models are needed.^{43,53} This doctoral programme used the KTA process as a framework to develop the KT strategy. In accordance to the KTA process, a range of theories underpinned the choice of strategies employed (see Table 4).

Rationale for the studies

Rationale for the randomised controlled trial

The effect of a multifaceted KT strategy on a range of EBP behaviours, involving a number of AHP groups⁶ is yet to be quantified in a rigorous study. In the first study, an 8-week RCT was designed to evaluate the effectiveness of a multifaceted KT strategy comprising of a 3-day workshop, access to the EAS and policy changes (paid EBP time, mentoring, mandatory use of outcome measures and changes in documentation) to improve AHPs' EBP behaviour. The secondary aims were to measure the effect on EBP attitudes and knowledge.

EBP behaviour, targeting a range of clinical behaviour across an array of intervention areas was sought in this study, and thus novel and unique approaches were required. In previous studies, components of KT strategies used with health practitioners have included workshops, mentoring, reminder systems, opinion leaders, outreach visits and journal clubs. The unique and key component of the present study was the EAS that summarised cerebral palsy research evidence with supporting clinical algorithms (decision-making flowcharts).

Rationale for the follow-up study

Some types of EBP behaviour may take time to develop,^{4,173} and behaviour change needs to be measured over a longer period to investigate the long-term intervention effectiveness. This may be especially true considering the types of organisational change initiatives that are a part of the KT strategy. For example, system changes to documenting client goals and mentoring are intervention areas that if they have an effect, may have an effect over the medium to long term. The second study, the 2-year follow-up study was therefore conducted to measure the long-term effectiveness of the KT strategy to change EBP behaviour.

Synopsis

This chapter provided background research literature related to EBP, KT and the allied health professions. Definitions of EBP and KT were provided along with a brief background and history of EBP. A range of theories and models that underpin EBP behaviour change were then described. The major barriers to EBP were detailed along with a summary of the effectiveness of a range of KT strategies. Tools measuring EBP knowledge, behaviour and attitudes were outlined and rationale for conducting the research studies was presented.

Chapter 3 details the methods for the cluster RCT that measured the effectiveness of a KT strategy aiming to change AHPs' EBP behaviour.