The factors influencing nurse graduates use of mobile technology in clinical settings in Perth Western Australia: A mixed method study

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Chapter Six

Discussion, conclusion and recommendations

Introduction
This chapter includes a synthesis of the findings in relation to the research questions. Comparisons are made to other studies explored in the literature in order to interpret the outcomes of the study. The chapter will include the limitations of the study, together with recommendations. It will conclude by providing implications and recommendations from the present study for linkage into clinical, education and research considerations. The aim of the chapter is to reconstruct a holistic picture of the study.

Study purpose
This study set out to investigate the factors influencing nurse graduates use of mobile technology in Perth, Western Australia. The assumption was that there were few standard policies in healthcare institutions to guide graduates use of mobile technology. Significantly, there appeared to be a potential gap between learning with mobile technology in undergraduate nursing programs and their use in the clinical setting. Three research questions were posed:

1. What factors influence nurse graduates use of mobile technology in the clinical setting?
2. To what extent and in what ways do nurse graduates currently use mobile technology in the clinical setting?
3. What are the perceptions of nurse coordinators, educators and managers of graduate programs regarding mobile technology use in the clinical setting?

In order to answer these questions and to provide a better understanding of the research problem, a mixed method study design with six sequential stages was used. This design combined quantitative with qualitative data (Creswell & Plano Clark, 2011; Creswell, 2015). Data collection for the quantitative phase used an
online survey, whilst focus groups used an online text-based questionnaire. The questionnaire was developed using the findings from the survey. This approach uncovered limitations of one approach that was corrected or balanced by the other (Creswell & Plano Clark, 2011).

A number of themes were uncovered from the results and findings of the study, which explained factors influencing graduates clinical use of mobile technology. The synopsis of themes are presented in the following headings: usefulness at the point of care; covert use; bridging the gap from University; a personal mobile technology preference over ward PC’s; policies and guidelines; the influence of others; & support initiatives.

**Usefulness at the point of care.**

A major factor that influenced the graduates to use mobile technology was its usefulness at the point of care. Most importantly, graduates felt their safety and quality of care was improved. A reason for the perceived improvement in safety, may be linked to being able to access unfamiliar medications. These results match those observed in earlier studies with undergraduate nurses (Farrell & Rose, 2008; George, Davidson, Serapiglia, Barla, & Thotakura, 2010; Hudson & Buell, 2011; Koeniger-Donohue, 2008; Patillo, Brewer & Smith, 2007; Secco, Jamieson, Profit, Bailey, Brennick, Whitty-Rodgers, 2010; Wu & Lai, 2009).

The Technology Acceptance model (TAM2) posits that both social influence processes and cognitive instrumental processes influence technology acceptance (Venkatesh & Davis, 2000). Whilst there was no single factor that significantly influenced graduates to use mobile technology in the clinical setting, both social and cognitive variables were influential. Graduates valued ease of use and its usefulness, which led to their intention to use (Davis, Bagozzi & Warshaw, 1989). Ease of use was probably related to graduates familiarity with mobile technology having learnt the benefits they offered during their undergraduate program. In a study, using student nurses as participants, a similar finding suggested that there was a general perception that technology was useful and easy to use (Williamson & Muckle, 2017). The job relevance and usefulness of using mobile technology at the point of care
corroborates an earlier study which found that mobile technology use in healthcare enhanced patient safety; improved care quality; and increased efficiencies (Scott, 2017; Strudwick, 2015).

Graduates were in the process of gaining more confidence with their time management, which they believed increased when using personal mobile technology at the point of care. As an example, one student was told to access a point of care resource that was at another end of the ward, when they had a more up to date resource on their own mobile technology device at the bedside. Similar findings concerning time management have been reported in a previous study using undergraduate nursing students (George, Davidson, Serapiglia, Barla & Thotakura, 2010). From a nursing students’ perspective, they found more time was actually spent with patients, by looking up information to improve quality of care, which enhanced patient safety (Grabowsky, 2015).

The majority of graduates felt that clinical use of mobile technology improved their learning and felt the transition of theory to practice was improved. Although other studies have used undergraduate students as participants, they have concluded similar results (Farrell & Rose, 2008; George, Davidson, Serapiglia & Barla, 2010; Koeniger-Donohue, 2008; Patillo, Brewer & Smith, 2007; Wu & Lai, 2009; Secco, Jamieson, Profit, Bailey, Brennick, Whitty-Rodgers, 2010; & Hudson & Buell, 2011).

Whilst nurse leaders agreed with the graduates that clinical use of mobile technology for learning offered benefits for education, some were more concerned that graduates would spend less time with the patient. By contrast, graduates reported spending more time with patients, as they could use the resource at the point of care. This finding compares favourably with a study of student nurses found more time was actually spent with patients, by looking up information to improve quality of care with enhanced safety (Grabowsky, 2015; Koeniger-Donohue, 2008; Johansson et al., 2013). They also felt that using their mobile technology at the point of care improved their self-confidence. This benefit linked to previous literature with undergraduate nursing students (Goldsworthy, Lawrence & Goodman, 2006; Johansson, Peterson & Nilsson, 2013; & Wu and Lai, 2009).
This study demonstrated interesting differences in the gender of graduates in the clinical use of mobile technology. More males than females felt their organisational skills, performance, and learning were improved with the use of mobile technology. They perceived a high quality of output, indicating mobile technology was important for their job. These findings link to previous research, which has revealed that gender plays a significant role in determining the intention to accept technology (Goswami & Dutta, 2016).

Moreover, a significant finding was noted where more males than females indicated that clinical mobile technology use, did not require a lot of their mental effort. This finding links to previous research into technology acceptance, where women used technology when there was less effort required (Venkatesh & Morris, 2000). In addition, previous research links to social influence effect, where females were more sensitive to the suggestions of their peers. Within the context of this study it was evident that nurse leaders influenced the clinical use of mobile technology and created apprehension for some graduates. This finding was similar to TAM2 studies, which suggested that influence of peers was stronger when forming an Intention To Use (ITU) the technology (Venkatesh, Morris, Davis, & Davis, 2003). The same study also revealed that females were more anxious than men when it comes to using technology. This resulted in a reduction in their perceived self-effectiveness leading to increased perceptions of the effort required to use the technology (Venkatesh et al, 2003).

Personal use of mobile technology at the point of care, may assist in meeting standard four of the National Safety and Quality Health Service (NSQHS) standards for healthcare settings and may assist in reducing medication errors for nurse graduates and students. The ACSQHC stated that systems should be developed considering local circumstances, with consideration of individual roles and resources using information technology, equipment, staff, education and training (ACSQHC, 2012). Further research into this area would assist in confirming the perceived improvement in safety for medication administration for graduates, when using their personal mobile technology at the point of care.
Covert use.

A common theme that emerged from the study was the covert use of mobile technology. Harking back to their student days, graduates remarked that despite the University dictating they were not permitted to use their mobile phones when on clinical practice, they used them covertly. The majority of graduates valued using mobile technology and indicated they used the resource for their learning whether they were encouraged to or not by the University. The finding suggests the benefits of use outweighed the risks of being reprimanded by some senior staff who may not have been supportive. Despite potential restrictions during clinical practice rotations as students, graduates found clinical use of mobile technology improved their transition of theory to practice. Previous research also identified that nursing students covertly use mobile technology, and that it was the culture of the unit or ward that was an influencing factor (Doyle et al. 2014; Strandell-Laine, Stolt, Leino-Kilpi, Saarikoski, 2015; Pimmer, Brysiewicz, Linxen, Walters, Chipps, & Gröhbiel, 2014). Furthermore, previous research conducted from in-depth interviews with nurses across thirteen hospitals in the Philippines found that even when policy restricted clinical use of mobile technology, nurses perceived the benefits outweighed the risks of being ‘caught out’ by nurse leaders. The study found that mobile technology use was instrumental for the nurse’s role, and although its use was prohibited by most hospitals, nurses justified their covert use for clinical purposes and for the benefit of their patients (Bautista & Lin, 2016).

The covert use of mobile technology depended on ‘who’ was around at the time, and whether senior nurses were supportive. Senior nurses and managers also influenced their use (Bautista & Lin, 2016). Graduates in this study also indicated they were also having to prove to their nurse managers and peers they were professionally using their personal mobile technology.

Additionally, the use of clinical mobile technology and support for its use varied between the hospital sites. Differences were noted between graduates clinical use of mobile technology based on the location of their graduate program. When it was used for accessing information, apps were more valued at some hospitals than others. In addition, some hospitals, encouraged of clinical use of mobile technology for learning and education.
Bridging the gap from University.
As students, the majority of graduates used mobile technology on a daily basis for learning within their undergraduate degree. As such, the graduates found it provided a bridge from University to clinical settings. During this transition phase, graduates often accessed their University notes and resources online through the ‘cloud’. This finding was consistent with studies concerning student nurses use of mobile technology. Similar to graduates, students found online mobile technology more useful than text-based resources, and were more likely to access evidence based resources (Kuiper, 2008; Williams and Dittmer, 2009). It could be argued, that graduates confidence increased in the application of theory to practice, since they often shared resources and encouraged professional use with other nurses and multidisciplinary colleagues.

Graduates valued mobile technology for enhancing their learning in both the academic and clinical environments. They suggested that mobile technology for learning had higher value in some universities compared to others. Previous research has been conducted into integrating technologies into nursing curricula, with many nursing bodies and associations encouraging its use (CASN, 2012; National League for Nursing, 2008; Sigma Theta Tau International Honor Society of Nursing (STTI), 2006; & The International Council of Nurses (ICN), 1997). Currently, competencies in informatics and mobile technology are required to prepare students for evidenced based practice and safe nursing care prior to professional practice (CASN, 2012; Hebda & Calderone, 2010).

Personal mobile technology preference over ward PC’s.
As previously mentioned, mobile technology within this study encompassed any portable mobile devices that can connect to the Internet. These may include any items such as smartphones, tablets, laptops and iPads. In the clinical setting access to the Internet is gained by using the ward PC. Information regarding patient care, hospital policies, guidelines and protocols are also stored on the ward PCs. Both the graduates and nurse leaders found accessing ward PCs a challenge especially in public hospitals such as SCGH, RPH and FSH. This limited access may have been associated with competition from other health professionals (Guillot & Pryor, 2007).
Such challenges, however, were less in the newer FSH, which had computers on wheels (COW’S). Fiona Stanley Hospital had been touted as WA’s first paperless fully digital hospital, with some healthcare clinicians preferring to enter their clinical data on the COW devices instead of the ward PC (McDonald, 2015). Although potentially having access to more PC’s and COW’s at this site, graduates still valued access to their personal mobile technology for clinical use.

The graduates noted that when they were students, they had limited access to ward PCs as they had not been given a login password. This meant that vital Internet resources, test results and other ward policies and guidelines were unavailable. This factor may have led to the covert use of their personal mobile technology and continued once the student graduated.

**Policies and guidelines.**

One hospital had a policy for clinical use of mobile technology, but generally, graduates were unsure if policies or guidelines existed. They felt ‘stuck in the middle’ without clarity. Nearly half the graduates indicated they felt unsure whether nurse managers or senior management supported them in using mobile technology and that nurse leaders often vacillated between being supportive and unsupportive. This stance may have been associated with the lack of a policies (Beauregard, Arnaert, & Ponzoni, 2017).

In relation to hospital support, most graduates felt unsure if their hospital library supported the use of mobile technology. Generally, however, University libraries attempt to match subscriptions to point of care to the hospital library subscriptions for healthcare staff use. This provides a useful assistance in bridging the transition from healthcare student to graduate. A possible explanation for graduates being unsure about library resources could be related to the lack of adequate orientation to the library, or a lack of clarity in the use available resources. An important finding, relating to the low levels of perceived support from the hospital, was that most graduates would have valued clear guidelines or policies that directed the clinical use of mobile technology.
Graduates indicated they felt unsure if they could use mobile technology for patient education. The opportunities for such use could be realised with clear policies or guidelines concerning their use in the clinical area. Elsewhere, other studies have revealed that mobile technology plays a very important role in patient education and self-management of disease (Mosa, Yoo & Sheets, 2012; Schnock, Ravindran, Fladger, Leone, Williams, Dwyer, Vu, Thornton & Gazarian, 2017).

Most graduates used mobile technology frequently at the point of care and were keen to engage further with patients and their family using this resource. It is argued in the literature, the use of mobile technology resources in healthcare settings, has enabled new opportunities for developing patient-centred approaches to care. In addition, mobile technology resources such as eHealth education and for health promotion would empower the patient to manage their health and would strengthen the nurse-patient relationship (Mather & Cummings, 2015).

Nurse leaders were uncertain about who they felt should guide clinical use of mobile technology. This indecisiveness could be related to the lack of clear guidelines/policies, or the personal preference of the senior nurse leaders. Previous studies have indicated that most policies and guidelines for the personal use of mobile technology in clinical settings were based on professional expert recommendations, rather than research findings (Moyer, 2013).

**The influence of others.**

Most graduates regularly observed other health professionals and patients using mobile technology in the clinical area. The majority of graduates, however, were concerned that other staff and patients may think they would be using it for unprofessional reasons. This finding supported the suggestion that staff and patients could perceive that the device was being used for personal or social reasons (Mann, Medves, & Vandenkerkhof, 2015).

The term ‘Image’ as a TAM2 variable within social influences, was defined as ‘the degree to which use of an innovation is perceived to enhance one’s . . . status in one’s social system’ Moore and Benbasat (1991, p. 195). Within this study, some graduates believed that it was acceptable to use mobile technology at a patient’s
bedside since they observed doctors using their mobile phones. Similarly, they indicated that younger staff shared mobile technology resources for clinical applications, and that this use reflected the future of healthcare. It would seem that younger staff influenced the perception of cultural change concerning the acceptance of mobile technology for use in clinical settings. Thus, it is conceivable that as a consequence, younger staff enhance a graduate’s social status. This supposition would align with the TAM2 framework.

In contrast, within the context of this study, professional image displayed by graduates using mobile technology at the point of care, was concerning to both graduates and nurse leaders. Graduates were apprehensive that patients and other staff may think they were using their mobile technology unprofessionally. Some nurse leaders also pointed to their perception that graduates clinical use of mobile technology at the point of care was unprofessional remarking that graduates should be focussed on patient care. Such a perception seems inconsistent, since it has been demonstrated that graduates use their mobile technology to effect better patient care.

Graduates clinical use of mobile technology was directed by a variety of people, which may include peers, nurse leaders, and other multidisciplinary team members. Inconsistencies in guidance and direction, however, lead to discrepancies in levels of support and to covert use of mobile technology. Nurse leaders provided examples of their own clinical use of mobile technology, which impacted how they delivered clinical education to graduates.

Some nurse leaders did not support clinical use of mobile technology, where others were very supportive. Graduates observed younger nurses and multidisciplinary team members using mobile technology more frequently than older staff within the clinical area. This observation may be related to older nurses not using such technology during their student nurse days and had not had the opportunity to up-skill. This finding concurred with a similar, recent finding which suggested that nurses aged 50 years were less likely to use a smartphone in acute care settings and did not agree with the benefits of smartphones (Flynn, Polivka, & Behr, 2017).
Graduates thought that a cultural change was occurring within clinical settings in the use of mobile technology. This was associated with younger staff being familiar with mobile technology. They encouraged each other and shared mobile technology resources for the betterment of patient care. This cultural change has been previously identified as being integral to the modernization of the workplace (Farrell, 2016). Some nurse leaders in this study, in a private hospitals, used iPads for teaching graduates, however, an overall preference for personal mobile technology at the point of care was noted.

Support initiatives.
A major theme from both graduates and nurse leaders was the necessity for hospital support initiatives related to clinical use of mobile technology. Inconsistencies and discrepancies were noted in this study, which created barriers for professional clinical use by both graduates and nurse leaders. Discrepancies between nurse leaders related to ‘who’ is responsible for guiding the clinical use of mobile technology, particularly when there were no specific guidelines or policies for its use. Both graduates and nurse leaders identified the need for a clear policy or guideline for the clinical use of mobile technology. Such a requirement was also recognised by a recent study that focused on the perceptions and experiences of nurse managers in British Columbia relating to Bring Your Own Device (BYOD). The study suggested that a specific policy including boundaries and expectations was required to address how personal mobile technology should be used in clinical settings (Martinez, Borycki, & Courtney, 2017).

Within this study, inconsistencies were noted in the nurse leader’s responses in how they supported clinical mobile technology use. Most graduates, however, found mobile technology useful in the clinical setting at the point of care. Recent literature also highlights a difference in perceived benefits, where a study of nurse leaders in the U.S. into the clinical use of personal mobile technology with staff suggested more concerns than benefits. The study, however, suggested caution for the implications of the findings, suggesting clinical nurses at the point of care who were not included in the study may find significant benefits (Brandt, Katsma, Crayton, & Pingenot, 2016).
Graduate responses in the qualitative phase, indicated an overall hospital response was required to assist in shifting the culture on the wards in regards to clinical use of mobile technology. An example was provided by a graduate which interestingly, matched the innovations in Canada whereby posters and staff inservices support the professional use of mobile technology in the clinical settings (Registered Nurses Association of Ontario [RNAO], 2017). Similarly, in comparison to other studies, when nurses felt their organisation had high levels of facilitating conditions of both physical and technical infrastructures supporting the use of the technology, high levels of technology acceptance was noted (Aggelidis & Chatzoglou, 2009; Asua, Orruno, Reviriego, & Gagnon, 2012). The authors of a study involving both nurses and medical staff, noted these facilitating conditions included: support and technical help when the technology was implemented, available equipment, and importantly end-user involvement in the decision making process (Asua, Orruno, Reviriego, & Gagnon, 2012).

The influence of others on graduates’ clinical use of mobile technology was a significant finding within the study. This influence extended to the extent and in what ways it was used. Support from hospital authorities was highlighted with graduates providing tangible examples of how they preferred the support to occur and when transitioning from students to graduates. An important and recent study found that educators enhance the benefits of mobile technology use in academic and clinical settings as experienced by the students. This can be through improved delivery methods, practice methods, and strategies to keep students engaged and prepared. It is argued that these initiatives would ensure that nursing students are even more prepared for the transition into the clinical workforce (Williamson & Muckle, 2017). Strategies to enhance the clinical use of mobile technology, included having preceptors and nursing staff who were competent in using the resource (Hudson & Buell, 2011).

**Conclusion**

The blending of findings provides support for the premise that clinical use of personal mobile technology, assists in bridging the gap in learning from University to clinical settings for nurse graduates. Findings also suggest that significant
inconsistencies and discrepancies exist in clinical settings for graduates. Some of these inconsistencies and discrepancies include the lack of clear policies or guidelines, differences in levels of support and direction from nurse leaders and senior staff, and an overall lack of support and guidance from the hospital sites within the study.

The covert use of mobile technology was associated with the inconsistencies of nurse leader’s directions. Their influence was an overriding concern of the graduates as they experienced mixed messages. Based on these mixed messages, they often had to hide and covertly use their mobile technology. Other healthcare professionals also communicated these mixed messages as they were often observed using their smart phones in at the point of care. As such, these people unwittingly acted as role models.

Added to these issues, was the concern that patients would think the graduate was behaving unprofessionally if they used their mobile technology at the point of care. Interestingly, it is noted that in today’s social climate, many patients use their mobile technology to investigate their condition and self-diagnose. Additionally within this study, graduates noted high use of the patients own mobile technology in their bed spaces. A major concern of the graduates, however, indicated a fear that other staff and patients would think the graduate was unprofessional by using their own personal mobile technology.

Whilst younger staff were supportive, older staff tended to mistrust the personal use of mobile technology. This finding may have been associated with nurse leader unfamiliarity with the benefits of using mobile technology at the point of care, or alternatively, it might be that they had not learnt how to use the technology as part of their own training.

The most obvious finding to emerge from this study was that nurse graduates found personal mobile technology use in clinical settings relevant and useful for their roles. It was the relevancy and usefulness related to patient care that graduates justified their covert use of mobile technology. Perceived benefits of using mobile technology from the graduates’ perspective included: improved self-confidence; time efficiency; improvement in safety and quality of care; and an improvement in
organisational skills. These factors may have influenced a graduates’ intention to use mobile technology. The findings of the study enhance understanding of the TAM2 social and cognitive variables that influence graduates use of mobile technology use in clinical settings. In general, this research extends nurses’ knowledge and the methods that graduates use their mobile technology in the clinical settings. It also suggests that both social and cognitive factors are influential in its use. The present study confirms previous findings in the literature and contributes new and valuable additional evidence that has implications for healthcare organisations and universities that offer undergraduate nursing programs.

**Limitations of the study**
The present study explored graduates’ clinical use of mobile technology. Thus, given the setting and design of the study generalisability of the findings are subject to some limitations. These may include:

- Within the quantitative survey, the Cronbach’s alpha score was low for one of the section headings: ‘mobile technology use by nurses, other health professionals and patients’. Cronbach’s alpha for the questions within this subheading were low at $\alpha=0.517$. The researcher considered removing this subheading from the analysis due to the low internal consistency score. It was noted however, that trends in question responses were also confirmed in the qualitative findings. For example, questions regarding policy and guidelines within this section were related to themes and subthemes in the qualitative stages. As section one only utilised frequency and percentages, this subheading was left in the study for the benefits noted in the qualitative phase. If this study is replicated, it will need further review of these subheading questions to gain an improvement in the internal consistency.

- Although the study contained a relatively small sample size, most of the results were significant. The significance observed indicated meaningful effect sizes. With a small sample size, however, caution must be applied, as the findings might not be transferable. In addition, as the study was presented in Western Australia, the findings may not relate other healthcare service sectors, or other universities nationally or internationally. As similar findings were noted in this study to literature
from around the world, however, the significance of the results may be applicable to other settings.

- The literature uncovered a number of other challenges to the clinical use of mobile technology such as issues of infection control, and risks relating to social media in healthcare settings. These issues were not found, but might be important to pursue in the future especially when developing guidelines and policies for the clinical use of mobile technology.

- This study did not involve older senior nurse peers in the design. Further research may benefit from this group’s perspectives, since it uncovered older nurses particularly nurse leaders influence graduates.

- As participants were employed in Perth metropolitan hospitals perspectives of graduates in outer city hospitals and in country/rural areas were not sought. Thus, findings may not be as transferrable to these settings. Further research could focus on the perspectives of country and rural areas.

- During the data collection phase for the quantitative survey with graduates at one of the hospital sites, it was noted graduates commenced the online survey, but their time was cut short accidently due to time constraints. This meant that graduates had completed only half of the survey, with most not completing section two (TAM2). An average time frame calculated form the survey website would assist in future planning.

- Nurse leader’s perspectives were only collected in the qualitative phase of the study. Future research may benefit from quantitative surveys and would add more significance to qualitative findings.

- The TAM2 did not include voluntariness as a social influence in the present study. Voluntariness has been defined as the extent to which potential adopters of the technology or system perceive the adoption decision to be non-mandatory (Hartwick and Barki 1994). Voluntariness was used by the original authors of TAM2 as a moderating variable to distinguish between mandatory and voluntary usage of technology (Venkatesh & Davis, 2000). As clinical mobile technology use by graduates was a voluntary decision to adopt or reject, a comparison to mandatory usage was not applicable.

- Similarly, the TAM2 variable of experience was not included within the present study as a measured variable in the TAM2. The original authors of TAM2
found in their study, that as individuals gained direct experience with a system or technology over time, they relied less on social information in forming perceived usefulness and intention (Venkatesh & Davis, 2000). These results, however, were mainly applied to mandatory technology. As previous research (Davis et al. 1989) was found to have a less significant role on social influences such as voluntariness and experience in voluntary contexts, a decision was made to exempt these variables. Fisher’s exact tests were applied to the demographic of time frames within the graduate program, which revealed mixed results.

**Implications and recommendations of findings**

The findings of this study have a number of important implications for future practice and research. Thus, recommendations from study link into clinical, education and research considerations. The following recommendations include:

**Clinical.**
- A need for policies and/or guidelines that support clinical use of mobile technology. This would aid all staff in guiding the professional use of such technology. This initiative may reduce the current covert nature of its use by graduates. For example, policies or guidelines may need to be formulated at a broader Health Department level for public hospitals, to reduce inconsistencies and discrepancies noted within the study between the hospital sites.
- The involvement and engagement all relevant parties would be important when developing the policies and or guidelines, to gain a balanced perspective. Such people could include for example, end users such as the graduates, nurse leaders, IT staff, and academic staff from universities.
- Should policies or guidelines become available, then it would be the hospitals’ responsibility to inform all staff. As demonstrated successfully from the literature in Canada for example, posters informing patients and visitors of the safe and professional use of mobile technology by staff may be useful. As a cultural shift is already occurring for education and clinical use of mobile technology with younger nurses and within the multidisciplinary team, their influence on older staff could be an important issue to consider. As suggested in the findings, ward in-service sessions demonstrating positive and professional use
in clinical settings, may assist in changing culture for older staff who may not be as familiar with mobile technology as a point of care resource.

- Hospital library departments may need to liaise with nurse leaders for clarity in what resources and mobile subscriptions are available for nurses at the point of care.

- A review of ward PC access for nursing staff may need to occur, due to the many challenges highlighted with access noted within the study. In addition, when the graduates were students, they faced issues with accessing ward PCs. A review of student access permission to essential ward PC based systems such as blood results, policies and guidelines may need to be conducted for students to access.

- When policies and guidelines are available, graduates may benefit from additional support for mobile technology use as a link from University to the clinical settings. An orientation that includes examples of professional, versus unprofessional use may be useful. Involving the hospital library staff to promote subscribed point of care resources available for all staff access, may reduce inconsistencies within the multidisciplinary team as to who can use these resources and to what extent in the clinical area. This initiative may assist in further bridging the gap between learning at University with point of care resources and what is available within clinical settings.

- Public hospitals should consider trials of portable devices such as iPads for use at the point of care. Building on the innovation from the private hospital sites, nurse leaders found these useful for flexible learning with graduates. Hospital support and training would be required, however, as challenges such as poor Internet access still exists at some sites. More research may be required, however, as graduates may prefer their own familiar device that conveniently fits into their pocket for use at the point of care.

**Education.**

- Academics and hospital clinical educators/nurse leaders should work together to support transitions and bridge potential gaps in learning. This initiative is also based on motivations from nursing organisations and the need in industry for e-resources on mobile technology for patients and significant others. In addition, an
aim would also be to reduce the ‘covert use’ noted within the study, so students and graduates can feel empowered to use mobile technology professionally and appropriately when transitioning from University to clinical settings.

**University settings.**

- The encouragement of ongoing links with nurse academics and nurse leaders in clinical settings for clarity in encouraging appropriate, and agreed point of care resources. This would also encourage innovation and sharing of ideas and resources.
- A review of clinical practice rotation guidelines for student nurses in relation to the clinical use of mobile technology should be undertaken. It should be noted that graduates face challenges relation to use of personal smart phones being used by others in the clinical setting and passwords to PCs were not forthcoming when students are on their clinical rotation. Increased flexibility for students may be required by universities in the use of mobile technology on clinical practice rotations, as resources gained from University and from other nurses provided many perceived benefits noted at the point of care.

**Research.**

- An important issue for future research would be the association of personal, clinical use of mobile technology and the perception of improving medication safety. Further research is recommended should be conducted to investigate the link between using mobile technology at the point of care and the prevention of medication errors.
- Replication of this study on graduates in the rural areas of WA could benefit the progression of nursing knowledge and better patient care.
- Replication of this study with other health professionals could also benefit others in the multidisciplinary health care team.
- The perspectives of patients and significant others when staff are using clinical mobile technology would be valuable, as significant benefits highlighted by the graduates in this study may also be elicited by these groups.
- Future research in the use of mobile technology in nursing may benefit from the use of the TAM3 model, which combines TAM2 and the model of the determinants of perceived ease of use (Venkatesh & Bala, 2008).