iMidwife

midwifery students' use of smartphone technology as a mediated educational tool in clinical environments

DeLeo, Annemarie; Geraghty, Sadie

Published in:
Contemporary Nurse

DOI:
10.1080/10376178.2017.1416305

Published: 04/07/2018

Document Version
Peer reviewed version

iMidwife: Midwifery students use of smartphone technology as a mediated educational tool

Abstract

Background: The increasing use of smartphone technology in health care provides midwifery students with unprecedented access to online resources that facilitates the optimal care of women and supports ongoing learning.

Problem: A small pilot study was conducted in Western Australia, with 30 undergraduate and postgraduate midwifery students, to explore the use of smartphone technology whilst in clinical practice.

Aim: This study aimed to define the impact of smartphones in clinical decision-making and learning whilst in clinical areas, by midwifery students at the point of care.

Methods: An online survey with questions relating to midwifery students' use of smartphones during clinical practice was used to collect data from undergraduate and postgraduate midwifery students.

Findings: Five consistent themes were identified from the results. Smartphone technology encourages self-directed learning, consolidation of theory, engagement through blended learning, complements online education in clinical practice, and is a trend in the future of midwifery curriculum.

Conclusion: Smartphones enhance the learning and mobility of supportive resources that consolidate midwifery students' clinical experience in workplace environments.

Keywords: Smartphones, Midwifery, Learning, Education

Introduction

The rapid growth of information technology in health care has created new opportunities for innovation and the integration of smartphones in clinical practice. The increasing use of smartphones, as a tool for sourcing contemporary, evidence-based information, improves communication capabilities and accessibility to global platforms relevant to health care (BinDhim and Trevena, 2015). Smartphones have created new directions for learning and teaching, with students enrolled on healthcare higher education courses showing enthusiasm to extend educational platforms through the mobility of technology, accessibility of information and flexibility in the learning process (Briz-Ponce et al., 2016). Combining the use of smartphone technology with clinical skills in healthcare environments, facilitates clinical practice at the point of care (Mi et al., 2016). In exploring the capabilities and accessibility of retrieving evidence-based information, contemporary midwives can create learning environments that connect birthing women and midwives at all stages of the childbirth process (Hendricks et al., 2016). The sharing of information, and utilizing prompt access to resources, allows midwives to be with women, learn with women and educate women to facilitate informed decision-making; strengthening the woman-midwife partnership.

The increasing use of digital technology in health care, suggests midwifery students have unprecedented access to online resources, that facilitates the care of women, and also supports ongoing learning and midwifery professional development (Mikkonen et al., 2016, Shaw-Battista et al., 2015). Smartphone technology can directly access information through various online platforms and knowledge-based websites, in order to provide prompt information, evidence-based knowledge, and guidance in the clinical environments. The integration of smartphone technology into clinical practice has been described as a visionary concept for the future of midwifery; embracing a new style of information seeking, whilst contributing to raising the profile of midwifery as a progressive profession (Hoope-Bender et al., 2016).

Midwifery students experience many new challenges when learning the skills required for midwifery practice. The connection of knowledge, with practical skills in real-world health care, is often shadowed by rapid exposure to complex care issues and overwhelming workloads (Milligan et al., 2016, Reale et al., 2016), which may leave students feeling stressed and incompetent at a woman's bedside. Smartphones have the capability to improve students' confidence and learning through instant access to learning platforms, supporting the role of a preceptor to aid decision-making and care of women in a practical environment. Merging theory with practice has been shown to create an opportunity for student learning, and having instant access to information and evidence-based knowledge facilitates self-directed learning and confidence in students' own abilities to provide a high standard of care in clinical practice (Raman, 2015). Exploring the use of smartphones by midwifery students provides an insight into the supportive needs of students on clinical placement, and the true value of smartphone use by the bedside.

The impact of smartphone technology on midwifery students' learning has the potential to influence future trends for university education and clinical practice in health care settings. Adapting current teaching strategies to support this evolution of technology creates innovative learning environments and improves patient outcomes without compromising quality care and the partnership between women and midwives (Forehand et al., 2016). Connectivity between university and clinical placements provides an opportunity for integration of theory with clinical experience, which improves the knowledge and education of midwifery students as they transition from midwifery student to registered midwife. It has also been suggested that this type of learning experience permits students the flexibility, and opportunity, to undertake responsibility for self-directed learning and professional development that is unique and tailored to suit individual learning needs (Arbour et al., 2015).

The continual progression of application (apps) developments relating to midwifery and obstetric care of women, generates an alternative means of acquiring information through downloadable programs for individual use. Apps are available through various platforms to assist information retrieval and can serve multiple uses depending on individual needs. Medical apps continue to be developed and improved in regard to information access in pharmacology protocols, diagnostic assessment tools, evidence-based research and professional governance (Hussain et al., 2015). Women also access digital media to source information relating to pregnancy and childbearing using apps, blogs, discussion forums and social media (Lupton, 2016). This provides insight into the variety of applications sourced by both healthcare providers and consumers. Application developments are limited only by the imagination and knowledge of developers and will continue to surge as technology advances. However, given the intimate nature of midwifery, apps related to midwifery and childbearing should be credentialed by regulation from governing authorities to ensure information provided is accurate and current (O'Connor and Andrews, 2016). There is also scope for the development of apps specific to the needs of midwifery students; facilitating their learning through online information and personalized functions that cater to individual learning needs, enabling transfer of knowledge to support competence and confidence.

Competition between medical and midwifery students for 'hands on' experience in birth and intrapartum procedures also lends itself to smartphone technology, as simulation experiences are currently being piloted for the acquisition of clinical skills (Lindsay-Miller et al., 2015). This enables students to gain proficiency in skills through virtual scenarios, simulated birth, complex care emergencies and a range of clinical skills that would normally be limited opportunities during clinical experience. Additionally, reports regarding the development of smartphone learning in clinical environments, suggests that it provides students' with a tool for understanding obstetric events as they happen, enabling prompt retrieval of information at the time to support their experience (Rashid-Doubell et al., 2016, Buchholz et al., 2016).

The popularity of smartphones extends to the consumer; with increasing numbers of women now actively seeking information relating to pregnancy and birth. Accessibility to online information forums predicts a shift from traditional maternity care to a new era, where midwives direct women to online health apps for education and health promotion, traditionally a primary role of the midwife (Lee, 2016). Policy makers are yet to set firm guidelines for the use of smartphone technology in obstetrics, however, it is recognised that there is a need to integrate smartphone technology into maternity care (Carissoli et al., 2016).

Methods

This study was conducted using a mixed methodology approach, surveying student midwives' using a questionnaire that facilitated both qualitative and quantitative responses. This gave the researchers valuable insight into students' individual experiences with smartphone technology in midwifery clinical areas, while providing quantitative data on environmental factors, popular mobile applications, user accessibility and professional governance. Midwifery students were encouraged to express their experience of people's perceptions towards their smartphone use whilst on clinical placements, emphasizing a gap in governance relating to the use of mobile phones in various clinical settings and (a negative) workplace culture being relevant and influential to smartphone use during clinical practice.

The rationale for using a mixed-methods methodology is in the researchers intention to focus on student midwives' experiences with using mobile phones in clinical settings, while developing quantitative data for investigation regarding technology and the transition of mobile health applications into clinical practice and tertiary governance.

Setting

This pilot study was conducted at a University in Perth, Western Australia.

Sample

Undergraduate and postgraduate midwifery students, enrolled on midwifery courses at one University, were offered the opportunity to participate in the online survey. The number of midwifery students enrolled in the University was 76, and a total of 30 participants responded, resulting in a 23% response rate. This was a satisfactory number of participants, as qualitative studies can achieve information-rich data from small numbers of respondent participation (Whitehead and Whitehead, 2016). Midwifery students enrolled during the time of the study were predominantly female and ranged between18 and 55 years of age.

Data collection

A 10 question self-administered online survey was used to obtain data from the midwifery participants, including two Likert-scale questions regarding demographic information. Opportunity was given through 'textboxes' for participants to provide additional information on their experience and thoughts regarding the value of smartphones during clinical practice. It was also an opportunity for students to express their support and concerns for integrating smartphone technology into university curriculums. An online survey offered a cost and time effective approach; furthermore, it allowed the researchers access to a greater sample of participants.

The survey questions did not request personal identification, in compliance with ethical considerations for students' anonymity. The researchers considered participants' time and resources through recruitment strategies, opting to use university software (Qualtrics), for the data collection from the online survey, and providing students with the benefit of accessing the survey at a convenient time and place through their own personal devices. Recruitment ceased approximately eight weeks after being distributed, and one reminder email was sent to all participants prior to the study closing.

Data Analysis

Data analysis was completed using Qualtrics, a web based research software, available to the researchers within the University, that automatically constructed graphical data from the information the participants provided. The participants' written material, collected from the text-boxes in the survey, led to the application of inductive reasoning and the formation of themes from interpretation by the researchers. Graphs were used as a visual aid to support written responses, providing more meaningful data and analysis.

Ethical considerations

This pilot study was granted ethical approval from the University's Research and Ethics Committee. Participants were provided with an information sheet, outlining the purpose and design of the study, which opened when the participant clicked onto the survey link. The consideration of confidentiality and anonymity were addressed through written assurance, on the information sheet, that survey responses would remain confidential. Reporting and dissemination of results were clearly outlined and participants guaranteed that all responses would be deleted from the secure website on completion of the study. Participants were invited to contact the primary researcher if further information was required. Participants were informed that they had they right to decline participation by simply disregarding the link to the online survey. Informed consent was assumed if participants chose to participate in the survey.

There were no incentives offered for participation in the study, however, the researchers made reference to the potential benefits of personal reflection from respondent participation, and satisfaction from knowing the pilot study would contribute to the learning needs and education forums of future midwifery students.

Findings

The demographic questions, relating to the midwifery students, indicated that 69% (n=20) of the respondents were aged between 18 – 32 years, and 31% (n=9) were aged 33 – 43 years old. The participants were asked if they intended to work in rural/remote areas or in the metropolitan area upon graduation; 85% (n=25) of participants intended to work in metropolitan hospitals on graduation, and 15% (n=4) said they intended to work in rural / remote areas in Western Australia. This question was asked as Western Australia has a large rural / remote area, where reliance on smartphone / online information may be crucial when providing maternity care. 28% (n=8) of participants stated that they had smartphones, and 6% (n=2) participants commented that they did not own or have access to a smartphone.

Accessibility of information and impact of mobile use in clinical settings

The midwifery students were asked which health apps and websites that they used to access information whilst in the clinical midwifery environments and to assist their studies. The most common answers were hospital guidelines, MIMS online, Google, AHPRA and the University library. However, 86% (n=26) of participants said they felt uncomfortable or were made to feel uncomfortable, using smartphones to access information whilst in clinical practice. A negative culture towards smartphone use impacted students' use of mobile phones in clinical settings. One participant commented:

'I feel uncomfortable using my phone in front of women and colleagues' (SM3).

And another participant stated:

'I am concerned by what women think about using my smartphone in the clinical areas, I worry they may think I'm using Facebook' (SM18).

Information accessed by student midwives'

Six participants said they regularly used their smartphones in the clinical areas to access evidence-based research, calculator apps, dictionaries, and pregnancy related websites. Despite the majority of students feeling uncomfortable with using

smartphones during clinical practice, most participants agreed that health apps and websites were easily accessible and a useful source of information for facilitating learning, when used as a tool in clinical practice. Only one midwifery student strongly disagreed with using a smartphone in clinical practice, and this participant did not own a smartphone.

Smartphones as an educational tool

The midwifery students gave varied responses to using smartphones as an educational tool in the clinical areas. 53% (n=16) of participants said although they used pregnancy related apps and online websites to facilitate health promotion, they did not direct women to them. The reasons given for this included:

> *'I do not suggest women use apps because there are many that are not credible and may provide incorrect information'* (SM21)

> *'I do not want women to 'Dr Google' themselves and be misinformed'* (SM7).

However, 56% (n=17) of midwifery students said they did use their smartphone apps to refer useful websites to other midwifery students, and also as an educational tool during Continuity of Care Experience (CCE) appointments to investigate current trends relating to pregnancy and birth. For example, one student commented:

> *'I check out websites if women ask me questions about a complex condition or have symptoms that I haven't yet learned about'* (SM15).

Another participant presented the idea that:

'by having a smartphone available during clinical practice I can educate myself and women on the most current information relating to pregnancy and birth' (SM21).

Use of mobile technology amongst midwifery students

The participants who used apps on their smartphones stated that they accessed health applications relating to midwifery practice at least weekly, with four participants using websites daily, and one commenting that they accessed health apps more than twice a day. Participants who had smartphones, reported seeking online information regularly that related to their midwifery studies, with one student commenting:

'Smartphones make information so accessible, that's why keep it in my pocket' (SM21).

'Being able to quickly check my University modules, or use the medication calculator to help me with medications has really helped in in the clinical areas' (SM3).

'I had a lady admitted to labour ward with epilepsy, and while she was in the bathroom, I quickly downloaded the hospital policy on caring for women with epilepsy so I could read about what I needed to do and be prepared' (SM12).

Healthcare professionals use of mobile technology in clinical environments

63% (n=19) of participants reported observing other health professionals using smartphones as a tool in clinical areas. Doctors, midwives and medical students were identified as the most common consumers. One participant also noted that as midwifery students were using paperless portfolios for acquiring evidence from clinical practice, it was essential to use a smartphone in clinical areas to complete tasks and practical competencies. The majority of participants stated that smartphones should be accepted as a tool during clinical practice.

Mobile phones as a tool in clinical practice

Participants generally considered the use of smartphones assisted their learning capacity and confidence in clinical practice. Many of the participants expressed benefits in having accessible information that supported decision-making:

'Using my smartphone helps me find background evidence for procedures, interventions and best practice standards' (SM12),

'My smartphone is useful in expanding my knowledge and clarifying things that have come up during my clinical practice' (SM7).

Participants commented on the benefits of using smartphones to assist with breastfeeding education, to clarify blood results, and as a resource for understanding complex conditions. As previously stated, most participants reported that they felt uncomfortable using their smartphones in clinical practice, and some remarked that they had *'no idea'* of policies or standards relating to smartphone use during clinical practice. Two participants commented:

'I have been told it is not allowed' (SM14) and

'My ward manager does not like to see us using our smartphones at work' (SM20).

Governance of mobile technology

Two participants reported that University policy did not allow the use of smartphones while on clinical practice. Another participant commented that mobile phones could only be accessed *on a break* or *with permission from the shift coordinator*. The majority of participants stated that they did not know of any hospital policy relating to smartphone use, however, most assumed it would not be acceptable while in the clinical areas. Participants commented on the negative attitude of hospital management towards smartphone use in clinical areas, and the perceived notion that women would disapprove of midwives accessing their phones whilst working.

Discussion

This study demonstrates the potential for smartphone use in clinical practice to facilitate midwifery students' learning. Research, conducted with nursing students, indicates that access to smartphones offers students the opportunity to engage proactively with patients, share information and improve personal health literacy (Mather et al., 2014). Furthermore, the accessibility of information through smartphone technology, promotes behaviours that support ongoing learning and professional development which are core competencies of the midwife (Nursing and Midwifery Board of Australia, 2013). The transition from midwifery student to registered midwife can be challenging, and work readiness is an essential component of preparation for practice. Complicating this transition is the ongoing advancement of maternity care management, and technology, within primary health settings. Implementing smartphone technology within midwifery clinical environments may support students' learning, which has been recognised as a clinical attribute that will enhance the professional aptitude of midwives, promoting skillsets that facilitate research and evidence-based practice (Missen et al., 2015).

Work Integrated Learning (WIL), is a concept used to describe students' use of smartphones, as a link between University based curriculum and accessing work-related support platforms during clinical practice (Doyle et al., 2014). A study, examining smartphone resources for nursing students, found the use of smartphones supplemented theoretical education and supported clinical practice, that had benefits beyond University classrooms (Mosa et al., 2012). Findings from this review suggested the need for students and health care providers to have instant access to credible sources of information, as health promotion and education are key responsibilities in the professional role of healthcare providers.

Inquiry, into the implementation of best practice through integrating smartphone technology into University education, has transformed its' use as a tool, creating online platforms structured to support midwifery curriculum. From a learning perspective the

use of smartphones has the potential to enhance knowledge by providing students with varied content. Virtual tutorials, audio input, and simulation case studies are innovations currently being used in blended learning midwifery programs (Geraghty and Godwin, 2016). Appropriate use at the point of care may contribute to evidence-based practice, and initiate contemporary care of women, through the translation of knowledge from theory to practice amongst midwifery students (Mann et al., 2015).

Smartphone technology may commonly be mistaken as a disrupting influence in clinical environments, when assumptions are made that students are connecting with social media or text messaging, that appears to be unrelated to professional practice. Perceived negative social feedback is an identified factor, that emphasises positive as well as negative factors of implementing smartphone technology into clinical environments (Davies et al., 2012). To address this, cultural change is required. Smartphone learning and education within clinical environments needs to be implemented into the workplace culture; by embracing smartphone technology as a tool for education and support for students' learning, the use of smartphones within clinical practice would be more readily accepted. Smartphone use may help to motivate informed decision-making, critical thinking and learning by midwifery students. Implementation of smartphone technology to support learning connects students with clinical facilitators and midwifery peers, current education strategies and provides global conversations relevant to midwifery practice (Gikas and Grant, 2013).

There is potential for smartphones to engage midwifery students' creativity and critical thinking, encouraging active learning and sharing of information between students. This was revealed in a study conducted with midwifery students, that sought to develop and refine competencies in antenatal care through a virtual online antenatal clinic (Phillips et al., 2013). In this study, midwifery students were able to discuss their experiences with other students online, in communal forums, that encouraged feedback from both students and clinical facilitators, that were reported as being of value to learning outcomes. This mode of learning is supported by research in clinical

simulation, and is seen as an effective method of education in clinical environments (Briz-Ponce et al., 2016). Other benefits have been noted as increasing knowledge, improved adherence to quality and safety guidelines, and fewer medication errors (Mickan et al., 2014). In supporting the use of smartphone technology at the point of care, midwifery has the potential to connect women with midwives on a new level, and integrate best practice care whilst meeting the requirements of national regulatory guidelines.

Limitations and recommendations

Although this pilot study was relatively small, the information gained provides consistency in the evaluation of midwifery student experiences with smartphones in clinical settings to facilitate learning at the point of care. Participants were recruited from one University in Western Australia, which has potential to give findings less credibility in generalizing attitudes and beliefs of midwifery students across Australia. Further research into the capacity of smartphone technology, to advance midwifery student learning, could significantly change the platforms for learning within clinical environments. As midwifery curriculum transitions predominantly towards online education, further research into developing university accredited apps and smartphone access for all students during clinical placements could be considered, to support learning and develop proficiency in information technology. This would extend students' capabilities in information retrieval to facilitate active knowledge seeking behaviours. Assessment of organisational policy and guidelines would provide structure relating to the use of smartphones during clinical practice, allowing midwifery students access to learning platforms and University websites to support clinical experience.

Conclusion

The use of smartphone technology in healthcare is becoming a common occurrence in clinical environments, facilitating best practice care while supporting staff in clinical decision-making and professional development. Contemporary midwifery students'

benefit from the connectivity between University and clinical practice, with smartphone technology enhancing this link. Smartphones bring a new dimension to learning, providing the mobility of supportive resources, that consolidate students' clinical experience in workplace environments. This study reveals the value midwifery students' place on having instant access to evidence-based research, policies related to midwifery practice and access to online learning tools at the point of care. The findings from this study suggest there are many positive features of smartphone use in clinical midwifery practice that include portability, accessibility and connectivity between students and their capacity to acquire knowledge. Midwifery students support the use of smartphone technology that facilitates a blended learning approach to education, and that encourages self-directed learning through varied knowledge platforms. Smartphones provide opportunity for flexible education and engage students' to actively seek learning opportunities through ongoing study. Incorporating smartphone technology into midwifery curricula would establish a foundation for combining traditional midwifery care with contemporary progression of modern technology.

Highlights

Smartphone use provides midwifery students with instant access to online resources, that facilitates the optimal care of women, and supports ongoing learning
Midwifery students benefit from mobile innovations which strengthen the connectivity between theory and clinical practice and facilitate accessibility of evidence-based knowledge

Smartphone use encourages the mobilisation of education by midwifery students, providing varied learning platforms that enhance knowledge and competence in clinical practice
Using smartphones may create new directions for future education curriculum, and professional development of contemporary midwifery students and midwives
Smartphone use in clinical practice can strengthen the woman-midwife partnership through information sharing, learning and education at the point of care

References

ARBOUR, M. W., NYPAVER, C. F. & WIKA, J. C. 2015. Innovative Uses of Technology in Online Midwifery Education. *Journal of Midwifery & Women's Health,* 60**,** 278-282.

BINDHIM, N. F. & TREVENA, L. 2015. There's an App for That: A Guide for Healthcare Practitioners and Researchers on Smartphone Technology. *Online journal of public health informatics,* 7.

BRIZ-PONCE, L., JUANES-MÉNDEZ, J. A., GARCÍA-PEÑALVO, F. J. & PEREIRA, A. 2016. Effects of Mobile Learning in Medical Education: A Counterfactual Evaluation. *Journal of medical systems,* 40**,** 1-6.

BUCHHOLZ, A., PERRY, B., WEISS, L. B. & COOLEY, D. 2016. Smartphone Use and Perceptions among Medical Students and Practicing Physicians. *Journal of Mobile Technology in Medicine,* 5**,** 27-32.

CARISSOLI, C., VILLANI, D. & RIVA, G. 2016. An Emerging Model of Pregnancy Care: The Introduction of New Technologies. *Integrating Technology in Positive Psychology Practice***,** 162.

DAVIES, B. S., RAFIQUE, J., VINCENT, T. R., FAIRCLOUGH, J., PACKER, M. H., VINCENT, R. & HAQ, I. 2012. Mobile Medical Education (MoMEd)-how mobile information resources contribute to learning for undergraduate clinical students-a mixed methods study. *BMC medical education,* 12**,** 1.

DOYLE, G. J., GARRETT, B. & CURRIE, L. M. 2014. Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation model. *Nurse education today,* 34**,** 775-782.

FOREHAND, J. W., MILLER, B. & CARTER, H. 2016. Integrating Mobile Devices Into the Nursing Classroom. *Teaching and Learning in Nursing*.

GERAGHTY, S. & GODWIN, H. 2016. Evaluating postgraduate midwifery students' experiences of a model of blended learning. *British Journal of Midwifery,* 24**,** 60-63.

GIKAS, J. & GRANT, M. M. 2013. Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education,* 19**,** 18-26.

HENDRICKS, J., IRESON, D. & PINCH, C. 2016. App challenged: Are midwives prepared? *Australian Nursing and Midwifery Journal,* 23**,** 32.

HOOPE-BENDER, P., LOPES, S. T. C., NOVE, A., MICHEL-SCHULDT, M., MOYO, N. T., BOKOSI, M., CODJIA, L., SHARMA, S. & HOMER, C. 2016. Midwifery 2030: a woman's pathway to health. What does this mean? *Midwifery,* 32**,** 1-6.

HUSSAIN, M., AL-HAIQI, A., ZAIDAN, A., ZAIDAN, B., KIAH, M., ANUAR, N. B. & ABDULNABI, M. 2015. The landscape of research on smartphone medical apps: Coherent taxonomy, motivations, open challenges and recommendations. *Computer methods and programs in biomedicine,* 122**,** 393-408.

LEE, J.-H. 2016. Future of the smartphone for patients and healthcare providers. *Healthcare informatics research,* 22**,** 1-2.

LINDSAY-MILLER, J., AVERY, M. D., LARSON, K., WOLL, A., VONACHEN, A. & MORTENSON, A. 2015. Emergency birth hybrid simulation with standardized patients in midwifery education: Implementation and evaluation. *Journal of Midwifery & Women's Health,* 60**,** 298-303.

LUPTON, D. 2016. The use and value of digital media for information about pregnancy and early motherhood: a focus group study. *BMC Pregnancy and Childbirth,* 16**,** 171.

MANN, E. G., MEDVES, J. & VANDENKERKHOF, E. G. 2015. Accessing Best Practice Resources Using Mobile Technology in an Undergraduate Nursing Program: A Feasibility Study. *CIN: Computers, Informatics, Nursing,* 33**,** 122-128.

MATHER, C., CUMMINGS, E. & ALLEN, P. 2014. Nurses' use of mobile devices to access information in health care environments in Australia: a survey of undergraduate students. *JMIR mHealth and uHealth,* 2.

MI, M., WU, W., QIU, M., ZHANG, Y., WU, L. & LI, J. 2016. Use of Mobile Devices to Access Resources Among Health Professions Students: A Systematic Review. *Medical reference services quarterly,* 35**,** 64-82.

MICKAN, S., ATHERTON, H., ROBERTS, N. W., HENEGHAN, C. & TILSON, J. K. 2014. Use of handheld computers in clinical practice: a systematic review. *BMC medical informatics and decision making,* 14**,** 1.

MIKKONEN, K., ELO, S., KUIVILA, H.-M., TUOMIKOSKI, A.-M. & KÄÄRIÄINEN, M. 2016. Culturally and linguistically diverse healthcare students' experiences of learning in a clinical environment: a systematic review of qualitative studies. *International journal of nursing studies,* 54**,** 173-187.

MILLIGAN, F., WAREING, M., PRESTON-SHOOT, M., PAPPAS, Y. & RANDHAWA, G. 2016. Supporting nursing, midwifery and allied health professional students to raise concerns with the quality of care.

MISSEN, K., MCKENNA, L. & BEAUCHAMP, A. 2015. Work readiness of nursing graduates: current perspectives of graduate nurse program coordinators. *Contemporary nurse,* 51**,** 27-38.

MOSA, A. S. M., YOO, I. & SHEETS, L. 2012. A systematic review of healthcare applications for smartphones. *BMC medical informatics and decision making,* 12**,** 1.

NURSING AND MIDWIFERY BOARD OF AUSTRALIA. 2013. Available: http://www.nursingmidwiferyboard.gov.au/About/Statistics.aspx [Accessed].

O'CONNOR, S. & ANDREWS, T. 2016. Nursing Students' Opinion on the Use of Smartphone Applications (Apps) in Clinical Education and Training: A Study Protocol. *Studies in health technology and informatics,* 225**,** 1024.

PHILLIPS, D., DUKE, M., NAGLE, C., MACFARLANE, S., KARANTZAS, G. & PATTERSON, D. 2013. The Virtual Maternity Clinic: A teaching and learning innovation for midwifery education. *Nurse education today,* 33**,** 1224-1229.

RAMAN, J. 2015. Mobile technology in nursing education: where do we go from here? A review of the literature. *Nurse education today,* 35**,** 663-672.

RASHID-DOUBELL, F., MOHAMED, S., ELMUSHARAF, K. & O'NEILL, C. 2016. A balancing act: a phenomenological exploration of medical students' experiences of using mobile devices in the clinical setting. *BMJ open,* 6**,** e011896.

REALE, E., NOONAN, M. & BRADSHAW, C. 2016. An exploration of midwives' perceptions of caring for women with critical care needs in the labour ward setting.

SHAW-BATTISTA, J., YOUNG-LIN, N., BEARMAN, S., DAU, K. & VARGAS, J. 2015. Interprofessional Obstetric Ultrasound Education: Successful Development of Online Learning Modules; Case-Based Seminars; and Skills Labs for Registered and Advanced Practice Nurses, Midwives, Physicians, and Trainees. *Journal of Midwifery & Women's Health,* 60**,** 727-734.

WHITEHEAD, D. & WHITEHEAD, L. 2016. Sampling data and data collection in qualitative research.