An Investigation of the Value Played by Portable Digital Assistants (PDAs) in Increasing Home Care Nurses' Quality of Care: An Evaluation of the Nurses Experience

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Abstract— Study Aim: The integrated review is an evaluation of the role and value of PDAs in increasing home-based nursing care quality. This is developed through an experience of nurses evaluating how it has actually impacted on quality of care among home-based care provider nurses.

Research Methodology: The integrated review developed an integrated literature analysis. Key words were used on peer reviewed data within the search criteria for inclusion and exclusion. Only peer reviewed articles that had a GRADE rating of at least moderate were considered and used in the review paper. A total of 17 peer reviewed articles were identified and used in the study analysis.

Findings: This integrated review demonstrated that the use of PDAs among home care nurses increase their evidence-based practice adherence. This impacts positively on the nurse's awareness levels, understanding of the patients, and aids in reducing medical errors and mistakes. Additionally, the use of PDAs increases home based care nurses learning and career growth opportunities. The PDAs promote chances for peer learning and knowledge sharing.

Implications: The findings indicate that nurses have a positive experience in using PDAs. This is mainly for the PDAs with integrated information sharing system among pees and those who bar code reader on drugs. The healthcare systems and decision makers should invest in providing these PDAs and the relevant operating and functional systems for the home-based care nurses in the future.

Index Terms— PDA use, home care, nurses' experiences.

I. INTRODUCTION

The use of personal Digital Assistants (PDAs) has been on the rise in hospital settings (Divall, Camosso-Stefinovic & Baker, 2013). Physicians, doctors, and nurses are increasingly embracing the use of the devices. However, although the prevalence for use has been high in the hospital set up, studies, and instances of use outside the healthcare facilities is limited. Such areas with a significant yet not at optimal adoption of the PDAs is in homecare healthcare provision set ups (Zurmehly, 2010; Vilstrup, Madsen, Hansen & Wind, 2017). In particular, the use of PDAs among nurses in the home care set up is minimal. These are trends associated with a lack of understanding on the strategic value of the PDAs use, the cost-benefit analysis of the PDAs cost and nurses training against value, and the implications of the PDAs use in improving nurse's quality of care (Chang, Hsu, Liou, Kuo & Lan, 2011). Quality of care in a home care based set up is analysed in the dimensions of responsiveness to the patient needs, reduction and level of medical and care errors, and satisfaction and impact on the practicing nurses. There is a rising need for hospitals and other secondary healthcare facilities to reduce the strain on their facilities and resources and as such decongest. The rise of in-patients has strained on hospital resources including stretching the healthcare providers, thus leading to dissatisfaction, fatigue, and even turnover (Johansson Aarts & Darj, 2010; Gorodeski, 2013).

The handling of chronic illnesses such as cancer and diabetic patients, among others, on a home-based care has been on the rise (Sims-Gould & Martin-Matthews, 2010; Jack, Jenkins & Enslin, 2010). This has added the need for ensuring an increased in-home care quality. Although there are many involved stakeholders in home-based care including the family, patients, physicians, among others, the nurses play a core role in ensuring that all the medications, care, and physicians' requirements are adhered to, Supporting and aiding them in their duty's execution is paramount. With strained and scarce healthcare resources in home-based care programs, prioritising on essential strategies that would create maximum value with available funding. One such aspect has been the use of PDA tools, as basis for improving home-based care quality. Although studies have focused on the perceived implications for such devise use on their quality of care delivery, a shortage of literature has been developed using the nurse's own experiences and reports as a basis of evaluating their interaction with the PDA devices (Zurmehly, 2010 Hudson and Buell, 2011). The implication of this has been the lack of PDA use strategies that are driven by the nurses themselves. Instead, the underutilisation of PDAs among home-based care nurses has been linked to the lack of an understanding of the actual value that the nurses place themselves on their use of the PDAs (Doran, Haynes, Estabrooks, Kushniruk, Dubrowski, Bajnok, Hall, Li, Jedras

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and Bai, 2012).

Aim

The aim of the integrated literature review was to examine the value and implications of using PDAs use among home care nurses, though an evaluation of the nurse's experiences both in using the PDAs and in their work activities. This was to evaluate how the use of the PDAs improved and enhanced the nurse's quality of care to their patients through reinforcing and adding into their skills, expertise, and mode of care.

II. MATERIALS AND METHODS

The literature review data was collected through an online search to four databases, namely the CINAHL, MEDLINE and PROQUEST. The key words used in the review paper data collection were 'nurse*' and 'PDA' or 'personal digital assistant' and 'Home care'. As a limitor, the phrase 'nurses experience' was used as a limitor to ensure that only the studies that focused on the direct responses and experience report by the nurses were used. The three key search phrases were based on the literature review variables. As a search criteria limitor, the study used studies published after 2010, meaning 2010-2020. The inclusion criteria for the studies was publication in the English languages/the availability of an English version, the availability of the entre PDF for the studies, and direct relationship to the study scope and focus. In recognition of Randolph (2009) study that online data bases lead to 10% to 50% of exhaustive literature searches, a manual search on the references of the obtained articles from the key words search was used as an expander tool for the scope of the obtained references. The exclusion criteria were on studies not available in full PDFs and which were published in other languages and without an English version. Any studies that lacked the search key words under their titles or the key words sections were excluded based on a low relevance index. The GRADE model was used to analyse the obtained articles evidence quality

III. FINDINGS AND SEARCH OUTCOMES

The study finding through the select key words led to a total of 27 articles. The elimination of duplication of the articles led to the elimination of 10 articles. This is in addition to the elimination of a further 7 articles that lacked a complete relevance to home care nurses use of PDAs. Thus, the study had a total of 10 articles. Through a perusal of the article's references and biographies, an additional 7 articles were included in the study analysis. This meant that the study findings were based on 17 articles, all peer reviewed and meeting the inclusion criteria. In terms of the study obtained scope, the designs for the adopted studies varied. There were 3 quantitative studies (Doran, Haynes, Estabrooks and Bai, 2012; Johansson, Petersson and Nilsson, 2013; Hudson and Buell, 2011), 3 qualitative studies (Hudson and Buell, 2011; Zurmehly, 2010; Johansson, Petersson & Nilsson, 2011), 1 mixed research design studies (Johansson, Petersson & Nilsson, 2010), 4 systematic review designs (Divall, Camosso-Stefinovic and Baker, 2013; Divall and Baker,

2012; Smith Stoner, 2013; Seemungal & Wedzicha, 2006) and 4 experimental studies (Krauskopf and Farrell, 2011; Scandurra, Hägglund & Koch, 2011; Lee, Hsiao, Chen & Liu, 2010), respectively. The obtained articles were analysed for quality through the GRADE model. The tool grades evidence in an article based on the variables of risk of bias, imprecision, inconsistency, indirectness and publication bias, respectively (Alonso-Coello, Oxman, Moberg, Akl & Guyatt, 2016). This aimed at ensuring that the obtained findings evidence and relationship to the study. Under the model, the study findings were ranked from very low (+) to high (++++). Only studies that were at least of moderate quality were used. Overall, of the 17 studies, 10 were of high evidence grading level and 7 were of moderate grading level. This meant that all the studies qualified for inclusion in the study. The evidence quality was sufficient to inform the study findings and discussions, respectively.

Based on a critical analysis of the findings, two main themes emerged as the core study findings. (i) support for evidence-based practice and (ii) support in learning and knowledge sharing among nurse students and practitioners.

On support for evidence-based practice and emergency response, the findings demonstrated a higher relationship between the use of PDAs and increased quality of care and accuracy and efficiency (Johansson, Petersson & Nilsson, 2010; Smith Stoner, 2013). Nurse were listed as having a better understanding of emergency issues of concern when treating their home-based care patients (Lee, Hsiao, Chen & Liu, 2010). Additionally, it was noted that nurses using PDAs had a better source of data and information to support their decision making, and evaluate relevance of medications and drugs to their patients Lee, Hsiao, Chen & Liu, 2010; Scandurra, Hägglund & Koch, 2011; Seemungal & Wedzicha, 2016).

On the learning opportunities, the studies indicated that the use of PDAs served as a peer knowledge sharing basis and platform (Zurmehly, 2010; Divall Camosso-Stefinovic and Baker, 2013). It also noted that through PDAs use, nurses had a quick platform and a base from which they could retrieve critical information to aid and guide their professional activities. The PDAs also supported home care nursing students in their learning process (Krauskopf and Farrell, 2011; Hudson and Buell, 2011). Collectively, they increased awareness levels, and potential and opportunities for career growth and advancements (George, Davidson, Serapiglia, Barla & Thotakura, 2010).

IV. DISCUSSION

Support Nurses emergency Response Capabilities

The use of PDAs supported an evidence-based practice among home care nurses. In this set up, it is critical that the nurses understand the patients, both their health conditions and their medical history (Seemungal & Wedzicha, 2016). The use of PDAs presents the nurses with an easy and portable basis and tool for acquiring such information (Johansson, Petersson & Nilsson, 2010; Smith Stoner, 2013). This is mostly important in emergency situations where the nurses need to make strategic decisions on their home care

patients within a limited period of time to consult the respective hospitals and physicians. Instances are in the case of handling Diabetic patients. An experimentation process indicated that nurse with PDAs had a better control of the patient's emergencies (Lee, Hsiao, Chen & Liu, 2010). This was due to the case of access of information through the PDAs use as opposed to those relying on traditional medical filling and reporting systems. Nurses indicated that in their experience, it was easier, safer, and more convenient to offer emergency response to home based care patient when they had access to the PDAs (Lee, Hsiao, Chen & Liu, 2010; Smith Stoner, 2013). This was due to the ability to easily search for patient's history to understand their past patterns and illnesses as well as the search of new information and data specific to experienced emergency scenarios such as through nursing platforms like the Nursing PLUS among others (Doran, Haynes, Straus, Grimshaw, Hall & Nguyen, 2010; Doran, Haynes, Estabrooks, Dubrowski, Bajnok, Jedras and Bai, 2012). In aiding evidence-based practice, the nurses have an information base to hedge the decision-making process.

Increase Healthcare Quality on Drugs Administration

Access to information in a timely and reliable manner is vital in accurate and quality healthcare provision. For the home care nurses, access to information on drugs and the potential for reactions and incompatibility of drugs is critical (Johansson, Petersson & Nilsson, 2011; Krauskopf and Farrell, 2011). The use of PDA, especially those with code readers enables the assessment of the drugs. Through the drug assessment support systems on the PDAS, the home care nurses are able to cross check the drugs relevance and potential side effects on their patients (Lee, Hsiao, Chen & Liu, 2010; Scandurra, Hägglund & Koch, 2011; Seemungal & Wedzicha, 2016). Through the evidence-based system, the nurse's decision-making process is significantly supported. They are aided on reducing the risk of errors through creating stability and information access dependability (Lee, Hsiao, Chen & Liu, 2010). Through the PDAs use the home care nurses check for drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly people, reduce drug-related risks of falling, and reduce the drug-related admissions to hospitals (Johansson, Petersson & Nilsson, 2010; Johansson, Petersson & Nilsson, 2011). This is predominantly relevant in instances where there is a turnover or a shift change among home care nurses. The PDA memory use was identified as a base for supporting nursing quality and continuity of the offered care and medication, regardless of the shift changes or nurse's turnover. Instances are in the use of PDAs with bar code reader and a storage for such information. Through the bar code reader system, it was possible to not only compare and asses the quality of current medication, but also a history of such medication on home care patients. An examination of the existing findings indicated that nurses had a positive experience in the use of PDAs with a bar code reader due toits ability to compare and help in administering medication to the patients (Hudson & Buell, 2011; Johansson, Petersson & Nilsson, 2013).

Support Peer Knowledge Sharing

The use of PDAs support learning at tow levels, (a) for nurses in home care practices and for (b) nursing students hoping to work in home care services provision (Zurmehly, 2010; Divall Camosso-Stefinovic and Baker, 2013). The use of PDAS improved knowledge sharing opportunities and capabilities among nurses. The availability of information, articles and sharing options and the ease of using PDAs has enabled and improved peer learning opportunities among nurses (Zurmehly, 2010). Nurses, similar to other professions need a continuous learning program and model. This is to help equip them with the emerging and changing trends in their practice and profession at large. The use of PDAs among home care nurses serve as their continuous improvement tool and basis (Krauskopf and Farrell, 2011; Hudson and Buell, 2011). Through the shared information and data, the nurses improve their skills and knowledge on a daily basis. An example was an investigation of how the use of PDAs increase the home care nurse's quality. When offered PDAs and monitored over a period of 12 months, Doran, Haynes, Kushniruk, Straus and Nguyen (2010) indicated that the nurses were actively searching for new information and data. This was on a real time basis when seeking to address non-traditional and unexpected medical concerns on their patients. Among the listed platforms as popular among the nurses searching for information included Google, and Nursing PLUS.

Other instances of searching for new information through the PDAs was through the ability to pass on the awareness and lessons learnt onto patients on the use of technology in improving their care (Zurmehly, 2010). The nurses noted that PDAs that had a pre-installed system allowing for a real time storing and sharing of the information were more valuable and preferred. This is because, such a system enabled them document their daily experiences as apart of their tacit knowledge in home-based care services provision. In the long run, such information was not only useful to peers with whom it was shared with. Instead, it was also helpful as a personal growth and learning base, through past experiences and evidence-based learning (George, Davidson, Serapiglia, Barla & Thotakura, 2010).

Once a medical professional activity has been executed, it is then recorded on the PDA memory system. The report and lessons learnt are used as a basis for future peer learning in the long run period. This is a critical important as a tool for retaining continuity with a high nursing in home care turnover and shifts among nurses. Besides supporting earning for the existing home care nurses' practitioners is it also a tool for promoting learning for aspiring home care nursing students. The students tested illustrated a higher understanding and ability to address clinical questions with continued use of PDAs on their internship period (Schnall, Currie, Jia, John, Lee, Velez & Bakken, 2010; Jeffrey & Bourgeois, 2011) The peer learning both for the registered practising and the student nurses was aided by the PDAs memory and storage options, the creation of systems supporting information sharing and an ease of use of the

PDAs.

V. Implications and Literature Gaps

The study findings are a demonstration of the strategic value that the use of PDAs plays in improving home care nursing quality. Nevertheless, the lack enough data and information to support the use of PDAs as a strategic decision and strategy in healthcare provider organisations. Existing literature demonstrates that the absolute and general value of the PDA systems use has been understudied (Doran, Haynes, Estabrooks, Kushniruk, Dubrowski, Bajnok, Hall, Li, Jedras and Bai, 2012; Divall, Camosso-Stefinovic and Baker, 2013). This means that there lacks enough primary and empirical data to enable healthcare provider organisations prioritise on the use of PDAs as a tool for improving their home care nurses quality of care. Although some hospitals have adopted this as a strategy, to support their nurses, a majority of other organisations view its use as voluntary. Equally, although a majority of home-based care nurses appreciate the role the PDAs play, its use has largely been voluntary. Individuals aspects such as 'culture,' 'structural and electronic resources,' and 'breadth of device functions' (positive effects), and 'slack staff' (negative). 'Organizational culture' (positive), 'breadth of device functions' (positive), and 'slack staff '(negative) (Doran, Haynes, Estabrooks, Kushniruk, Dubrowski, Bajnok, Hall, Li, Jedras and Bai, 2012). This is a demonstration that the use of the PDAs although adding value still has significant adoption challenges.

Further, despite the fact that the study has focused on PDAs as a single autonomous component for the home-based care nurses, they are used in unison with other support systems such as electronic nursing systems. The combination and seamless interaction of the PDA use with other electronic systems increase the value and significance of the PDA systems. The findings implications on the practices are on the rationalise for the decision by health care organisation to invest in securing the home care nurses PDAs as basis for improving their quality of care (Seemungal & Wedzicha, 2016). In particular, the findings have the implication of creating a solution to the rising challenges in creating a knowledge sharing platform especially in the wake of rising nurses' turnover, the need for experience and tacit knowledge learning for the nursing students, and influence on nursing quality care budgets.

The existing knowledge gap on the implications of PDAs as a learning tool for practitioners and students creates a basis for future studies development. Further related studies on the use of PDAs among home care nurses should evaluate the functionality and the PDA systems that improve a knowledge sharing model among the nurse and allows for continuity in between home care nursing shifts and in case of home care nurses turnover.

VI. Conclusion

The minimum expectations of the healthcare systems is that patients under home based care access quality healthcare services. These are predominantly offered by the home care nurse practitioners. Although this set of nursing professionals have unique training due to the different context of their work, it is always important to ensure their quality of care is monitored and improved. The use of PDAs has evolved from the mere use of technology for ease of information access, to an important tool in supporting the nurses' practice. Nurses should view the PDAs as a part of their duty's execution mandatory tools, and a such leverage on the ability to learn and monitor their patients' medical profiles and histories.

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	Authors and Date	Type of Study	Purpose of the Study	Methods	Findings	Implications	Limitations
1	Doran, D. M., Haynes, R. B., Kushniruk, A., Straus, S., Grimshaw, J., Hall, L. M., ... & Nguyen, H. (2010	• Longitudinal quasi experimentation a 12 months period	• To assess the impact and suability of PDAs in increasing nurses work in home care professional services delivery	• The study used the Diffusion of Innovation theory and the • Promoting Action on Research Implementation in Health Services (PARIHS) model. The setting was 29 acute care, long-term care, home care, and correctional organizations in • Ontario, Canada. The sample consisted of 488 frontline-nurses.	• Nurses most frequently consulted drug and medical reference information, Google, and Nursing PLUS. There was a finding that among PDA users over time there was improved quality of care through increased awareness and increased information access with ease on a timely and real time basis	• It is feasible to provide nurses with access to evidence-based practice resources via • mobile information technologies to reduce the barriers to research utilization.	• Use of self-reports that were had to validate for accuracy and honesty
2	Seemungal, T. A. R., & Wedzicha, J. A. (2016)	• Systematic Literature Review	• Evaluating how the use of PDAs was an alternative for offering effective and quality home care services for COPD patients to reduce hospital overloads. order to decrease the cost of hospitalised patients, supported • discharge or hospitals at home schemes have been advocated.	• Used a systematic literature analysis on existing literature on COPD patients home care services	• The study findings indicated that the nurses had a strategic role to create an awareness among patients on how to use the PDA systems. This indicated that nurse played an awareness/educational role in supporting the patients understanding of the PDAs working systems.	• The implications are on the value of using home care and a demonstration that nurses can improve their awareness through the use of the drug administration support systems on the PDAs	• Lack of practical empirical data
3	Johansson, P. E., Petersson, G. I., & Nilsson, G. C.	• Mixed research study	• The aim of the present study was to evaluate nurses'	• The study used 15 nurses used Life Reader in scanning patients' drugs.	• By using the LIFe-reader®, the majority of the	• The study illustrated the value of an	• The use of a relatively sample base of only 15

			experiences of using a MDSS in a PDA with a barcode reader, in order to obtain profiles of the patients' medication, regarding drug–drug interactions, therapeutic duplications, and warnings for drugs unsuitable for elderly in home care.	The nurses answered a questionnaire before, during and after their assignments. They were then interviewed in focus groups	nurses found it easy to obtain profiles of the patients' medication and check for drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly people, reduce drug-related risks of falling, and reduce the drug-related admissions to hospitals. The scanning function was described as easy and time saving, although not always possible to use	added scanning feature on PDAs to help nurse in profiling patients and establishing a patient's drug history	nurses
(2010)							
4	Doran, D., Haynes, B.R., Estabrooks, C.A., Kushniruk, A., Dubrowski, A., Bajnok, I., Hall, L.M., Li, M., Carryer, J., Jedras, D. and Bai, Y.Q.C., 2012	• Quantitative study	• The purpose of this study was to investigate the role of organizational context and nurse characteristics in explaining variation in nurses' use of personal digital assistants (PDAs) and mobile Tablet PCs for accessing evidence-based information. The	• The sample consisted of 710 participants (response rate 58%) at Time 1, and 469 for whom both Time 1 and Time 2 follow-up data were obtained (response rate 66%). A hierarchical regression model (HLM) was used to evaluate the effect of predictors from all levels simultaneously	• Frequency of Nursing Plus database use was explained by 'culture,' 'structural and electronic resources,' and 'breadth of device functions' (positive effects), and 'slack staff' (negative). 'Organizational culture' (positive), 'breadth of device	• Nurses should be provided with access to electronic resources such as drug and medical reference information, and to best practice information to support their learning needs and to promote evidence-based	• There was no control group and therefore it was not possible to rule out other possible variables that could explain change in information use.

			Promoting Action on Research Implementation in Health Services (PARIHS) model provided the framework for studying the impact of providing nurses with PDA-supported, evidence-based practice resources, and for studying the organizational, technological, and human resource variables that impact nurses' use pattern		functions' (positive), and 'slack staff '(negative) were associated with frequency of Lexi/PEPID drug dictionary use.	practice.	
5	Smith Stoner 2013)	• Systematic literature design	• The study focused on enumerating the value and rationale for using PDAs as a tool for promoting the nurse's schedules when working from home	• The study methodology and database relied on existing literature to derive findings	• The findings indicate that the use of PDAs by nurse allow them more organisation, and reduce strain and stress on their working schedules	• The use of PDAs increases nurses learning and organisation	• Lack of peer reviewed references to support the findings and discussion
6	Lee, R. G., Hsiao, C. C., Chen, K. C., & Liu, M. H. (2010)	• Experimentation of a PDA evidence-based system	• The purpose of the study is an evaluation of how the use of PDAs by the nurses connected with a GSM and phone allows for effective care delivery, improving quality for the diabetic	• The study methodology was diabetic patients using the PDA system and the evaluation of the feedback and reports generated through the system	• The study findings indicate the ability and support for an evidence system for the nurses, especially in dealing with patient emergencies. It allows for evidence based and effective	• The systems provide fast and reliable information base for the patients and the nurses	• The study was developed and sponsored by the system evaluated developer.

					support for the patients, allowing the nurse reduced stress wen handling the patients.	
7	Scandurra, I., Hägglund, M., & Koch, S. (2011)	• Experimentation on PDA systems use	• The overall study aim is to investigate the value of PDA systems in offering nurses with information to performance-orie nted data.	• working groups consist of 5 home help workers, 3 district nurses, 2 general practitioners (GP), 3 usability experts and medical informaticians and 3-5 system developers. The design process includes activities	• The findings indicated that the use of PDAs and the bar code readers had an effect on increasing effectiveness in awareness and information-based decision making for the nurses	• The use of PDAs has an opportunity of reducing potential for drugs administration errors	• Lack of empirical data
8	Johansson, P.E., Petersson, G.I. and Nilsson, G.C., 2013.	• Quantitative study	• The overall study aim was to investigate the value and implications of using PDAs among nursing students	• In this intervention study, nursing students (n = 67) used PDAs during a period of 15 weeks, replied to questionnaires, and participated in focus group interviews.	• The PDA was regarded as useful, and was presumed to imply increased confidence and time savings, and contribute to improved patient safety and quality of care.	• PDA use was considered a value addition to nurses' professional satisfaction	• A small sample base mainly comprised on the nursing students
9	Johansson, P., Petersson, G., & Nilsson, G. (2011).	• Qualitative-single Case study	• The aim of this study was to describe one nurse's experience of using a personal digital assistant (PDA) in nursing practice.	• Data through an interview on a single case study nurse was collected and analysed	• The findings show that the PDA provides immediate access to information anywhere and at any time, with advantages for both the nurse and for her patients. The PDA increased her confidence and efficiency	• The incorporation of a multifunctional PDA is an important issue for nursing management, as it could both change and provide new possibilities for nursing practice. The	• Limitation on the use of a single case study negating the need for comparisons

					practice; it was easier to keep up- to- date and spend more time with the patient. Furthermore, the PDA was perceived as improving patient safety and patient participation.	use of PDAs could also aid decision- making, improve patient safety and benefit patient outcomes.	
10	Krauskopf, P.B. and Farrell, S., 2011	• Experimental with a repeated measures design.	• To determine if using personal digital assistants (PDAs) increased accuracy and efficiency of clinical decisions made by novice nurse practitioners (NPs).	• 40 novice NPs. Data were collected from December 2003 to March 2004 following a stratified random assignment of the subjects to a textbook or PDA group	• In both laboratory values and one of the treatment sections, the PDA users were more efficient in determining an answer to the clinical questions. Accuracy of PDA users was equal to textbook users.	• Supports the need for PDAs use to complement	• Controlled experimentation USE
11	Zurmehly, J., 2010.	• Qualitative study	• The study was an evaluation of the role of PDAs in supporting nurses learning in their clinical care context	• The National League for Nursing Task Group on Instructional Technology has undertaken a review of articles in an attempt to summarize current literature regarding the use of PDAs in nursing	• The findings indicated that with a high reliability of PDAs as a learning tool for nurses, an ideal knowledge sharing platform for nurses	• Role of PDAs in knowledge sharing among nurses	• Lack of an empirical evaluation model, analysis qualitative in nature
12	Hudson, K. and Buell, V., 2011	• Qualitative design	• The study aims to evaluate home nurses' experiences with an ENR.	• 13 in- depth interviews with home nurses, head nurses and Administrators, and four focus groups with a total of 24 home nurses	• Despite technical difficulties, the home nurses are willing to give the ENR and PDAs a chance, because they believe in its value	• There is need to view PDAs as a component of ENR so as to create a higher value and benefits	• Primary use of qualitative data. There is need for future quantitative data
13.	Divall, P., Camosso-Stefinovic, J. and Baker, R.,	• Systematic literature Review	• This article describes the development and	• Review of the evidence- based literature, including peer- reviewed	• Blending the technologies of high- fidelity	• Faculty developed a general	• Lack of empirical quantifiable data

				articles and reviews.			
	2013.		implementation of integrated use of personal handheld devices (personal digital assistants, PDAs) and high- fidelity simulation in an advanced health assessment course in a graduate family nurse practitioner (NP) program		simulation and handheld devices (PDAs) provided a positive learning experience for graduate NP students in a teaching laboratory setting.	template tool and systems- based clinical scenarios integrating PDA and high- fidelity simulation. Faculty observations, the general template tool, and one scenario example are included in this article.	
14	George, L.E., Davidson, L.J., Serapiglia, C.P., Barla, S. and Thotakura, A., 2010	• Quantitative study	• is article describing the use of PDAs by undergraduate and graduate nursing students during their educational process	• Nursing students were sampled for experiences in using PDAs	• findings from the study indicated that students used their PDAs for both classroom and clinical activities and that drug reference software was the most frequently used software application.	• There is a need for the use of PDAs to promote nursing students learning on home-based care	• The se of students and experience could have led to controlled findings

15	Jeffrey, K., & Bourgeois, S. (2011)	• Systematic literature review	• The objective of this review was to determine whether the use of Personal Digital Assistants (PDAs) would provide greater support in developing undergraduate nursing students' clinical reasoning, in comparison to more traditional resources such as textbooks.	• The search strategy sought to identify published data from five electronic databases: CINAHL, Medline, Cochrane Library, Meditext and Scopus. Unpublished literature was also sought in digital dissertations, conference proceedings, relevant scholarly websites and reference lists.	• This systematic review provides evidence that the use of PDAs is able to improve nursing students' self-efficacy and accuracy in clinical situations that require direct and context-free answers, such as medication administration, but is not as supportive as textbooks in assisting students to apply this knowledge critically in decision making and problem solving.	• The use of PDAs by undergraduate nursing students can improve students' confidence in the often-stressful clinical environment	• Lack of the collection of enough quantitative study data