

The Evidence Available to Teach Evidence-Based Nursing Practice by Nurse Educators

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By

SAMSON WAKIBI

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OR

Dean of the College of Graduate and Postdoctoral Studies
University of Saskatchewan
116 Thorvaldson Building, 110 Science Place,
Saskatoon, Saskatchewan S7N 5C9,
Canada

Abstract

Background and Aim: The benefits that ensue from evidence-based nursing practice (EBNP) in health care settings have been globally communicated to nurses. However, the current clinical activities surrounding EBNP demand involvement of nursing institutions in creating an EBNP thrust. The purpose of this research project was to explore, synthesize, and describe the evidence available to teach EBNP to undergraduate student nurses, so the students can continue to integrate EBNP in clinical settings upon becoming professional nurses.

Methods and Design: This thesis was guided by the Joanna Briggs Institute (JBI) guidelines for writing systematic reviews. While using these guidelines, the focus was on qualitatively synthesizing all the available evidence. All the retrieved articles were subjected to the inclusion and exclusion criteria and finally appraised for quality using the JBI tools for qualitative assessment.

Results and Conclusion: Fifteen articles were included in the systematic review. The results indicate that several educational strategies exist to teach EBNP effectively. These strategies have been designed based on time and duration of teaching EBNP, nursing practice content to be taught, context of teaching and learning, and EBNP pre-requisites. Well-designed evidence-informed educational strategies have a positive impact on students' EBNP knowledge and a big potential for promoting EBNP implementation in clinical practice. The effective EBNP educational strategies should be student engaging, bridging classroom and clinical settings, built on the context of EBNP steps (Melnik & Newhouse, 2014), and be time friendly. A significant benefit is realized when nurse educators use these strategies in combination. However, cost effective strategies promoting critical and evidence-based thinking are needed for teaching EBNP by nurse educators, especially in developing African countries where health care fiscal and human resources are scarce.

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The Redeemer God lives.

Dedication

This thesis is dedicated to my parents; Wilberforce Mukisa and Rebecca Ndikwani, who entrusted their hope and finances in me that they would see me graduate and be of help to them and other people. This work is also dedicated to all nurse educators who are very passionate about changing the status quo of nursing education and practice in African countries.

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Chapter One: Introduction and Literature Review

In this chapter the researcher described the background to this research project, the problem that necessitated this study, and the significance of this study. The research purpose and research questions are also stated in this chapter. This chapter is also inclusive of a diversified literature review of the available information surrounding this topic.

1.1. Introduction

Evidence-based nursing practice (EBNP) is a decision-making approach to patient care that utilizes an integration of the most current and valid research findings, the nurse's clinical expertise, the client values and preferences, and available resources in making practice decisions (Registered Nurses' Association of Ontario, 2014). The benefits that spring from EBNP include: improved nurses' practice knowledge, patient-centred care with better patient outcomes, reduced occurrence of adverse events, reduced patient care costs to patients and health facility, and increased patient satisfaction (DiCenso et al., 2005; Registered Nurses' Association of Ontario, 2014).

Reaching the desired EBNP decision involves the usually unmentioned decision analysis. This decision analysis consists of defining a decision problem and outlining all possible actions, benefits, and risks which precede a decision option (Dowding & Thompson, 2009). Whether a nursing decision option is accepted or rejected, is dependent on the risk-benefit comparison which is supported by the knowledge from explicit information (Dowding & Thompson, 2009; International Council for Nurses, 2012; Registered Nurses' Association of Ontario, 2014). This information falls into two categories; the information to nurses informed by research findings, institutional factors, and their clinical team members and the information from patients on their care values, beliefs, and preferences. The patients' preferences are majorly affected by their previous experience with the healthcare, culture, religion, economic status, and the information availed to them from the health care team

(DiCenso et al., 2005). The best decision is one with the highest benefit estimate a nurse or nurses settle for (Estabrook, 1998), and in this EBNP case, it draws from information well understood by nurses and that well understood by patients. This information should be of good quality and explicit enough to create the best decision option (Dowding & Thompson, 2009).

Nurses are required to search for quality research evidence (Melnyk & Newhouse, 2014), but because of the challenges to EBNP (discussed later), there has been a move to summarize this information in to evidence-based tools (Bergman, 1999; DiCenso et al., 2005; Dowding & Thompson, 2009; Registered Nurses' Association of Ontario, 2014). These tools include evidence-based practice guidelines (EBPG), case reports, drug guides, evidence-based textbooks, evidence-based textbook summaries, procedure manuals, and clinical pathways (Bergman, 1999; DiCenso et al., 2005; Lavelle, Schast, & Keren, 2015). Through these tools, gathered and appraised evidence is combined to make explicit recommendations for clinicians (DiCenso et al., 2005; Lavelle et al., 2015; Registered Nurses' Association of Ontario, 2014). Above all, these tools are usually nationally or locally accepted for use (Rycroft-Malone, 2008). The use of these evidence-based tools is aimed at extending the benefit of EBNP through uniform clinical practice, increased patient education, and medical and nursing litigation protection (Lavelle et al., 2015; Registered Nurses' Association of Ontario, 2014). The individual and group understanding of clinical guidelines and any other evidence-based tools is more likely to be uniform, unlike their understanding of research findings (Rycroft-Malone, 2008). In this case, the benefits of EBNP would be hard to achieve when individuals and groups make effort to interpret research findings for their individual clinical use. Rycroft-Malone (2008) contends that research findings are suitable catalysts for clinical decision making while evidence-based tools like clinical guidelines are ready products for clinical use, hence, supporting the use of evidence-based tools by nurses.

Following the recognized benefits of EBNP, governments, organizations, and professional associations around the world exhort nurses to use evidence-based nursing practice (EBNP) in clinical settings (DiCenso et al., 2005; International Council for Nurses, 2012; Registered Nurses' Association of Ontario, 2014). Also, the teaching of EBNP to student nurses is advocated for (Malik, McKenna, & Griffiths, 2017) and some research describes the existence of this teaching in nursing education (Aglen, 2016; Balakas, Sparks, Steurer, & Bryant, 2013; Moen, Ndateba, Collins, & Iyamuremye, 2015; Winters & Echeverri, 2012). However, in some African countries, teaching EBNP is not yet part of the curricula content of nursing programs although this kind of practice is highly needed in the clinical settings as is detailed in chapter four. Also, the degree nurses who would be at the centre of EBNP are very few in clinical settings of these countries.

1.1.1. Statement of the problem. Evidence-based nursing practice is vital in clinical practice. The use of EBNP as a decision-making trail enables nurses to achieve effective and efficient patient care within the hospital care settings (Registered Nurses' Association of Ontario, 2014). EBNP demands nurses' skills that go beyond those needed for understanding scientific research. Nurses also, need to understand their patients' and the health care setting related factors (Melnik et al., 2012). Short of any of these needs poses a barrier to effective EBNP in clinical settings by the nurses. In nursing educational programs, many nurse educators strive to equip student nurses with EBNP competencies in an attempt to assist them to be ready for the required EBNP in clinical settings (Dawley et al., 2011; Doane & Varcoe, 2012; Finotto et al., 2013; Moen et al., 2015). Some of these nurse educators' instruction approaches particularly emphasize more of the students' understanding of research concepts and principles and less of how the research evidence is integrated with patients' and organizational factors to make patient care decisions. In a similar way, many of the nurse educators follow Melnyk et al.'s (2010) seven EBNP steps; aiming at having the students

master the flow of these steps. The systematic application of the EBNP steps is impossible for many of the nurses in clinical care settings (DiCenso et al., 2005). These nurses often use other ways of EBNP like using evidence-based practice guidelines to inform their clinical practice. Therefore, in pursuit of a generation where all nurses are subject to meaningful and effective EBNP, it is important for nurse educators to understand the effective strategies for teaching EBNP and how these strategies can be used to transform the learning of EBNP into implementation in clinical settings. This understanding should ultimately empower nurse educators to assist undergraduate student nurses to effectively apply EBNP when they become professional nurses.

1.1.2. Research purpose and questions. The purpose of this study was, therefore, to explore, synthesize, and describe the evidence available through the current curricula designs and teaching strategies to teach EBNP to undergraduate student nurses, so the students can continue to integrate evidence-based nursing practice in clinical settings upon becoming professional nurses. This research study was intended to understand EBNP knowledge transmission and implementation by exploring the processes and outcomes of the current EBNP educational strategies.

This study was directed by two questions: (1) What educational strategies are being used by nurse educators to teach EBNP to undergraduate student nurses? (2) How do these strategies impact undergraduate student nurses' acquisition of EBNP knowledge and EBNP implementation?

1.1.3. The significance of the study. Through this study, two dimensions of significance are conceivable; the importance of using evidence to design educational strategies and the power of well-designed educational strategies in transforming EBNP in clinical settings. The available evidence on teaching EBNP to undergraduate student nurses presents grounds on which nurse educator can base to take a certain line of instruction. As such, nurse educators should design or re-design EBNP curricula and teaching strategies based on the existing justification of the teaching-learning process, which draws on both clinical and academic factors. Hence, this study contributes to improvement in nursing education programs and nurses' clinical practice, particularly as far as EBNP teaching and practice are concerned respectively. These improvements are additionally met by this study informing policymakers for educational program and clinical practice policies.

1.2. Literature Review.

This is an additional review of the information available within the realm of evidence-based nursing practice. In this section, criticisms, barriers, strategies to overcome barriers to EBNP are explored. Followed by an understanding of the role of context in EBNP. An assessment of the available review studies on EBNP is discussed and how teaching and learning of EBNP takes effect. Lastly, a discussion on how learning EBNP can be supported is explored.

1.2.1. EBNP Critique. The existing criticisms of EBNP might have significantly contributed to its slow uptake where it is not well recognized. Some nursing researchers argue that EBNP is devoid of theory, is more empirical, and undervalues other sources of evidence (Fawcett, 2012; Melnyk et al., 2012, Porter, 2012). Fawcett (2012) dismissed these criticisms by showing that the criticisms are majorly because of poor interpretation of EBNP. The author argued that each of the four ways of knowing (ethical, empirical, personal and aesthetic), which are highly central to nursing knowledge, has a theoretical foundation

(ethical theories, personal theories, empirical theories and aesthetic theories) (Fawcett, 2012). Thus, if well interpreted, all the four ways of knowing fit well within the scope of nursing practice, and particularly EBNP. Hence, EBNP is not devoid of theory (DiCenso et al., 2005). Additionally, EBNP is not more empirical as some nurses may claim, neither does it value quantitative research over qualitative research (Estabrook, 1988; Porter, 2012). While researchers of quantitative research seek to understand interventions and assessments, their counterparts conducting qualitative research seek to create the meaning of phenomena (DiCenso et al., 2005; Porter, 2012). As a result, qualitative and quantitative research complement each other and EBNP requires the application of the best research which can be either or both two research forms (DiCenso et al., 2005). Hence, no single source of evidence is undervalued in EBNP.

1.2.2. Barriers to EBNP. Amidst the reported need for and the tremendous benefits of EBNP, several challenges to EBNP movement have often been reported. Studies have reported that while some nurses lack enough skills to evaluate the quality of research (DiCenso et al., 2005; Malik, McKenna, & Plummer, 2016), many nurses do not have enough time for EBNP during clinical practice (Laibhen-Parkes, 2014). Some nurses have limited EBNP Knowledge, interest, and motivation to implement EBNP (DiCenso et al., 2005; Doane & Varcoe, 2012; Fiset, Graham, & Davies, 2017). The nurses' interest in implementing EBNP may basically be affected by attitude, knowledge, and skills (Weng, Kuo, Lo, Chen, & Chiu, 2013). These three factors complement each other. A knowledgeable nurse will most likely be skilled and highly committed (positive attitude) because of the value attached to EBNP (Fiset et al., 2017). Doane and Varcoe (2012) contend that the quality of action can only be determined by the extent of value and privilege accorded to it. In this case, EBNP calls for nurses to value it and currently this change is reported to have largely taken effect (André et al., 2016; Brooke, Hvalič-Touzery, & Skela-Savič, 2015; International Council for Nurses,

2012). Therefore, these nurses practice EBNP. Organizational barriers to EBNP also exist (DiCenso et al., 2005; Melnyk et al., 2012). Some organizations lack support to implement EBNP, do not have an EBNP vision and strategy, and have poor leadership structures to offer direction to the implementation of EBNP (Melnyk et al., 2012).

1.2.3. Strategies to overcome EBNP barriers. To counteract the above challenges, key strategies have come into place. Ciliska, Pinelli, DiCenso, and Cullum (2001) proposed availing time to nurses for library literature search that they may gather, appraise, and synthesize evidence needed for their practice. This proposal might be impractical given the global shortage of nurses in clinical settings (Doane & Varcoe, 2012; Mugomeri, Chatanga, Maibwise, & Masitha, 2016). The patient workload is very demanding, needing more than the time available for nursing practice for the nurses employed on wards in most clinical settings (Doane & Varcoe, 2012). The lack of printed or online nursing research journals in clinical institutional libraries is another concern (Ciliska et al., 2001). Increasing the availability of the resources in the clinical setting has a potential of infringing on the already financially constrained healthcare settings of some countries (Melnyk et al., 2012) and the time and capability to analyze and synthesize a research article may not be available to the nurses, as highlighted above. Instead, DiCenso et al. (2005) found it more feasible to designate a person who can analyze and synthesize recent research or search for already synthesized information like the evidence-based tools. This information can then be made available to nurses through continuous nursing education, grand rounds, and staff meetings to facilitate decision making and practice change (DiCenso et al., 2005; Estabrooks, 1998).

1.2.4. The role of context in EBNP. The practice of EBNP in a clinical setting is in part influenced by contextual factors (DiCenso et al., 2005; Melnyk & Newhouse, 2014; McCormack, Kitson, Harvey, Rycroft-Malone, Titchen, & Seers, 2002). In clinical practice, context refers to an environment in which healthcare practice happens; this environment can

be affected by political, social, economic, cultural and historical factors (Melnik et al., 2012; McCormack et al., 2002). Therefore, equipping nurses with EBNP skills and knowledge is not enough. Successful implementation of EBNP requires a focus beyond nurses as individuals to nurses as a team (Melnik et al., 2012), and an institutional commitment. EBNP drawing from a team dialogue on contextual factors has a higher success potential than individual EBNP (Kitson, Rycroft-Malone, Harvey, McCormack, Seers, & Titchen, 2008; Melnik et al., 2012). As such, some settings, for example, those with good leadership, facilitation, enough resources, appropriate learning, and evaluative mechanisms have been more conducive for successful implementation of EBNP compared to those settings without (Kitson et al., 2008). Additionally, the recommendations of the EBNP competencies required of nurses are uniform for all nurse graduates globally (Hines, Kynoch, Munday, & McArdle, 2017; International Council for Nurses, 2012; Jackson, 2016), yet, the country contexts differ tremendously. This contextual variation might to a reasonable extent explain the slow adoption of EBNP in some countries.

To clearly illustrate how context plays a big role in the EBNP movement, DiCenso et al., (2005) and Pashaeypoor, Ashktorab, Rassouli, and Majd (2017) demonstrated how EBNP implementation (using an evidence-based tool) in an organization can be facilitated using frameworks such as the Rogers' diffusion of innovation theory. Diffusion of innovation is a five-step process; knowledge, persuasion, decision, implementation, and confirmation (Rogers, 1983). Information about the evidence-based tool needs to be adequately shared by all members of the organization (DiCenso et al., 2005; Pashaeypoor et al., 2017). This approach is aimed at sharing the evidence available in the tool such that all members of the team are knowledgeable (knowledge step) about it. This step creates a platform for persuading members to understand how the contextual factors of the clinical setting interact with the information about the tool (persuasion step), an approach often adopted by a

healthcare agency. At this point, team members are in a better position to decide (decision step) whether they need to adopt and use the evidence-based tool or not. This decision usually depends on the information about the tool, clinical setting factor, patient values, and clinical expertise. Therefore, this decision influences adopting the tool to facilitate EBNP or not adopting it (implementation step). Lastly, an evaluation to confirm (confirmation step) that the adopted tool is changing practice as predicted in the knowledge step takes place (DiCenso et al., 2005; Pashaeypoor et al., 2017). This innovation is one of the best ways nursing practice can be changed at an organization or a team level. Additionally, institutions may, and often do insist on a particular approach and this five-step process illustrates how one achieves commitment to that approach.

1.2.5. Teaching and learning of EBNP. EBNP has received maximum attention, and research shows that nurses in clinical settings practice it (International Council for Nurses, 2012; Registered Nurses' Association of Ontario, 2014). However, the EBNP taught to student nurses in academic settings seems to be different from the EBNP happening among nurses in the clinical setting. There seems to be a difference between what nurses learn and what they practice (Doane & Varcoe, 2012). Some evidence shows that student nurses learn searching, synthesizing, and appraising research studies in EBNP courses (Dawley, Bloch, Suplee, McKeever & Scherzer; 2011; Finotto, Carpanoni, Turrone, Camellini & Mecugni, 2013). However, do the nurses really conduct these steps when in clinical practice for EBNP?

The educational strategies nurse educators use in nursing education play a big role in the conversion of evidence into clinical nursing practice (Moen et al., 2015). However, there is a reported ineffectiveness in the educational strategies some nurse educators use to teach EBNP to student nurses. This ineffective teaching can be explained in two dimensions. First, evidence shows that in nursing education, the teaching of research utilization is undifferentiated from the teaching of EBNP (André et al., 2016; DiCenso et al., 2005). In

nursing, research utilization is significantly different from EBNP. While research utilization is limited to the use of research findings in nurses' work, in EBNP, nurses take an integrated approach to practice where research findings, clinical expertise, patient values, and resources are all considered and valued (DiCenso et al., 2005; Estabrooks, 1998). Thus, research utilization is a subset of EBNP (Estabrooks, 1998). In several studies, nurse educators have reported teaching research utilization to mean the teaching of EBNP (André et al., 2016; Nordsteien, Horntvedt, & Syse, 2017). Even in some institutions where educators can differentiate the two, teaching EBNP has been done mostly theoretically, inadvertently reinforcing the gap between what students know and do (Malik et al., 2017). Yet, evidence shows that effectively teaching students EBNP reduces the skill-knowledge gap (Doane & Varcoe, 2012). Therefore, there is a need to strengthen nursing education programs to adequately deliver the required EBNP knowledge and skills to the students so as to close the learning-practice disparity.

Second, because teaching EBNP means appropriately integrating knowledge from the classroom into clinical practice, EBNP knowledge from classrooms ought to give way to evidence-based patient care skills (Malik et al., 2017). Malik et al. (2017) reported that in clinical settings, student nurses are exposed to learning which is different from that in classrooms. The nurses in clinical settings teach student nurses what they practice (Malik et al., 2017); the EBNP guided by evidenced-based tools like clinical guidelines (Registered Nurses' Association of Ontario, 2014), according to how they learned while in school (Balakas et al., 2013; Moen et al., 2015), or according to the practice tactics they developed due to patient workloads and shift demands (DiCenso et al., 2005). In classrooms, nurse educators teach students an evidence-based approach in which they should search, gather and appraise research evidence to support a decision reached (Wallace & Vanhook, 2016; Winters & Echeverri, 2012). This teaching in classrooms is based on the current

recommendations for the teaching of EBNP, yet, some of the nurses in clinical settings were in school years before the teaching of EBNP started (Balakas et al., 2013; Moen et al., 2015). Therefore, a stronger bond of collaboration between teaching institutions and healthcare institutions is needed to ensure consistent and collaborative approaches to EBNP in education and practice (André et al., 2016; Malik et al., 2017). Through this collaboration, student nurses can be taught the current and valid evidence-based approach to patient care. These weaknesses in the teaching of EBNP show the need for equally drawing from research, academic, and clinical/patient experiences in the teaching of EBNP to student nurses.

The teaching of EBNP to undergraduate student nurses is vital because it is the first preparation level for student nurses into the professional role (Sin & Bliquez, 2017). Evidence-based practice education prepares student nurses for dynamic health care systems where patient safety and best patient outcomes with minimal care costs are highly needed (Registered Nurses' Association of Ontario, 2014; Balakas et al., 2013; Ruzafa-Martínez, López-Iborra, Armero Barranco, & Ramos-Morcillo, 2016). Therefore, being EBNP competent is an essential outcome for all undergraduate baccalaureate student nurses (Bloom, Olinzock, Radjenovic, & Trice, 2013) and nursing education programmes have a fundamental role of reinforcing this outcome (Hickman, Kelly, & Phillips, 2014).

In nursing education, there is a reported lack of consensus across the world on how EBNP competencies should be taught in nursing curricula (Finotto et al., 2013). Competency refers to an integrated use of attitude, knowledge, and skills in practice which is usually developed in an educational setting (Ruzafa-Martínez et al., 2016). Several teaching innovations which have been used either alone or in combination exist to equip students with EBNP competencies. These innovations include: teaching EBNP through debates (Boyd, Baliko, & Polyakova-Norwood, 2015), social media (Carrington, Pace, Sheppard, Dudding, & Stratton, 2017), simulations (Raurell-Torreda & Romero-Collado, 2015), courses or

curriculum/ learning modules (Balakas et al., 2013; Finotto et al., 2013; Jackson, 2016), game-based learning (Davidson & Candy, 2016), and workshops and training sessions (Chen, Chen, Tzeng, & Liu, 2014). None of these strategies is better recommended for teaching EBNP compared to the others; however, all of them contribute to assisting the student nurses in using EBNP.

1.2.6. Review studies on teaching and learning of EBNP. Several review studies exist on teaching EBNP. In a narrative synthesis which was initially designed as a systematic review, Kyriakoulis, Patelarou, Laliotis, Wan, Matalliotakis, Tsiou, and Patelarou (2016) identified the educational strategies for teaching evidence-based practice to undergraduate health students. While the participants in the articles in this review were from several professions, only two articles represented the nursing profession. The authors' study aim was to identify the best teaching strategies; however, their discussion does not reflect this. Instead, it addresses the teaching time, the need for multifaceted teaching approach, and the evaluation of teaching evidence-based practice. Among the limitations mentioned was the failure to discern the effective method of teaching evidence-based practice (Kyriakoulis et al., 2016).

In another study, Häggman-Laitila, Mattila, and Melender (2016) conducted a systematic review of educational interventions and their outcomes on evidence-based nursing in clinical practice. One of their major findings is that educational interventions with better outcomes incorporated at least a theoretical background explaining the linkage of the EBNP teaching strategy to the learning outcome. This study focused only on learning and not the implementation of EBNP. The included studies had clinical nurses and other healthcare workers as study participants. Similarly, Melender, Mattila, and Häggman-Laitila (2016) conducted a systematic review with the aim of identifying the educational interventions used to promote learning of EBNP in nursing education. From the ten analyzed articles, each

educational intervention had a significant outcome on the students' acquisition of EBNP competencies. However, the study lacks a discussion on whether the different interventions can be combined, or which one is a better intervention compared to the others. Additionally, not only is the educational level of the student participants unclear in this study but also the exact descriptions of the educational interventions are not reported. The authors recommended conducting another review of interventional studies with long enough follow-ups.

In a systematic review on pedagogical strategies to teach baccalaureate students evidence-based practice, Aglen (2016) described two categories of pedagogical interventions: Learning information literacy and learning research process. The author's discussion was based more on teacher focused interventions (interventions that aim at informing students solely without drawing on the benefits of students' interaction with the clinical setting) and although they recommended educational theories for better pedagogical interventions, none was revealed in their study.

In a scoping review on the barriers, facilitators and educational interventions that promote students' use of EBNP in clinical nursing, Fiset, Graham, and Davies (2017), showed that most students and faculty lacked knowledge of and had a negative attitude toward EBNP; the nature of the negative attitude was not reported. However, the authors reported those strategies that promoted the teaching of EBNP in clinical setting had a big potential of reducing these barriers. The lack of substantiated description of the educational interventions in the retrieved articles limited this study (Fiset, Graham, & Davies, 2017). The teaching of EBNP at undergraduate nursing level needs to be given more attention so as to enable the student nurses to have the capacity to acquire and understand all necessary evidence, as well as appropriately implement this evidence within the clinical setting (Estabrook 1998; Sin & Bliquez, 2017).

1.2.7. EBNP steps and content. In line with the above need, Melnyk, Fineout-Overholt, Stillwell & Kathleen (2010) provided seven EBNP steps; 1) cultivate a spirit of inquiry and EBNP Culture, 2) ask the PICOT question (population of study, intervention or issue of concern, comparison intervention, outcome, time duration), 3) search for the best evidence, 4) critically appraise the evidence, 5) integrate the evidence with clinical expertise and patient preferences to make the best clinical decision, 6) evaluate the outcomes of the EBNP practice, 7) and disseminate the outcomes (Melnyk et al., 2010). All nurse educators have the onus to teach this information to student nurses. Some evidence suggests that students heavily rely on what they see in practice compared to what they learn in class to be better suited for clinical settings upon graduation (Sin & Bliquez, 2017). As such, the seven EBNP steps ought to be taught to students in accessibility of clinical context, so as to encourage EBNP implementation (Carrington et al., 2017; Chen et al., 2014; Sin & Blique, 2017). Nurse educators should immerse student nurses into the experience of EBNP, rather than just offering them knowledge on what EBNP should be. Nonetheless, the third EBNP step necessitates that student nurses have good literature search skills to retrieve all valid literature to adequately support the last four steps of EBNP (André et al., 2016; Nordsteien et al., 2017). As such, student nurses also need to have computer and database search skills in learning EBNP.

Currently, there is no clear outline of the EBNP content to be taught to the students of different program levels in nursing education (Jackson, 2016). Rather, only examples of EBNP implementation strategies have been provided (Finotto et al., 2013). In an attempt to understand how nursing education programs were incorporating EBNP education at undergraduate nursing curricula in Australia, Malik, McKenna, and Griffiths (2015) showed that there was no national standardized goals and objectives to be followed by programs. As such, a significant disparity in nursing education curricula pertaining to EBNP was evident

across the 32 studied universities (Malik et al., 2015). In the University of North Florida School of Nursing (USA), undergraduate nurse educators comprehensively cover only the first four steps of EBNP; cultivating a spirit of inquiry, asking PICOT question, searching the best evidence, and critically appraising the evidence (Bloom et al., 2013). The authors argue that these are the only steps which resonate with the American Association of Colleges of Nursing baccalaureate competencies and the rest have to be developed at other educational levels as nurses advance in their nursing career (Bloom et al., 2013). Contrary to these authors' argument, the definition of EBNP supports the need to include the fifth EBNP step (integrating research evidence with other evidence) in the teaching of EBNP. One would wonder whether the four taught steps are enough to create the desired national EBNP change. Additionally, this EBNP teaching seems to be more evaluative than being practice orientated. Therefore, there is a need to clearly understand the teaching of EBNP in line with the current clinical practice.

Researchers contend that teaching of EBNP to undergraduate students is a big challenge to nurse educators (Hande, Williams, Robbins, Kennedy, & Christenbery, 2017; Malik et al., 2017; Ruzafa-Martínez et al., 2016; Scurlock-Evans, Upton, Rouse, & Upton, 2017; Sin & Bliquez, 2017). The teaching of EBNP has constantly attracted a debate on when to teach or introduce EBNP (Elçin, Turan, Odabaşı, & Sayek, 2014), whether EBNP should be taught as a standalone course or integrated within the curricula (Finotto et al., 2013; Scurlock-Evans et al., 2017), and what is or is not a barrier to teaching EBNP (Malik et al., 2016; Ruzafa-Martínez et al., 2016).

In nursing education, the goals and objectives of teaching EBNP seem to be unclear to nurse educators. Nursing students at different program levels are unusually expected to have the same EBNP competencies (Chang & Levin, 2014; Hande et al., 2017). Hande et al. (2017) called for a clear-cut line between what should be learned by students while advancing

from baccalaureate, to master's, and to Nursing doctorate (Ph.D., DNP, DNS) levels of the nursing curriculum. The authors argue that although clinical decision making, critical thinking, problem identification, and outcome measurement are the EBNP competencies identical to the three programs, students' abilities can never be the same across the different levels (Hande et al., 2017). Therefore, nurse educators should develop students' EBNP competencies according to the learners' objectives at the different levels of nursing education.

1.2.8. Assessing learning of EBNP. The argument by Hande et al. (2017) brings to light the implausible findings of some of the evaluative studies on the teaching of EBNP to student nurses. Studies have reported EBNP competencies being assessed on either student nurses or practicing nurses without specifying what the participants ought to know and do, given their levels of nursing qualification (Chen, Tzeng, et al., 2014; Ruzafa-Martínez et al., 2016; Upton, Scurlock-Evans, & Upton, 2016). Yet, Upton, Scurlock-Evans, and Upton (2016) contend that the measurement tools for these studies, like the student evidence-based practice questionnaire (S-EBPQ), have the potential to evaluate EBNP competencies at all levels, stretching from student nurses, through practicing nurses to specialist nurse practitioners whose levels of EBNP competencies certainly vary. These tools are even relevant for the theoretical evaluation of student learning of EBNP (Upton et al., 2016). Thus, the practical abilities of the participants (students) could be inadequately reflected in evaluation studies based on self-report. These observations in the assessment/evaluation of learning EBNP call for designing and using of appropriate assessment tools which would reflect the real learning of EBNP (particular to either EBNP theory or use of EBNP) and in the respective educational levels. Therefore, EBNP competencies for the different nursing education levels should be identified and the subsequent evaluation tools should also be based on these competencies.

1.2.9. Underpinning learning of EBNP. Although a need for creative and enjoyable educational strategies is reportedly paramount to students' learning of EBNP and is highly sought after by nurse educators currently (Chang & Levin, 2014; Sin & Bliquez, 2017), Hande et al. (2017) reminds nurse educators to not forget the students' way of learning which follows the domains of psychomotor, affection, and cognitive stages in teaching EBNP. This learning trajectory enables nurse educators to look at student nurses as individuals who can learn differently in different conditions (Hande et al., 2017). Paying maximum attention to this trajectory in the teaching of EBNP will support the still challenging EBNP implementation (Chang & Levin, 2014). Consequently, researchers have found curriculum designs and learning strategies based on theoretical frameworks and models to teach EBNP having significant EBNP outcomes (Ruzafa-Martínez et al., 2016; Scurlock-Evans et al., 2017). Some of the employed theoretical frameworks and models include constructivism (Scurlock-Evans et al., 2017), theory of planned behaviour (Ramos-Morcillo, Fernández-Salazar, Ruzafa-Martínez, & Del-Pino-Casado, 2015), active learning (Boyd et al., 2015; Davidson & Candy, 2016; Zhang, Zeng, Chen, & Li, 2012), diffusion of innovations (Pashaeypoor et al., 2017), and domains of learning (Hande et al., 2017).

In the context of educational theories, two curricula learning approaches have been implemented and evaluated; EBNP as a standalone course and EBNP embedded in the existing nursing courses. In standalone courses, EBNP content and processes are taught to students in a single course usually disconnected from other curricula courses, while in embedded curricula, EBNP content is integrated throughout the entire curriculum in connection with other theoretical and clinical courses (Malik et al., 2015). Malik et al. (2015) added that in EBNP embedded curricula, EBNP is considered an everyday practice to the learners during their entire nursing program unlike in standalone EBNP courses where EBNP can potentially be viewed as an academic exercise. Scurlock-Evans et al. (2017), in their

quantitative study comparing the impact of embedded curriculum with modular-based EBNP teaching, found no statistical significance between curriculum-design and impact on students' evidence-based practice profiles. In contrast, Ruzafa-Martínez et al. (2016) in their quasi-experimental study found out that nursing students who participated in EBNP concepts integrated within the curriculum significantly improved their evidence-based practice competency compared to the students who did not. Nonetheless, researchers argue that through the embedded curriculum, new information builds on the previously learned information, hence, reinforcing learning (Malik et al., 2015; Scurlock-Evans et al., 2017). The important question is, could both of these learning approaches be used?

Scurlock-Evans et al. (2017) described nursing education curricula embedding evidence-based practice in nursing courses as spiral curricula. In the spiral curricula, topics are covered in increasing complexity across the years of program study and new (more complex) topics are studied in reference to the already covered topics (Malik et al., 2015; Elçin et al., 2014; Scurlock-Evans et al., 2017). As such, the spiral learning is of benefit if applied to student nurses as they switch between academic and practice settings (Malik et al., 2015; Scurlock-Evans et al., 2017). Additionally, the spiral learning ensures that what is planned is both delivered to and learned by the students (Knight, 2001). The spiral curricula facilitate student nurses to see the value of research evidence in patient care (Malik et al., 2015). In this way, spiral curricula have the potential of making the learning process ample enough for students to utilize and build on the previously learned information. Elçin et al. (2014) believe that students may best understand the philosophy of EBNP when involved in its practical application with actual patients. As such, the interplay between academic and clinical teaching settings is key to EBNP of holistic qualities (Mackey & Bassendowski, 2017; Scurlock-Evans et al., 2017). As opposed to the use of hypothetical scenarios where students miss out on the patient encounter, Hande et al. (2017), and Mackey and

Bassendowski (2017) recommend the use of patient-centered strategies in teaching EBNP to student nurses. These strategies give student nurses opportunities to value the patient as a member of the decision-making group (Hande et al., 2017) as well as lessening the knowledge-skills gap (Mackey & Bassendowski, 2017). Consequently, these strategies facilitate the recognition and use of patients' values in decision making by student nurses (Hande et al., 2017) as required by the definition of EBNP and the seven EBNP steps. Therefore, EBNP learning through spiral curricula should be intertwined with student-patient encounters. Scurlock-Evans et al. (2017) contend that nurses' culture of practice in the clinical setting is inculcated in them at school when still students. As such, the EBNP in clinical settings can be in part explained by the way nurses were taught while at school as student nurses (Scurlock-Evans et al. (2017). Similarly, based on Khan and Coomarasamy's (2006) proposal for interactive and clinically-integrated teaching approaches of evidence-based practice, Fiset, Graham, and Davies (2017) recommended understanding how the teaching strategies impact evidence-based practice.

1.2.10. Definitions of terms. The above literature review has set a context for the evolution of EBNP over time. As such, the following terms generated from the literature review need to be well understood as they are used in this research.

Evidence-based medicine (EBM) refers to “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett, Rosenberg, Muir, Haynes, & Richardson, 1996) (p. 71) and its integration with clinical judgement of the physician (Mackey & Bassendowski, 2017; Sackett et al., 1996). This definition makes physicians more of technicians who just do what evidence says. As such, evidence-based practice emerged from EBM because of the need for evidence to be used by members of healthcare professions other than medicine while thinking through other factors which might affect that evidence (Mackey & Bassendowski, 2017).

Evidence-based practice refers to the application of the best available, current, valid and relevant research findings into clinical decision-making by integrating one's own clinical expertise and considering client values and preferences, and available resources (International Council for Nurses, 2012; Melnyk, Fineout-Overholt, Gallagher-Ford, & Kaplan, 2012; Registered Nurses' Association of Ontario, 2014).

Evidence-based nursing practice (EBNP) is the evidence-based practice specific to the nursing discipline as nurses encounter patients in the clinical settings (DiCenso, Guyatt & Ciliska, 2005; André, Aune, & Brænd, 2016). The terms *Evidence-based nursing (EBN)* and EBNP can be used interchangeably (DiCenso et al., 2005; Winters & Echeverri, 2012). The two terms mean the same thing as in the definition for EBNP above. The choice of preference for the use of these two terms is up to the individual using them.

Evidence-informed practice (EIP) is another recent term which emerged with the plethora of criticisms on EBNP. This term (EIP) refers to the consideration of EBP (as defined above) in the context of its implementation (Melnyk & Newhouse, 2014). As such, EIP requires that EBNP is implemented considering organizational and institutional factors that affect clinical practice (Melnyk & Newhouse, 2014). For consistency, the term EBNP was used in this project write-up.

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Chapter Two: Methods

This chapter describes the different approaches that were used to explore, synthesize and describe the evidence available through the educational strategies to teach EBNP to undergraduate student nurses. These approaches basically explain how the results for the mixed methods systematic review presented in chapter four were obtained. The study design, protocol, data collection and synthesis, and rationale for the different choices are detailed in this chapter.

2.1. Study Design

A mixed studies systematic review was employed in this study. A mixed studies systematic review refers to a kind of systematic review which brings together findings from studies with different study designs (Pluye & Hong, 2014). In systematic reviews, researchers try to gather all appropriate evidence “that fits pre-specified eligibility criteria to answer a specific research question,” (Moher, 2015, p.3). Systematic reviews bring all the vast information some people would not get given the time, resource, and skill constraints (Higgins & Green, 2008). Additionally, a systematic review is taken to be comprehensive when it incorporates more than one method; combined evidence from quantitative, qualitative, or mixed studies for easy decision making (Joanna Briggs Institute, 2014; Pluye & Hong, 2014). Therefore, a mixed methods systematic review was used in this study to achieve a succinct, explicit, and elaborate synthesis which incorporates all the evidence available from qualitative, quantitative, and mixed methods studies.

2.2. Study Protocol

This study followed the guidelines for writing systematic reviews by the Joanna Briggs Institute (JBI) (Joanna Briggs Institute, 2014). These guidelines provide for the review of studies with either qualitative or quantitative findings. The researcher commences a systematic review study by defining the scope of the study. This scope is inclusive of the title

of the study, background, study goal and objectives, and the inclusion and exclusion criteria. The researcher details a search strategy through which potential studies are identified and subjected to the eligible criteria (inclusion and exclusion). All eligible studies are then subjected to quality appraisal using the JBI Meta-Analysis of Statistics Assessment and Review Instruments (MAStARI) for quantitative findings and the JBI Qualitative Assessment and Review Instrument (QARI) for qualitative findings. Once the quality of the eligible studies is established, data extraction follows using the MAStARI and the QARI data collection forms. The relationship between and within the studies is subsequently explored, followed by synthesis or analysis of the best evidence, and lastly, recommendations and conclusions are given. The preferred reporting items for systematic reviews and meta-analyses (PRISMA) flowchart is the required format for the Joanna Briggs Institute systematic reviews (Joanna Briggs Institute, 2014) and it is shown in appendix A.

2.3. Inclusion Criteria

All articles with undergraduate baccalaureate student nurses as study participants and nurse educators as lead authors were included in this study. These articles included a description of educational strategies to teach EBNP. The articles showed availability of evaluative criteria and findings of the impact of the education strategy. All the included studies were between 2008-2018 (10 years) with either qualitative, quantitative or mixed methods study designs.

2.4. Exclusion Criteria

Articles with any description of an educational strategy on EBNP for qualified nurses (non-students) and graduate student nurses were excluded. Articles with no description of the educational strategy were not included in the study. Non-peer-reviewed articles and articles in languages other than English were excluded. Articles that were not reporting on studies,

for example, theoretical articles, and any form of reviews (like systematic, scoping, and integrative reviews) were excluded.

2.5. Data Sources

The following databases were searched for articles using pre-determined search terms; CINAHL, MEDLINE, EMBASE, ERIC, and Web of Science Core Collection. The search terms included; educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education, evidence-based education, and evidence-based practice education. These search terms and databases were determined under the guidance of the university librarian.

2.6. Data Collection and Synthesis

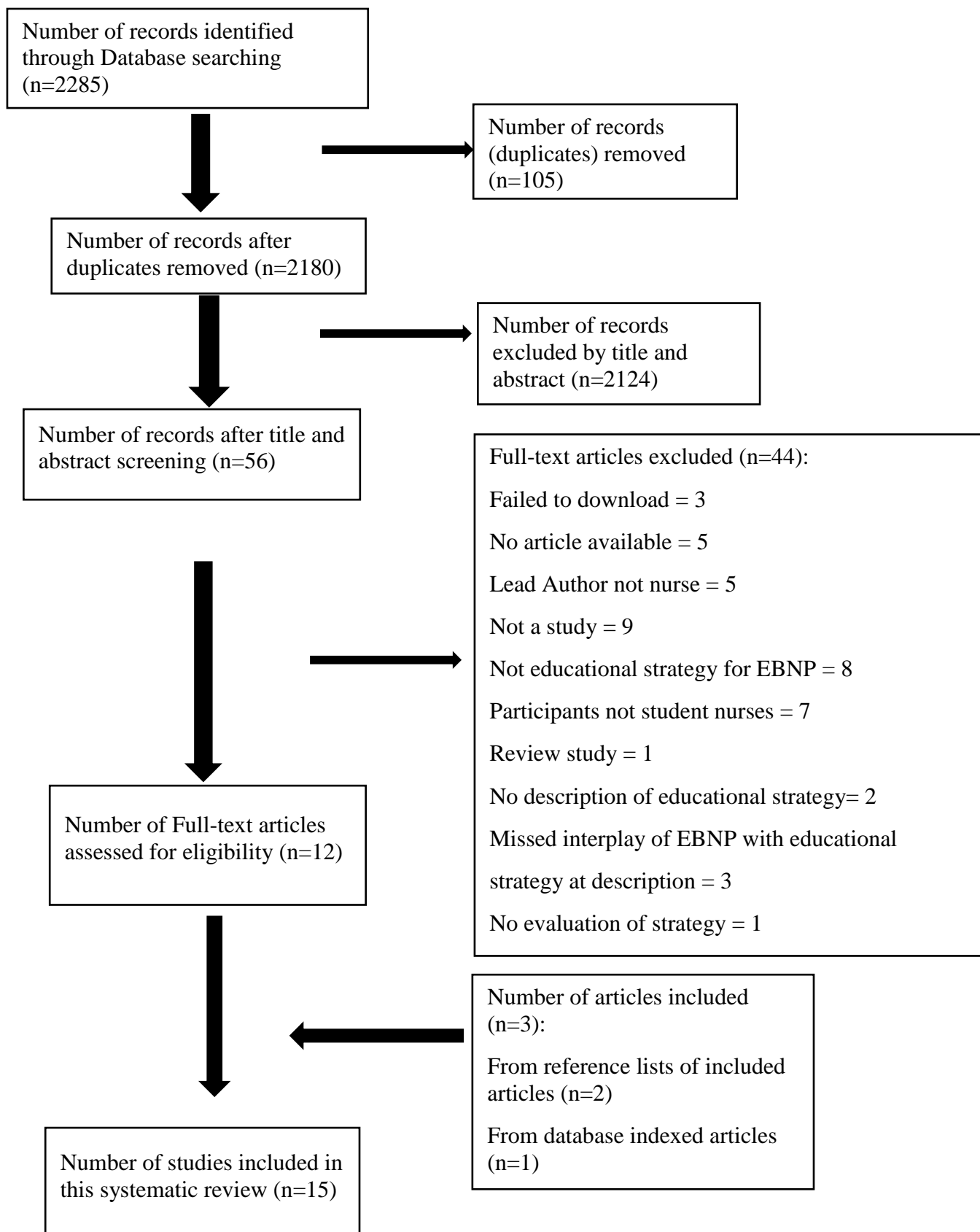
2.6.1. Search strategy. As required by JBI guidelines (2014), the search strategy followed three phases. First, articles were identified using predetermined search terms as described in section 2.5. Second, the identified articles including their titles and abstracts were subjected to the inclusion and exclusion criteria as outlined above and those eligible were retrieved. Third, the reference lists of these retrieved eligible studies were searched for additional articles meeting the inclusion criteria. Additionally, the indexed terms in bibliographic databases were analysed for relevant articles for inclusion. All the identified articles that met the inclusion criteria were finally assessed and screened for methodological validity using standardized critical appraisal instruments from the Joanna Briggs Institute as shown in appendix D.

2.6.2. Quality appraisal. To understand the standards to which the authors conducted the retrieved studies, two kinds of quality appraisal tools were used. As shown in table 3,

quantitative studies and one mixed methods study were assessed using the JBI Meta-Analysis of Statistics Assessment and Review Instruments (MAStARI) in appendices G and H. All the qualitative studies and one mixed methods study were assessed using the JBI Qualitative Assessment and Review Instrument (QARI) in appendix F. These tools created an understanding of the choice and congruity within the philosophical perspective, methodology, research questions, data collection, data analysis, interpretation of results, ethical considerations, and conclusions made by the authors. The JBI quality appraisal process focuses on clarifying why and what articles are suitable for the review (Joanna Briggs Institute, 2014), thus, producing a qualitative appraisal outcome. For the purpose of categorizing the quality of the articles to be studied, a grading system developed by Downe et al. (2009) based on the work of Lincoln and Guba (1985) was utilized. This system enabled the researcher to understand which articles were of high, moderate and low quality. A grade was attached to the study based on the absence or presence of flaws and the effect of these flaws on the reliability and validity of the study.

2.6.3. Data extraction and management. The articles that met the inclusion criteria were double assessed by the researcher for accuracy. Data to be analysed was collected using standardized tools of the JBI Meta-Analysis of Statistics Assessment and Review Instrument for quantitative studies in appendix F and the JBI Qualitative Assessment and Review Instrument for qualitative studies in appendix G (Joanna Briggs Institute, 2014). Extracted data was as well managed in Microsoft excel throughout quality assessments, data abstraction, and synthesis. Additionally, all information in the data collection tools was merged into one pinch table for easy reference and comparison. Figure 1 depicts the process used in the selection of articles to be included in the systematic review.

Figure 1: PRISMA Flow Diagram for The Search and Selection Process of Studies



2.6.4. Data synthesis. A convergent qualitative synthesis was used for data synthesis in this study. In this design, the results from qualitative, quantitative, and mixed methods studies were transformed into themes and sub-themes by qualitative thematic synthesis design (Pluye & Hong, 2014). This synthesis design was used because JBI guidelines do not have provisions for this kind of data combination (data from different study designs). As per qualitative thematic synthesis, all the extracted data in the pinch table were read and re-read in a comparative process. First, broad themes of findings were created by grouping together similar themes and categories which were already existent in the qualitative studies and qualitative parts of the mixed methods studies. Non-similar themes and categories of qualitative findings were grouped separately. Secondly, variables that were used in quantitative studies and quantitative parts of the mixed methods studies were qualitatively coded. The codes that were similar to the already created themes of qualitative findings were grouped accordingly. The codes that were different from the already existing themes were categorized separately. Following these two steps, broad themes emerged. Thirdly, within each broad theme, findings were synthesized further by combining the separate categories or qualitative codes to form coherent sub-themes. Thus, creating particular sub-themes from the general themes, which were then presented in the results section.

2.7. Ethical Considerations

All researchers conducting studies under the University of Saskatchewan must seek and obtain ethical approval from the University of Saskatchewan Research Ethics Review Board. This study is a systematic review of already published manuscripts. Independent ethical approval was not required; however, all articles meeting inclusion criteria were assessed for ethical approval and the findings reported in the discussion part of the systematic review report.

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Chapter Three (Manuscript One). The Evidence Available to Teach Evidence-based Nursing Practice by Nurse Educators: A mixed Studies Systematic Review.

This chapter presents a systematic review paper titled “The evidence available to teach evidence-based nursing practice by nurse educators: A mixed studies systematic review.” Producing this paper was part of the protocol of this project. This paper consists of content from chapter one and two of this thesis, as well as the results and discussion of what the author proposed to do through these two chapters. This paper answers the research questions (research objectives) provided in chapter one using the methods in chapter two. This paper has been written and meets the requirements for publishing in the International Journal of Nursing Studies and will be co-authored with all the committee members; Ferguson. L., Berry. L., Leidl. D., and Belton. S.

3.1. Introduction.

Evidence-based nursing practice (EBNP) is an important topic for both the nurses in practice (Melnyk, Fineout-Overholt, Gallagher-Ford, & Kaplan, 2012) and nurse educators in nursing education (Hande, Williams, Robbins, Kennedy, & Christenbery, 2017). This EBNP uses the current and valid research findings, the nurse’s clinical expertise, the client values and preferences, and the available resources to make a clinical decision (International Council for Nurses, 2012; Registered Nurses’ Association of Ontario, 2014). Therefore, EBNP is the backbone of trusted decision-making in clinical practice (Dowding & Thompson, 2009; Registered Nurses’ Association of Ontario, 2014). The decisions made through EBNP are essential to the quality of patient care and health care systems. As such, governments, organizations, and professional associations around the world have encouraged EBNP in clinical practice and promoted its teaching in nursing education (DiCenso, Guyatt & Ciliska, 2005; International Council for Nurses, 2012; Registered Nurses’ Association of Ontario, 2014).

However, the current educational activities surrounding this topic demand the development of curricula that support EBNP initiatives in clinical settings. The EBNP taught to some student nurses in classrooms seems to be different from that the students experience in clinical settings. In the classrooms, nurse educators mostly teach student nurses the EBNP according to the EBNP process. This process demands searching, appraising, and synthesizing research findings before applying it to patient care (Melnik et al., 2010), yet, the nurses' clinical practice is different. Nurses in clinical settings use already synthesized evidence-based tools such as clinical practice guidelines (CPG), evidence-based textbooks, clinical pathways, evidence-based procedural manuals, and policy guidelines to justify their practice (DiCenso et al., 2005; Lavelle, Schast, & Keren, 2015). These tools are available in many clinical settings and are often updated based on new research evidence. Additionally, nurses in clinical practice may have the capacity to read a single article and apply its findings to patient/client care, but as a general practice, they do not have time to synthesize all available relevant articles (DiCenso et al., 2005). The student nurses are more likely to adopt the kind of EBNP experienced in clinical settings because it is closely within the realm of their future practice than the way they are taught in classrooms.

Therefore, through this paper, the researchers bridge this learning-practice disparity through creating an understanding of the best educational strategies nurse educators can use to teach EBNP that is both replicable in clinical practice and sustainable past the student nurse level.

3.2. Background.

Implementing EBNP in clinical settings faces several barriers, that are individual and organizational. Studies have reported that while some nurses lack enough skills to evaluate the quality of research (Malik et al., 2016), many do not have enough time to assess evidence for practice (Laibhen-Parkes, 2014). Other nurses have limited knowledge, interest, and

motivation to implement EBNP (Doane & Varcoe, 2012; Fiset, Graham, & Davies, 2017). The nurse's interest in implementing EBNP may be affected by attitude, knowledge, or skills (Weng, Kuo, Lo, Chen, & Chiu, 2013). At the organization level, some organizations lack financial support, a vision, and good strategies to implement EBNP, while others have poor leadership structures to offer direction to this implementation (Melnik et al., 2012). As such, organizations and institutions have a role to play in the success of EBNP at the nurses' or practice level.

Despite the organizational barriers to implementing EBNP in many settings, several initiatives have been put in place to promote this kind of practice among the nurses. Ciliska, Pinelli, DiCenso, and Cullum (2001) proposed that health care settings should avail time to nurses for library activities. Through this library time, the nurses do a literature search, appraise, and synthesize evidence needed for their practice. However, this proposal might be impractical given the global shortage of nurses in clinical settings (Doane & Varcoe, 2012; Mugomeri, Chatanga, Maibvise, & Masitha, 2016). Ciliska et al. (2001) also proposed that availing printed or online research journals to nurses would minimise on the time wasted searching for the articles. Availing of research articles would still require each individual nurse to assess and appraise them individually and considering other evidence determining factors. These nurses could have divergent evidence-based practices due to the likely differing interpretations of the research findings. As such, designating a person or a team of people to analyze and synthesize recent research on behalf of a group of nurses or a healthcare institution is appropriate. This information can then be made available to nurses through continuous nursing education, grand rounds, staff meetings, or practice committee meetings to facilitate decision making and practice change (DiCenso et al., 2005).

Alternatively, and particularly at the level of nurse training, student nurses can be taught how to use evidence-based tools. Evidence-based tools refer to summarized

information from gathered and appraised evidence with explicit recommendations for clinical use. Evidence-based tools aim at extending the benefits of EBNP through uniform clinical practice, increased patient education, and medical and nursing litigation protection (Lavelle et al., 2015; Registered Nurses' Association of Ontario, 2014). These tools offer high-quality information from already appraised and synthesized studies; hence, thwarting the evidence search time burden (DiCenso et al., 2005). The individual and group understanding of evidence-based tools is also more likely to be uniform, unlike their understanding of research findings from individual studies (Rycroft-Malone, 2008). In this case, the benefits of EBNP would be easier to achieve than when individuals and groups make an effort to interpret and synthesize the research findings of single studies for their individual clinical use. Therefore, the emphasis on learning how to access and use evidence-based tools is needed in student nurses so that it is part of their practice culture before they join the professional practice.

This emphasis ultimately requires better teaching styles for EBNP. However, in some cases, nurse educators conflate research utilization and EBNP. In several studies, nurse educators have reported teaching research utilization to mean the teaching of EBNP (André et al., 2016; Nordsteien, Horntvedt, & Syse, 2017). While research utilization is limited to the use of research findings in nurses' work, in EBNP, nurses take an integrated approach to practice where research findings, clinical expertise, patient values, and resources are all considered and valued (DiCenso et al., 2005; Registered Nurses' Association of Ontario, 2014). Thus, research utilization is an essential subset of EBNP (Moen et al., 2015) and nurse educators need to firmly uphold this distinction. Even in some institutions where educators do differentiate the two, teaching EBNP is done mostly theoretically, inadvertently reinforcing the gap between what students know and can do (Malik et al., 2017). Yet, evidence shows that teaching students EBNP reduces the skill-knowledge gap (Doane & Varcoe, 2012).

Some nurse educators do not substantiate their students' clinical setting learning; students are entirely left in the hands of clinical nurses. Nurses in clinical settings teach student nurses what and how they practice (Malik et al., 2017). The nurses' practice may be guided by evidence-based tools (Registered Nurses' Association of Ontario, 2014), according to how they learned while in school (Balakas, Sparks, Steurer, & Bryant, 2013), or according to the practice tactics they developed due to patient workloads and shift demands (DiCenso et al., 2005). Given the fact that the student nurses would soon join the clinical setting as professional nurses, they certainly adhere and learn from the clinical nurses; making the classroom learning of EBNP process less significant.

However, whether student nurses learn from the clinical nurses or from the academic nurse educators, teaching and learning in the two settings should be complementary to each other (André et al., 2016; Malik, et al., 2017). The teaching in the clinical setting should actualize that in the classroom and the teaching in the classroom should draw on the needs of and experiences in clinical settings (Benner, Sutphen, Leonard, & Day, 2010). This kind of teaching and learning requires nurse educators to use educational strategies that are beyond the traditional teacher-centered styles.

Four review studies having baccalaureate student nurses as participants were found on teaching EBNP. In a narrative synthesis that was initially designed as a systematic review, Kyriakoulis, Patelarou, Laliotis, Wan, Matalliotakis, Tsiou, and Patelarou (2016) identified the educational strategies for teaching evidence-based practice to undergraduate health students. This review consisted of only two nursing articles. The authors' aim was to identify the best teaching strategies for EBNP; however, their discussion does not reflect this. Instead, it addresses the teaching time, the need for multifaceted teaching approach and the evaluation of teaching EBNP. The authors acknowledged their failure to discern the effective method of teaching EBNP as part of the study limitations (Kyriakoulis et al., 2016).

Melender, Mattila, and Häggman-Laitila (2016) conducted a systematic review with the aim of identifying the educational interventions used to promote learning and implementation of EBNP in nursing education. From the ten analyzed articles, several educational interventions were identified, and each had a significant outcome on the students' acquisition of EBP competencies. However, the study lacks a detailed discussion of how the educational strategies assist student nurses to translate EBNP knowledge into clinical practice. Also, the study lacks a discussion of whether the different interventions can be combined, or which one can be better used.

In another systematic review (Aglen, 2016) on pedagogical strategies to teach baccalaureate students evidence-based practice, two categories of pedagogical interventions were described: learning information literacy and learning the research process. The author's discussion was based more on academic driven interventions that aim at solely informing students without drawing on the benefits of students' interaction within the clinical setting. The focus on how these interventions promote EBNP in clinical settings was not covered.

In a scoping review (Fiset et al., 2017) on the barriers, facilitators, and educational interventions that promote students' use of EBNP in clinical nursing, most students and faculty lacked enough knowledge for EBNP and had a negative attitude toward EBNP; however, the nature of the negative attitude was not reported. The authors reported that strategies which promoted the teaching of EBNP in the clinical setting had a big potential of reducing these barriers. This study largely covered the barriers and facilitators of EBNP and did not significantly address the educational strategies for teaching EBNP.

Given this background, through this study, the researchers bridged the gap in the literature by identifying the effective educational strategies to teach EBNP to student nurses.

Additionally, this article creates an understanding of how these strategies can translate the learning of EBNP at school into professional practice.

3.2.3. Purpose and objectives

Therefore, the purpose of this study was to explore, synthesize, and describe the evidence available through the literature on current curricula designs and teaching strategies to teach EBNP to undergraduate student nurses. The ultimate goal is that the students can continue to integrate EBNP in clinical settings upon becoming professional nurses. This research study was intended to understand EBNP knowledge transmission and implementation by exploring the processes and outcomes of the current EBNP educational strategies. This study was directed by the following questions: (1) What educational strategies are being used by nurse educators to teach EBNP to undergraduate student nurses? (2) How do these strategies impact undergraduate student nurses' acquisition of EBNP knowledge and EBNP implementation?

3.3. Methods.

3.3.1. Design. This research project was a mixed studies systematic review following the guidelines for writing systematic reviews developed by the Joanna Briggs Institute (Joanna Briggs Institute, 2014).

3.3.2. Inclusion and exclusion. The included articles had nurses as lead authors, undergraduate baccalaureate student nurses as participants, and clear descriptions of educational strategies to teach EBNP. The articles described research studies and included an evaluation of the educational strategy. All the included studies were from 2008-2018. Reasons, why articles were excluded, are presented in figure 1.

3.3.3. Data sources. Five databases chosen under the guidance of the academic librarian were searched for articles using pre-determined search terms in section 3.3.4. These

databases include; CINAHL, MEDLINE, EMBASE, ERIC, and Web of Science Core Collection.

3.3.4. Search process. The search terms were in four clusters which were predetermined based on the study topic and the preliminary search: (i) educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, and teaching methods; (ii) evidence-based nursing practice, evidence-based nursing, evidence-based practice, and evidence-informed practice; (iii) students, undergraduates, nursing students, and student nurses; (iv) nursing education, evidence-based education, evidence-based nursing education, and evidence-based practice education. These terms were determined with the assistance of a university-level academic librarian. Each search term was searched in all the databases using both keywords and subject headings. Step one of the search process was to combine all the searched results from all the search terms within the individual clusters using the Boolean operator “or.” Step two was to combine all results from the different cluster results using the Boolean operator “and.” The last step was to limit the search process at each database level using the inclusion criteria possible.

3.3.5. Quality of the included studies. The JBI quality appraisal tools in appendices F, G, and H were used to qualify the selected studies for this systematic review study by understanding how the research questions, methodology, analytical strategies, and results were a better fit for each other. Appendix F is a JBI critical appraisal checklist for qualitative research, appendix G is a JBI critical appraisal checklist for analytical cross-sectional studies, and appendix H is a JBI critical appraisal checklist for quasi-experimental studies. The articles to which these tools were applicable are also shown in appendix D. It was noted that the tools for quantitative studies (appendices G and H) did not have a provision for the ethical considerations of the studies to be appraised. As such, a question on study ethics was included by the researcher. These JBI tools only provide a qualitative measure of study

appraisal. To have a better understanding of the quality of included studies, the grading system in appendix I created by Downe, Finlayson, Walsh, and Lavender (2009), based on the work of Lincoln and Guba (1985), was used. This grading system provided a quantitative measure of the quality of the included studies. No study was excluded as a result of this grading system of Down et al. (2009).

3.3.6. Data extraction and management. All full articles meeting the inclusion criteria were double assessed by the researchers for accuracy. Data were collected using standardized tools of the JBI Meta-Analysis of Statistics Assessment and Review Instrument for quantitative studies (see appendix J) and the JBI Qualitative Assessment and Review Instrument for qualitative studies (see appendix K) (Joanna Briggs Institute, 2014). All extracted data was managed in Microsoft excel throughout quality assessments, data abstraction, and synthesis.

3.3.7. Data synthesis. A convergent qualitative synthesis design (Pluye & Hong, 2014) was used, where results from qualitative, quantitative, and mixed methods studies were transformed into qualitative findings by qualitative thematic synthesis. To avoid reinterpretation of authors' work, themes in the qualitative studies were maintained; similar themes were grouped together, and non-similar themes reported separately. **(Insert figure 1 here)**

3.4. Results

3.4.1. Search outcomes. As provided in figure 1, out of the 2285 records identified from all the databases, 105 records were duplicates, and 2124 records were excluded. Reasons for the exclusion at this level included; the title or abstract not conforming to the inclusion criteria of this study, the title or abstract not focusing on the teaching of evidence-based nursing practice, or the title or abstract not being a review study. Additionally, 44 full-

text articles were excluded with reasons leaving 12 articles. The reference lists of these 12 articles and the database indexed articles were hand searched to allow for the inclusion of any relevant articles missed in the electronic database search process. The reference lists yielded two (2) articles, and one (1) article from the database indexed articles qualified to be included. Therefore, fifteen (15) articles were included in this systematic review. These fifteen articles are asterisked (*) at the beginning of each reference in the reference section.

3.4.2. Characteristics of included studies. The characteristics of all the included studies are summarized in table 1 with their methods and designs in appendix D. Most of the studies were quantitative (n=11), while four studies were qualitative (n=2) and mixed methods studies (n=2). As shown in appendix D, according to the grading system of Down et al. (2009), eight (8) studies were of high quality, four (4) studies were of moderate quality, and three (3) studies were of low quality. The low and moderate quality grade scores occurred as a result of methodological, validity, or ethical concerns.

3.4.3. Findings. The findings of the articles included in an in-depth review of this study are summarized in table 2. This table includes the studies, the significant findings in them, and the authors' recommendations. The findings are categorized according to the present study's questions. Thus, the two themes of these findings are described below; educational strategies and EBNP knowledge and implementation.

3.4.3.1. Educational strategies. Six sub-themes were generated for all of the strategies. The sub-themes include timing, duration, content, delivery method, context, and prerequisites. The nurse educators drew from more than one strategy in the teaching of EBNP to their students.

3.4.3.1.1. Timing. In this study, timing means the time in the nursing program when the nurse educators found it appropriate to teach EBNP to the students. Four studies had

EBNP taught in the third (senior) year of the nursing program (Keib, Cailor, Kiersma, & Chen, 2017; Kim, Brown, Fields, & Stichler, 2009; Leach, Hofmeyer, & Bobridge, 2016; Ruzafa-Martinez et al., 2016). While it was evident that in some studies EBNP content was first taught to students and such concepts used by the students as they studied other courses, in three studies EBNP was taught in second (Jalali-Nia, Salsali, Dehghan-Nayeri, & Ebadi, 2011; Ruzafa-Martinez et al., 2016; Smith-Strom & Nortvedt, 2008) and first (junior year) (Cosme, Milner, & Wonder, 2018; Dawley, Bloch, Suplee, McKeever, & Scherzer, 2011; Reid, Briggs, Carlisle, Scott, & Lewis, 2017) year of the nursing program respectively. In two studies EBNP was taught in all years of the nursing program (Brooke, Hvalic-Touzery, & Skela-Savic, 2015; Finotto, Carpanoni, Turrone, Camellini, & Mecugni, 2013). No single time of teaching EBNP was better supported than the others. However, in all studies, the appropriateness of this timing was determined by the strength and quality of both the teaching strategy and how the teaching strategy was evaluated (study design).

3.4.3.1.2. Duration. In this study, duration refers to the length of teaching EBNP to nursing students. The majority of the studies had the teaching of EBNP principles and concepts conducted for at least a full term (one term, two terms, one year, two years, and for the entire program years). In three studies, the EBNP teaching happened for a few hours (Kim et al., 2009; Zhang, Zeng, Chen, & Li, 2012) and one day (Jalali-Nia et al., 2011) and then the students were required to apply the learned EBNP principles in other courses or in EBNP projects.

3.4.3.1.3. Content. Under content, the details of what was covered in the different educational strategies were explored. In one study (Mattila, Rekola, Koponen, & Eriksson, 2013), research but not EBNP was first taught to the students followed by their participation in a hospital journal club. In the study by Foss, Kvigne, Larsson, and Athlin (2014), it was not mentioned what students were taught before their involvement in the hospital-based

collaborative practice. Either EBNP concepts or both EBNP concepts and research aspects were taught in the rest of the included studies. In four studies (Dawley et al., 2011; Finotto et al., 2013; Kim et al., 2009; Zhang et al., 2012), the educational strategies covered only EBNP principles and concepts; research was not part of the EBNP teaching. In a study by Oh et al. (2010), the educational strategy theoretically covered research principles with an EBNP clinical practicum. In a study by Keib et al. (2017), research and EBNP principles were integrated into the same course as one. Only in this study did nurse educators give students opportunities to understand how clinical guidelines (evidence-based tool) can be used (Keib et al., 2017). The EBNP principles taught to students followed the seven steps of EBNP according to Melnyk et al. (2010). These steps include; (1) cultivate a spirit of inquiry and EBP culture, 2) ask the PICOT question (population of study, intervention or issue of concern, comparison intervention, outcome, time duration), 3) search for the best evidence, 4) critically appraise the evidence, 5) integrate the evidence with clinical expertise and patient preferences to make the best clinical decision, 6) evaluate the outcomes of the EBP practice, 7) and disseminate the outcomes (Melnyk et al., 2010). In three studies (Reid et al., 2017; Ruzafa-Martinez et al., 2016; Smith-Strom & Nortvedt, 2008), only four steps of EBNP were covered in the educational strategies. The strategies in these three studies aimed at having students read, search, appraise and analyze data.

3.4.3.1.4. Delivery Method. While in almost all of the studies, nurse educators implemented EBNP as a standalone course, in two studies (Dawley et al., 2011; Jalali-Nia et al., 2011), EBNP was integrated into other courses. In these two studies, EBNP principles and concepts were required to be used as the courses progressed. In all of the studies, the nurse educators utilized, supported, and found benefit in combining the active/interactive and traditional teaching styles. Active or interactive teaching styles included group work, small group discussions, workshops and seminars, group or individual presentations, and self-

directed learning. The traditional teaching styles were lectures, individual work, and individual online learning. Zhang et al. (2012) in their educational strategy used self-directed learning and workshops to teach EBNP while Kim et al. (2009) used an interactive method consisting of lectures, group work, and clinical activities (project) to teach EBNP. In seven of the studies (Cosme et al., 2018; Dawley et al., 2011; Finotto et al., 2013; Keib et al., 2017; Oh et al., 2010; Smith-Strom & Nortvedt, 2008; Ruzafa-Martinez et al., 2016), an evaluative strategy of the learning of EBNP resulting in a grade was used by the nurse educators. The evaluative strategies included exams, tests, quizzes, and assignments. In some studies, the evaluation was at the end of the learning process (summative evaluation) while in other studies it happened as learning unfolded (formative evaluation).

3.4.3.1.5. Context. In all the studies reviewed, the educational strategies had elements of both clinical and classroom settings (see table 1). In three studies, the teaching of EBNP was designed based on theoretical models and frameworks (Dawley et al., 2011; Kim et al., 2009; Foss et al., 2014). These models and frameworks laid a basis (of why and how) for the learning of EBNP.

3.4.3.1.6. Prerequisites. As highlighted under the sub-theme of content, some nurse educators required students to cover research or research related concepts (like statistics, epidemiology) prior to the teaching of EBNP. Also, in eight (8) of the fifteen (15) studies, basic knowledge of and skills in computer or information and communication technology (ICT) were needed for search and retrieval strategies to complement the learning of EBNP.

3.4.3.2. EBNP knowledge and implementation. Under this theme, five sub-themes were generated from all the articles. These include; knowledge acquisition, EBNP use and research utilization, collaborative teaching, facilitation in learning, and barriers and facilitators.

3.4.3.2.1. Knowledge acquisition. The students' acquisition of EBNP knowledge stands on a continuum with other factors like attitude, skills, confidence, and perceptions (Zhang et al., 2012). Eighty-seven percent (87%) of the studies had their findings related to this sub-theme. In all these studies, the chosen educational strategies were reported to have a positive impact on students' EBNP knowledge although the knowledge elements impacted are not or insufficiently reported in some studies. The amount of EBNP knowledge gained determined the student nurses' confidence and attitudes for EBNP. Although there was no absoluteness in the educational strategies that would reliably sustain the EBNP knowledge from students' level to practicing nurses' level, some promising evidence exists. Some educational strategies exhibited a potential to create some sustainability in EBNP knowledge. A study by Cosme et al. (2018) showed that teaching an EBNP course to students could sustain EBNP knowledge past one year. Researchers contend that teaching EBNP courses might have long-term benefits to the nursing profession through creating critical thinking and EBNP interest (Finotto et al., 2013; Keib et al., 2017; Leach et al., 2016). Students can understand the EBNP process, think critically and may choose to implement it in the future.

3.4.3.2.2. Collaborative teaching. A form of collaboration between the teaching institutions and clinical institutions in the training of student nurses was noted in many studies. In five studies (Dawley et al., 2011; Foss et al., 2014; Keib et al., 2017; Mattila et al., 2013; Oh et al., 2010), nurse educators immersed students into clinical practice as a way of building on and consolidating the didactic EBNP knowledge initially gained. Nurses and other hospital staff in clinical practice play a key role in facilitating students' learning. Additionally, in teaching EBNP, a collaboration has been observed to exist between librarians, computer laboratory technicians and nurse educators (Finotto et al., 2013; Foss et al., 2014). This collaboration facilitates students' learning of literature search skills by use of

these experienced and expert individuals in such fields, rather than the nurse educators (who are less skilled in such fields) teaching themselves to the students.

3.4.3.2.3. EBNP use and research utilization. From most of the articles included in this review, the students considered the EBNP teaching strategies to be paramount in linking their learned theory to clinical practice. In some studies, the educational strategies significantly contributed to the use of research and EBNP in clinical practice (Brooke et al., 2015; Foss et al., 2014; Keib et al., 2017; Leach et al., 2016; Reid et al., 2017). In other studies, this contribution was not considered significant (Finotto et al., 2013; Kim et al., 2009; Mattila et al., 2013). The low-quality and moderate quality scores on the articles among these categories of significance interfere with drawing a general conclusion. Studies of Foss et al. (2014) and Mattila et al. (2013) were of low quality (credibility, transferability, dependability, and confirmability were highly affected) while studies of Finotto et al. (2013), Keib et al. (2017), and Reid et al. (2017) were of moderate quality (credibility, transferability, dependability, and confirmability were moderately affected). Hence, the quality of the study might have a big role to play in determining whether or not the educational strategies facilitate implementing EBNP.

3.4.3.2.4. Facilitation in learning. Facilitation has been identified to cover supervision, mentorship, preceptorship, and teaching. Facilitators of the EBNP are not only limited to academic faculty, but also include physicians (Finotto et al., 2013); head nurses, registered nurses (RN), and clinical nurse lecturers (Foss et al., 2014); nurses, charge nurses, information specialists, and nurse directors (Mattila et al., 2013), and clinical nurse preceptors (Oh et al., 2010). Among the reviewed studies, there existed discrepancies in the abilities of the facilitators to meet the learning needs of the students. In a study by Zhang et al. (2012), students reported that they needed more instructions to understand what they were doing. In a study by Dawley et al. (2011), the academic nurse educators doubted the sufficiency of the

guidance and support given to students by the clinical faculty. In a study by Foss et al. (2014), the practicing nurses were not of help to the students in the search for articles as both were in the learning process of EBNP. These results indicate the key role facilitation plays in learning EBNP.

3.4.3.2.5. Barriers and facilitators to EBNP education. There are barriers and facilitators to both the teaching of EBNP to students and the use or future use (implementation) of EBNP by the students, particularly upon graduation. As shown throughout this paper, some factors can be either barriers or facilitators based on their availability or absence or organization in the learning process. Such factors include a favorable learning environment, effective teaching strategy, resources, students' exposure to a clinical setting, time limitations, and availability of organizational support. These factors were well distributed in all the articles included in the review. **(Insert tables 1 and 2 here)**

3.5. Discussion

Through this systematic review, the authors have explored the evidence available to teach EBNP. The studies that were included demonstrated that the chosen educational strategies significantly and positively affected students' acquisition of EBNP knowledge. This finding agrees with previous review studies on teaching EBNP (Kyriakoulis et al., 2016; Melender et al., 2016). Jalali-Nia et al. (2011) and Kim et al. (2009) provided EBNP education in a one-day and two hours' workshops and the EBNP knowledge gained was tested at the end of the semester between the control and intervention groups. The study by Jalali-Nia et al. (2011) also evaluated students' learning through marks obtained in examinations. The strategies in other studies lasted beyond a single day's duration and entirely evaluated students' learning of EBNP based on individual reports (subjective evaluation). These differences in the duration of teaching and the evaluation of EBNP

possibly justify the differences in the ability of the teaching strategies to create EBNP knowledge gains and implementation readiness.

Debates still exist on whether teaching EBNP empowers or changes students' interest in the use of EBNP. In many studies, the attitude for EBNP was increased alongside EBNP knowledge. In the studies by Kim et al. (2009), Leach, et al. (2016), and Mattila et al. (2013), EBNP knowledge was improved and attitude was not positively affected. The failure to improve attitude is largely associated with the duration of teaching EBNP and how the teaching is evaluated. Changing individuals' attitudes requires a longer duration of exposure to EBNP teaching (Kim et al., 2009; Mattila et al., 2013). The overall low study quality of the study by Mattila et al. (2013) (credibility, transferability, dependability, and confirmability highly affected) could have undermined this finding. Although there is support for the longer duration of teaching EBNP to student nurses, Oh et al. (2010) contend that even a short exposure to EBNP educational programs has some benefit through improving efficacy for EBNP.

This review has not found support for any best timing (when to teach EBNP) or duration of EBNP teaching. Some nurse educators opted to teach EBNP in year one (junior year), year two, year three (senior year), while others taught it across all the program years. Also, EBNP was taught for a range of exposure from a few hours to across an entire term and backed up with clinical exposure. A previous review study reported this same finding (Kyriakoulis et al., 2016). The choice of EBNP teaching duration or timing depends on the nurse educators' interests and the institutional factors surrounding teaching EBNP. For example, some nurse educators taught EBNP in preparation for students' clinical rotations. Student nurses may however adequately benefit from EBNP exposed to them at multiple points in the curriculum (Cosme et al., 2018).

As observed in three studies (Dawley et al., 2011; Foss et al., 2014; Kim et al., 2009), the use of theoretical models and frameworks highly supported the teaching of EBNP for knowledge acquisition and implementation in three ways. First, the model or framework relates the theory learned to the practice needed (Kim et al., 2009), hence being of benefit to both nurse educators and student nurses. Second, a model or framework directs students' learning by guiding the students through a step-wise process of learning (Dawley et al., 2011; Kim et al., 2009). Third, the nurse educators too are directed on how they should effectively and efficiently teach EBNP (Dawley et al., 2011; Foss et al., 2014) by reflecting on the EBNP-teaching associated factors. The models and frameworks provide the rationale for any actions and steps taken by the nurse educators in the teaching process. Educational strategies utilizing theoretical frameworks or models have better outcomes compared to those strategies without one (Haggman-Laitila, Mattila, & Melender, 2016; Melender et al., 2016).

The use of several teaching methods (multifaceted approach) in combination was a strength for many of the current educational strategies. Providing teaching strategies for a variety of learning styles supported the effective outcomes seen in many studies. Learning has been found to be maximized when learners are subjected to different learning approaches (Oh et al., 2010; Zhang et al., 2012), especially in cases where an educator is not sure of the learning styles of the students. In some strategies, nurse educators presented theoretical concepts to learners and followed up with either clinical practice/practicum or EBNP project. In other strategies, the nurse educators taught EBNP in two or more separate courses with the second or subsequent course(s) building on the first one (spiralling). Spiralling ensures that the students build on the previously learned knowledge as they progress in the nursing curriculum (Aglen, 2016; Fiset et al., 2017; Scurlock-Evans et al., 2017); hence adequately preparing students for implementing EBNP.

Consequently, some nurse educators taught EBNP as a standalone course or as part of other program courses (course-integrated). Determining a better educational approach between standalone and course-integrated approaches is still challenging as no absolute recommendation for one exists. However, Ruzafa-Martinez et al. (2016) supported the teaching of EBNP as a standalone course within the nursing curriculum with a view that it is cost effective. Many EBNP courses were taught as part of the formal program curriculum, and others were instructed outside the formal students' curriculum (Foss et al., 2014; Mattila et al., 2013; Zhang et al., 2012). The distinct benefit of these two ways of integrating EBNP is not well documented. The two studies which support teaching EBNP outside students' curriculum were low-quality studies (Foss et al., 2014; Mattila et al., 2013). However, some evidence of at least moderate quality supports the integration of EBNP courses within the formal nursing curriculum (Keib et al., 2017; Leach et al., 2016; Zhang et al., 2012). The integration of EBNP in students' curriculum is synonymous with American Association of Colleges of Nursing's (2008) and Registered Nurses' Association of Ontario (2014) recommendations to produce graduate nurses who can provide evidence-based, cost-effective, multi-dimensional, and high-quality patient care.

The results of this study show a focus on integrating the teaching of EBNP steps and their applicability to the clinical settings to the student nurses. With claims of nurses not using EBNP steps in practice (Aglen, 2016), this integration is paramount to the students' learning of EBNP. Unless a student is able to evaluate research, providing EBNP to patient care might be highly compromised (Brooke et al., 2015). Authors of previous review studies on the teaching of EBNP have made a similar observation and even recommended teaching EBNP covering all the seven steps (Aglen, 2016; Haggman-Laitila et al., 2016). Alongside learning the theory of EBNP steps, effective approaches are needed to create knowledge

transfer. Clinically oriented approaches to teaching EBNP which are student-centered are currently desirable (Aglen, 2016; Cosme et al., 2018).

The students' learning of research as pre-requisite to the practice of EBNP was very evident in the findings of this study. The need for this pre-requisite arises from the fact that EBNP seems to be "a new world" (Brooke et al., 2015, p. e8) and its understanding and applicability to patient care is drawn from research (Brooke et al., 2015; Kim et al., 2009; Leach et al., 2016). As such, students need to know when and how to use research to support their clinical practice (Dawley et al., 2011). Student nurses' understanding of research articles increases their confidence when faced with an opportunity to apply the learned knowledge and research evidence (Keib et al., 2017). As such, research and evidence-based tools should be taught to students with a purpose of helping them see the applicability of such information in practice; rather than solely gaining evaluative skills as it has been identified in many studies in this review.

As observed in the sub-theme of delivery method, the process of writing theses and EBNP assignments gives student nurses experience in computer literature search and critical analysis of the existing evidence (Finotto et al., 2013; Smith-Strom & Nortvedt, 2008). As such, assessing the learning of research and EBNP based on the students' performance might be preferred to strengthen their confidence in implementing EBNP when they become professional nurses. Subsequently, the literature search skills might be better taught by an academic librarian. Hence, the inclusion of librarians in the teaching of EBNP is vital; yet many African universities have underutilised them in teaching of students.

Given the existing exhortation for collaboration between academic and clinical settings in pursuit of effective and efficient EBNP education (André et al., 2016; Malik et al., 2017), some nursing educational settings have achieved this. This collaboration is evident in

all the studies which had a collaborative relationship between education and practice. The involvement in the supervisory, teaching and assessment support by the clinical team has been less embraced in some studies. This deficiency could be because the full involvement of the clinical team puts an extra facilitation demand on the academic setting (Foss et al., 2014). Facilitation in the teaching and learning of EBNP is not only restricted to academic educators. All staff in the computer laboratories, libraries, and clinical setting have a role to play in the students' learning of EBNP. This kind of working together draws the different skills to create a collaborative skill-support beyond which a single academic nurse would provide.

The disparity in resource availability among the global regions has impacted the trend of learning and implementing of EBNP. Some clinical and academic settings do not have regular access to clinical settings, and computers and internet to access research and other evidence-based materials (Finotto et al., 2013; Leach et al., 2016). Students in these settings may not effectively and realistically learn and implement EBNP as do their counterparts in settings where resources are more readily available. In this review, the researcher found evidence that such settings can benefit from collaboration and partnerships. Simulation centers (Ruzafa-Martinez et al., 2016) and skills laboratories (Finotto et al., 2013) have been used in some of the studies to support learning in institutions where resources and the healthcare situation did not allow for the use of a comprehensive clinical approach to learning EBNP. The nurse educators' creativity in making learning real to students is appealing in the teaching of EBNP.

In addition to the many barriers to the learning and implementing of EBNP discussed throughout this paper, time limitation (Brooke et al., 2015; Leach et al., 2016) remain the most reported barrier. Time constraint has created what Oh et al. (2010) refers to as nurse isolation from knowledgeable colleagues with whom research findings can be discussed.

Both the academic and clinical nurse educators consider teaching EBNP to be time demanding (Oh et al., 2010). Both teaching EBNP content and basing this teaching on evidence demand time which many nurse educators don't have. Just like the already practicing nurses, when students become practicing nurses, the patient care load may limit or hinder their capacity to implement EBNP. Therefore, innovative EBNP educational strategies negating these barriers are needed for nurse educators.

3.5.1. The weight of the evidence. The state of the published literature revealed that there is evidence to support teaching EBNP to student nurses. This evidence (the 15 articles) is, however, small compared to the total number of articles retrieved in the databases (2,283 articles); these articles make 0.7% of the total articles. This evidence might indicate that very few well-designed studies describing and evaluating the educational strategies have been published. The limited studies with participant randomization and intervention and control groups could have reduced the quality of the findings of quantitative studies. Subsequently, according to the present study design both qualitative and quantitative findings equally contributed to the state of this study. As such, the fewer number of qualitative research studies (2 articles) might have had a limited role in explaining the evidence available to teach EBNP. The absence of ethics review and the unproven validity of some of the study tools as mentioned earlier lessened the quality of three studies as shown in table 3. Although some authorities consider experimental studies to be more rigorous compared to the rest of the studies (Ham-Baloyi & Jordan, 2016), this present review study had one experimental study and a significant number of quasi-experimental studies.

However, this mixed studies systematic review generates strength from the 91% (10 of the 11 articles) of interventional articles which utilized pre-tests and post-tests. Additionally, most of the tools used in the studies retrieved were validated. The design of this present study was also rigorous enough to capture sound evidence. The designs of most of the

studies, both experimental and non-experimental, included in this study were convincingly sound. Hence, significantly contributing to the final grades of the quality of the studies. Subsequently, the finding that most studies (8 of 15) were of high quality may reflect the inclusion of only peer-reviewed articles in this study, thus, depicting their quality appraisal essence (Ham-Baloyi & Jordan, 2016). The scoring of most articles as high quality was also due to the ability of the research studies to show higher significance in answering the questions of the present study.

3.5.2. Limitations of this review. Several weaknesses and challenges to this review study have been discussed throughout this paper. The three low-quality studies included in this review possibly have a significant effect on the conclusions made. This review did not statistically analyse the included studies. Probably results from a meta-analytic review could have varying conclusions. Also, the 15 included articles out of the 2,283 articles identified in the databases is small evidence; hence, a limitation to this study. No articles from the African countries qualified to be part of this study; hence, making it had to understand the teaching of EBNP in African context through this rigorous study. This absence could mean that many African journals are not indexed in the major search databases. Additionally, although peer-reviewed articles consist of rigorous studies, there is a possibility that this search process limited to only these articles might have led to the elimination of good articles.

3.6. Implications and Conclusions

Teaching EBNP effectively requires well-designed educational strategies. The timing unlike the duration of teaching EBNP has been noted to be an insignificant concern in this review. However, best EBNP educational strategies need to adequately consider the content of EBNP to be taught, inclusive of all EBNP steps, and the good delivery methods. These methods need to consider the learner as an active participant in the learning process, one who learns through experience. This experience demands a union between the classroom and

academic learning guided by theoretical models and frameworks. Before any EBNP teaching, students ought to have research skills and the nurse educators be knowledgeable in EBNP. Utmost benefit has been observed to accrue from the use of several educational strategies especially in combination and married with clinical exposures. Such use of educational strategies has the potential of adequately contributing to the student nurses' acquisition of EBNP knowledge and EBNP implementation. Through this use of educational strategies, the possibility of sustaining EBNP knowledge beyond the student level to when the students become professional nurses in clinical settings is increased. Teaching EBNP as part of all the student nurses' curricula is evident. Importantly, a strong collaboration among nurse educators and practicing nurses in helping students learning EBNP should be the current focus in teaching EBNP. Nonetheless, further research using robust study designs is needed in the understanding of the teaching and implementation of EBNP in undergraduate student nurses. More studies are needed especially with a meta-analysis component, a post-student level follow-up, and on nurse educator skills to teach EBNP.

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Chapter Four (Manuscript Two). Teaching Evidence-based Nursing Practice Using Evidence to Student Nurses in Developing Countries

In this chapter, the author presents a paper titled “Teaching evidence-based nursing practice using evidence to student nurses in developing countries.” This is a discussion paper on how the evidence in manuscript one (chapter three) can be adapted to the African nursing education systems. This paper basically extends the discussion of the findings in chapter three. Writing this paper was stated in the protocol of this project. This paper has been written and meets the requirements for publishing in the International Journal of Nursing Education Scholarship and will be co-authored with all the committee members; Ferguson. L., Berry. L., Leidl. D., and Belton. S.

4.1. Introduction

Nursing is both a practice and theory-based profession (Phuma-Ngaiyaye, Bvumbwe, & Chipeta, 2017). As such, current nursing education curricula should be inclusive of evidence-based nursing practice (EBNP). Failure to develop the culture of EBNP in nurses while they are still students makes it hard to promote its practice in clinical settings (Moen et al., 2015). Not developing this culture during nursing education programs, makes graduated nurses run a risk of relying solely on their own and the colleagues’ knowledge and expertise and clinical facts acquired at school to make their clinical practice decisions. In this case, nurses fail to realize the need and value for research evidence in their clinical practice decisions. Usually, the nurses adhere to the kind of practice they learned at school (Moen et al., 2015).

EBNP requires the use of best research evidence (both qualitative and quantitative), clinical expertise, and paying attention to patient values and preferences, clinical setting related factors, and financial costs (to both patient and health care institution) in nursing care (Boswell & Cannon, 2011; DiCenso, Guyatt, & Ciliska, 2005). The nurse needs to give

proportional consideration to all these parameters in making a clinical practice decision under EBNP. The use of research evidence implies EBNP is informed by nursing or clinical research (nursing's body of knowledge) (Moen et al., 2015). Research, an investigative process, contributes to this body of knowledge (Cannon & Boswell, 2011). EBNP creates and promotes a critical thinking approach (Cannon & Boswell, 2011) in which nurses are able to understand their patients through reflective and pluralistic thinking (Scheckel, 2009). EBNP also empowers nurses to be in a position to change practice with the changing healthcare systems and patient conditions (Cannon & Boswell, 2011). Generally, through EBNP, nurses are well prepared to meet the complex needs of patients in nursing practice (Blaauw, Ditlopo & Rispel, 2014), even amidst nurse shortages. For these reasons, EBNP has been advocated for by several healthcare organizations and associations to be part of nurses' educational preparation and clinical activities (International Council for Nurses, 2012; World Health Organization, 2013).

In clinical practice, nurses may not go through the whole process of searching for and synthesizing several research articles on a given patient condition while providing patient care, as required by EBNP (Melnyk, Fineout-overholt, Stillwell, & Kathleen, 2010). However, they may retrieve and read at least one article of a study on a given patient condition, understand it and apply such evidence to practice if applicable. This process is EBNP, but it is limited. It is one way of finding evidence to support clinical practice. Evidence from a single study might not be the best available evidence. Nurses can also use evidence-based clinical practice guidelines, clinical pathways, policy statements, procedure manuals, protocols, and position statements as references during patient care (DiCenso et al., 2005). These evidence-based tools reflect research and non-research evidence rigorously integrated to support clinical practice; thus, can be referred to as best practice guidelines (BPG) (Registered Nurses Association of Ontario, n.d). The BPGs usually address specific

health conditions and are frequently updated. The use of these BPGs by nurses constitutes EBNP because these tools are already evaluated in light of other practice decision making factors as outlined in the EBNP definition. The nurses' research synthesis skills are not needed in the use of BPG; rather, their appraisal skills of these guidelines for credibility is paramount. Appropriateness of any research evidence and BPG to the practice setting and patient conditions (also evidence) qualifies it to be the best evidence (Registered Nurses' Association of Ontario, n.d). Therefore, in EBNP, nurses use evidence in different forms to inform their clinical practice.

DiCenso et al. (2005) exhorted nurses seeking to use healthcare literature in practice to answer three questions; are the results of the study valid? What are the results? How can I apply these results to patient care? These are evidence-evaluative questions. Appropriately answering these questions demands a firm grasp of the evidence search process (where and how to find articles), research methodologies (research with strong study designs), and having clinical experience/ exposure and strong judgement. We believe these processes can best be developed and fostered at school when nurses are still students. As such, in this paper, we use the key findings from a systematic review (Wakibi, Ferguson, Berry, Leidl, & Belton, in review) to discuss how these processes can be cultivated in nursing education. In this review, the authors explored the evidence available to teach EBNP to undergraduate student nurses by nurse educators. The key findings included: The need to design effective educational strategies which put into consideration time, duration, content, delivery method, context, and the pre-requisites for teaching EBNP; and the design of educational strategies which promote student nurses' appropriate acquisition of EBNP knowledge and its implementation into patient care. Effective EBNP educational strategies engage students, bridge classroom and clinical settings, build on the context of EBNP steps, and are time friendly. Students' research skills and the educators' EBNP knowledge should be key pre-

requisites in the learning of EBNP (Wakibi et al., in review). These authors found that student nurses' knowledge acquisition is on a continuum with skills and attitude; as such, any effective EBNP educational strategy should have the capacity to equally develop all these three aspects. The authors also identified the need for strong collaboration between educators and practicing nurses in teaching and learning of EBNP (Wakibi et al., in review).

The purpose of this current paper, therefore, is to provide strategies to African nurse educators to teach EBNP based on research evidence. The ultimate goal of these strategies is the integration of EBNP as an integral and integrated part of the nurses' clinical activities. In this paper, the authors first explored nursing education in Africa, connected nursing education to EBNP, explored EBNP education generally, and lastly, assessed the state of EBNP in Africa. We identified the gap between the practice and teaching of EBNP and suggest strategies that can transform the teaching of EBNP in African countries.

4.2. Nursing Education in Africa

In Africa, nursing education has several training levels for becoming a practicing nurse. These levels include apprentice (trained on the job), certificate, diploma, baccalaureate, master (on small scale) and doctoral (on a very small scale) prepared nurses. Baccalaureate degree, master's degree, and Ph.D. education are exclusively attainable at the university. Many African countries like Uganda, Ghana (Bell et al., 2014), Nigeria (Agbedia, 2012), South Africa (Blaauw et al., 2014), Malawi, Zambia, Kenya, and Zimbabwe (Bvumbwe & Mtshali, 2018) have concentrated on producing and employing less educated cadre of nurses, particularly the diploma and certificate nurses. As in other countries and geographic regions, nursing labour workforce demand drives the training and production of African nurses. The dominance of the less educated cadre nurses in most of the African healthcare systems is grounded in one broad reason. African countries have limited capacities to maintain the financial demands of the education and employment of baccalaureate nurses

(Blaauw et al., 2014). The less educated cadre nurses are cheaper to pay, can be trained in a short time frame and are believed to be able to address the alarming nurse shortages and significant basic nursing care deficits in these countries (Blaauw et al., 2014). Interestingly, these less educated nurses have been reported to possess limited knowledge and to lack evidence-based thinking skills (Snell & Daniels, 2014). Thus, the production of nurses with the required competencies at the baccalaureate and above levels becoming a critical role of nursing education in Africa (Bvumbwe & Mtshali, 2018).

The teaching of baccalaureate student nurses in African countries is not well documented; however, the available evidence suggests that significant developments are taking place. There is a current move away from the traditional passive, teacher-centered approaches which dominated the African nursing education in the past, moving to student-centered and active learning approaches (Kiguli et al., 2011; Muraraneza & Mtshali, 2018; Rakhudu, Davhana-Maselesele, & Useh, 2016). While the student-centered approach of learning is universally recommended for nursing education (World Health Organization, 2009), it is less appreciated by many nurse educators and student nurses in some African countries, and yet well appreciated by a few others (Agbedia, 2012). For student nurses and nurse educators who are used to the traditional teacher-centered teaching approaches, active and multifaceted learning strategies are considered problematic (Day, 2011). These students and educators might find these approaches too time wasting to achieve the constructed ambitious learning objectives; usually constructed to deliver a lot of content to the students. That is why even when curriculum revisions are made, nurse educators direct high attention to the quality and quantity of the content to be delivered to the student nurses and little or no revisions of the teaching approaches are made (Day, 2011). The teaching approaches used by the nurse educators might to a large extent portray the student nurses' way of practice in clinical settings. Student nurses (of traditional approach) who are dependent on their

educators' content in learning, are likely to wait on physicians and senior nurses for orders on the next steps in patient care (Zadeh, Khajeali, Khalkhali, & Mohammadpour, 2014), rather than thinking (critically) together with the physicians and nurses as a team. Thus, the traditional teaching approach stands to be a potential future hazard to effective safe patient care (Zadeh et al., 2014).

A Ugandan study of nursing education showed that the nursing curriculum for the Ugandan student nurses focused largely on the cognitive learning domain and specifically on the lower levels of this domain; knowledge, comprehension, and application. The higher levels of analysis, evaluation, and creation are often not represented in the curriculum (Kiguli et al., 2011). In a Ghanaian study, which resembles nursing education in Uganda and some other African countries, students' clinical evaluation is solely based on the procedures performed and documented in the students' log book (Asirifi et al., 2017). In this case, log books majorly value psychomotor domain of learning compared to cognitive and affective learning domains. While evaluation of the students' learning still poses a big challenge in many African countries (Asirifi et al., 2017), it is not reflected at all in the nursing education curricula of some other African countries (Kiguli et al., 2011). These cognitive, psychomotor and affective domains mirror the knowledge, skills, and attitudes the students need to learn to practice effectively (Scheckel, 2016). The absence of any of the three domains of learning in the nursing curriculum may signal little or no valuing of them by the nurse educators.

4.2.1. Connecting nursing education to EBNP. Educating nurses at the baccalaureate level has been recognized as a strategy to address the increasingly complex issues of nursing practice (Blaauw et al., 2014) because baccalaureate education is largely about high-level and evidence-based thinking. As such, the baccalaureate degree nursing level has been suggested as the desired minimum entry level for nursing practice for the healthcare systems globally (Blaauw et al., 2014). There is evidence to support the need for

higher nurses' education in clinical practice; for example, from an observational study in nine European countries, hospitals with many baccalaureate nurses have seen a significantly reduced patient mortality (Aiken et al., 2014). The baccalaureate nursing degree requires that student nurses undergo rigorous education and assessment with the aim of empowering their critical thinking and EBNP abilities (Carvalho et al., 2017). The decisions made in EBNP require critical thinking (Boswell & Cannon, 2011) and EBNP promotes the key students' competencies of knowledge, skills, and attitude (Oermann, 2011). Therefore, nursing education should promote EBNP.

4.3. Evidence-based Nursing Practice Education

EBNP education simply means the teaching and learning of EBNP. EBNP education involves both didactic and clinical teaching, curricula and program design, advising students, and designing a conducive learning environment (Emerson & Records, 2008). The term EBNP education is used here to resonate with the description of EBNP provided above. The understanding of EBNP education is twofold. First, EBNP education is viewed as teaching student nurses how they should make patient care related decisions using the available, current, and reliable evidence while incorporating their own or clinician's expertise, patient values, circumstances, and resources, as in the EBNP definition. Second, EBNP education is viewed in terms of how the nurse educators conduct the teaching; their teaching strategies should be evidence-based (Emerson & Records, 2008; Wakibi et al., in review). This twofold understanding creates a clear distinction between the practice and teaching of EBNP and is suited to content and learners' needs. The sole aim of teaching EBNP (EBNP education) is to promote the practice of EBNP to improve patient care through available evidence (Miller & Boswell, 2011). Therefore, nurse educators should use evidence-based educational strategies to teach EBNP (Wakibi et al., in review; World Health Organization, 2009).

In addition to being a practice-based profession, the nursing profession values and promotes the development of knowledge, skills, and attitudes. These two aspects imply that nurse educators of EBNP education have to pay equal attention to the three domains of learning according to Bloom's taxonomy; cognitive (knowledge), psychomotor (skills), and affective domain (attitude) (Scheckel, 2016). This attention demands an integrated and evidence-based teaching approach which goes beyond mere lecturing and telling students what to do. Students need to be exposed to learning environments which are patient-care focused and student-centered (Wakibi et al., in review). These environments can use situated instruction where students learn from specific patient conditions, and experiential learning where students learn from exposure to clinical practitioners, patients, and families (Benner, Sutphen, Leonard, & Day, 2010). Situated instruction can take place in a skills laboratory, simulation center, or even staged in the classroom. This exposure gives student nurses an opportunity to learn by doing, thinking, and reflecting on the interaction of their skills, patient, and clinical setting related factors. Also, the students draw on the previously covered information (knowledge) and project this understanding to practice beyond the classroom setting (Oermann, 2011).

The appreciation for all three domains of learning is reflected in most of the EBNP educational strategies currently being used by nurse educators (Wakibi et al., in review). Interestingly, a balance between these domains is often missed out especially by the proponents of traditional teaching approach where the students and nurse educators find lecturing convenient for both of them, especially in teaching and learning the theoretical nursing course content (Benner et al., 2010). When teaching courses like physiology or nursing leadership, student nurses need to see the relevance of such course content to patient care. For example, when a patient's vital signs are presented to student nurses, understanding them to make the best inferences is more logical than just memorizing them in

decontextualized categories. When students are presented with leadership types and administrative processes, they ought to appreciate the evidence this content brings to transformative nursing practice. This kind of teaching promotes deep learning (learning to understand and create meaning), promotes EBNP (Wakibi et al., in review), and is well achieved in a student-centered and clinically-focused learning environment where evidence guides the teaching-learning process.

4.4. The State of Evidence-Based Nursing Practice in Africa

In developing countries, EBNP is in its early stages (D'Souza, George, Norohna, & Renjith, 2015), with most African countries going through similar developmental levels. To better understand the state of EBNP in Africa in this paper, we conducted a literature search. An electronic search of both “evidence-based practice” and “evidence-based nursing” as key terms and then limited to Africa in Cumulative Index to Nursing and Allied Health Literature (CINAHL), a commonly used nursing database, yielded 40 and 5 articles for the respective terms. The same search limited to Europe and North America (Canada and USA) yielded 2,916 and 383 articles for the respective terms in Europe and 5,783 and 409 articles for the respective terms in North America. While this sample search might imply limited published work on EBNP in Africa, it might also be true that EBNP activities are very few or absent in many African countries. This scale of EBNP in African countries might be in one way explained by the many employed nurses of diploma and certificate levels who do not study EBNP at school or study it haphazardly compared to the degree nurses; yet EBNP is complex and would ultimately require degree graduates (Blaauw et al., 2014). Despite this reality in the nursing education of African countries, EBNP remains a crucial issue in changing the curriculum and instruction of baccalaureate nursing education (Scheckel, 2009), and subsequently the healthcare systems.

4.4.1. Healthcare system realities that frustrate EBNP in Africa (using a Ugandan example). In Uganda, implementing most of the recommended evidence-based practices is okay to many healthcare workers (doctors and nurses) at most of the health facilities. However, several challenges to this practice are offered by the healthcare system itself. In a Ugandan rural study on acceptability of evidence-based neonatal care practices, Waiswa et al. (2008) showed that inadequate nurses' and doctors' evidence-based skills, patients' poor healthcare seeking behaviours, the big patient to healthcare worker ratios, and shortage of health facility resources were major obstacles to evidence-based practice. The majority of the nurses in Ugandan government owned health facilities are diploma and certificate prepared. Although these nurses can be critical thinkers, they are often short of evidence-based thinking because their training programs do not prepare them for this kind of thinking.

In line with resources for evidence-based practice, many health facilities in Uganda do not have computers and those which have, often do not have internet. Implying that any nurse or doctor at such a health facility prepared in evidence-based practice (in case there is any) would hardly implement this kind of practice. The chronic patient delays in seeking healthcare which may be both patient related and healthcare system created have also been observed not to favour evidence-based practice in Uganda (Waiswa et al., 2008). Some patients have poor healthcare seeking behaviours and delay to get medical interventions and the healthcare system's participation in lowering these delay cases is not yet satisfying. Also, the big patient numbers compared to available nurses and doctors may not allow room for adequately finding out for and using the most recent evidence as it escalates the delay in attending to patients. Therefore, given these challenges, the nurses and doctors may not care for the patients as the latest and relevant evidence might suggest; rather, subject them to any possible immediate interventions and procedures.

4.5. Transforming EBNP Education in Africa

The University of Rwanda is one of the few African universities which introduced EBNP as a course in the nursing curriculum (Moen et al., 2015). The evaluation of the teaching of EBNP in Rwanda showed a big potential for increasing nurses' use of EBNP in the clinical setting (Moen et al., 2015). This possibility of EBNP education positively transforming nursing clinical practice could be assumed elsewhere in Africa. However, EBNP education seems to be scarcely an area of focus in African nursing education. Very few African universities have embraced EBNP education and many of these universities are in the early stages of this educational development (Enuku & Adeyemo, 2014; Moen et al., 2015). Some African researchers have attributed the low consideration of EBNP education in universities to the new teaching roles which come with these reforms (Muraraneza & Mtshali, 2018). The new roles include course design and redesign, and regular access to resourceful information among others; yet, the nurse educators are not prepared for such roles (Muraraneza & Mtshali, 2018). Other African researchers contend that the EBNP aspects to be taught are not well understood by nurse educators (Enuku & Adeyemo, 2014). This negativity to EBNP education among nurse educators still surfaces amidst the initiation of the EBNP steps which are considered potential conduits for success in both the teaching (education) and practice of EBNP (Wakibi et al., in review).

The five EBNP steps are; (1) framing answerable (clinical or education) question, (2) searching for best evidence and critical appraisal, (3) integrating individual's (clinical or teaching) expertise with the best evidence and patient's and students' values and preferences, (4) implementing the (clinical or academic) change or intervention considering institutional resources, key stakeholders and support systems, and change agents, and (5) evaluating the change or intervention (Emerson & Records, 2008). These steps seem concise and

understandable; however, they might not be famous to some nurse educators. Even how these steps guide teaching EBNP to student nurses is missed by many nurse educators, those in Africa inclusive. One of the co-authors of this paper is a recent Bachelor of Science in nursing graduate from one of the African universities. He reported not to have come across the EBNP steps in his entire undergraduate education. Not at any time did the educators consciously present to his class any information specifically on EBNP. However, he found that the use of evidence in the training hospital was sometimes talked about by the nurses and doctors. Subsequently, the research course he was taught was purposed to give students an experience into the research process but not the use of such findings in patient care. Therefore, in many African countries, availing information on EBNP education might not be enough to change educational practices. African nurse educators need to be also helped to appreciate how to do the teaching of EBNP and what should be part of the EBNP content of undergraduate nurses (Wakibi et al., in review).

In learning EBNP, regularly asking answerable questions is preceded by a spirit of inquiry (Melnyk et al., 2010) which is equally possible in both classroom and clinical settings. The nurse educator asks the students in the classroom to draw on a previously encountered clinical experience to reify the classroom content. When in the clinical setting, the nurse educator asks the students to draw on the previously learned classroom information. Rather than delivering content to students or sending them to the clinical setting to discover learning on their own, while with students, the educator arouses their curiosity through questioning (Benner et al., 2010). The questioning sets the students into a search for answers (evidence) following the population-intervention-comparison-outcome-time (PICOT) format; thus, propelling the use of evidence into practice. This process should be deliberately reinforced by the nurse educator for an inquiry culture to develop in the students. However, finding evidence and determining the valid evidence for use is a skill the student nurses need

to develop (Wakibi et al., in review). This skill assists student nurses to provide answers to the evaluative questions asked by DiCenso et al. (2005) earlier in this paper. As such, taking students through a step-wise process of finding evidence is needed, probably in a computer laboratory or where students can have access to performance in real time (working on computers at the time of instruction). This is one of the engaging-learning processes Wakibi et al. (in review) found to be promoting EBNP. Although some nurse educators have the skills to perform thorough computer-based search and can model this to the students, the students can benefit more when an academic librarian is invited to take them through this process of finding evidence (team teaching) (Määttä & Wallmyr, 2010). The librarian teaches the students how to access credible evidence sources specifically the professional databases and how to navigate the school's electronic library (Levin & Lane, 2006). The librarian or the nurse educator should provide the students with a mechanism for determining credible evidence sources and websites so as they can often refer to it in their individual and group studies.

Team teaching is of high benefit in preparing student nurses for clinical practice (Benner et al., 2010); therefore, using it generally in teaching EBNP is important (Wakibi et al., in review). A classroom nurse educator can invite a clinical nurse to deliver or facilitate a clinically-focused session. The nurse educator can invite a colleague for example from pharmacology department to assist in designing or delivering a drug-related session. The colleague from the department of education can be invited to assist in the design of students' instructional strategies and syllabi. The colleagues from information technology (IT) department can be used to support technology-related learning. Nurse educators no longer need to teach in isolation of their colleagues and other educational organizations (Gaberson, Oermann, & Shellenbarger, 2015); rather, their partnerships bring different skills, knowledge, and resources together to support students' learning especially where they are scarce or non-

existent (Rakhudu et al., 2016; Wakibi et al., in review). For example, through partnerships and collaboration, certain resources like electronic databases (HINARI and PubMed), training materials and textbooks have been allocated and or subsidized purposely for the low-income countries (Bell et al., 2014). Teacher shortages have also been addressed through partnerships and team teaching (Gaberson et al., 2015).

While a nurse educator might need to invite a research educator to teach the research related aspects of EBNP, it is important for students to take a research course as a pre-requisite to the learning of EBNP (Wakibi et al., in review). The research courses at the undergraduate level should focus on helping students be better users than generators of evidence (Keib, Cailor, Kiersma, & Chen, 2017). In this perspective, the research course should help the students know and interpret the health statistics used in research studies for the purpose of application to patient care (Wakibi et al., in review). Memorizing such concepts for the purpose of passing exams is not inherent with EBNP; this is why the research courses should be designed to give student nurses opportunities to understand research information (articles) in real time (should be student-engaging). Through the research course, nurse educators help the students to understand how to find research articles and determine their credibility (strength of evidence) by understanding the study designs and methods (Miller & Boswell, 2011). Given the fact that the nurses may not have enough time to synthesize all available single studies, teaching student nurses about and how to access and appraise pre-processed information of clinical practice guidelines, review studies, and synopses of review and single studies is needed. The pre-processed information contains strong evidence which is well scrutinized and put together by experienced people (DiCenso et al., 2005). In their educational strategies, nurse educators should assist students to understand and use pre-processed information, particularly clinical practice guidelines because they are the norms of clinical practice (Levin & Lane, 2006).

Pre-processed nursing information can be accessed in several resources; clinical evidence, evidence-based nursing, Cochrane library, PubMed, and CINAHL among others. Clinical evidence consists largely of clinical practice guidelines. Evidence-based nursing publishes majorly synopses of single studies and review studies. Cochrane library, PubMed, and CINAHL consist majorly of high-quality review studies and single studies (DiCenso et al., 2005). When teaching students how to assess pre-processed information, attention is given to methods used, the currency, and clinical content of the guidelines. The content should be appropriate for patient care in the chosen setting (Registered Nurses Association of Ontario, n.d). This kind of assessment determines the credibility and applicability of this information. Having the search skills and ability to determine credibility and applicability of any information to a clinical setting significantly increases EBNP activities (Keib et al., 2017; Wakibi et al., in review). Therefore, a well-designed research course built on the perspective of EBNP adequately prepares the student nurses to suitably tackle step two and three of EBNP.

4.5.1. Initiating and transcending EBNP education. In implementing any educational innovation like EBNP education (EBNP step four), nurse educators need to identify and reflect on a guiding model or theory (Wakibi et al., in review). The theories and models create awareness and empowerment which are critical elements for any change (Nyoni & Botma, 2017) especially in African settings where EBNP education is new (Enuku & Adeyemo, 2014). For example, in Lesotho, the midwifery educators used the basic logic model to incorporate the objective structured clinical examination (OSCE) into their competence-based education curricula (Nyoni & Botma, 2017). This model provided guidance throughout this integration process while accounting for the OSCE application and its use of resources. This model guides program development through a five-step process of inputs, activities, outputs, outcomes, and impact (Nyoni & Botma, 2017).

Pashaeypoor, Ashktorab, Rassouli, and Majd (2017) used Rogers' (1983) diffusion of innovations model to bring EBNP education to the nursing education of one of the universities in Iran. In this model, Rogers (1983) discussed how an innovation can be moved to where it has never existed using a five-step process; knowledge, persuasion, decision, implementation, and confirmation steps. Through this model, the nurse educators bring to the awareness of all key stakeholders of the need for the teaching of EBNP and a proposal of how the teaching will happen (knowledge step). The understanding of EBNP education and the feasibility of its implementation given the educational context persuades the educational team to embrace EBNP education (persuasion step). When the team is convinced of the feasibility of EBNP education, a decision (decision step) is made to implement it (implementation step). Once the teaching of EBNP commences, mechanisms to assess its effectiveness have to be in place (confirmation step) (Rogers, 1983). These five steps are not linear, as such, the nurse educators can work back and forth to ensure positive progress and success in implementing EBNP education. The evaluation of both of these two model-based EBNP educational programs in Lesotho and Iran has shown tremendous success beyond the initiation.

In Africa, Muraraneza and Mtshali (2018) developed a middle range theory on competence-based curriculum with African educators as key participants. This theory enables African nurse educators to understand how borrowed curricula or educational teaching strategies can be contextualized into their nursing education systems. This middle range theory can equally facilitate the implementation of EBNP education. Two major categories to direct the curriculum reforms in nursing institutions are discussed in this theory; implementation, and monitoring and evaluation. Under the implementation category, the authors' discussion compels the nurse educators to pay attention to the teaching and learning process (student-centered approach), teaching methods (active and engaging), the nature of

the students (active learners) and teachers (as facilitators), as well as the assessment of the students (both formative and summative). These aspects are components of the evidence-based educational strategies needed in teaching EBNP (Wakibi et al., in review). In the category of monitoring and evaluation, strategies for promoting the new curricula and continuous improvement are provided. There should be a feedback mechanism from learners, educators, and employers, a curriculum committee to respond to feedback from these stakeholders, and nursing and midwifery regulatory bodies must be involved (Muraraneza & Mtshali, 2018). These aspects elucidate the collaboration and facilitation needed in teaching EBNP (Wakibi et al., in review). Interestingly, regulatory bodies in some African countries have not supported the enactment of important and beneficial educational reforms which would ultimately change their healthcare systems (Blaauw et al., 2014). For example, in Uganda, EBNP is desired for all graduating nurses but the Uganda nurses and midwifery council has not provided guidelines on how it can be integrated into the student nurses' curriculum or learning activities. Regulatory bodies play a critical role in setting a pace for the teaching of EBNP (World Health Organization, 2013). Therefore, the need for the active involvement of regulatory bodies in EBNP education is evident and urgent in Africa's nursing education.

The theory by Muraraneza and Mtshali (2018) has origins in African, unfortunately, it only broadly covers the implementation and evaluation processes which are the last two steps of Rogers' (1983) diffusion of innovations model. African nurse educators would require a combination of this model and theory to bring or improve EBNP education in their nursing institutions. However, as an effective approach to transformative EBNP education, nurse educators can best use these or any other theories under systems theory. Systems theory looks at the interaction of different systems in a social environment (Friedman & Allen, 2014). The teaching and learning of EBNP, in Africa just like any other region of the world, have social

systems like the hospital system student nurses join after education, the nurses' training institutions, and the nurses' training and practice regulatory bodies. Different interactions within and across these systems take place as the teaching and learning happen. These interactions are dependent on factors, predictable and non-predictable, within the social environment that affect the outcomes in the system of interest. The systems theory allows for the use of any relevant theories to understand these interactions and the changes (Friedman & Allen, 2014). For example, the logic model at the level of assessing learning of EBNP (micro-level) and the diffusion of innovations model at the level of initiating this teaching (meso-level) could be used by African nurse educators to understand the changes at such levels. As such, African nurse educators can best help their students learn EBNP when they treat EBNP education as a system well addressed under systems theory.

4.5.2. Integrative approaches to teaching and learning of EBNP. The teaching of EBNP demands an integrated and engaging teaching approach which brings together clinical and classroom learning while proportionally drawing on the three learning domains (Wakibi et al., in review). Through this kind of teaching, student nurses are engaged actively in the learning process and appropriately with the content and context of learning in both classroom and clinical setting for good nursing practice (Benner et al., 2010). Below we provide some integrative instructional approaches appropriate for use in EBNP education by African nurse educators.

4.5.2.1. *Unfolding case studies.* Unfolding case studies are innovative and engaging alternatives to lecture method of teaching EBNP; cases progress over time and usually in a changing patient situation (Benner et al., 2010). These cases allow students to build on previously learned information through a real-life clinical situation (Phillips, 2016). In this approach, the content the nurse educator would deliver to the students stands partly as scripts or patient narratives of the case study (Day, 2011). The other part of the content is covered by

the students as questions arise from the case study to create a discussion on what needs to be known and how it can be applied to the patient, family or community. At the end of each case scenario, the nurse educator provides study points and sources to the students for further study (Phillips, 2016). After the self-study which should be from credible sources, the students bring that evidence for the next case scenario where it can be analyzed and its applicability in patient care discovered. Thus, through unfolding case studies, the nurse educator takes students through all the EBNP steps.

4.5.2.2. The *subject-centered classroom*. Day (2011) provided an approach to closing the clinical and classroom setting gap; “the subject-centered classroom” (p.448). Subject refers to the nurse-patient/family/community relationships (Day, 2011). The nurse educator brings this relationship at the center of the classroom to be the focus of the learning. In this classroom, both the nurse educator and the student nurses are colleagues in learning, discussing and debating the topic in the classroom. An unfolding case study can be chosen to initiate and direct the discussion. The discussion and arising questions help students consolidate the content already covered, generate new knowledge, and engender curiosity for more knowledge on the topic. The students then find answers to the questions or more information which would be from credible sources using the EBNP steps. The context of the clinical setting is maintained in the classroom and student nurses are compelled to apply what they learn in the classroom when they go to practice (Day, 2011).

4.5.2.3. *Problem-based learning*. Problem-based learning is already in use in some African universities (Kiguli et al., 2011b; Rakhudu et al., 2016). In this approach, a clinically focused problem is created and presented to the students in small groups, usually as a scenario in an unchanging patient situation (Benner et al., 2010). The students discuss the problem on the topic and during this discussion, they develop questions (learning issues) for further individual research (self-study) from believable sources (EBNP step one and two).

After the self-study on the learning issues, the students again gather in the small groups to discuss their findings (EBNP step three) and would be required to implement the learned information once they go to practice (EBNP step four). In this approach, the nurse educator facilitates the discussion by probing the students' thinking (Benner et al., 2010).

4.5.2.4. Concept mapping. Concept mapping is a diagrammatic representation of the nurse's ideas of patient problems, general goals, predicted behavioral outcomes, knowledge of conditions, nursing interventions for the problems, and patient responses to the interventions (Schuster, 2016). Concept care maps assist student nurses to succinctly and mentally visualize and make relationships between these ideas while identifying priority nursing interventions (Carvalho et al., 2017). Developing these relationships and priorities demands critical thinking and evidence-based thinking which follow an undocumented EBNP process of determining a focused problem and finding suitable interventions. Through the concept care maps, student nurses understand and practice the organizing, planning, implementing, and evaluating of patient-centered care through an evidence-based approach (Schuster, 2016); which they later do in the clinical setting. The nurse educator may facilitate students' learning through a case study or real patients in clinical settings.

4.5.2.5. Simulation. Simulation refers to a representation of a real-life situation (Gaberson et al., 2015). The nurse educator can use any of or all of the following elements; live actors, games, written scenarios, virtual reality, and mannequins (Scheckel, 2009). Simulation involves low, moderate and high-fidelity experiences. Low fidelity simulations often use case studies and role plays. Moderate and high-fidelity simulations use technologically sophisticated participants, only that the participants in moderate-fidelity simulations do not have chest movements (Gaberson et al., 2015). The use of low-fidelity and sometimes moderate-fidelity mannequins in the training of student nurses offers resource constrained nurse educators a better place to start teaching EBNP because they are cheaper

compared to the high-fidelity simulators. Low fidelity simulations equally help students to cultivate all the elements of EBNP for real clinical practice (Robinson & Dearmon, 2013) through stimulating the students understanding and practice of what they previously learned while focusing on what they need to do better. Simulation provides an alternative learning experience for nursing education systems with limited opportunities for learning in a clinical setting (Robinson & Dearmon, 2013).

In these approaches, EBNP aspects can be taught to students as the EBNP learning unfolds by the nurse educator or in teamwork as discussed earlier. Common to all these integrative approaches is learning by asking questions, finding, and appraising evidence by the students. These aspects can be initially learned in the research course (Wakibi et al., in review). The nurse educator together with the students work through finding and appraising evidence using a few sample studies. Additionally, the nurse educator can provide students with a written paper critiquing the evidence base from these sample studies. This critique describes why the chosen studies qualify to be evidence answering a clinical question. The student nurses can always refer to this sample critique. The students learn how to determine the best evidence to support their discussions and provide answers to the questions arising from the discussions. The discussions set students to analyze the applicability of the information or knowledge at hand, alternatives, clinical (ethical) dilemmas alongside their personal values (Gaberson et al., 2015). Therefore, through these educational approaches, EBNP is promoted (Wakibi et al., in review).

The integrative approaches have a component of self-directed learning that gives the student nurses an opportunity to plan their own learning and practice. Self-directed learning enforces life-long learning needed for in-depth exploration in clinical practice when the students become professional nurses (Zhang, Zeng, Chen, & Li, 2012). These approaches also promote critical thinking (a component of EBNP) and create an alternative to a content-

laden nursing curriculum where nurse educators are not worried about not covering all the desired and planned course content. Rather, based on the discussion arising, the nurse educators decide how much content to deliver to the students. These approaches can also be implemented in combination and in clinically-focused courses throughout the curriculum, with minimal technology, and under limited resources. After implementation, the educational programs and learning of EBNP are evaluated (EBNP step five).

4.5.3. Evaluation of EBNP education. Instead of focusing majorly on delivering content, nurse educators should also find out whether students understand such content (evaluation of learning) (Benner et al., 2010). This focus highly benefits EBNP education (Wakibi et al., in review) because it creates a forward momentum, where the subsequent educational sessions create better student learning than the former (Gaberson et al., 2015). This evaluation has two formats; summative and formative assessments. Summative format happens at the end of learning and formative format happens as learning progresses (Bourke & Ihrke, 2016). While both assessments are needed, formative assessment has been more advocated for than summative assessment because it aims at assisting students in tracing their learning achievements, giving an account of their engagement in learning, and improving their learning through feedback (Bourke & Ihrke, 2016).

Furthermore, several recommendations favour assessing EBNP education objectively (what individuals know and do) rather than subjectively (what individuals report to know and do) (Cosme, Milner, & Wonder, 2018). Objective assessment reports on the students' performance as opposed to the students' own subjective assessment of EBNP learning which reports on the students' personal values and feelings (Cosme, Milner, & Wonder, 2018). Nonetheless, given the fact that the ideal EBNP values all the three Bloom's learning domains which are reflected by all these evaluative formats, African nurse educators should

have a balance for summative, formative, objective, and subjective assessment formats in EBNP education.

As a technique to both evaluating the learning of EBNP and enforcing its practice, we also suggest the use of students' written assignments. Written assignments can be in the form of reflective journals and narrative accounts of students' clinical experience (Gaberson et al., 2015). Through writing, students learn to think, organize their thoughts, and communicate them appropriately (Gaberson et al., 2015). These thoughts embody the cognitive (mental thoughts), psychomotor (performing abilities), and affective (relational skills) components of EBNP. In EBNP, these thoughts are supported by evidence, as such, the students get an opportunity to individually reflect on and perform the steps of EBNP. Generally, reflection helps students have permanent changes in practice that stem from EBNP learning. Therefore, nurse educators should provide enough writing practice in the students' EBNP courses/teachings to help students develop their ability to communicate their clinical knowledge, skills, values, and feelings.

The strategies discussed above have addressed the teaching, learning, and evaluation in EBNP education. However, the nurse educators, facilitators, and preceptors of students in the learning of EBNP need to be educated about what EBNP is, how students ought to learn it, and how it should be assessed (Wakibi et al., in review). For example, the design of the integrative approaches discussed above demands knowledge and skills which some of the African nurse educators might be lacking. Collaboration and partnerships can still benefit this EBNP readiness preparation through EBNP workshops, training, and mentorship programs from individuals with expertise and experience in EBNP education (Wakibi et al., in review).

4.6. Conclusion

Throughout this paper, EBNP education has been located within nursing education and particularly in the context of Africa. Strategies to either initiate teaching of EBNP or invigorate its trend based on what has happened either within or outside Africa have been provided. These strategies are entirely based on the ideas of promoting critical thinking and evidence-based thinking, creating active and patient-centered learning, being cost-effective, and fostering life-long learning in students. The suggested practices address the need for all the three domains of learning, integration of classroom and clinical learning, creating a conducive learning environment, and a culture of EBNP and EBNP education. We believe putting into practice these strategies would tremendously empower African nurse graduates to be better implementers of EBNP in their clinical settings once deployed as professional nurses.

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Chapter Five: Discussion and Conclusions

This chapter consists of a combined discussion of the main findings in the two manuscripts in chapters three and four. This discussion is intermeshed with recommendations for both EBNP implementation and further research. These recommendations draw on the significance of this research project for policy making, nursing education, clinical practice, and further research. Lastly, a conclusion to link the conclusions in the two manuscripts to the purpose of this project is provided.

5.1. Discussion and Recommendations

Professional organizations have continuously called for the teaching and practice of EBNP (International Council for Nurses, 2012; Registered Nurses' Association of Ontario, 2014; World Health Organization, 2013). While the outcomes of the attention to this professional exhortation have been significantly seen in the educational and health care systems of some countries like Canada (Canada Nurses Association, 2010), in many other countries, the response to this call is not clear. Specifically, it is not clear whether EBNP is taught to student nurses in some countries. Even where the teaching of EBNP exists, it might not be very effective to create EBNP use among professional nurses in clinical practice once they leave their training institutions. Through this thesis, the researcher has explored the evidence available to teach EBNP to student nurses. The researcher has paid specific attention to developing countries (particularly in Africa) by building on this evidence to suggest strategies for effectively teaching EBNP by nurse educators. The ultimate goal of this thesis is that nurse educators should be able to assist student nurses to use EBNP in clinical practice once they become professional nurses.

In chapter three, educational strategies to teach EBNP have been identified and discussed. How these strategies can impact student nurses' EBNP knowledge and the roles of such strategies in EBNP implementation have been also discussed. The EBNP teaching

strategies have been designed based on when, how, how long, from where (context), and what to teach in EBNP. In this research project, evidence shows that teaching EBNP using a combination of several teaching strategies which are student-centered and patient-focused is effective to the students' learning and use of EBNP. Effective EBNP teaching strategies should also enable student nurses to get engaged in experiential learning where they can observe and have hands-on practice. Combined educational strategies are more able to equally impact the students' attitude, skills, and knowledge of EBNP while empowering their critical thinking and evidence-based thinking skills. The ability to think through the clinical challenges given good skills and knowledge of the nurse to make an appropriate decision is fundamental to the practice of nursing (Oermann, 2011). That is why teaching EBNP while using effective educational strategies is necessary.

Throughout this research project, it is very evident that students learn EBNP better when they have both research and computer skills at the time of teaching EBNP. This finding demands the design of EBNP-focused research courses and students taking information and computer technology classes (ICT). In ICT classes the students learn all the skills needed to work on a computer, the literature search skills and how to manage data on the computers. As discussed in both chapter three and four of this thesis, equipping students with such skills calls for team teaching in nursing courses especially in those which are EBNP focused.

Learning research skills through research courses opens students to the world of statistics, research terminologies, research methods, research designs, and analytical procedures. Such research courses should be comprehensive and diverse enough to create an understanding of the kinds and strengths of the available evidence. Thus, the research and ICT courses should be independent of EBNP teaching and as discussed in chapter three, offering them prior or as pre-requisites to the teaching of EBNP to student nurses is of much benefit to the effectiveness of EBNP teaching.

As far as teaching EBNP in African countries is concerned, it is important to investigate further the abilities of nurse educator to teach EBNP. Although better educational strategies have been provided in this thesis, these strategies would need to be backed up by an understanding of the country context barriers and facilitators of teaching EBNP. In many of these countries, there could be a need to conduct needs assessments of the teaching of EBNP. This assessment might involve an understanding of the nurse educators' knowledge in both EBNP and instructing it (the human resources available), and the material resources available for EBNP teaching. Subsequent to this assessment, offering training, workshops, and encouraging nurse educators to be part of EBNP conferences might be needed. This kind of nurse educator empowerment has been observed to be an effective contribution to the teaching of EBNP (D'Souza, George, Norohna, & Renjith, 2015). Also, although Balakas, Sparks, Steurer, and Bryant (2013) contend that sharing the positive outcomes of EBNP activities is a cornerstone to earning financial support, I believe sharing the challenges and barriers to EBNP and its teaching also offers lessons to those who are yet to consider EBNP and its teaching and even attract potential expertise to address those challenges. Therefore, there is a need for publishing more literature on the teaching and practice of EBNP in African countries.

Additionally, there is a need for more research to explore the current state of involvement of African regulatory bodies into the practice and teaching of EBNP. As noted in chapter four, nursing regulatory bodies in some countries have not had a significant role in the teaching and practice of EBNP, yet these bodies are considered to be pacesetters for nursing practice and nursing education (World Health Organization, 2013). The regulatory bodies should propel the EBNP movement through EBNP policy making, advocacy, and setting guidelines for how EBNP teaching in nursing programs and EBNP in clinical settings should take effect. In this case, the attention given to the teaching of EBNP should be relative

to that offered to EBNP in clinical practice; as the teaching of EBNP takes place so must be its practice. The teaching of EBNP in nursing programs is only useful when it is practiced in clinical settings. EBNP knowledge and skills would not be of any benefit to the students, nursing education, and the health care systems if student nurses enter professional practice and can never implement or apply what they learned. As such, the regulatory and professional associations or bodies and ministries of health have an important role to play as far as EBNP among nurses in clinical settings is concerned.

Designing short EBNP courses or workshops (seminars) for nurses in clinical practice is a better place to start or encourage more involvement in EBNP in clinical settings in many African countries. These courses have the potential of initiating the culture of EBNP in clinical settings as well as equipping those nurses who finished school before the teaching of EBNP started (where it is existent). However, there is a need to explore the state of EBNP in hospital settings to understand the match between teaching EBNP and its practice.

On the side of EBNP teaching, there is also a need to revise curricula, design courses, and syllabi which are both evidence-based and inclusive of EBNP as discussed in chapter four. EBNP can be taught as an integrated component of all the courses of the nursing curriculum or as an independent course and then the students required to apply the knowledge gained to all other courses in their program. These revisions and designs might demand collaboration with well skilled and knowledgeable personnel in the area of teaching and practice of EBNP.

As observed in chapter four, some of the current nursing curricula in African countries encourage less critical thinking, little or no evidence-based thinking, and more of skills acquisition and memorization of learned information. Therefore, as a further direction for EBNP promotion and implementation, evaluation of the degree nursing programs in light

of their contribution to EBNP in clinical practice is paramount. This evaluation should assist nurse educators and all healthcare stakeholders in paving a way for the initiation or invigoration of the teaching of EBNP. Involving all stakeholders in the planning, designing, and evaluation of the teaching of EBNP would strongly negate the barriers to EBNP education. As implied in the definition of EBNP (Boswell & Cannon, 2011; DiCenso, Guyatt, & Ciliska, 2005), the nursing program should be assisting nursing students to be well equipped to meet the demands of the communities, rather than, just being in a position to complete all the institutional and academic needs.

Although the strength of the findings in this project can be attributed to the rigorous methods used, adhering to the Joanna Briggs Institute (2014) guidelines for conducting systematic reviews, no African study was represented in the systematic review (in chapter three of this thesis). A more inclusive study of the grey literature or an African focused rigorous study is needed to clearly describe the teaching of EBNP in African countries. Additionally, studies evaluating the existing strategies to teach EBNP should be strongly designed to yield believable results; results with a high potential of applicability.

5.2. Conclusion

Evidence to teach EBNP has been identified and described in this thesis. Effective educational strategies to teach EBNP have been discussed. These strategies are student-engaging, patient-focused, draw on the expertise of different faculty members, based on evidence, and aim at creating a culture of EBNP and EBNP education. With particular emphasis on the teaching of EBNP in African countries, these strategies should also be cost-effective and highly utilise the available resources. Also, in this thesis, a discussion on how rather than just what to teach in EBNP education has been suggested. The use of these strategies will effectively impact the student nurses' acquisition of EBNP knowledge and

EBNP implementation, with a high potential of sustaining EBNP use beyond student time to professional nurse practice time.

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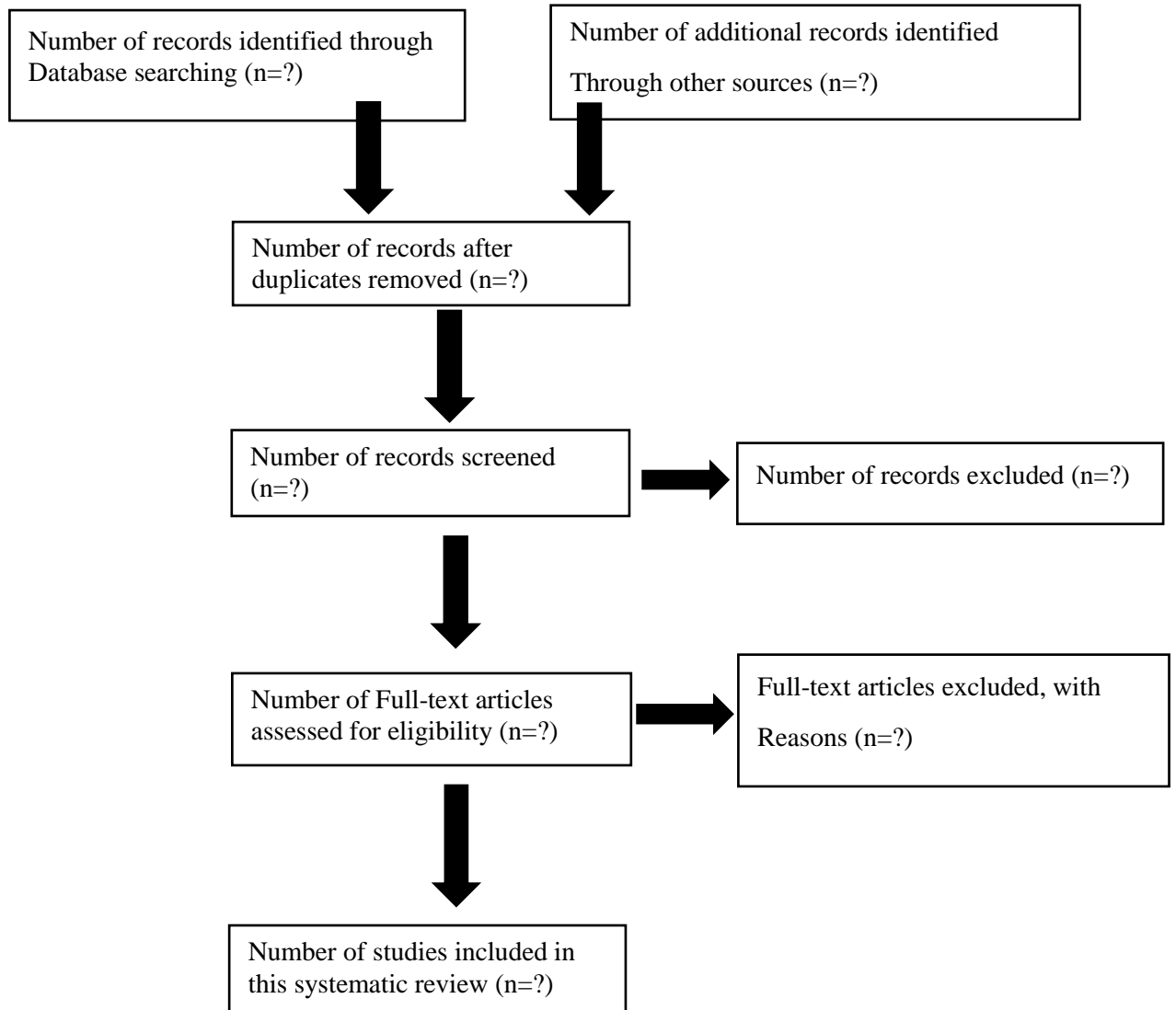
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Appendices

Appendix A: JBI protocol (JBI follows the PRISMA-P format for systematic reviews)



Appendix B: Table 1; Data Extraction

	Study	Study aim	Country	Participants	Setting	Data collection	Data analysis	EBNP educational strategy
1	Brooke, Hvalic-Touzery, & Skela-Savic (2015)	To explore student nurses' perceptions on and importance of evidence-based practice and research in relation to their current and future practice.	England/Slovenia UK	Students from two different universities, across the three years program, N=70	Both teaching strategy and the study took place in academic setting	Focus group discussions audio recorded and using a question guide.	Audio records were transcribed verbatim and analyzed using IPA to generate themes.	Learning is divided into three component parts; introducing research principles first, teaching EBNP content, then understanding the application of EBNP concepts to practice. The teaching runs throughout program years didactically
2	Cosme, Milner, & Wonder (2018)	To objectively assess prelicensure nursing students' evidence-based practice knowledge	USA	Students in junior year of program, N=57	Both teaching strategy and the study took place in academic setting	An existing objective online questionnaire was used.	SPSS was used to generate descriptive statistics and run t-test and repeated ANOVA.	A one-time EBNP course taught didactically covering research methods and statistics, EBNP concepts and principles. Students do quizzes and assignments for a grade to evaluate their learning.
3	Dawley, Bloch, Suplee,	To evaluate the newly created and implemented	USA	Secondary analysis of data from	Study was secondary analysis of	Students made journal entries	Content analysis was	Teaching follows a learning design (theoretical

	McKeever, & Scherzer (2011)	pedagogical approach designed to provide “hands on EBP skills training.”		evidence based clinical journal completed by 198 students	data and educational strategy took place in both academic and clinical setting	consisting of answers to two self-generated questions and justification for asking one of the questions. This narrative data was abstracted.	conducted in an Excel file.	framework) with an underpinning scientific rationale. This approach has 3 stages; backward design, determining acceptable evidence, and planning learning experience and instruction. The approach has the concept of critical thinking. Students learn EBNP concepts and principles in their introductory courses, these principles are then required for all other courses in the program. Research course is taught in senior year of program. Assignments for grades were taken at the end of the program.
4	Finotto, Carpanoni, Turrone, Camellini, &	To describe the structure and contents of the lab’s three-year EBP and to	Italy	Newly graduated students of a three	Both the study and educational strategy took place	A subjective questionnaire constructed by the researchers	Descriptive statistics and Bonferroni test were run.	EBNP runs throughout the program years. Students learn the EBNP concepts and

	Mecugni (2013)	describe the perception that newly graduated nurses have relative to the usefulness of skills learned during this course.		years program. N=300	in academic setting (both computer laboratory and classroom).	was used. Tool was researcher administered.		principles in classroom and subsequently implement them practically in the computer laboratory. Students take tests and examinations to evaluate learning. Blended learning (brainstorming, group work, and individual work) is employed.
5	Foss, Kvigne, Larsson, & Athlin (2014)	To describe the collaborative model that was developed in the project and a pilot study of its first application and evaluation.	Norway	Second and third year students from a three years program. N=38	Both the study and educational strategy took place in clinical and academic setting	A subjective online questionnaire developed by the researchers was used.	Descriptive statistics and thematic content analysis	A collaborative model of best practice was used. This model allows students, nurses, and faculty to work together on ward-based improvement areas following EBNP steps. Students and nurses have facilitators throughout the whole process and they work in small groups. Students and nurses received prior training in literature search. The students

								then presented the findings and recommendations to the nurses and facilitators to come up with practice changes. The practice changes were implemented and evaluated.
6	Jalali-Nia, Salsali, Dehghan-Nayeri, & Ebadi (2011)	To assessing the impact of evidence-based education on Iranian nursing students' knowledge and attitude.	Iran	Second year students, N=41	Both the study and educational strategy took place in academic setting	Five subjective questionnaires developed by the researchers were used. Tool was researcher administered.	SPSS was used to run independent t-test, paired t-test, Chi-square, and Mann-Whitney test.	Four phases; 1. Before teaching EBNP, tutors took EBNP training. 2. Students receive workshop on EBNP principles. 3. Students taught medical-surgical courses using EBNP approaches. Students worked in small groups with facilitation from the tutor and main researcher. 4. Students received assignments to guide their group work and final exam for evaluation.

7	Keib, Cailor, Kiersma, & Chen (2017)	To evaluate the changes in nursing students' perceptions of and confidence in research and evidence-based practice and interest in research participation after completing a research course.	USA	Third year students from two different years (2012 & 2013), N=109	Both the study and educational strategy took place in clinical and academic setting	A subject questionnaire developed by the researchers was used.	SPSS was used to perform descriptive statistics, Wilcoxon signed-ranks tests, and Mann-Whitney tests.	Third year students taught a research course having evidence-based principles. Students' learning consisted of lectures, seminar assignments and discussions and group work. Unit exams were taken at the end, plus an EBNP project on clinical wards with nurses aimed at developing clinical practice guidelines.
8	Kim, Brown, Fields, & Stichler (2009)	To evaluate the effectiveness of EBP-focused interactive teaching strategy.	USA	Senior students from two different universities in two different years (2007 & 2008), N=208	Both teaching strategy and the study took place in academic setting	An existing subjective questionnaire was used.	SPSS was used to perform descriptive statistics, independent t-tests, and bivariate Pearson's correlation analyses.	The teaching strategy designed based on model of diffusion of innovations and self-efficacy theory. EBNP concepts were first taught in 2hrs and EBNP project described. EBNP project carried out throughout semester in partnership with clinical preceptors. Project conducted in small groups.

9	Leach, Hofmeyer, & Bobridge (2016)	To measure the impact of research education program on the attitude, skill and uptake of evidence-based practice among undergraduate student nurses.	Australia	Third year students, N=84	Both the study and educational strategy took place in the academic setting	A subject online survey developed by one of the researchers was used.	SPSS was used to perform descriptive statistics, Chi-square/Fishers Exact tests, paired sample t-test, and Wilcoxon signed rank test.	Two courses are offered; first is about research and EBNP principles. Second course uses principles in the first one to answer practice-based research questions. These courses take place for eight weeks each.
10	Mattila, Rekola, Koponen, & Eriksson (2013)	To assess learning and utilization of research knowledge after implementation of nursing journal clubs from perceptions of nursing students.	Finland	Students with a prior diploma aiming at a degree, N=52	Both the study and educational strategy took place in clinical and academic setting	A subjective questionnaire based on an existing questionnaire was used.	PASW statistics program was used to perform descriptive statistics and Chi-square tests. Open-ended questions grouped according to content analysis.	A nursing journal club was started at the hospital in the wards with nurses, hospital directors. Students taking research and development studies took part. In the journal club, a problem is identified, and articles searched, appraised through discussion to create resolutions. Students worked in small groups with nurses, specialists, charge nurses, and hospital directors. Students

								also made presentations aimed at changing hospital practice.
11	Oh et al. (2010)	To examine the effectiveness of integrating EBP into a clinical practicum on EBP efficacy and barriers to research utilization among Korean RN-to-BSN students.	Korea	First year students with a prior diploma (RN) aiming at a degree (BSN). N=74	Both the study and educational strategy took place in the clinical setting	A subjective structured questionnaire developed by the researchers was used. Tool was researcher administered.	SPSS was used to perform descriptive statistics, paired t-tests, and bivariate analyses.	Students completed a research course, then were given a clinical practicum in clinical setting incorporating EBNP. The practicum happened twice; in the middle and end of semester. This practicum was for 6 days. The practicum was based on steps of EBNP. Two lectures were first given by faculty members to students and their clinical preceptors on EBNP processes and concepts. Students worked on hospital units in small groups starting with defining patient's nursing problems from interviews and electronic medical records databases.

								Students conducted both individual and group EBNP projects. Small group conferences were provided and also students presented their EBNP projects
12	Reid, Briggs, Carlisle, Scott, & Lewis (2017)	To evaluate EBP at the start and on completion of year 1 undergraduate nurse level.	UK	Year one students of the three years program, N=311	Both the study and educational strategy took place in the academic setting	Two existing subjective online questionnaires were used.	SPPSS was used to perform descriptive statistics, and Mann-Whitney tests.	EBNP module1 is taught to students throughout year one alongside three 6 weeks clinical placement. The module utilizes blended learning (lectures, small groups, online eRources). And there is both summative and formative evaluation. The module concentrates more on introduction to EBNP (understanding EBNP concepts), research question PICO, searching skills and data analysis.

13	Ruzafa-Martinez, Lopez-Lborra, Barranco, & Ramos-Morcillo (2016)	To evaluate the effectiveness of an EBP course for undergraduate nursing students on their EBP competence, measuring changes in their EBP attitudes, knowledge and skills.	Spain	Second or third year students, N=148	Both the study and educational strategy took place in the academic setting	An existing subjective questionnaire was used. Tool was researcher administered.	SPSS was used to perform descriptive statistics, Chi-square tests, independent samples t-test, repeated ANOVA, and partial paired eta tests.	15 weeks EBNP course. Students first completed biostatistics and epidemiology courses. The course focused on 4 steps of EBNP. It used lectures, seminars, small group discussions, practical computer work, individual work, and assignments and final examination were taken
14	Smith-Strom & Nortvedt (2008)	To evaluate whether evidence-based teaching methods are effective in teaching students to critically appraise a scientific article.	Norway	Second year students of a three years program, N=48	Both the study and educational strategy took place in the academic setting	A subjective questionnaire was developed. Tool was researcher administered.	Data from open ended question was transcribed verbatim and categorized. It's not clear how the other data was analyzed.	One time 4 weeks EBNP course on reading, searching, and critically appraising evidence (3 steps of EBNP). Students appraised articles in small groups, plenary discussions and had lectures. A final examination was taken. Students had a manual to guide their article appraisal process.

15	Zhang, Zeng, Chen, & Li, (2012)	To evaluate the effectiveness of an educational program on knowledge, attitudes and beliefs, and behavior of EBP on undergraduate nursing students.	China	Students in hospital from seven different universities, N=75.	Both the study and educational strategy took place in academic setting	A subjective questionnaire constructed by the researchers. Tool was researcher administered.	SPSS was used to perform descriptive statistics, independent t-test, and Chi-square test.	Students in clinical practice were invited to be part of the EBNP learning strategy lasting 2 months. They were briefed by director of the program on how the learning was to take place and then grouped in groups. Two learning strategies were employed; self-directed learning of EBP basics (phase1) and workshops for critical appraisal of literature (phase2). At the end there were presentations from all groups.
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Appendix C: Table 2; Summary of Significant Findings

No.	Authors	Title of article	Significant findings	Recommendations
1	Brooke, Hvalic-Touzery, & Skela-Savic (2015)	Student nurse perceptions on evidence-based practice and research: an exploratory research study involving students from the University of Greenwich, England and the Faculty of Health Care Jesenice, Slovenia.	Teaching both research and EBNP gives student nurses confidence, and knowledge for EBNP. Students are empowered to incorporate new evidence in patient care. Students' perceptions of learning EBNP included developing nursing as a profession through development of new ideas, and existence of discrepancies in the practice and teaching of EBNP.	There is need for students support in clinical placements through development of clinical mentors who can engage students in EBNP and research. Student nurses need to be engaged in EBNP and research throughout their study years.
2	Cosme, Milner, & Wonder (2018)	Benchmarking of Prelicensure Nursing Students' Evidence-Based Practice Knowledge	Although students received teaching on research methods and statistics and EBP content, this study showed that they were short of knowledge on interpreting statistical tests and applying EBNP in clinical practice. However, EBP was sustained one year later.	Student nurses need exposure to EBNP at multiple points in the curriculum to enhance their EBNP knowledge and skills. Teaching EBNP through spiraling technique might be of utmost benefit. It's important that EBNP be objectively evaluated.
3	Dawley, Bloch, Suplee, McKeever, & Scherzer (2011)	Using a Pedagogical Approach to Integrate Evidence-Based Teaching in an Undergraduate Women's Health Course	The teaching approach offered students appropriate EBNP skills for their nursing practice. Students were able to know when and how to use EBNP. The evaluation of teaching approach provided significant EBNP feedback appropriate to both students and faculty.	Making assignments realistic facilitates both students' learning and transition to professional practice.

4	Finotto, Carpanoni, Turrone, Camellini, & Mecugni (2013)	Teaching evidence-based practice: Developing a curriculum model to foster evidence-based practice in undergraduate student nurses	The use of laboratory three years EBNP is significantly useful in equipping students for searching evidence for their thesis work. This educational strategy may not help students to translate EBNP process in to clinical training, as such non-EBNP skills from the clinical mentors are likely to be promoted. However, students express an intent to use EBNP skills learned in the clinical setting.	No recommendations
5	Foss, Kvigne, Larsson, & Athlin (2014)	A model (CMBP) for collaboration between university college and nursing practice to promote research utilization in students' clinical placements: A pilot study.	The findings indicate the model highly contributed to a change in nursing practice on the wards. Students reported the model contributed to a valuable learning experience creating a better understanding of research utilization.	The model be used in every clinical part of nursing education
6	Jalali-Nia, Salsali, Dehghan-Nayeri, & Ebadi (2011)	Effect of evidence-based education on Iranian nursing students' knowledge and attitude	Students' knowledge increased significantly in evidence-based approach compared to traditional (lecture, questions, answers). Integrating EBNP into courses improves knowledge and attitude. Although evidence-based approaches are time consuming, learner knowledge and interest to participate is promoted, and transfer of theoretical knowledge to clinical settings is very possible.	Further research be conducted to guide the decision on how to arrange the curriculum for undergraduate nursing program integrating evidence-based approaches, its timing and impact on long-term learning.

7	Keib, Cailor, Kiersma, & Chen (2017)	Changes in nursing students' perceptions of research and evidence-based practice after completing a research course.	Teaching both research and EBNP concepts creates an understanding of the difference between the two. Students understanding of research created their confidence in it as well as increasing the future intentions to use it in practice. Therefore, incorporating research and EBNP in curriculum is vital to improving students' knowledge and attitudes of EBNP.	Research and EBNP courses should continue to be implemented in nursing curriculum of undergraduates.
8	Kim, Brown, Fields, & Stichler (2009)	Evidence-based practice-focused interactive teaching strategy: a controlled study.	The educational strategy did not have a positive contribution on the students' attitude for EBNP and future use. However, the strategy was effective at improving EBNP knowledge and use.	Further evidence is needed to confirm the effectiveness of EBP-focused interactive and clinically integrated teaching strategy.
9	Leach, Hofmeyer, & Bobridge (2016)	The impact of research education on student nurse attitude, skill and uptake of evidence-based practice: a descriptive longitudinal survey.	The strategy did not have a significant impact on students' EBNP attitudes, however, students EBNP skills, and use of EBNP were improved. Lack of time and skills to search and interpret research were major barriers while availability of resources like online database, appraisal tools, and online education materials were the reported EBNP facilitators.	There is need to understand whether students' use of EBNP can be sustained (long term) and reflected in clinical practice in the future. Researchers need understand how timing, duration and content and delivery methods impact on the educational outcomes
10	Mattila, Rekola, Koponen, & Eriksson (2013)	Journal club intervention in promoting evidence-based nursing:	Students learnt what EBNP is but did not learn how to solve clinical problems in nursing and neither did they understand the interplay	Integrating journal clubs with other strategies promoting evidence-based nursing contributes to research utilization.

		Perceptions of nursing students.	between research and EBNP. Therefore, students were not able to utilize research in practice; research knowledge is prerequisite to research utilization and EBNP.	
11	Oh et al. (2010)	Integrating evidence-based practice into RN-to-BSN clinical nursing education.	The teaching strategy had a significant contribution on students' confidence to use EBNP process. However, it contributed less to their ability to appraise and search for evidence. Students need computer skills and research skills before EBP takes effect. Although the strategy reduced barriers to research utilization, Lack of documented need to change practice and nurse isolation from research discussions were the major barriers to research utilization.	Nursing research and EBNP should be incorporated in the students' curriculum and both short term and long-term effectiveness of the integration be evaluated.
12	Reid, Briggs, Carlisle, Scott, & Lewis (2017)	Enhancing utility and understanding of evidence-based practice through undergraduate nurse education.	Educational strategies alongside clinical placements alters both beliefs and implementation of EBNP. Students in clinical practice are continuously using evidence-based tools (e.g clinical practice guidelines) to practice. Skills in critical appraisal, generating a PICO question and accessing search database facilitate implementation of EBNP; these were promoted by the educational strategies.	There is need for research on practicing nurses who undertook an EBP educational strategy while still students to understand how the knowledge and skills gained can translate unto nursing care delivery.

13	Ruzafa-Martinez, Lopez-Lborra, Barranco, & Ramos-Morcillo (2016)	Effectiveness of an evidence-based practice (ESP) course on the EBP competence of undergraduate nursing students: A quasi-experimental study.	The study findings show that integrating EBNP courses in curriculum improves students EBNP competence, attitude, knowledge and skills.	There is need for students to learn basic epidemiology and statistics before taking a specific EBP course. There is need for further research in understanding the potential of students promoting EBNP among practicing nurses by acting as role models
14	Smith-Strom & Nortvedt (2008)	Evaluation of evidence-based methods used to teach nursing students to critically appraise evidence	The findings indicate that blended learning was an effective way to learn. Active and appealing learning strategies significantly contribute to effective and efficient leaning.	Students need to meet role models if they are to implement and use their experiences in EBNP, therefore clinical exposure to EBNP is paramount to students' learning.
15	Zhang, Zeng, Chen, & Li, (2012)	Assisting undergraduate nursing students to learn evidence-based practice through self-directed learning and workshop strategies during clinical practicum.	There were significant improvements in participants' EBP knowledge, attitude and beliefs. The findings indicate that participants were more satisfied with the learning through workshops. The learning strategy encouraged learning through self-directed approach, with communication and corporative abilities. Participants' dissatisfaction with SDL learning strategy was highly associated with inadequate facilitation	There is need to foster cooperative relationships among students and clinical nurses to improve the process of both teaching EBNP in educational institutions and utilizing best evidence in clinical settings.

Appendix D: Table 3; Quality Appraisal Results

No		Article	Method/ Design	Identified flaws	Grade (Quality)	Appraisal tool used
1		Brooke, Hvalic-Touzery, & Skela-Savic (2015)	Qualitative, IPA	All required areas were identified and well addressed	A (High)	Appendix F
2		Cosme, Milner, & Wonder (2018)	Quantitative, One group quasi-experimental, pre-test and post-test.	All required areas were identified and well addressed	A (High)	Appendix H
3		Dawley, Bloch, Suplee, McKeever, & Scherzer (2011)	Qualitative, Content analysis	All required areas were identified and well addressed	A (High)	Appendix F
4		Finotto, Carpanoni, Turroni, Camellini, & Mecugni (2013)	Quantitative, Cross-sectional (descriptive)	Study aim, methodology, & analysis not congruent; choice of test was not justified yet a different test (One-way ANOVA) might be appropriate.	B (Moderate)	Appendix G

				As such credibility and confirmability are moderate.		
5		Foss, Kvigne, Larsson, & Athlin (2014)	Mixed methods. Descriptive	<ul style="list-style-type: none"> -Data collection incongruent with study stated methodology; the study aim implies an intent for a qualitative study unlike the methods and unmentioned methodology which point more to a quantitative study. -Study tool has both Likert scale and open-ended questions. -Study findings are qualitatively reported but with no representation of participant voices. -Data analysis is incongruent with study tool design. 	C (Low)	Appendix F

				As such, transferability, dependability and confirmability of this study are low		
6		Jalali-Nia, Salsali, Dehghan-Nayeri, & Ebadi (2011)	Quantitative, Experimental with a comparison group and randomized participants. Pre-test and post-test.	All required areas were identified and well addressed	A (High)	Appendix H
7		Keib, Cailor, Kiersma, & Chen (2017)	Quantitative, Two intervention groups quasi-experimental. Pre-test and post-test	-Participants for the intervention not similar -Unclear whether participants received similar treatment. Therefore, credibility and confirmability are moderate.	B (Moderate)	Appendix H
8		Kim, Brown, Fields, & Stichler (2009)	Quantitative, Quasi-experimental with control group. Pre-	All required areas were identified and well addressed	A (High)	Appendix H

			test and post-test			
9		Leach, Hofmeyer, & Bobridge (2016)	Quantitative, longitudinal design. Pre-test and post-test	All required areas were identified and well addressed	A (High)	Appendix H
10		Mattila, Rekola, Koponen, & Eriksson (2013)	Quantitative, Cross-sectional. Descriptive	-Ethical approval not mentioned -Validity and reliability of study tool not documented. -Data analysis is not pre-specified in the methods section. Therefore, the study credibility, transferability, dependability, and confirmability are low	C (Low)	Appendix G
11		Oh et al. (2010)	Quantitative, A one group quasi-experimental. Pre-test and post-test	-Ethical approval not mentioned.	B (Moderate)	Appendix H

12		Reid, Briggs, Carlisle, Scott, & Lewis (2017)	Quantitative, Cross sectional. Descriptive	-Part of the analytical process deferred from the prespecified study aim; study objectives do not depict any intentions of comparing time1 & 2. Thus, a wrong statistical test (Mann-Whitney) was used. Therefore, credibility and confirmability are moderate.	B (Moderate)	Appendix G
13		Ruzafa-Martinez, Lopez-Lborra, Barranco, & Ramos-Morcillo (2016)	Quantitative, Quasi-experimental with a control group. Pre-test and post-test.	All required areas were identified and well addressed	A (High)	Appendix H
14		Smith-Strom & Nortvedt (2008)	Mixed-methods. Descriptive	-Study methods were not well discussed; no data analysis. -Validity of study tool was not assessed. -Ethical approval not mentioned. Therefore, the study credibility,	C (Low)	Appendix H

				transferability, dependability, and confirmability are low.		
15		Zhang, Zeng, Chen, & Li, (2012)	Quantitative, A one group quasi-experimental. Pre-test and post-test	All required areas were identified and well addressed	A (High)	Appendix H

Appendix E: Table 4; Search Strategy and Output

No.		Database (2008-2018)	Search terms	Limiters	Returned articles
1		CINAHL	Educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education,	Full text and abstract available, references available, published 2008 -2018, English language, peer reviewed.	602

			evidence-based education, evidence-based practice education		
2		MEDLINE	Educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education, evidence-based education, evidence-based practice education	Full text and abstract available, published 2008-2018, peer reviewed, English.	107
3		EMBASE	Educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education,	Peer reviewed, full text and abstract available, English language, 2008-2018, journal article, post-secondary education.	91

			evidence-based education, evidence-based practice education		
4		ERIC	Educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education, evidence-based education, evidence-based practice education	Peer reviewed, full text and abstract available, English language, 2008-2018, journal article, post-secondary education	556
5		Web of Science Core Collection	Educational strategies, curricula designs, teaching strategies, learning strategies, teaching interventions, learning interventions, teaching methods, students, undergraduate students, nursing students, student nurses, evidence-based practice, evidence-informed practice, evidence-based nursing, evidence-based nursing practice, nursing education,	Published 2008 – 2018, English language, article, Web of science categories (education, educational research or education scientific disciplines or nursing or health care sciences services or education special)	927

			evidence-based education, evidence-based practice education		
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Appendix F: JBI Critical Appraisal Checklist for Qualitative Research

Reviewer ----- Date-----

Author ----- Year----- Record Number

	Yes	No	Unclear	Not applicable
1. Is there congruity between the stated philosophical perspective and the research methodology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there congruity between the research methodology and the research question or objectives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there congruity between the research methodology and the methods used to collect data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there congruity between the research methodology and the representation and analysis of data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there congruity between the research methodology and the interpretation of results?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a statement locating the researcher culturally or theoretically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the influence of the researcher on the research, and vice-versa, addressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are participants, and their voices, adequately represented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Appendix G: JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies

Reviewer ----- Date -----

Author ----- Year-----Record Number-----

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the study subjects and the setting described in detail?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were objective, standard criteria used for measurement of the condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall appraisal:	Include <input type="checkbox"/>	Exclude <input type="checkbox"/>	Seek further info <input type="checkbox"/>	

Comments (Including reason for exclusion)

Appendix H: JBI Critical Appraisal Checklist for Quasi-Experimental Studies

(non-randomized experimental studies)

Reviewer----- Date -----
 Author----- Year----- Record Number -----

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	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the participants included in any comparisons similar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was there a control group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of participants included	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

in any comparisons
measured in the same
way?

8. Were outcomes measured in a reliable way?
9. Was appropriate statistical analysis used?

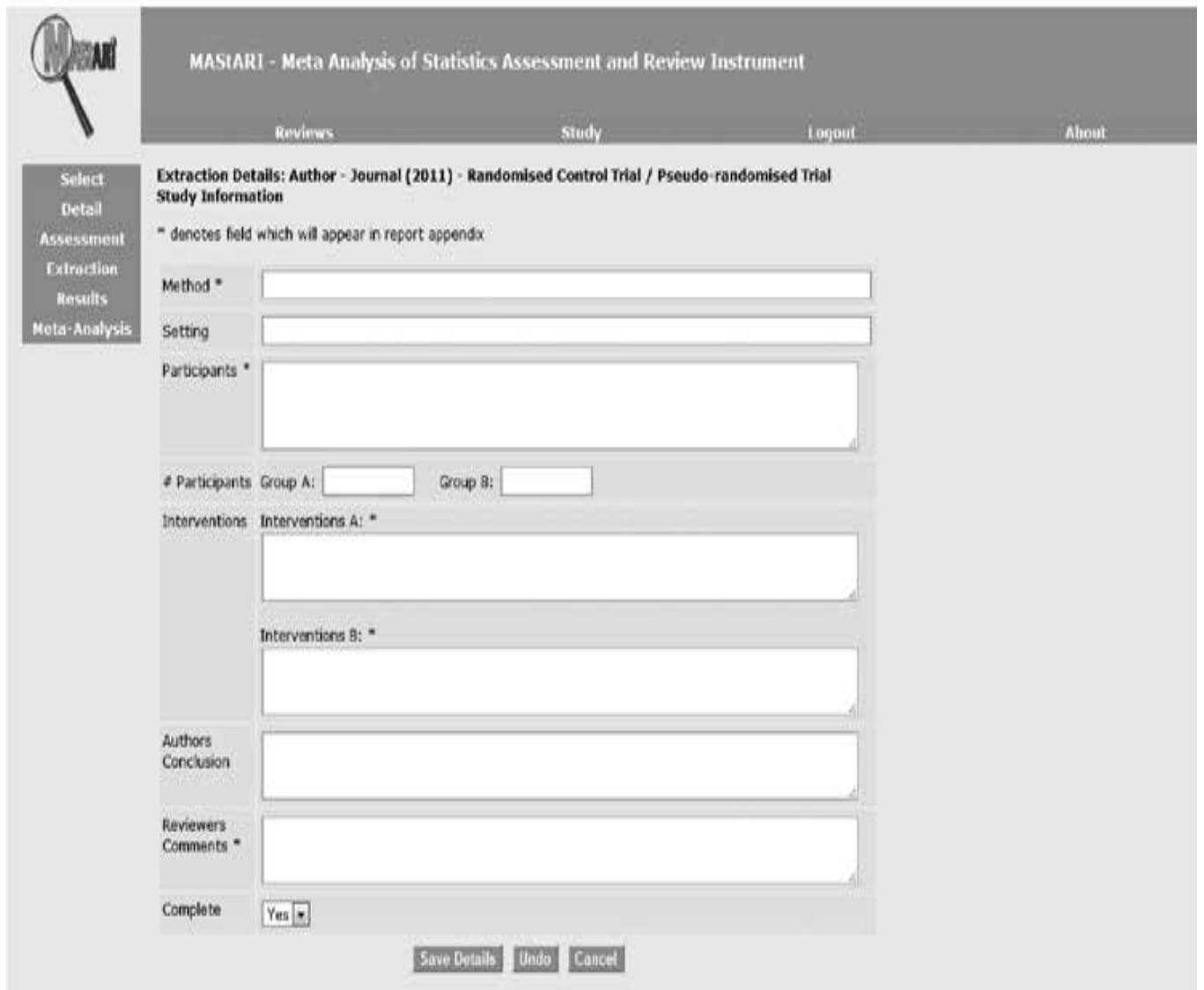
Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion) -----

Appendix I: Grading System Created by Down et al. (2009), Based on the Work of Lincoln and Guba, (1985)

A	No, or few flaws. The study credibility, transferability, dependability, and confirmability is high
B	Some flaws, unlikely to affect the credibility, transferability, dependability and /or confirmability of the study
C	Some flaws that may affect the credibility, transferability and/or confirmability of the study.
D	Significant flaws that are very likely to affect the credibility, transferability, dependability and /or confirmability of the study

Appendix J: Meta-analysis of statistics assessment and review instrument



The image shows a web-based form for data entry in the MASIARI system. The header includes the logo and navigation links for Reviews, Study, Logout, and About. A sidebar on the left contains a menu with options: Select, Detail, Assessment, Extraction, Results, and Meta-Analysis. The main content area is titled 'Extraction Details: Author - Journal (2011) - Randomised Control Trial / Pseudo-randomised Trial Study Information'. A note indicates that an asterisk (*) denotes a field that will appear in the report appendix. The form contains several input fields: 'Method *' (text), 'Setting' (text), 'Participants *' (text area), '# Participants' (with sub-fields for 'Group A:' and 'Group B:'), 'Interventions A: *' (text area), 'Interventions B: *' (text area), 'Authors Conclusion' (text area), 'Reviewers Comments *' (text area), and a 'Complete' field with a 'Yes' dropdown menu. At the bottom, there are three buttons: 'Save Details', 'Undo', and 'Cancel'.

MASIARI - Meta Analysis of Statistics Assessment and Review Instrument

Reviews Study Logout About

Select
Detail
Assessment
Extraction
Results
Meta-Analysis

Extraction Details: Author - Journal (2011) - Randomised Control Trial / Pseudo-randomised Trial Study Information

* denotes field which will appear in report appendix

Method *

Setting

Participants *

Participants Group A: Group B:

Interventions Interventions A: *

Interventions B: *

Authors Conclusion

Reviewers Comments *

Complete Yes

Appendix K: Qualitative assessment and review instrument



The screenshot displays the QARI (Qualitative Assessment and Review Instrument) web application. The top navigation bar includes links for Reviews, Study, Categories, Synthesis, Logout, and About. A sidebar on the left contains a menu with options: Select, Detail, Assessment, Extraction, and Findings. The main content area is titled 'Extraction Details: Author - Journal (2011)' and includes a note: '* denotes field which will appear in report appendix'. The form contains the following fields:

- Methodology:
- Method: *
- Phenomena of Interest: *
- Setting:
- Geographical:
- Cultural:
- Participants: *
- Data Analysis:
- Authors Conclusion: *
- Reviewers Comments: *
- Complete:

At the bottom of the form are three buttons: Update, Undo, and Cancel. The footer of the page reads: 'Version 5.0 Copyright © Joanna Briggs Institute 2011.'