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Clinical Nurses' Research Capacity Building in Practice—A Systematic Review

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Abstract

The aim of this study was to identify and evaluate evidence of clinical nurses' research capacity building in practice. A systematic review of studies of nurses' research capacity building in practice was performed. The quality of the articles was evaluated and reflected on in accordance with the Quality Assessment and Validity Tool for Correlation Studies. The literature searches identified a total of 4748 abstracts and titles. Eight quantitative studies were included in the evaluation. Three themes emerged from the analysis: Failure to ensure research quality and standards, Developing a research culture and Collaboration and organization of research utilization. The first theme has one sub-theme: Lack of knowledge about how to increase research utilization. The second theme is based on three sub-themes: Ability to identify clinical problems, changing nurses' attitudes to research and research supervision. Finally, the third theme has one sub-theme: Funding as a success factor. In conclusion, research capacity building requires the development of research competence to generate knowledge that enhances quality and patient safety. Nurse leaders are essential for establishing evidence-based practice and a research culture, thus enhancing nurses' scientific attitudes and capacity.

Keywords

Capacity Building, Clinical Nurses, Practice, Systematic Review

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1. Introduction

The World Health Organization ([1], p. 1) introduced a Global Programme of Work (GPW) in order to strengthen research capacity in nursing and midwifery. The objectives were to develop global policies, norms and standards to strengthen nursing and midwifery; provide solutions derived from evidence-based policies and practices; and establish consensus among partners through relevant mechanisms to support nursing and midwifery. A review by Segrott *et al.* [2] described research capacity-building as enhancing the ability of individuals within a discipline or professional group to undertake high-quality research and enabling such activities. Furthermore, an inductive concept analysis by Condell *et al.* [3] stated that capacity building in nursing should be reflected in policy documents and peer-reviewed journals. Research on capacity building implies a funded intervention operationalized across the literature and a move from policy to research [3]. A decade ago, researchers focused on increasing nurses' research activity, leading to a significant growth in both knowledge and the use of research resources was demonstrated [4]-[6]. Furthermore, Clifford and Murray [5] suggested enhancing collaboration between academics and practitioners in order to reduce the research-practice gap in nursing. Thus several researchers increasingly considered the importance of contextual issues as well as factors such as time, funding, support and cultural values [2] [6]-[9] and suggested using mentors to educate nurses in research skills. Models of how to enhance nurses' research capacity were identified in reviews [10] [11] and it was pointed out that capacity building must include evidence-based practice (*i.e.*, knowledge implementation), facilitation (*i.e.*, focus on nursing leadership), teams, units and networking as well as experiential learning, (*i.e.*, development of clinical nurses' research capability by direct participation in one or more phases of the research process). Important elements were leadership, organisational needs and management support [10]. Cooke and Green [11] suggested that development of nurses' research capacity of must include the organisational levels necessary for fostering a research-oriented culture and appraising the relevance of research, funding and practice. Strategies are required for the publication of research findings as well as the creation of opportunities for enhancing research skills and obtaining academic qualifications [11].

Several authors proposed targeted interventions for overcoming the barriers to implementing research capacity building [12] [13]. The main barriers include lack of time, nurses' authority, support and research knowledge [14] [15]. In addition, there it is essential to strengthen beliefs among nurses about the benefits of research and research teams as well as to increase available library resources [12]. Two challenges appear to restrict research capacity, namely material constraints and organisational contexts, including the changing roles and expectations of nurse educators. Strategies identified in the literature were the creation of infrastructures, the fostering of research cultures and environments in addition to facilitation of training and collaboration [2]. As these studies revealed, there has been extensive research on barriers to research utilization and resource investment, but a strategy to facilitate research utilization remains to be found [16] [17]. Several factors that can increase research capacity in clinical nursing have also been described in theoretical and qualitative studies [18]-[22]. In their theoretical study, Jeff *et al.* [18] reported how research capacity in nursing has an impact on patient outcomes. Building research capacity through collaborative partnerships is a core component of increasing the body of nursing knowledge about patient safety [18]. A number of key approaches have been suggested, such as articulation of questions consistent with a strategic direction that can make research meaningful. Feedback is mentioned as a way to inform about the contribution of research to guiding policy and practice. It has been pointed out that research capacity in nursing needs to be initiated, supported and monitored by leadership [20] [21]. As already mentioned, an increase in research expertise will lead to better patient/client care and improved education of nursing and midwifery students [21]. In order to invest in and build nursing research capacity, hospitals must develop creative approaches to spark interest in nursing research and to equip clinical nurses with research competencies [22]. The articulation of a vision for nursing research and a capacity-building framework by means of a multi-pronged approach is required [22]. Other suggestions for strengthening research capacity building were to engage key stakeholders, have senior management endorse the value of nurse leadership and build on existing collaboration to obtain funding [22]. Strong and visible academic leadership, fulfilling organisational requirements, providing a supportive infrastructure as well as a successful contextual adjustment of models for building research capacity have also been suggested [20] [23]. In this regard, organisational context plays a central role in shaping the utilisation of research [24]. Despite the evidence from studies of nurses' capacity building, there is little focus on empirical studies in clinical nursing and how nurses' capacity building can improve patient care.

Aim

The aim was to identify and evaluate evidence of clinical nurses' research capacity building in practice. The review question was: What is the evidence of clinical nurses' research capacity building in practice?

2. Methods

2.1. Design

A systematic review method [25] was used in order to make a thorough critical appraisal of the quality of available evidence. The key characteristics of a systematic review are: 1) a clearly stated set of objectives with an explicit reproducible methodology; 2) a systematic search that attempts to identify all studies that meet the eligibility criteria; 3) an assessment of the validity of the findings of the included studies; and 4) a systematic presentation and synthesis of the characteristics and findings of the included studies ([26], p. 55).

2.2. Search Strategy

Two electronic databases, EMBASE and Ovid MEDLINE(R), were used to access information and answer the review question. In February, June and November 2014 we searched for articles using the following search words: *capacity building*, *Nordic countries* (*Norway*, *Sweden*, *Denmark*, *Finland*, *Iceland and Scandinavia*), *nursing research*, *nursing role*, *nursing care*, *leadership*, *nursing attitude* and *nursing practice* both alone and in combination. The searches were made by a specialized librarian and restricted to articles published between January 2004 and November 2014. The first author (K.L.) discussed the search words and outcomes with the specialized librarian and the co-authors. After the first search the search words were narrowed and changed to: *capacity building*, *nursing research* and *nursing practice* for the second and third search. The search words were used both alone and in combination.

The authors are nurse researchers working in different hospital contexts representing three disciplines (nursing, caring and public health) and three Nordic countries; Finland, Denmark and Norway. Their specialities are nursing leadership, mental health, coping with chronic disease, perioperative nursing, elder care and depression. They are familiar with various designs including implementation science, as well as a range of methods and the use of theoretical frameworks. The process was inspired by PRISMA [26] [27].

2.3. Inclusion and Exclusion Criteria

The articles were selected if they fulfilled all of the following inclusion criteria: the subjects of the study were nurses; it described research capacity in nursing care or practice; and was written in the English language. The studies included in this review were quantitative research studies (correlation, quasi-experimental, survey). The exclusion criteria were: duplicates, no information on research capacity building in clinical nursing practice, a context other than hospitals, reviews, collaborative projects between developed and under-developed countries, qualitative and theoretical study designs, education, and published before 2004. The state of knowledge was developed in three steps (**Figure 1**).

2.4. Step I Assessment of Evidence

The second author (E.E.S.) invited all the authors to participate in two meetings in order to plan and structure the entire literature review, formulate and discuss the review questions, search for literature, *i.e.*, data collection, and agree on the inclusion and exclusion criteria, in addition to criteria for critically appraising and analysing the findings. References in the selected studies were also scrutinised and discussions held with the co-authors regarding the key search outcomes and references [28]. The five authors reviewed and assessed the titles and abstracts of the articles for inclusion based on the inclusion and exclusion criterion. A total of 4748 titles were identified in the initial search, of which duplicates (n = 217), articles not written in English (n = 4), published before 2004 (n = 21), with a main focus other than capacity building in nursing (n = 62), a context other than hospitals (n = 22), collaborative projects with developing countries (n = 9), reviews (n = 7), or with a qualitative theoretical study design (n = 29) were excluded. Of the remaining 4377 articles, three were included. The second electronic search revealed a total of 2774 titles of which 18 articles were reviewed, 15 excluded and three included. Finally, the third search revealed 2763 titles of which 97 were reviewed, 95 excluded and two included.

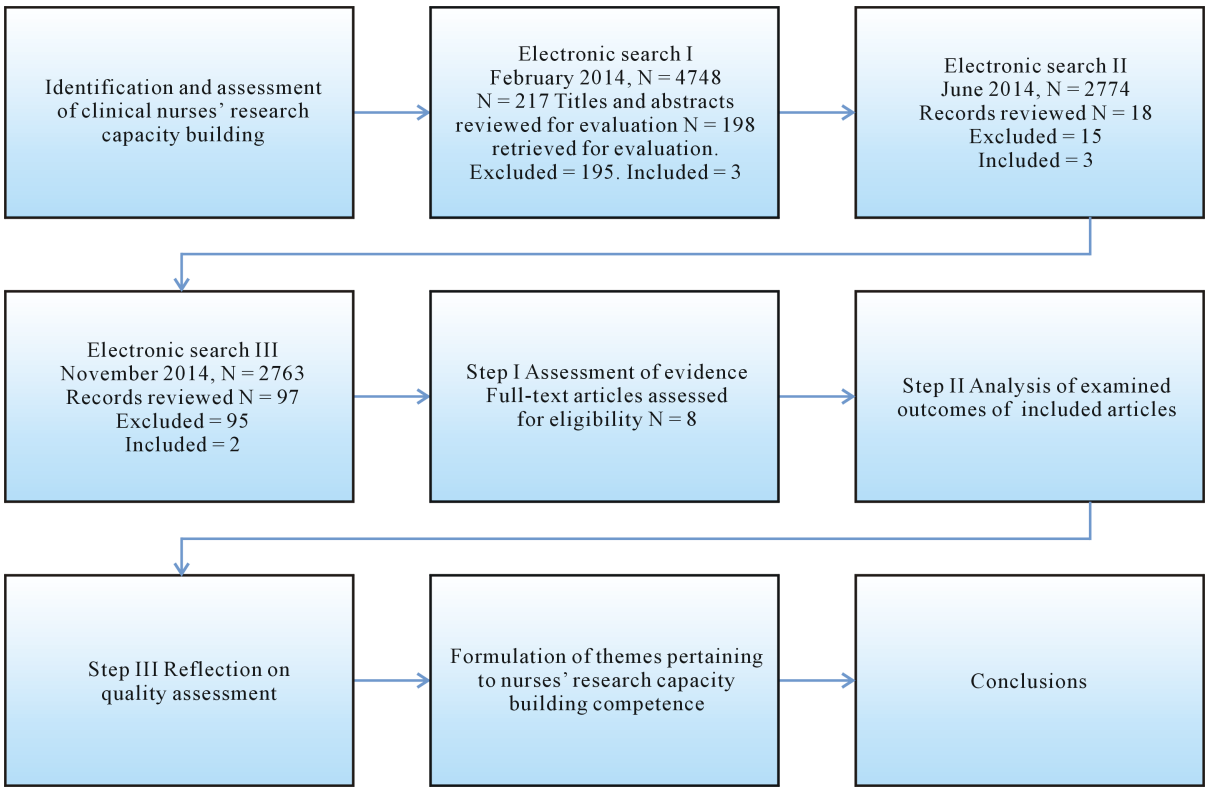

Figure 1. Flow diagram of the various phases of a systematic review inspired by PRISMA.

The references of the eight included articles were also reviewed, but no additional articles were found. One of the author (E.S.) checked and validated the three search histories in order to achieve an overview and make sure that no article had been missed.

2.5. Step II Analysis of Outcomes of Included Articles

The characteristics of the included articles are reported in **Table 1**. The following data components were examined in each of the articles: name of author(s), country, aim and research questions, subjects and study setting, theoretical framework or model, measurement instruments, reliability, validity and analysis.

2.6. Step III Reflection on Quality Assessment and Thematic Analysis

The quality of the eight included articles on nurses' research capacity was reviewed, evaluated and reflected on in accordance with the Quality Assessment and Validity Tool for Correlation Studies [29] [30]. The quality assessment covered design, sample, measurement and statistical analysis (**Table 2**). The eight studies were rated as cross-sectional in nature. Six studies used non-probability sampling [31]-[36], one employed a Web-based questionnaire Survey Monkey [37] and a population of all RNs working in a teaching hospital [38]. Corchon *et al.* [31] used a control group and a quasi-experimental design. Four studies reported a response rate > 60% [33]-[35] [38]. Three studies employed correlational analysis and had internal consistency > 70 [33] [34] [36] [38]. Seven studies reported using a theoretical or model framework for guidance. Five studies contained demographic characteristics [33] [34] [36]-[38]. Two studies had a sample drawn from more than one site [32] [36]. All studies justified sample size, while two [35] [38] reported that anonymity was assured. However, ethical approval can be considered to include anonymity, even if this is not explicitly stated in the other six studies. All studies reported ethical approval. In addition, the papers were analysed to identify the characteristics of nurses' research capacity. A thematic analysis was performed by two of the authors (E.S., A.L.H.) by exploring the key findings from each of the studies and coding them under various themes, which were discussed with the co-authors until consensus was achieved.

Table 1. Summary of the quality of the eight included articles on clinical nurses' research capacity.

Author country year	Aim and research questions	Subjects and study setting	Theoretical framework or model	Method/design Measurements instruments	Reliability	Validity analysis
1) McCance *et al.* 2007 UK	To identify strategic priorities to inform the development of a regional strategy for nursing and midwifery research and development	Purposive sample N = 105 Healthcare organisations higher education institutions, research funders, join appointees, representatives from government and professional bodies, commissioners of healthcare services and lead researchers from other disciplines	R&D agenda for nursing and midwifery Northern Ireland	Combined design Two data collections Delphi technique and nominal group technique (NGT) Mail survey, 24 items, 5 point Likert scale	Not reported	Content validity Face validity by two independent researchers SPSS
2) Martinez 2012 Cuba	To assess the results of a strategy implemented to develop nursing capacity for health systems and service research	Nursing managers n = 32 (pilot-test) Survey N = 105 nursing managers	Literature review and bibliometric analysis	Combined design Quasi-experimental Survey	Not reported	Face validity Pilot test Situation analysis Descriptive analysis, percentages
3) Akerjordet *et al.* 2012 Norway	To determine clinical nurses' interest in and motivation for research. An additional aim was to identify management and organisational resources to improve nurses' research capacity in practice.	N = 364 clinical nurses	Literature review	Cross-sectional survey, 59 items, 5-point Likert scale	Cronbach alpha test 0.91 - 0.98 Overall alpha 0.99.	Content validity SPSS Descriptive analysis, means, standard deviation and percentages were calculated as well as frequencies to summarize and compress distributions of data
4) Corchon *et al.* 2011 Spain	To evaluate a contextually framed intervention to increase nursing research capacity among clinical nurses	n = 89 Control group n = 81 Clinical nurses, ward manager, mentors.	Literature review	Quasi-experimental design, 27 items and 42 items	Cronbach alpha test and re-test *t*-Student test; $t = 0.04$, p = 0.92 Correlation 0.70	Content validity Descriptive comparative analysis ANOVA *t*-tests for paired samples
5) Brown *et al.* 2010 USA	To explore the relationships between perceived barriers to research use and the implementation of evidence-based practice and to investigate the barriers as predictors of implementation of evidence-based practice	A convenience sample of hospital nurses N = 1301 Four hospitals	Not specified	Cross-sectional Survey Barriers scale, 29 items, 5-point Likert scale. Evidence-Based Practice (EBPQ) Questionnaire, 24 items, 7-point Likert scale	Cronbach alpha test and re-test 0.80, 0.80 + 0.72 and 0.65 for each subscale EBPQ 0.87 in total 0.85 for Practice, 0.79 for Attitudes, and 0.92 for Knowledge	Content validity Construct validity Correlational analysis Hierarchical multiple regression analysis
6) Akerjordet *et al.* 2012 Norway	To examine clinical nurses' research capacity and investigate related factors (*i.e.* the different phases of the research process).	N = 364 clinical nurses	Literature review	Cross-sectional survey 59 items, 5-point Likert scale	Cronbach alpha Pearson's correlation coefficients	Content validity Principal component analysis

Continued

7) Jamerson & Vermeerch 2012 Ohio/USA	To identify the demographics of research facilitators, to determine the prevalence and type of nursing research models and to compare and contrast model differences to develop recommendations for practice	N = 69	Literature review (the conduct of research, development of research capacity, building aresearch culture within the organization)	Survey, 7 items	Not reported	Not reported A total function count (TFC) was calculated for each of the participants. Multiple regression
8) Czerwinski *et al.* 2004 Houston Texas, USA	To investigate nurses' knowledge, attitudes and practice (KAP) with regard to research	Web-based survey N = 600 nurses Hospital setting	Theory-driven. It was hypothesized that educational level would be positively associated with KAP factors.	Survey, Instrument KAP, 33 items.	Not reported	Not reported KAP scores were calculated by totalling the responses for each question and calculating a mean score by dividing the total score by 33 statements

NGT = Nominal group technique; TFC = Total function count; KAP = Knowledge Attitudes and Practice.

Table 2. Summary of quality assessment of included articles (n = 8).

	Number of articles	
	No	Yes
Design:		
1) Was the study observational (cross-sectional)*?	0	8
2) Was probability sampling used?	6	2
Sample:		
1) Was sample size justified?	0	8
2) Was sample drawn from more than one site?	6	2
3) Was anonymity protected?	1	6**
4) Was response rate more than 60%?	4	4
Measurement:		
1) Reliability	4	4
2) Used a valid instrument for measurement of nurses' research capacity?	2	6
Research capacity:		
1) Were contextual determinants measured rather than self-reported	0	8
2) If a scale was used for measuring effect, was the internal consistency > 70?	4	4
Theoretical framework or model for guidance	1	7
Statistical analysis:		
1) If multiple effects were studied, were correlations analysed?	5	3
2) Were outliners managed and addressed in the study	8	0

**All studies were approved by an institutional review board or ethics committee.

3. Results

Eight articles [31]-[38] that fulfilled the inclusion criteria were printed out and reviewed in detail in accordance with the quality assessment process in order to identify clinical nurses' research capacity building in practice (**Table 1**). The majority of the included studies were from Europe and the USA. Three themes emerged from the analysis; Failure to ensure research quality and standards, Developing a research culture and Collaboration and organization of research utilization. The first theme has one sub-theme; Lack of knowledge about how to increase research utilization. In the second theme, three sub-themes emerged; Ability to identify clinical problems, Changing nurses' attitudes to research and Research supervision. Finally, the third theme has one sub-theme; Funding as a success factor (**Table 3**).

3.1. Failure to Ensure Research Quality and Standards

In the paper by Brown *et al.* [36] capacity building was achieved by investigating barriers to the utilisation of research among hospital nurses. Several papers report barriers; nurses were unaware of research [38]; failure to apply research findings or being hindered from implementing evidence in practice [32]; lack of resources such as research teams [32], research training, time allocated to research activities [33] [34], and the knowledge required to utilize research [33]. Thus, implementing research findings can be hindered due to individual, sociopolitical and knowledge barriers.

Lack of Knowledge about How to Increase Research Utilization

In one of the studies it was found that the subjects perceived barriers to research utilisation to a "little extent" and a "moderate extent" ([36], p. 1947). The main barriers were from the organization subscale, including "*the nurse does not have authority to change patient care*" and "*the nurse is unaware of research*". The lowest ranked barriers were "*research conclusions not justified*" and "*research has methodological inadequacies*". The respondents' age, years of experience as an RN, Master degree, Doctoral degree, position of nurse manager, clinical nurse supervisor and nurse educators had statistically significant positive correlations with one or more of the subscales. Baccalaureate degrees and staff nurse position showed statistically significant negative correlations [36]. There was a significant positive correlation between knowledge to identify clinical problems and age and years of clinical experience [38]. These results indicate that for most hospital nurses, the barriers to research utilisation measured by the BARRIERS scale have a minimal influence on the implementation of evidence-based practice [32]. The role of nurse researcher was described, where the research facilitators' responsibilities are to assist clinical staff in the research process from initiation of a project to the final dissemination of the findings [37]. Two papers described aspects of both barriers and facilitators [31] [33], as well as providing insight into aspects of developing practice based on the best available evidence. Despite the fact that few nurses were engaged in research-based activities, a positive attitude towards research was reported [33]. The nurses were interested in developing knowledge of research skills that enhance patient safety and contribute to continuous quality improvement [33]. Research barriers were related to factors perceived by the nurses as a hindrance to implementing research findings in practice. The nurses employed at a university hospital emphasised lack of designated time and lack of interest as the major research barriers. In addition, lack of knowledge, research supervision and support were perceived as barriers in the clinical setting [33].

Table 3. Overview of the themes and sub-themes.

Themes	Failure to ensure research quality and standards	Developing a research culture	Collaboration and organization of research utilization
Sub-themes	Lack of knowledge about how to increase research utilization	Ability to identify clinical problems	Funding as a success factor
		Changing nurses' attitudes to research	
		Research supervision	

3.2. Developing a Research Culture

One study by Jamerson and Vermeersch [37] divided the nurse research facilitator's responsibility into three major areas; *the conduct of research* (own, and/or others), *the development of research capacity*, and the *building of a research culture* within the organization. Learning from experience is one important way of developing research capacity.

3.2.1. Ability to Identify Clinical Problems

The respondents in the study by Czerwinski *et al.* [38], did not achieve a high score in any area. The highest scores were the ability to identify clinical problems and willingness to engage in research. The lowest score was knowledge of how to implement research. The results were examined in the light of demographic characteristics of age, professional category, years in nursing, and education. The findings revealed a moderate level of knowledge in terms of identifying clinical problems. Four of the eight professional categories including manager/supervisor, director/administrator, and leader/coordinator had a high score and all other professional categories had a moderate score. A similar picture was found with respect to years in nursing. Respondents with a diploma or master degree had a high score in the ability to identify clinical problems. Low scores for the knowledge of how to implement research were found for all demographic subdivisions. Czerwinski *et al.* [38], reported discrepancies in the sample size among different educational groups. Ninety-eight per cent of nurses indicated that they did not receive any research training and most of them did not participate in research activity [31]. The result showed no significant differences between the groups in the use of material resources, databases and library facilities [31].

The results revealed a great increase in knowledge, as well as a clear improvement in nurses' skills in searching for and understanding evidence clearly improved. Nurses' perceptions about facilitators of and barriers to participation in research activities were measured by the facilitators and barriers scale. The results revealed no significant differences in nurses' perceptions before and immediately after the course, although such differences emerged at the end of the intervention period. Thus for the intervention group nurses, all variables changed significantly during the intervention. Regarding research knowledge and skills, an increase was observed immediately after the intervention, which was maintained during the whole period in which the Journal Club took place. However, their perceptions about the facilitators of participation in research activitites decreased significantly during the intervention [31].

A functional role was devoted to the initiation and conduct of research and to the identification of clinical problems. The largest group of respondents indicated agreement with a functional role format (entire effort devoted to the initiation and conduct of research). Four (l8%) provided descriptions consistent with a dual role model. They were employees of the institution but had additional responsibilities besides research facilitation. A collaborative role model was mentioned by some of the respondents. Of the 23 functions that the respondents were asked to address, all were performed by at least some of the respondents but no function was performed by all of them. However, literature searches, literature reviews/critiques/synthesis, research questions/hypothesis generators and research/evidence-based practice as well as education were reported. All other functions were mentioned by at least half of the respondents with the exception of instrument development, informing staff about grant opportunities, reviewing grants, and facilitating journal discussion groups [37]. Improving research skills in terms of defining/refining research questions and design was reported by Akerjordet *et al.* [34]. Furthermore, most of the respondents revealed that all organizations need a vision for R&D that can be translated into strategy, that takes account of regional developments, as well as a strong and visible nursing research leadership [35]. Strong and visible leadership for nursing and midwifery R&D activities should exist at senior level in all health and social services [35]. It is interesting to note that the data indicated that most participants considered all statements to be of importance.

3.2.2. Changing Nurses' Attitude to Research

Although they were not directly involved in research actvities, the attitude of the nurses in the control group improved significantly during the intervention [31]. The participants were requested to state their opinion of nursing research by means of an open question. Sixteen responded and all highlighted the fact that research was necessary and essential for the nursing profession. Ward manager support was perceived as the main facilitator of participation in research activities. The second most important facilitator was nurses' attitudes and motivation.

In addition, material resources and access to information were essential [31]. Regarding research knowledge, highly significant differences were found between the groups. An interesting finding was that most of the nurses empasised that inner motivation was a valuable asset for professional development [33]. The importance of available opportunities and adapted working hours was also acknowledged by more than half of the nurses. In addition, role models and clinical supervision were considered important motivational factors [33]. Czerwinski *et al.* [38], found a trend that respondents with graduate degrees had higher scores in knowledge about how to conduct research than respondents without such degrees. There were significant differences among educational groups in the two categories, but they became non-significant when adjusted for multiple tests. Brown *et al.* [36] also found that respondents with a graduate degree had a higher level of knowledge related to how to conduct research than those without such a degree. Regarding career opportunities for nurses within research and development, it was reported that most of the nurses intended to develop career opportunitites within the health and social services [35].

3.2.3. Research Supervision

Research supervision was found to be the best method for enhancing clinical nurses' research skills [34]. Most of the RNs perceived their research capacity as weak or acceptable and only a few (7.6%) as good or excellent. These nurses participated in research activities and half wanted to increase their research involvement. The five highest percentages in terms of perceived low research capacity were assessing inter-rater reliability, pilot testing an instrument for reliability, sensitivity and specificity, identifying and considering controlling for confounding variables and using computerized statistical packages [34]. Research supervision was a significant prerequisite for enhancing research skills among the nurses, followed by the need of support when preparing a grant application. The nurses emphasised the value of assistance related to literature searches and statistical support provided by the research department at the hospital [34]. There was evidence of the need for research supervision in the development of proposals as well as for mentorship [38] to undertake research activities [34].

3.3. Collaboration and Organization of Research Utilization

The establishment of clinical and academic collaborative networks was reported [33]. A research culture in practice and effective interprofessional collaboration are necessary to improve clinical nurses' research capacity building. Multidisciplinary collaboration was highlighted as increasing professional communication and leadership [35]. The study by Corchon *et al.* [31] identified the need to enhance knowledge and research skills by means of integrating research and development into professional practice. A study from Cuba reported several research interventions aimed at increasing nursing research capacity on individual and institutional levels for health systems and services research [32]. The result classified nursing research into three major areas: Patient perceptions, beliefs, knowledge and values; Prevalence and incidence of health problems, indicators of population health status; and evaluation of nursing competencies [32]. Most of the nurses reported that it is necessary to develop strong links on the organizational level including the "D" in R&D (Research & Development). In order to achieve this there are several regional support mechanisms such as; the Clinical Research Support Centre and Nursing Programme Manager [35], which highlight the need to increase opportunities for mulidisciplinary work for the purpose of R&D [32] [35]. A majority of the nurses wanted to collaborate in areas related to management and organisation of research activities. The main preference appeared to be collaboration with a research supervisor or a research team. Building community partnership as a basis for research and evaluation and conducting literature searches were also perceived as areas requiring improvement. In addition, some of the nurses wanted to strengthen their research skills related to evaluation of implemented research results and qualitative research design. Increased knowledge of the development of clinical guidelines appeared to be important for clinical nurses [33]. A series of small group workshops on research design, implementation, analysis and publication of scientific papers seemed to be an important skill development strategy. Individualized assistance and research colloquia/seminars were emphasised as a means of improving knowledge and skills. The four highest ranked areas of research capacity were considering ethical issues, conducting interviews, knowledge of how to access relevant literature, and keeping a systematic record of the published literature accessed [34].

Funding as a Success Factor

Nearly half of the nursing and midwifery group needed funding to develop research capacity at doctoral level as

well as postdoctoral training to become researchers. They emphasised the necessity of increasing postdoctoral training opportunities [35].

In conclusion, the findings of McCance *et al.* [35] provided insight into the development of expertise that will enable the profession to deliver research programmes. Among the top 12 research activities and development priority areas were the need for a vision, the need to enhance strategic, strong and visible leadership, to identify mechanisms by which research and development activity is integrated in practice, in addition to opportunities for multidisciplinary work. Other skill development strategies included how to incorporate research into practice, promote willingness to engage in research, additional training to conduct research [38], and how to identify research mentors [31] [33] as well as research capability (research skills, general research knowledge and attitudes towards research) [31]. How to identify a research area was prioritised by more that half of the nurses, while a third of them wanted to design a research project and receive help to obtain research funding [33].

4. Discussion

In this systematic review we have synthesized evidence of clinical nurses' research capacity building in practice and revealed three themes; Failure to ensure research quality and standards, Developing a research culture and Collaboration and organization of research utilization.

4.1. Failure to Ensure Research Quality and Standards

There is little doubt about the relationship between clinical nurses' research capacity building and development of evidence-based practice [39]. However, there is a lack of a shared understanding of the meaning of research capacity building [40] and despite the fact that research capacity building and evidence-based practice are closely linked, few studies have proven this relationship. Evidence based practice is related to patient safety and requires willingness to integrate the best available scientific evidence in daily nursing care [41] [42]. Clinical nurses should be interested in developing knowledge that can enhance patient safety and quality of care, thus research capacity building in clinical nursing should focus on how to design studies that highlight clinical questions and the development better care for patients. Cooke [43] suggested that action oriented and user involvement approaches generate useful research that is useful and close to practice. Several studies have pointed out barriers to research capacity building in clinical nursing and defined the factors that must be improved.

Two of the studies assessed these barriers in an intervention to develop clinical nurses' research capacity [31] [32]. In addition, in one study a consensus process was organised to develop a regional research strategy for research in clinical nursing and midwifery [35]. These are examples of an important first step in the process of research capacity building. However, there remains a paucity of studies that link research capacity building in clinical nursing to patient outcome and quality of care. Segrott's [2] review from 2006, summarizing studies from 1999 to 2004 on the challenges and strategies involved in developing research capacity building in clinical nursing, concluded that there is a consensus on the need for building research capacity [2]. This is in accordance with McCance *et al.* [35], who established that the basis for capacity building is engagement in research and development activities to generate knowledge. According to Cooke [43], capacity building takes place on four structural levels; individual (by participation), team (multi- and interprofessional involvement), organizational (infrastructure and support), and research network level (developing structures between and outside health organizations). In nursing practice, clinical nurses' research capacity building is a question of developing abilities, *i.e.*, research competence [22] and knowledge implementation [10] [11] impacting on patient outcomes [18]. Outcome measures of research and knowledge implementation could, according to Jamerson & Veermeersch [37], be policy or procedural changes, cost savings, improvement in satisfaction, decreases in nursing turnover, as well as effects on specific quality indicators, and nursing effectiveness measures.In addition to developing research competence including academic leadership of research by ensuring skills and confidence (coordination of research programmes), research capacity building is enhanced by intellectual and social capital by means of tracking linkages and collaborations [11]. Besides traditional measurement outcomes (a publication in peer reviewed journals and conference presentations) Cooke [11], highlights the need to disseminate the social impact of research (impact on the lives of patients, for communities, and quality of services). There is also a need for dissemination of economic outcomes related to product outputs and health gains and/or the cost effectiveness of interventions. Another principle is that research is dependent on infrastructure including structure, processes, funding and fellowship. As a professional outcome, sustainable research capacity building requires

the necessary competence to undertake research and apply skills to practice and patient outcomes [11].

4.2. Developing a Research Culture

Developing a research culture is an important part of building research capacity. All the included studies have a clinical setting in non-academic institutions, mostly hospitals. Despite the fact that academic employees in the hospitals are active researchers who produce scientific articles, they normally have their academic position in a university and may thus lack the necessary influence to change the research culture in the clinic. However, clinical researchers' knowledge of research based practice and their ability to supervise research projects can inspire and motivate clinical nurses who are interested in research, thus influencing the culture in their department. This "bottom-up" approach is important for changing the culture, but works slowly [2]. On the other hand, Cooke [1] argued that it is important to develop a research culture that generates research that is useful for practice on the ability of nurses and teams to conduct research. He further argued that capacity building is conducted within a policy context that can nourish or restrict the progress. In addition, research training improves clinical nurses' research capability, knowledge and skills [31].

Akerjordet and Severinsson [44] pointed out that leadership is a key component in the development of a research culture. Leaders in university hospitals have traditionally had an academic education, although mostly in medicine. In the same way as nursing leaders have been shown to be essential for the development of an evidence based practice culture [23], they also seem to be key actors in the establishment a research culture [20] and therefore require an academic education.

The intervention studies included in this review have a clear aim of enhancing clinical nurses' capacity building in practice by educational and strategic processes, which are important premises for changing the culture. The concept of capacity building contains processes of adaption to change, where the cultural challenge is to promote and make it possible by reducing barriers for nurses in the clinic to work in a more evidence-based manner, thus ensuring that the research culture in nursing is sustainable and continues to develop. In the included studies the nurses seemed willing to engage in research, but lacked the necessary resources. By establishing a nursing research culture the institution places research on the agenda, but systematic work is needed to enhance it.

4.3. Collaboration and Organization of Research Utilization

In his review ten years ago, Segrott ([2], p. 648) pointed out that we must move from "problem and solutions to process and outcome". Some of the included studies still focus on barriers and actions that must be taken. Only two articles outline a process of capacity building in nursing research on an educational and strategic level. One article describes a strategic consensus process on a regional level. Educational and strategic processes resulted in increased research knowledge among nurses that was maintained for over a year [31]. Such processes are important as a first step in research capacity building in clinical nursing. However, to contribute to better quality and safety of care they must be integrated in the organization in the form of continuous and stable activities that ensure the sustainability and further development of clinical research projects.

While, activities such as journal clubs and workshops initiated as a project or by the research department can be a good start for research awareness in clinical nursing, a successful outcome depends on a sound, integrated research strategy and leadership support. In the intervention study by Corchon *et al.* [31], journal clubs were seen as an effective strategy for promoting research, becoming familiar with research methods, seeing the value of research for practice and selecting a topic that is important for practice. About 50% of the nurses in the clinic had a positive attitude to research and clearly stated their barriers and needs in terms of conducting research. Key factors were knowledge and leadership that clearly prioritizes research by providing the necessary resources to engage in research projects and to put knowledge into practice [44].

5. Clinical Implications

A prerequisite of research capacity building is the development of research competence to generate knowledge in order to enhance patient safety and quality of care. The nurse leader is essential for establishing evidence-based practice and a research culture as means of changing nurses' attitudes. One strategy could be to develop action and qualitative research to explore how to integrate new knowledge into nurses' capacity building. How-

ever, in order to ensure sustainability it is necessary to develop research strategies in the organizational policy. Such strategies can nurture the progress of research teamwork, which is an important part of enhancing research capacity building in nursing.

6. Methodological Limitations of the Included Studies

Several of the reviewed studies are cross-sectional surveys [33] [34] [36]-[38] that contribute limited knowledge. Half of the studies had a fairly low response rate (less than 60%) but the sample size was justified in all eight articles. Reliability of the measurements was not described in four of the articles and internal consistency was lower than 70 in four of the articles.

7. Methodological Limitations of This Review

The strength of this review is the systematic search history and the use of experts to identify the electronic papers that were included. Another strength is the expertise of the authors, all of whom have long experience of clinical nursing research. Qualitative research synthesis enables researchers to summarize existing studies and the knowledge they contribute. However, a limitation is the small number of papers (eight), all of which were quantitative in design, which means that the interpretation can only refers to the included paper. A larger number of studies would have resulted in other themes, sub-themes and probably a more comprehensive picture of the findings. The process is described in more detail in a stepwise manner. This involved identifying the findings in each of the studies in addition to the abstraction and synthesis, as well as interpretation of the content. A further limitation of the studies reviewed is that their context is not taken into account in any great detail. Developing capacity building in nursing research can differ between various nursing contexts in hospitals and the community health system.

8. Conclusion

Reviewing articles on capacity building in nursing research in a clinical setting shows what is required to increase nurses' involvement in research. However, there still remains a lack of studies reporting how research capacity building has led to research-based practice, better quality and safety of care. We conclude that research capacity building requires the development of research competence to generate knowledge that enhances quality and patient safety care; the use of an implementation approach can enable dissemination of evidence-based knowledge; to ensure sustainability, research strategies should be integrated with the organizational policy that nurtures the progress and impact of research capacity building, where infrastructure, research teamwork and networking are important aspects. Finally, nurse leaders are essential for establishing evidence-based practice and a research culture, thus enhancing nurses' scientific attitudes and capacity.

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