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**Short informative title**: Mixed methods systematic review: factors influencing research activity among nurses in clinical practice

Short running title: Research activity among clinical nurses

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## Title

Mixed methods systematic review: factors influencing research activity among nurses in clinical practice

#### Abstract

**Aim**: To identify, evaluate and summarise current evidence in relation to the factors that influence the conducting of research by nurses in clinical practice.

Design: Mixed methods systematic review.

**Data Sources:** CINAHL, EMBASE, MEDLINE, Scopus and ASSIA, with dates limited from 2015 - 2020.

**Review Methods:** The Joanna Briggs Institute approach was followed, with results reported according to the Preferred Reporting System for Systematic Reviews and Meta-Analyses. The associated checklist for systematic reviews was also utilised. A standardised data extraction tool was then utilised, with quality appraisal guided by the Mixed Methods Appraisal Tool, with a subsequent convergent qualitative synthesis.

**Results:** 16 papers were identified for inclusion, nine quantitative, six qualitative and one mixed methods. Four themes were identified: research competence and culture, proactive research mentorship, research resources and making a difference. These were critically discussed in relation to barriers and enablers to the conduct of research by nurses in clinical practice. Commonly cited barriers included a lack of research knowledge, confidence and access to resources, particularly protected time. While enablers such as educational partnerships, identifying research motivated clinical nurses and access to research role models were also apparent in the literature.

**Conclusions:** Globally, nurses in clinical practice are clearly motivated to engage in the research process despite apparent barriers that have a significant impact on productivity. Nevertheless, there are also enablers to building research capacity apparent that offer methodological and structural approaches to empower this group to conduct research.

**Keywords:** Mixed methods systematic review, Mixed Methods Appraisal Tool, Nurses in clinical practice, Conducting research, Barriers and Enablers

#### What does this paper contribute to the wider global clinical community?

- This mixed methods systematic review synthesised research of a variety of designs to explore the barriers and enablers that nurses in clinical practice experience when conducting research.
- It has highlighted that while nurses in clinical practice experience a range of barriers to conducting research, a variety of enablers are also apparent that if harnessed could help further develop research capacity.
- These findings will be of interest to nurses in clinical practice, nurse managers, educators and policy makers to inform the development of future strategies to build research capacity among this large professional group internationally.

## Introduction

From Florence Nightingale to modern day nursing practice, nurses have been key in the generation of knowledge to inform their clinical practice through engagement with the research process (Dunning 2013). International nursing practice is continually evolving in response to the ever-changing needs of patients in a variety of settings ranging from primary, secondary to tertiary care. Nursing research is therefore a fundamental cornerstone of the evolution of safe, efficient and person-centred modern nursing practice (Polit and Beck 2017). While it is acknowledged that it is not necessary for every nurse to conduct research, being engaged in the process is arguably a means of safeguarding evidence-based practice (EBP) (Bourgault 2018).

Nurses in clinical practice can be described as those who practice within clinical settings that have daily direct patient contact (Siedlecki and Albert 2016). Arguably, being at the patient's

side, such nurses are in the ideal position to pose clinically relevant research questions for exploration through the research process (Siedlecki and Albert 2016). However, nurses in clinical practice are faced with a multitude of competing priorities and as such the conducting of research is often and understandably a lesser priority when competing with the multifaceted demands of this role. Research capacity can be seen as the ability to conduct, use and sustain research in practice (Chen et al 2019). In order to enhance nursing research capacity a greater understanding of factors influencing research activity in clinical nursing practice must first be better understood.

A body of evidence has historically explored common barriers to the conducting of research by nurses in clinical practice, highlighting a lack of time, support and funding as confounding factors (Higgins et al 2010, Akerjordet, Loki and Severinsson 2012, Silka et al 2012). More recently an integrative review conducted by Scala, Price and Day (2016) explored best practices for engaging clinical nurses in research. A review of papers from 2005 to 2015 was conducted here. This highlighted that a multifaceted approach is required to support clinical staff in the conducting of nursing research, identifying themes including access to infrastructure, executive leadership support, identifying strategic priorities, educational tactics and leveraging established networks (Scala, Price and Day 2016).

However, the contemporary nursing landscape has further evolved since the initial timeframe of this review, with associated changes in nursing roles and responsibilities (Scottish Government 2017a). Attempts to address key aspects of identified themes are also apparent in contemporary nursing practice. Strategic priorities are arguably being addressed through updated research policy (NHS Health Research Authority 2017). While clinical role innovations such as the Advanced Nurse Practitioner with research as a named aspect of this role (Scottish Government 2017b) is an example of leveraging established networks to facilitate the conduct of clinical research by nurses. Furthermore, the imbedding of Clinical Academics to provide clinical leadership and foster executive leadership partnerships internationally (Pattison et al 2021) also addresses a key theme identified by Scala, Price and Day (2016). Changes in the nursing workforce are also evident, most notably through retirement of an ageing professional population. In addition, an increased number of nurses exiting their professional training with a degree award or higher is also apparent, thus contributing towards a research ready workforce (International Council of Nurses 2020) and clearly addressing global educational tactics.

As such this mixed methods systematic review will address this gap in current evidence synthesis through explicitly exploring not only the barriers, but the enablers to the conducting of research by nurses in contemporary clinical practice. It will build upon previous work to develop a balanced understanding to aid in the ongoing development of a culture of research in practice among this large group of clinicians globally.

## Aim

The systematic review question was: What are the barriers and enablers that impede or aid nurses in clinical practice to conduct research in practice?

## Methods

## Design

A mixed methods design (Aromataris and Munn 2020) was selected in order to answer the research question and address the heterogeneous nature of this body of evidence. Mixed methods systematic reviews reflect the complexity of research questions in healthcare and assist with both depth and breadth of understanding (Higgins et al 2020). This review design followed the Joanna Briggs Institute (JBI) approach to mixed methods systematic reviews (Aromataris and Munn 2020), with results reported according to the Preferred Reporting System for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al 2021). The PRISMA guidelines for Systematic Reviews and Meta-analysis was also used as a checklist to guide this review (Page et al 202) (Supplementary File 1). This systematic review's protocol was registered and published by Research Registry (www.researchregistry.com), with the identifying number reviewregistry984.

#### Search methods

The healthcare and biomedical science bibliographic databases CINAHL, Scopus, ASSIA, MEDLINE and EMBASE were utilised to conduct a systematic search of the literature. Initial test searches were performed in May 2020 in CINAHL, which led to refinement of the search strategy with the support of a specialist librarian, in July 2020. In order to create a robust strategy, the review question was structured utilising the Population, Intervention, Comparison, Outcome (PICO) framework (Aromataris and Munn 2020, Aveyard 2018, Higgins et al 2020). Appropriate keywords and MeSH headings were formulated for each strand of the framework

and each combined using Boolean logic and citations retrieved. A summary of this process is presented within Tables 1 and 2.

Papers in the English language, in peer reviewed publications were reviewed, limited to the past five years to provide a current overview of the literature. No geographic limitations were placed on the search in order to capture all relevant international literature for inclusion. Additional studies were then searched for within the reference lists of key papers and through searches of the grey literature. Furthermore, the National Institute for Health Research (NIHR), Research Registry and JBI databases were searched for any registered protocols in this field.

#### Inclusion and exclusion criteria

This mixed methods systematic review was guided by the clear application of inclusion and exclusion criteria during the screening of retrieved papers (Bettany-Saltikov and McSherry 2016). These criteria were applied stringently to ensure that papers were appropriate in answering the research question and that the process applied was replicable and transparent. The PICO format was again utilised but with the addition of study design (Higgins 2020). Table 3 highlights the inclusion and exclusion criteria applied.

#### Search outcome

A total of 5096 citations were retrieved and exported to EndNote to facilitate data management and screening. After deduplication, the title and abstract of the remaining 4297 papers were reviewed and screened for relevance. 4242 papers were excluded, leaving 55 papers for full text screening. In total 16 papers met the inclusion criteria and were subject to quality appraisal and data abstraction by the first reviewer (LM) using a Microsoft Excel spreadsheet. The final synthesis was constructed from these nine quantitative, six qualitative and one mixed methods primary research papers. Methodological rigour was safeguarded during this process whereby second (BJ) and third (MC) reviewers were invited to independently examine a random sample of these papers, similarly, screening for relevancy and inclusion. Any variances were subsequently discussed, and inclusion or exclusion agreed. Figure 1 depicts an overview of the outcome of the search deployed utilising the PRISMA (2020) diagram.

## **Quality appraisal**

The Mixed Methods Appraisal Tool (MMAT, Hong et al 2018) was selected to evaluate the methodological quality of the studies identified for inclusion, reflecting JBI guidance

(Aromataris and Munn 2020). The MMAT as validated by Pluye et al (2009) establishes validity and reliability for summarising overall quality across a range of study designs, thus ensuring a consistent approach. Quality appraisal was conducted by the first reviewer (LM) with a random sample independently evaluated by the second (BJ) and third (MC) reviewers, allowing critical discussion until consensus was reached. As argued by Hong et al (2008) a numerical score was not given to each study but instead papers were ranked low, moderate or high quality, dependent upon MMAT criterion. All ranked studies were included in this review following quality appraisal, regardless of outcome. Only one study was assessed to be of a low quality however this was the sole mixed methods study identified for inclusion in this review and as such this was included to enhance methodological variety. Table 4 includes an overview of the assessment of methodological quality of included studies.

## **Data abstraction**

Key data from included papers was extracted into a Microsoft Excel spreadsheet using a standardised tool by the first reviewer (LM). This abstraction tool was designed by the review team and was influenced by JBI and PRISMA guidance and as such recorded key study characteristics including author, year, country, design, sampling, data collection and findings. This matrix was piloted during the testing of the search strategy and discussed with the review team prior to full implementation. Table 4 provides a summary of data extracted from studies included.

#### Synthesis

Data synthesis followed a convergent qualitative synthesis design as recommended by the JBI (Aromataris and Munn 2020), to integrate results and findings from included studies in a simultaneous manner. This approach also aligns with the typology as developed by Hong et al (2018) and the nature of the research question posed. Quantitative data was therefore extracted and interpreted into a narrative description thus allowing integration with qualitative data. The individual strands of the included mixed methods study were also independently analysed. Resulting qualitative data was pooled and thematic analysis conducted by the primary reviewer (LM) using Braun and Clarke's (2006) approach. This process involved becoming familiar with the data by reading and re-reading the original studies, generating initial codes, searching for themes in these initial codes, reviewing themes, defining and naming themes and finally reporting findings in the resulting narrative synthesis (Braun and Clarke 2006). Generated

themes were also discussed and agreed with the wider review team (BJ, MC). An overview of theme generation is depicted in figure 2.

## **Theoretical framework**

In the process of data analysis resultant themes were also mapped to the Promoting Action on Research Implementation in Health Services (PARIHS) framework (Kitson, Harvey and McCormack 1998). This conceptual framework presents the interplay and interdependence of many factors influencing the effective uptake and implementation of research evidence into practice, whereby successful implementation (SI) is seen as a function of (f) the evidence (E), context (C) and facilitation (F) (Kitson, Harvey and McCormack 1998), as highlighted in figure 2.

## Results

## **Study characteristics**

The final synthesis included 16 studies, in the English language, all of which reported primary research results or findings within peer reviewed journals. Table 4 provides an overview of these studies, nine of which were quantitative in nature, six qualitative and one mixed methods study. The predominant design adopted across this group was cross-sectional descriptive survey, which was deployed in 10 of the included papers. Interpretive descriptive (n = 2) and grounded theory (n = 2) was also utilised, while only one paper favoured action research or mixed methods approaches respectively. Studies were conducted internationally with the majority in the United States of America (USA, n = 6), followed by Australia (n = 4) and then the United Kingdom (UK, n = 3). The remaining studies were conducted in the United Arab Emirates (UAE), Denmark and Canada thus providing insight into the conduct of research by nurses in clinical practice across the globe. Convenience sampling was notably favoured in the majority of studies (n = 9) with sample sizes ranging from 2226 nurses in clinical practice (Hagen 2018) to that of the smaller purposive sample of 10 utilised by Ryder, Jacob and Hendricks (2019). The variance in sample sizes observed however can be attributed to choices aligned with methodological design. The same being arguably true of the data collection methods favoured whereby all nine quantitative studies utilised a variety of surveys, with the Barriers to Nurses Participation in Research Questionnaire (BNPRQ) being the most prevalent of these (Hagen and Walden, 2017, Hagen 2018). Qualitative studies instead favoured a variety

of data collection methods including individual interviews, reflective observations and focus groups.

#### **Convergent qualitative synthesis**

Data synthesis will be presented aligned to the four themes of research competence and culture, research resources, proactive research mentorship and making a difference as developed from thematic analysis of the literature and highlighted in figure 2, with reference drawn to the PARIHS framework (Kitson, Harvey and McCormack 1998).

#### **Research competence and culture**

Intrinsic barriers to the conducting of research by nurses in clinical practice, themed as research competence and culture, was identified in the literature and mapped to evidence in the PARHIS framework (Kitson, Harvey and McCormack 1998). This theme was firstly apparent in research by Berthelsen and Hølge-Hazelton (2015) in their descriptive cross-sectional survey of a convenience sample of 87 orthopaedic nurses in a Danish Regional Hospital, when exploring their knowledge and practical research competencies. This study reported that the majority of respondents had a low self-perceived theoretical knowledge and practical research competencies, despite prevalent internal motivation to conduct clinically embedded research (Berthelsen and Hølge-Hazelton 2015). Berthelsen and Hølge-Hazelton (2015) also found a lack of acceptance from colleagues related to research activity to be a significant intrinsic research barrier among this sample. This in partnership with a lack of research competence highlights a significant barrier to the conduct of research by this group in practice, despite their motivation.

Caldwell et al (2016) similarly found that clinical nurses reported a lack of knowledge, skills and research training in their multidisciplinary survey of all clinical staff at a regional cancer centre in the UK, to identify barriers to participation in research. Convenience sampling was again favoured, which Gerrish and Lacey (2010) describe as the weakest form of sampling as generalisability can be compromised. This sample did however yield a population of clinical nurses (n = 33), 26% in the overall sample, the second largest professional group after radiographers (31%, n = 39) who responded to this electronic survey. Similar to Berthelsen and Hølge-Hazelton (2015), Caldwell et al (2016) also reported that the majority of participants in this study had a positive attitude towards research and as such if a lack of research competence can be addressed, it can be postulated that a culture of research activity would be able to thrive among this group.

Paget et al (2016) also highlighted resources including knowledge as a core barrier to the conduct of research, in their grounded theory exploration of factors influencing clinical research participation among a sample of 40 clinicians, including nurses, in a children's hospital in Australia. This qualitative study builds upon previous research by also reporting solutions suggested by participants to enhance research activity in clinical practice. Improved availability and access to research mentors was one such solution highlighted by Paget et al (2016) that can be clearly aligned to addressing the core intrinsic barrier of research competence. Information and education were also solutions identified here whereby participants expressed a need for training in specific areas such as the writing of research protocols and grant applications. These solutions if addressed in partnership in practice could again significantly enhance the culture of research conducted by nurses in clinical practice.

Most recently, Ryder, Jacob and Hendricks (2019) similarly favoured a qualitative approach to explore ways in which Nurse Practitioners (NPs) engage in research in their roles in clinical practice. 38 NPs identified from a previous survey consented to participate in follow up interviews. A total of ten interviews were conducted and thematically analysed using Braun and Clarke's (2006) approach. A core theme identified here was research support whereby NPs expressed a desire for support from Higher Education Institutions (HEIs) facilitating collaboration, particularly in areas where NPs were lacking in research competence such as support with statistics. Ryder, Jacob and Hendricks (2019) also highlighted that those NPs who were not research active at the time of the interviews had a clear enthusiasm to get involved in future research. This again reinforces the work of Berthelsen and Hølge-Hazelton (2015) whereby motivation among nurses in clinical practice to conduct research was apparent.

It can thus be seen that despite intrinsic barriers to the conducting of research, predominantly related to research competence through a lack of knowledge, skills and training among nurses in clinical practice, there remains a clear interest and motivation to engage in clinically embedded research. It can therefore be postulated that if this motivation could be harnessed and fostered, a research culture could further flourish among this large population in clinical practice.

#### **Research resources**

A further theme highlighted from analysis of this body of evidence was those barriers extrinsic to nurses in clinical practice, namely access to research resources. These have been mapped to facilitation in the PARIHS framework (Kitson, Harvey and McCormack 1998). A variety of research resources were identified within the literature as critical for the conduct of research by clinical nurses, the most prevalent of which was time. This was most notably apparent in research conducted by Hagen and Walden (2017) that surveyed 2156 clinical nurses practicing in a large paediatric hospital in the USA using the Barriers to Nurses' Participation in Research Questionnaire (BNPRQ), to examine barriers to nursing research. A secondary purpose of this study was to report on the development of the BNPRQ as a validated tool for data collection. A total of 450 nurses responded to this electronic survey that explored and ranked 15 barriers to nursing research.

Hagen and Walden (2017) found that a lack of time to do research was the largest barrier among this sample. This was followed by a lack of incentives to do research and a concerning lack of availability of experienced nursing research mentors. Of particular note here Hagen and Walden (2017) reported that 63% of this sample had some type of research experience, however the meaning behind this was not clearly explored within this study. So again, despite research resources being commonly cited as barriers to the conducting of research by nurses in clinical practice, it can be postulated that a significant number were still able to engage in the research process, which is encouraging when generalising to the wider population.

Hagen (2018) built upon this research by conducting a further cross-sectional survey similarly utilising the BNPRQ to assess nurses' satisfaction with opportunities to engage in research. This study reinforced that time was a significant barrier but also suggested that providing protected research time, access to training and mentorship could be effective strategies to increase research satisfaction and enable productivity among nurses in clinical practice (Hagen 2018). This was further corroborated by Robichaud-Ekstrand (2016) in their similar study exploring clinical nurses' views on nursing research which identified a need for further research supervision in practice through partnerships with HEIs.

Furthermore Al-Yaseem et al (2019) similarly reported a lack of time as a key barrier to the conducting of research among nurses in the UAE in their large cross-sectional survey. Convenience sampling was again favoured to survey 606 nurses working in a variety of

secondary care settings, utilising a tool incorporating the BARRIERS questionnaire (Funk et al 1991) with a survey of common barriers to conducting research in nursing practice. In addition to a lack of time, analysis of this data also highlighted a lack of appropriate training, further emphasising not only extrinsic but intrinsic barriers to the conducting of research by nurses in clinical practice.

Bench, Downie-Baker and Fish (2019) built upon the quantitative works of Hagen and Walden (2017), Hagen (2018) and Al-Yaseem et al (2019) in their mixed methods exploration of orthopaedic nurses' views of perceived barriers and facilitators associated with engagement with the research process. This single centre study based in the UK, surveyed all qualified nurses (n = 373) practicing at a national specialist orthopaedic hospital, also inviting them to take part in follow up focus groups (n = 14) to further explore nurses experiences. The quantitative strand of this study confirms the results of previously cited research in highlighting a lack of time as a significant barrier to the conduct of research by these clinicians. Descriptive statistical analysis of this data subsequently informed the design of the topic guide used during the qualitative strand of focus groups. Bench, Downie-Baker and Fish (2019) subsequently report key findings associated with time such as a need for back-filled time for research and for "user friendly" flexible support for research activity, such as through collaborative approaches like action learning.

While a lack of time was the predominant extrinsic barriers to engagement with the research process by nurses in clinical practice, a lack of access to appropriate support via research mentorship was also highlighted as an extrinsic barrier. While this was alluded to by Hagen (2018) and Ryder, Jacob and Hendricks (2019) it was further examined by Brown et al (2017) in their descriptive study to explore the views of nurses towards child health research and factors influencing their willingness to facilitate this in practice, using a survey. While Brown et al (2017) similarly report time as a significant barrier they also highlight the importance of a dedicated team to support and facilitate research by nurses in clinical practice and facilitate research culture.

These results were again reinforced by Pintz et al (2018) who also reported the importance of access to research infrastructure and collaborative support from HEIs in the research mentorship of clinical nurses within Magnet-Designated Hospitals in the USA. Pintz et al (2018) surveyed 181 nursing research leaders to assess characteristics in relation to research

infrastructure, culture and training. However, the decision to survey nurse leaders as opposed to nurses in clinical practice could limit the value of this quantitative descriptive study. Yet from these papers is can be seen that research resources, namely a lack of protected time and access to appropriate mentorship represent significant extrinsic barriers to the conducting of research by nurses in clinical practice internationally.

#### **Proactive research mentorship**

While some papers identify a lack of research mentorship as a barrier to the conducting of research by nurses in clinical practice, a few others conversely highlight its function as an extrinsic enabler when implemented effectively. This again can be mapped to the PARIHS framework (Kitson, Harvey and McCormack 1998) in relation to facilitation, whereby the impact of effective support of nurses in clinical practice can be seen to directly influence the conducting of research by this group. This was apparent in a study conducted by Gullick and West (2016), the aim of which was to evaluate Wegner's Community of Practice (CoP) as a framework for building research capacity and productivity among a sample of 25 advanced practice nurses at a single teaching hospital in Australia. A prospective, longitudinal, qualitative descriptive design was favoured here in order to fully assess the impact of this approach on the conducting of research over a seven year period. Participants self-selected into research clusters, created around clinical groupings and were mentored by a doctorally prepared Clinical Nurse Consultant who was also the primary researcher in this evaluation. Data was collected from a variety of sources during this time including focus groups, education evaluations, email transcripts and field observations that were then thematically analysed. Gullick and West (2016) concluded that the CoP framework invited differing levels of participation, created a rhythm for research related activity and fostered research interactions and relationships in practice, thus demonstrating this as a powerful model to support and facilitate research by nurses in clinical practice.

More recently Alomari, Wilson and Lewis (2020) conducted an evaluation of an action research project to explore its effectiveness as a mechanism to build research capacity among a group of clinical nurses practicing in a complex medical ward in an Australian hospital, offering a different methodological stance. This qualitative study was conducted in partnership with a group of six clinical nurses with no previous research experience. Alomari, Wilson and Lewis (2020) found that action research offered a participatory approach to engage and support bedside nurses to work collaboratively to conduct research that can positivity impact patient

care. They further highlight that these clinical nurses were able to take ownership of the research process and were able to translate their results and findings into their own clinical practice, as well as dissemination with others. It can thus be seen from this evidence that effective collaboration, support and facilitation are key to successful research capacity building among nurses in clinical practice now and in the future.

## Making a difference

A variety of enablers to the conducting of research by nurses in clinical practice, that can be recognised as intrinsic to the practitioner, were also been identified in the literature. These were themed as making a difference, incorporating individual motivators and research ownership, which were mapped to context in the PARIHS framework.

Siedlecki and Albert (2016) conducted a grounded theory study to develop an understanding of research active clinical nurses with a purposive sample of 26 nurses practicing within a hospital in the USA. Data was collected from this group by means of semi-structured interviews, with digital recordings and interview notes collated and analysed by two researchers using a constant comparative method as described by Strauss and Corbin (1990). Analysis identified three core themes related to successful research activity, namely trigger events, nurse characteristics and supporting conditions. Interestingly key characteristics for successful research active nurses such as curiosity, awareness, ownership and self-confidence were highlighted. Siedlecki and Albert (2016) therefore conclude that nurses in clinical practice can effectively conduct research in spite of commonly cited barriers and constraints when practicing within a supportive environment. While this is arguably a small-scale qualitative study it does however present significant findings to be considered in nursing practice when exploring intrinsic enablers.

Scala et al (2019) built upon this research in their interpretive descriptive study to gain an understanding of what motivates nurses in clinical practice to be engaged in research and specifically identify common characteristics for success among this group. Similarly to Siedlecki and Albert (2016), Scala et al (2019) utilise a purposive sample of 34 clinical nurses, identified from seven care settings in the USA. A team of 12 researchers then conducted semi-structured interviews with open ended question using Vroom's (1964) expectancy theory as a guide. The research team then independently conducted thematic analysis of transcribed recordings prior to discussion and synthesis of themes, thus enhancing rigour. Key themes

identified included feeling empowered, being part of the bigger picture, advancing professionally and problem solving. In addition, a clinical nurse profile was created highlighting traits for success such as curiosity, an eagerness to learn, innovation, collaboration and a passion about improving care, aligning to the theme of making a difference. These findings are corroborated by Arthur et al (2019) who similarly reported a positive attitude and innovation as key characteristics of research active nurses in clinical practice. Thus, it can be seen that there is a paucity of evidence that highlights intrinsic enablers that if recognised in wider clinical nursing practice could significantly enhance the conducting of research by this population.

#### Discussion

This mixed methods systematic review was undertaken to identify, critically evaluate and synthesise current evidence in relation to the conducting of research by nurses in clinical practice. It has highlighted four key themes, which were found to be congruent with previous research in this area, despite developments in contemporary nursing practice internationally (Higgins et al 2010, Akerjordet, Loki and Severinsson 2012, Silka et al 2012, Scala, Price and Day 2016). Themes were also mapped to the PARIHS framework (Kitson, Harvey and McCormack 1998) with barriers and enablers to the conduct of research by nurses in clinical practice discussed in relation to core components of successful implementation (Figure 2).

Intrinsic barriers as discussed by Berthelsen and Hølge-Hazelton (2015), Caldwell et al (2016), Paget et al (2016) and Ryder, Jacob and Hendricks (2019) highlight a lack of research competence and culture as a significant obstacle to the conduct of research by nurses in clinical practice, despite clear motivation. This was mapped to evidence in the PARHIS framework (Kitson, Harvey and McCormack 1998). However, it can be argued that the modern nursing profession is moving towards an all-graduate profession internationally and as such knowledge and understanding of EBP and the principles of the research process should facilitate a level of research preparedness among all nurses (Coyne, Grafton and Reid 2016). Yet the findings of this review do suggest that clinical nurses need further access to education and training on the research process to meet this clear need in clinical practice. As such it can be argued that access to funding to support research preparedness in practice will also be fundamental in facilitating a culture of research among this group. This in partnership with common extrinsic barriers, namely access to research resources, predominantly protected time and research mentorship (Hagen and Walden 2017, Hagen 2018, Robichaud-Ekstrand 2016) further highlights this issue in practice. These factors were mapped to facilitation in the PARIHS framework (Kitson, Harvey and McCormack 1998). Furthermore, current vacancies in clinical nursing practice present an additional challenge to such resources in practice, that again will impact upon the conduct of research by this professional group (Bayliss-Pratt, Daley and Bhattacharya-Craven, 2020).

However, strengthened partnerships between HEIs and clinical practice is one such mechanism to overcome these barriers suggested in the literature. This also reinforces the work of Scala, Price and Day (2016) who similarly emphasise the need for enhanced educational tactics to aid in the development of a culture of research in clinical nursing practice. However, this will require further strategic support and planning from nurse leaders in practice and educators alike to champion clinical nurses keen to engage in nursing research in practice. Joint appointments through models such as Clinical Academic Careers (Pattison et al 2021) is one such approach to aid in overcoming these barriers, though the provision of Professorial clinical research leadership. Yet, while this approach is apparent in some areas of contemporary nursing practice, this remains rare, and as such there is clearly scope for this role to be further expanded to meet the research needs of clinical nurses globally (Strickland 2017, Coad et al 2019, Pattison et al 2021).

Gullick and West (2016) and Allomari, Wilson and Lewis (2020) conversely highlight extrinsic clinical research enablers focussing on methodological approaches to proactive research mentorship, namely via a CoP and action research. This theme was again mapped to the PARIHS framework (Kitson, Harvey and McCormack 1998) in relation to facilitation. Such novel approaches clearly have a positive and multifaceted impact on enabling clinical nurses to conduct research in practice through empowerment, collaboration and a sense of ownership. In addition, the impact of doctorly prepared nurses as research mentors was highlighted here. The Campaign for Action (2020) reports that the number of nurses receiving doctoral degrees in the USA has increased year on year over the past decade, from 532 in 2010 to 801 in 2019; while this may be a relatively small percentage of the overall professional population, this does highlight a shift in professional development which if supported internationally could have a significant impact on research culture in clinical nursing practice.

These papers again build upon primary research cited by Scala, Price and Day (2016), however limited current research was identified to evaluate such methods and therefore further high-

quality research is required in this area, particularly utilising mixed methods approaches to build on this evidence base. Furthermore, intrinsic clinical research enablers as identified by Siedlecki and Albert (2016), Scala et al (2019) and Arthur et al (2019) highlight the impact of individual motivators among nurses in clinical practice to make a difference when engaging in research. It can thus be postulated that further innovations are required in practice to identify clinical nurses with desirable key characteristics and implement interventions to allow them to engage in research at the bedside, facilitating personal development while enhancing patient care through nurse led research.

#### Limitations

A standardised, rigorous approach following JBI guidance (Aromataris and Munn 2020) was adopted here, however it is important to acknowledge that there were also some limitations. Firstly, this review was conducted by a small review team. In order to further enhance rigour, a larger number of independent reviewers would have safeguarded reliability (Gray, Grove and Sutherland 2017). However, this review was the initial phase of PhD and as such a small supervisory team of subject specialists contributed to this review. Secondly and notably, all papers identified for inclusion were set in secondary care environments and as such transferability of findings does not reliably extend to wider care settings. Also, as previously highlighted one study was assessed for methodological quality using the MMAT (Hong et al 2018) and was found to be of a low quality but still included in this review. However, this was justified as the sole mixed methods study identified for inclusion and included to enhance methodological variety. Finally, as the literature search was restricted to the English language some relevant international primary research papers may have been excluded, but again it was out with the scope of the review team to have included such research. Arguably, the triangulation of quantitative, qualitative and mixed methods studies strengthened the overall rigour of this review which has provided an in-depth synthesis of factors influencing research activity in clinical nursing practice.

## Conclusion

This mixed methods systematic review has provided a convergent qualitative synthesis of current global literature presented via a thematic analysis of the evidence. Barriers and enablers to the conducting of research by nurses in clinical practice have been explored in relation to identified themes. While it is clear from this that nurses in clinical practice are still

experiencing historical barriers that hinder their ability to conduct research; reassuringly there is current literature highlighting the enablers to the conducting of research by this group from an international perspective. This combined with a clear motivation and interest among the wider population of clinical nurses to be involved in research presents a beacon of hope for the ongoing development of the evidence base of the nursing profession, by engaging clinical nurses in EBP to enhance the patient experience. Yet with approximately 28 million nurses worldwide, significant changes in research culture within clinical nursing practice are required to ensure the continued growth of the evidence base within this dominant, patient centred healthcare profession internationally (World Health Organisation 2021).

#### **Relevance to clinical practice**

The findings of this mixed methods systematic review will most importantly be of relevance to nurses in clinical practice, some of whom clearly have a desire to engage in a culture of conducting research in practice. As such this review will help equip and empower this population of clinicians with clear evidence of how to best support their research development needs. Findings should also influence global clinical nurse leaders and managers to increase efforts to support such nurses to address extrinsic barriers to the conduct of research. This review has similarly provided important evidence for policy makers, educators and researchers to support the development of research by nurses in clinical practice through collaboration and mentorship to aid in future research capacity building internationally.

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Figure 2 – Thematic matrix mapped to PARIHS framework

Where SI = f(E, C, F)

SI = successful implementation, f = function of, E = evidence, C = context, F = facilitation (Kitson, Harvey and McCormack 1998)

# Table 1 – Keywords and MeSH headings

PICO	Keywords and MeSH heading
Population	"Nursing staff, hospital" "Staff nurses" "Nurse researchers" "Registered nurses" "nurs*" "clinical nurs*" "practicing nurs*"
Intervention	<ul> <li>"Nursing practice, evidence-based"</li> <li>"Research personnel"</li> <li>"Nurse researchers"</li> <li>"Clinical nursing research"</li> <li>"Research, nursing"</li> <li>"clinical research"</li> <li>"research active*"</li> <li>"research active*"</li> <li>"research culture"</li> <li>"conducting research"</li> <li>"research participation"</li> <li>"research capacity building"</li> <li>"research capacity"</li> <li>"engage* N1 research"</li> </ul>
Comparison	None
Outcomes	"Nurse attitudes" Motivation barrier* enabler* factor* "influencing factor*" "support system*" "research barrier*" "barriers N1 research" Participation Satisfaction hindrance* opportunit*

# Table 2 - CINAHL search strategy

Search Strand	Syntax
<b>S1</b>	MH "Nursing staff, hospital" OR MH "Staff nurses" OR MH "Nurse
	OR MH "Registered nurses"
<b>S2</b>	TI nurs* OR TI "clinical nurs*" OR TI "practicing nurs*"
S3	AB nurs* OR AB "clinical nurs*" OR AB "practicing nurs*"
<b>S4</b>	S1 OR S2 OR S3
85	MH "Nursing practice, evidence-based" OR MH "Research personnel" OR MH "Nurse researchers" OR MH "Clinical nursing research" OR MH
	"Research, nursing"
<b>S</b> 6	TI "clinical research" OR TI "research active*" OR TI "research culture" OR
	TI "conducting research" OR TI "research participation" OR TI "research capacity building" OR TI "research N1 practice" OR TI "research capacity" OR TI "engage* N1 research"
<b>S</b> 7	AB "clinical research" OR AB "research active*" OR AB "research culture" OR AB "conducting research" OR AB "research participation" OR AB "research capacity building" OR AB "research N1 practice" OR AB "research capacity" OR AB "engage* N1 research"
<b>S8</b>	S5 OR S6 OR S7
<b>S9</b>	MH "Nurse attitudes" OR MH Motivation
S10	TI barrier* OR TI enabler* OR TI factor* OR TI "influencing factor*" OR TI "support system*" OR TI "research barrier*" OR TI "barriers N1 research" OR TI Participation OR TI Satisfaction OR TI hindrance* OR TI
	opportunit*
S11	AB barrier* OR AB enabler* OR AB factor* OR AB "influencing factor*" OR AB "support system*" OR AB "research barrier*" OR AB "barriers N1 research" OR AB Participation OP AB Satisfaction OP AB hindrance* OP AB
	opportunit*
S12	S9 OR S10 OR S11
S13	S4 AND S8 AND S12

PICOS	Specifications	Inclusion Criteria	Exclusion Criteria
Population	Nurses	clinical nurses of all fields of practice	clinical research nurses, students, academics, midwives, allied health and other registered medical professionals
Intervention	Nursing research	studies that explore clinical nurses conduct of research in practice	studies that solely focus on the application of evidence-based practice, research utilisation and research dissemination
Comparison	None	None	None
Outcomes	Barriers and enablers	studies that highlight barriers or enablers to the conduct of research by clinical nurses in practice	
Study designs	All study designs	primary research of quantitative, qualitative or mixed methods designs	systematic reviews, narrative reviews, editorials, discussion pieces and anecdotal accounts

# Table 3 - PICOS inclusion and exclusion criteria

## Table 4 - Overview of included studies

Author, date, country	Design	Data collection method	s Sampling	Key findings	MMAT
Al-Yateem et al, 2019, United Arab Emirates	Cross-sectional survey	Survey, online and paper based, based on the BARRIERS questionnaire	Convenience sample ( $n = 606$ ) nurses from across UAE, first phase who attended research workshop (paper survey, $n =$ 62), then a second phase by electronic survey	<ul> <li>Highest ranked barriers to nurses conducting research: <ul> <li>lack of time/competing demands</li> </ul> </li> <li>Followed by: <ul> <li>inadequate compensation for time</li> <li>lack of approximate training</li> <li>lack of support</li> </ul> </li> </ul>	Moderate
Alomari, Wilson and Lewis, 2020, Australia	Action research	Notes from meeting and 6 semi structured interviews, audio recorded, transcribed and analysed	Convenience sample of all nurses one ward ( $n = 33$ ) were invited to participate - resulting in 6 participants who met full inclusion criteria	<ul> <li>Themes identified included:</li> <li>motivations for joining research,</li> <li>feelings expressed by nurses about research</li> <li>being part of a research team</li> <li>influence of research on their own practice</li> <li>outcomes of research on nurses</li> </ul>	High
Arthur et al, 2019, United States of America	Cross-sectional, descriptive, quantitative survey	Online survey of 4 measures - data collected over one month	Convenience sample ( $n = 1528$ ) nurses invited to participate with $n = 623$ respondents	<ul> <li>Barriers identified to research participation related to: <ul> <li>time</li> <li>knowledge and availability of resources</li> </ul> </li> <li>Institutions wishing to expand nursing research capacity need to use innovative and novel approaches to address these issues. Positive attitudes toward research also important.</li> </ul>	High
Bench, Downie-Baker and Fish, 2019, United Kingdom	Single centre mixed methods study	Paper-based questionnaire response rate n = 75 and 14 focus groups of 3-11 participants each	All qualified nurses (n = 373) in one trust were invited to take part in both quantitative and qualitative phases	Prevalent barriers highlighted in the questionnaire include: • resources • funding • backfill time • support, encouragement and training 4 key themes from focus group analysis: • research activity • priorities and motivation • culture and leadership • resources	Low

Berthelsen and Holge- Hazelton, 2015, Denmark	Descriptive cross-sectional survey	24 item questionnaire using a Likert scale, paper version	Convenience sample of all nurses employed in one orthopaedic department were invited to participate $(n = 87)$	<ul> <li>Key themes:</li> <li>knowledge and competences in nursing research</li> <li>interest in nursing research</li> <li>motivation to increase knowledge</li> <li>personal and contextual barriers</li> </ul>	High
Brown et al, 2017, United Kingdom	Descriptive study design	Paper based questionnaire, quantitative with 2 open ended qualitative questions – response rate n = 105	Convenience sample of 195 nurses	<ul> <li>Themes identified:</li> <li>motivators: altruistic, individual, external</li> <li>barriers: external, ethics, individual</li> <li>research factors</li> </ul>	Moderate
Caldwell et al, 2016, United Kingdom	Survey	Electronic survey - 23 closed questions reported here	Convenience sample of all clinicians working in a regional cancer centre $n = 123 - nurses$ included in sample	Main barrier reported was a lack of time followed by not having had enough research training and support from mangers	Moderate
Gullick and West, 2016, Australia	Prospective, longitudinal, qualitative descriptive design	Emails, blogs, education session, field observations and 6 focus groups. Also, measurable outcomes, namely evidence of research dissemination	Convenience sample for 40 Advanced Nurse Partitioner's invited to participate yielding a group of 25 participants	Community of practice seen as a powerful model to: enhance collegiality enable research confidence capacity and productivity allowed differing levels of involvement created rhythm	High
Hagen, 2018, United States of America	Cross-sectional study	Online survey via survey monkey using the Barriers to Nurses Participation in Research Questionnaire (BNPRQ)	Distributed to a convenience sample of 2226 nurses with 473 responses, across the 2 institutions surveyed	<ul> <li>Themes:</li> <li>satisfaction with opportunities to engage in research were low across the sample</li> <li>advanced practitioners reported the lowest level of satisfaction with opportunities to engage in research</li> <li>practitioners have research ideas but not the knowledge and skills to progress with this in practice due to barriers such as time</li> </ul>	High
Hagen and Walden, 2017, United States of America	Survey	Online survey via survey monkey using the Barriers to Nurses Participation in Research Questionnaire (BNPRQ)	Convenience sample of nurses - working full time at one hospital – response rate 450 nurses of a potential 2156	Respondents who were employed longer and within specialities felt that there were more resource Top barriers cited as: 1. lack of time 2. lack of incentives 3. lack of research mentors	High

Paget et al, 2016, Australia	Grounded theory	Discipline specific focus groups $n = 6$ (audio recorded) - 3 open ended questions and a demographic questionnaire	Clinical staff (n = 1936) - doctors, nurses and AHPs were invited by email to participate in focus groups to discuss clinical research participation - response rate 40 - 45% of which were nurses	<ul> <li>4 major themes, 3 of which addressed barriers to research participation:</li> <li>cultural factors</li> <li>personal factors</li> <li>resources</li> <li>solutions as proposed by participants</li> </ul>	Moderate
Pintz et al, 2018, United States of America	Descriptive correlational study	Online survey using Hospital-based nursing research characteristics questionnaire	3 sources of participants via - nursing research leaders, American organisation of nurse executives and association for nursing professional development to identify purposive sample of 124 participants	<ul> <li>Highlighted a need for:</li> <li>research mentors and support</li> <li>education</li> <li>protected time</li> <li>financial assistance</li> </ul>	Moderate
Robichaud-Ekstrand, 2016, Canada	Descriptive cross-sectional multicentre study	Paper survey - using previously validated tool	Pool of 1665 potential participants, 1081 nurses participated	<ul> <li>Themes key to success of clinical nursing research in practice: <ul> <li>research supervision in practice</li> <li>sharing research and clinical expertise</li> <li>infrastructures between academic and clinical institutions</li> </ul> </li> </ul>	Moderate
Ryder, Jacob and Hendricks, 2019, Australia and Ireland	Interpretative descriptive approach	Recorded telephone and Skype interviews - 9/10 selected phone - 1 skype interview - 11 open ended questions - interviews lasted 26 - 48 minutes	Convenience sample of Nurse Practitioners in Australia and Ireland – self identified as either research active or non-research active $(n = 10)$	<ul> <li>4 major themes identified:</li> <li>research role</li> <li>research challenges</li> <li>research support</li> <li>research leadership</li> </ul>	High
Scala et al, 2019, United States of America	Interpretative descriptive approach	Semi structed interviews by Principal Investigator, open ended questions, digitally recorded - approximately 30 mins each - conducted until data saturation	Purposive and network sampling - identifying 34 nurses for inclusion across 7 sites	<ul> <li>Motivating factors identified:</li> <li>empowering nurses</li> <li>impact on the bigger picture and profession</li> <li>advancing nursing practice</li> <li>key individual characteristics also highlighted</li> </ul>	Moderate

Siedlecki and Albert, Grounded 2016, United States of theory America

Interviews- digitally recorded - semi structured - lasted 20-30 minutes- memo notes by the researcher

Purposive and theoretical sampling - registered nurses with daily direct patient contact and had been Principal Investigator in at least one clinical nursing research study not part of an educational programme - accessed via a database of nursing research studies (n = 26)

Themes:

- triggers, such as a clinical event or a lack of evidence in practice
- research active nurses' individual characteristics
- research process support •

High



# PRISMA 2020 Checklist

Section and Topic	ltem #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 4
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	NA
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	NA
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	NA
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Page 5
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 6
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 6

Section and Topic	ltem #	Checklist item	Location where item is reported
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Page 7
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Page 6
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 5
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA
RESULTS	1		
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Table 4
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 4
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 4
Results of	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 4
syntheses	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	NA
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	NA
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	NA
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Table 4
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 14
	23b	Discuss any limitations of the evidence included in the review.	Page 15
	23c	Discuss any limitations of the review processes used.	Page 15

Section and Topic	ltem #	Checklist item	Location where item is reported
	23d	Discuss implications of the results for practice, policy, and future research.	Page 16
OTHER INFORMA	TION		
Registration and	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 4
protocol	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 4
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Title page
Competing interests	26	Declare any competing interests of review authors.	Title page
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	NA

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

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