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Barriers to, and facilitators of, eHealth utilisation by parents of high-risk newborn infants in the NICU: a scoping review protocol

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ABSTRACT

Introduction Parental presence in the neonatal intensive care unit (NICU) has been demonstrated to enhance infant growth and development, reduce parental anxiety and stress and strengthen parent–infant bonding. Since eHealth technology emerged, research on its utilisation in NICUs has risen substantially. There is some evidence that incorporating such technologies in the NICU can reduce parental stress and enhance parent confidence in caring for their infant.

Several countries, including China, restrict parental attendance in NICUs, citing infection control challenges, issues of privacy and confidentiality and perceived additional workload for healthcare professionals. Due to COVID-19 pandemic-related shortages of personal protective equipment and uncertain mode of transmission, many NICUs around the world closed to parental visiting and engagement in neonatal care.

There is anecdotal evidence that, given pandemic-related restrictions, eHealth technologies, have increasingly been used in NICUs as a potential substitute for in-person parental presence.

However, the constraints and enablers of technologies in these situations have not been exhaustively examined. This scoping review aims to update the literature on eHealth technology utilisation in the NICU and to explore the literature on the challenges and facilitators of eHealth technology implementation to inform future research.

Methods and analysis The five-stage Arksey and O'Malley methodological framework and the Joanna Briggs Institute scoping review methodology will serve as the foundation for this scoping review. Eight databases will be searched for the relevant literature published between January 2000 and August 2022 in either English or Chinese. Grey literature will be manually searched. Data extraction and eligibility screening will be carried out by two impartial reviewers. There will be periods of both quantitative and qualitative analysis.

Ethics and dissemination Since all data and information will be taken from publicly accessible literature, ethical approval would not be necessary. A peer-reviewed publication will be published with the results of this scoping review.

Trial registration number This scoping review protocol was registered in Open Science Framework and can be found here: https://osf.io/AQV5P/.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The scoping review will provide a comprehensive update on literature reporting on the use of eHealth technologies in the neonatal intensive care unit, and particularly any advances as a result of the pandemic.
⇒ The research will conduct a structured search through eight electronic databases and grey literature in order to guarantee the comprehensiveness of the search.
⇒ This scoping review will focus on publications written in English and Chinese.
⇒ As this is a scoping review, no critical evaluation of the included studies or risk-of-bias assessment will be done.

INTRODUCTION

Parental presence in the neonatal intensive care unit (NICU) has been found to be effective in reducing negative outcomes of NICU care for both infants and parents, such as improving early neurobehavioral outcomes in preterm infants and decreasing maternal mental health risks.[1–4] Many NICUs in the West have established protocols for family-centred care and provide parents with 24/7 access to their infants.[5] Regardless of the approach taken to support parental presence, the family's role at the bedside, even in a virtual sense, is of paramount importance to both the newborn and their parents.

Despite a considerable body of literature on interventions and approaches to enhance family engagement in care, including family-centred care and family-integrated care,[6] parental involvement in providing care for their preterm newborn is still limited in many NICUs. For instance, the majority of NICUs in China have restricted visiting regulations and minimal parental involvement, making family-centred care difficult to execute.[7–9] In contrast, NICUs in Global North in particular

welcomed all parents without restrictions before COVID-19.[5 7]

However, with the outbreak of COVID-19, many NICUs in Global North temporarily prohibited in-person visiting in an attempt to limit the spread of COVID-19 and preserve personal protective equipment supplies.[5 10] A survey of 277 NICUs in the USA reported that NICU policies preserving 24/7 parental presence decreased (83%–53%, p<0.001), and preservation of full parental participation in rounds fell (71%–32%, p<0.001).[5] The European Foundation for the Care of Newborn Infants COVID-19 Zero Separation Collaborative Group conducted an online survey of parents' experiences with disruption to visiting access and provision of family-centred care as a result of COVID-19. Of the 2100 participants who responded from 56 countries, 21% reported no parental access to their hospitalised newborn infant.[11] These abrupt restrictions on the parental presence and family involvement in NICU undoubtedly impede the capacity to deliver family-centred care. The changes may impact parental stress and neonatal outcomes. The authors recommended the development and implementation of policies to ensure family-centred care is safeguarded during emergencies such as a pandemic, including access to their infant, adequate provision of health information, and continuous and respectful communication between healthcare professionals and parents.

Restrictive visiting policies may have prompted the development and implementation of eHealth technologies in NICUs.[12] eHealth is the integration of information and communications technology and electronic processes to facilitate improved communication, delivery of health services and management of health systems.[13] In recent years, the utilisation of eHealth technologies in the NICU in Global North has been diverse and increasing,[12] including supporting parents in an early discharge after childbirth using videoconferencing,[13] telemedicine[14] and SMS support[15]; and facilitating parental presence and involvement in care using an interactive learning platform,[16] web camera,[14 17] Skype/FaceTime and smartphone,[18] in order to enhance and support their family-centred care and improve communication and family satisfaction. Also, eHealth technologies such as WeChat and smartphone are widely used in the NICU in China.[19 20] A recent systematic review revealed that mobile health technologies are increasingly used in low-income and middle-income countries, although the quantity and quality remain limited.[21] eHealth technologies have increasingly been used in neonatal intensive care as a potential substitute for in-person parental presence. Additionally, the constraints and enablers of technologies in these situations have not been exhaustively examined. This scoping review seeks to update the literature on eHealth technology utilisation in the NICU and to explore the literature on the barriers to, and facilitators of eHealth technology implementation in order to inform future implementation research.

Study objectives

This scoping review will update the literature in relation to the application of eHealth technology in the NICU to improve parental health outcomes and examine the facilitators of and barriers to eHealth utilisation in the NICU setting.

METHOD AND ANALYSIS

Protocol design

The scoping review will adhere to the methodological framework outlined by Arksey and O'Malley[22] in 2005, as well as the methodology manual published by the Joanna Briggs Institute for scoping reviews.[23] The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews will serve as the guiding framework for both the current protocol and any subsequent scoping review.[24] Thus, the review will proceed through five stages: (1) identifying the research question; (2) identifying relevant studies; (3) selection of relevant articles; (4) charting the data; and (5) collating, summarising and reporting of results.

Stage 1: identifying the research question

Through consultation with the research team, the overall research questions are:

1. What eHealth technologies are used for infants and their families in the NICU?
2. What impact do eHealth technologies have on the anxiety and stress of parents of infants in the NICU?
3. What impact do eHealth technologies have on the workload of healthcare professionals in the NICU?
4. What are the facilitators of, and barriers to, implementing eHealth technologies in the NICUs?

Stage 2: identifying relevant studies

The scoping review will use the Population, Concept, Context (PCC) framework as recommended by the Joanna Briggs Institute. We will comprehensively search articles and grey literature published up to August 2022 in any language. The databases chosen for this scoping review are PubMed, Embase, Scopus, Web of Science, ScienceDirect, CINAHL, CNKI and Wanfang. A preliminary exploratory search strategy based on the PCC framework will be created on PubMed To find some pertinent terms, with no language restrictions. The Medical Subject Headings (MeSH) terms will be evaluated and ranked according to their relevance and frequency (table 1). A second search strategy will be created based on the most pertinent MeSH terms, which will be filtered to either English or Chinese. We will also create a subcategory of excluded articles that are not in English or Chinese, but that have English abstracts, which could help other researchers evaluate the potential for extending this work with publications in additional languages.

A search of grey literature from the websites of pertinent organisations will be done to get the level of comprehensiveness necessary for a scoping review.[25] The

Table 1 List of the keywords and Medical Subject Headings used in the search strategy

Concept	Keywords	Medical Subject Headings
Parents	'parent*'; 'mother*'; 'father*'; 'caregiver*'; 'care giver*'; 'famil*'	'parents'; 'caregivers'; 'family'; 'mother'; 'father'; 'family satisfaction'; 'parental satisfaction'
Neonatal	'pediatrics'; 'infant*'; 'newborn*'; 'perinat*'; 'neonate*'; 'preterm*'; 'premature*'; 'baby'; 'babies'	'pediatrics'; 'infant, newborn'; 'neonatal nursing'; 'neonatology'; 'intensive care, neonatal'
Healthcare professionals	'healthcare professional*'; 'nurs*'; 'neonatal nurs*'	'nurse'; 'healthcare professional'; 'neonatal nursing'
eHealth	'social media'; 'medical apps'; 'eHealth'; 'telemedicine'; 'internet'; 'mHealth'; 'mobile health'; 'information technology'; 'web camera'; 'webcam'; 'teleneonatology'; 'facetime'; 'skype'; 'smartphone'; 'zoom'; 'videoconference*'	'telemedicine'; 'medical informatics'; 'internet'; 'cell phone'; 'mobile applications'
Barriers and facilitator	'barrier*'; 'limit*'; 'difficult*'; 'restrict*'; 'constraint*'; 'facilitator*'; 'factor*'; 'promot*'; 'ease*'	'barrier'; 'facilitator'
Parental and healthcare professional's outcomes	'anxiet*'; 'stress*'; 'depress*'; 'pressure*'; 'workload*'	'anxiety'; 'stress'; 'healthcare professionals, workload'

*Truncation used to expand search.

organisations include the WHO, nursing associations worldwide, Google Scholar, Conference Papers Index, PapersFirst and Scopus.

Stage 3: selection of relevant articles

In this stage, we will specify and refine our inclusion and exclusion criteria based on the PCC framework identified for this review. The application of additional eligibility criteria guarantees that the selected articles is pertinent to the research question. All papers derived from the search process will be imported to Covidence, which is a web-based tool to facilitate the conduct and documentation of literature reviews. Then, a two-step screening procedure will be conducted. The first step involves screening article titles and abstracts to determine their eligibility. The second step is full-text screening where only those articles deemed relevant will be kept. Each article will be evaluated independently by two reviewers and consistency checks will be conducted.

Eligibility criteria

Inclusion criteria

The selection of studies for this review will be based on the following criteria:

1. Articles reporting eHealth technologies to improve parental outcomes and health professionals' outcomes.
2. Articles reporting barriers to, or facilitators of, implementation of eHealth technologies in the NICU.
3. Studies published in English or Chinese between 2000 and 2022.
4. Studies conducted in the NICU.
5. Studies that are a full report of original research.
6. Grey literature about the implementation of eHealth technologies in the NICU.

In the inclusion criteria, 1 and 2 are linked by 'OR', and 3–5 are linked by 'AND'.

Exclusion criteria

The review will exclude studies based on specific criteria as follows:

1. Studies published in other languages.
2. Studies published before 2000.
3. Letters to the editor, editorials, commentaries.

The PRISMA flowchart will be used in the study selection procedure and updated once the evaluation is complete (figure 1).

Stage 4: charting the data

Using Covidence, two independent reviewers will conduct data extraction to ensure the approach is consistent with the research questions and with the inclusion and exclusion criteria.

The reviewer team plans to create and test a standardised data-charting form through an iterative process.

The data extraction table produced will include at least the following key elements:

1. First author's name.
2. Title.
3. Year of publication.
4. The journal's name.
5. Country of origin.
6. Aim/purpose of the study.
7. Study design.
8. Study population.
9. Sample size.
10. Methodology.
11. Outcomes and results of the study.

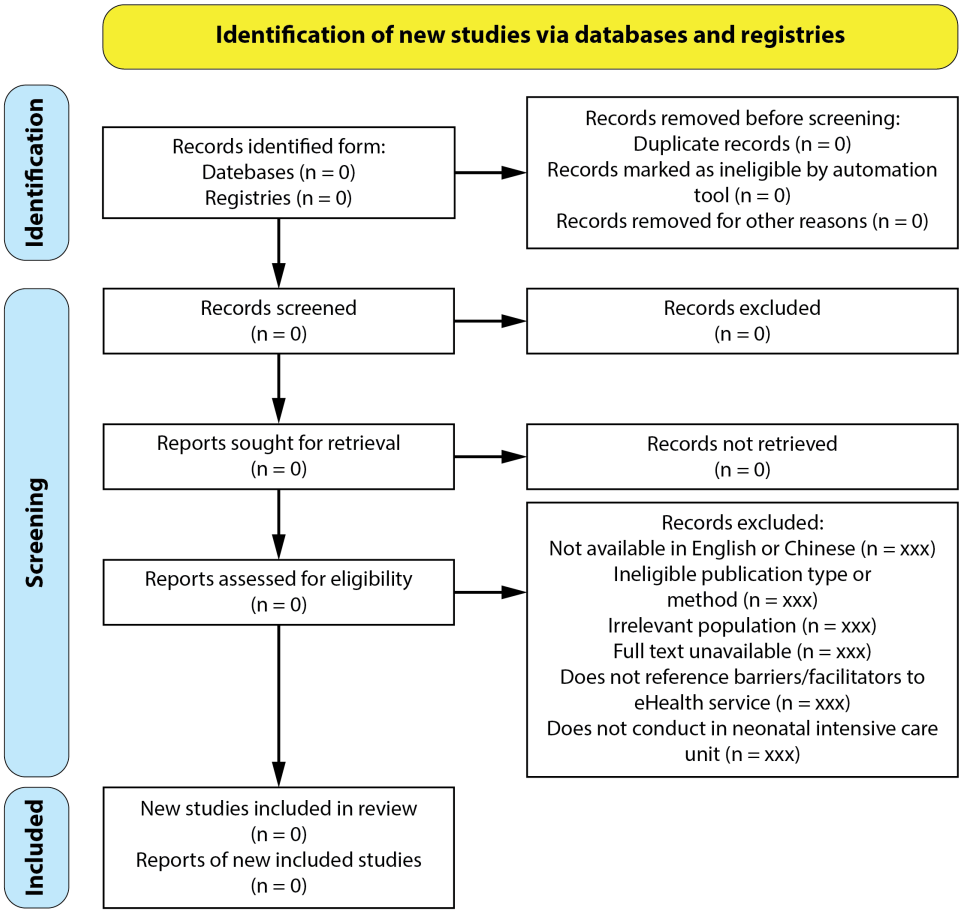

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews, 2020 flow diagram.

12. Key findings that relate to the scoping review questions.

Stage 5: collating, summarising and reporting the results

This scoping review aims to present an overview of the research rather than evaluate the quality of the included studies.

A narrative report will be produced that synthesises and summarises the progress of research, the impact of eHealth technologies on outcomes of parents and healthcare professionals, and the barriers and facilitators associated with the implementation of eHealth in the NICU.

This stage will occur in two phases. First, a quantitative analysis will be conducted using tables to determine the differences and range of variables based on the journal where the articles were published, countries and regions, field of research, methodology, objective/purpose of the study, actors targeted for change, health system stakeholders involved and health system setting.

Second, two reviewers will thoroughly examine all papers in both English and Chinese as part of the qualitative analysis. To make data analysis easier, a qualitative data management software system (NVivo V.11) will be employed. The study team will list the important ideas and procedures that were employed. In order to describe the characteristics of the studies that were included, we will first evaluate the data using a descriptive summary. Then, we will employ a content analysis strategy to pinpoint the eHealth technology in NICU's facilitators and inhibitors. Two reviewers will be trained on how to code the retrieved data using a broad-based coding system in order to get 80% coding agreement. The results of our analysis will then be reported using themes, and they will be produced in accordance with the goal of our study. We will then conduct a comprehensive analysis of the linkages between the synthesised themes and subthemes, of the significance of our findings, and of the knowledge gaps, as well as determine the meaning of our findings. The implications for current clinical practise and upcoming research will also be covered. According to Arksey and O'Malley's suggested methodology, neither an evaluation of the quality of individual studies nor a risk-of-bias assessment will be conducted. As required, the results will be presented in an aggregated and visual format (eg, using tables and charts).

Patient and public involvement

Patients, parents, healthcare professionals and members of the public will not be involved in the writing of the protocol or the drafting of the scoping review.

ETHICS AND DISSEMINATION

This scoping review does not need ethical approval. There will be no participation by humans or animals, and all data and information will be gathered from open databases. The findings of this scoping review will be disseminated to pertinent healthcare specialists and published in peer journals. This scoping review is foundational work for a further research project that will aim to evaluate eHealth technologies to augment parent visits in the NICUs.

Contributors YZ conceived of the idea and produced the initial draft of the review protocol. LJ contributed meaningfully to the drafting, reviewing and editing. Both authors read and approved the final manuscript.

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Competing interests None declared.

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