SCOPING REVIEW

Patient engagement practice within perinatal eHealth: A scoping review

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Abstract

Background: There is a gap in knowledge about how perinatal eHealth programs function to support autonomy for new and expectant parents from pursuing wellness goals.

Objectives: To examine patient engagement (access, personalization, commitment and therapeutic alliance) within the practice of perinatal eHealth.

Design: Scoping review.

Methods: Five databases were searched in January 2020 and updated in April 2022. Reports were vetted by three researchers and included if they documented maternity/neonatal programs and utilized World Health Organization (WHO) person-centred digital health intervention (DHI) categories. Data were charted using a deductive matrix containing WHO DHI categories and patient engagement attributes. A narrative synthesis was conducted utilizing qualitative content analysis. Preferred Reporting Items for Systematic Reviews and Meta-Analyses 'extension for scoping reviews' guidelines were followed for reporting.

Results: Twelve eHealth modalities were found across 80 included articles. The analysis yielded two conceptual insights: (1) The nature of perinatal eHealth programs: (1) emergence of a complex structure of practice and (2) practising patient engagement within perinatal eHealth.

Conclusion: Results will be used to operationalize a model of patient engagement within perinatal eHealth.

KEYWORDS
implementation, perinatal care, technology

1 | INTRODUCTION

Perinatal periods are a time when new and expectant parents should receive support towards health-related behaviours, health prevention and coaching to maintain wellness and closeness with infants (Hantsoo et al., 2018; Hawkins et al., 2019; He et al., 2021; Marko et al., 2016). Intensive, frequent, quality health behaviour coaching and counselling of new parents is important during perinatal periods to promote patient engagement and positive perinatal outcomes (Danbjørg et al., 2014; de Mooij et al., 2018; Himes et al., 2017;

Kennelly et al., 2016). Perinatal patients perceive care as satisfactory when it is personalized and supports health engagement (Labrie et al., 2021; Phillippi et al., 2016).

eHealth perinatal care that focuses on involving patients has the potential to improve quality of care (van den Heuvel et al., 2018). New models of perinatal care are emerging that show promise for benefiting perinatal patients, these aim to improve participation and collaboration between families and professional care providers (de Mooij et al., 2018; Nelson & Holschuh, 2021). Few studies have investigated how eHealth programs support parents to engage throughout the entire perinatal continuum. Perinatal care has been historically fragmented between services for maternity and neonatal care, which has limited parents' ease in engaging (Molenaar et al., 2018). Integrated eHealth systems might support the harmonization between maternity and neonatal care programs, which might be the bridge that leads to more patient participation. Examining patient engagement practices within perinatal eHealth could illuminate ways for integration of programs that are engaging, personalized and less fragmented between maternity and neonatal care.

In 2015, the World Bank Group, the United States Agency for International Development (USAID) and the World Health Organization (WHO) strongly recommended the 'use of the digital revolution to scale up health interventions and engage civil society' (World Health Organization, 2018). Patient engagement is a bedrock philosophy for healthcare policy and practice in the United States of America (USA) and the United Kingdom (UK) (Gibson et al., 2012; Millenson & Macri, 2012). Financial incentives and support are being offered for care systems that demonstrate practices of patient engagement in the USA and UK (Gibson et al., 2012; Millenson & Macri, 2012). Patient engagement integration into health policy has been discussed in the last decade; however, the operationalization, mention of a clear definition and monitoring of patient engagement as a structure, process and outcome lack consistency (van den Heuvel et al., 2018).

2 | BACKGROUND

2.1 | Principles of perinatal patient engagement

The principles of woman- and family-centred care are central to perinatal care, consider the individual parent and aim for interactions between health providers and individuals that promote collaboration and shared decision-making (Fontein-Kuipers et al., 2018; Franck & O'Brien, 2019). Patient Engagement is conceptually linked to woman- and family-centred care. The practices associated with patient engagement cannot be captured within a single measure or indicator (Barello et al., 2016; Higgins et al., 2017; Kelders, van Zyl, & Ludden, 2020). Higgins et al. (2017) proposed that the meaning of patient engagement deserved scrutiny, and other researchers pose that patient engagement is multifactorial and works through structures, processes and behaviours (Higgins et al., 2017; Kelders, Kip, & Greeff, 2020). In a concept analysis, patient engagement was defined

as both a 'process and behaviour [that] is shaped by the relationship between the patient and provider and the environment in which healthcare delivery takes place' (Higgins et al., 2017). Four attributes of patient engagement provide conceptual components for inquiry: (1) access, (2) personalization, (3) commitment and (4) therapeutic alliance (Higgins et al., 2017). Access refers to the ability of the patient to obtain all health resources required to experience high-quality and appropriate care (Higgins et al., 2017). Personalization assures that the interventions conform to the unique circumstances of the patient (Higgins et al., 2017). Commitment is the cognitive and emotional factors that empower the patient to exploit health resources and therapeutic alliance represents the elements of the patient–provider relationship that impact engagement in care (Higgins et al., 2017).

2.2 | Examination of person-centred perinatal eHealth practices

Perinatal eHealth programs have not been examined using clear definitions of person-centred and patient engagement practices. Implementation of eHealth interventions in perinatal practice should begin with the definition of patient engagement and a clear understanding of person-centred digital health interventions (DHI), as defined by the WHO (World Health Organization, 2018). WHO classifications of person-centred DHI contain four categories of patient activities intended to support their health self-management (World Health Organization, 2018). These four categories lay the foreground for person-centred perinatal eHealth and are as follows: (1) Targeted client communication; (2) client-to-client communication; (3) personal health tracking and (4) on-demand information services.

If integrating patient engagement into perinatal eHealth is to meet or exceed the promise as a novel system that supports current values of person-centred perinatal practice, research needs to be conducted to examine the nature of perinatal eHealth, and how the attributes of patient engagement are being practised within programs. Here, this scoping review identifies the nature and range of person-centred perinatal eHealth and illustrates how the attributes of patient engagement are practised within these programs. The research question guiding this review was: What is the nature and range of perinatal eHealth practice characterized by integration of the four WHO person-centred DHI categories and patient engagement attributes?

3 | METHOD

3.1 | Design

A scoping review was suited for mapping person-centred perinatal eHealth due to the complexity of this topic (Tricco et al., 2018). Considering the complexity and interdisciplinary nature of the perinatal eHealth practice we utilized an iterative process for data charting, analysis and synthesis recommended by Daudt et al. (2013) and

endorsed by Pham et al. (2014). The aim of this scoping review was to develop an understanding of the nature and range of perinatal eHealth and identify gaps in the research to inform practice, policymaking and future research (Daudt et al., 2013). A systematic approach for this scoping review was further guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses—extension for scoping review (PRISMA-ScR) guidelines (Tricco et al., 2018).

3.2 | Search strategy

Five electronic databases (Web of Science, Scopus, PubMed, Eric and Cumulative Index to Nursing and Allied Health Literature) were searched in January 2020 and again on April 26th, 2022, to include all studies up to the end of 2021. We used an expansive list of search terms to incorporate person-centred perinatal eHealth programs. See Table 1 for a list of general search terms and keywords. All citations were exported into RefWorks and Rayyan citation software for storage, screening and management (Ouzzani et al., 2016).

3.3 | Study selection

All reports included were published in English, had abstracts available, and no date limitations were set for the in original search. Studies were included that reported on person-centred perinatal eHealth programs, target users were new or expectant parents, programs were delivered during pregnancy, 6–8 weeks after birth (puerperium) and in the case of neonatal care, from birth up to the time a neonate receives care in neonatal or public health services

TABLE 1 Search keywords.

Keywords for search
Expectant Mothers, pregnancy, parent, family, partner, father
AND
Patient Engagement, Personalization, Decision Making, tailored care, tailoring information, tailoring resources, individual preferences, access to information, access to resources, access to guidance, healthcare availability, health service access, functional literacy, health literacy, commitment, patient commitment, motivation, patient-provider relationship, therapeutic alliance, communication, empathy, mutual understanding, trust, therapeutic relationship
AND
Randomized Controlled Trial, group, feasibility, acceptability, exploratory, mixed-method, Quasi-Experimental Studies, non-randomized controlled trial, qualitative studies
AND
Handheld, mobile, Computers, ipad, iphone, smartphone, cell phone, wireless, mHealth, Telemedicine, mobile health, eHealth, Wearable, application, External Fetal Monitoring, remote monitoring
AND
maternal care, antepartum, prenatal, perinatal, postnatal, neonatal, postpartum

(commonly near 44 weeks postmenstrual age). Puerperium has been defined as 6 weeks after birth (Aisien, 2021); however, inconsistencies in reporting this period occur and often range from 6 to 8 weeks after birth. All programs would contain at least one of the four WHO patient-centred DHI categories (World Health Organization, 2018). Studies were not included if the technology was meant to be used without a two-way interaction between health providers and clients; the eHealth system was using only outdated forms of telehealth (i.e. follow-up telehealth phone calls, paging or faxing) or the system was used solely for diagnostic screening.

3.4 | Data charting

Descriptive characteristics of all included studies were charted by two researchers (J.A. & H.H.). Descriptive data included:
(1) Author, year and country, (2) Study design, (3) Aim, (4) Target population and setting, (5) Program structure/devices, (6) WHO DHI categories, (7) Engagement evaluation and (8) eHealth modalities. Deductive and inductive content were charted according to codebook.

3.5 | Data analysis

Content analysis was performed for examining perinatal eHealth programs. Our initial codebook consisted of deductive codes related to access, personalization, commitment and therapeutic alliance and the four WHO DHI person-centred categories (Higgins et al., 2017; Kyngäs et al., 2020a; World Health Organization, 2018). We ensured validity of our codebook development by separating maternity and neonatal studies, ensuring careful organization and separation of inductive meaning units that came from maternity and neonatal programs. eHealth modalities and perinatal treatments were inductively identified and defined through careful examination of data about the eHealth programs' structure and device use (Kyngäs et al., 2020b). Treatment and eHealth modality categories were added to the codebook after consultation with first, third and fourth authors (Kyngäs et al., 2020b). Next meaning units were identified based on a matrix of deductive and inductive concepts (Graneheim & Lundman, 2004). The first author extracted meaning units and suggested associated codes, these were reviewed by the last author for clarity and consistency of coding. Codes were developed from condensed meaning units from maternity and neonatal services separately (Graneheim & Lundman, 2004). Subcategories were developed from harmonization of codes, some codes in maternity and neonatal services overlapped and some remained unique (Graneheim & Lundman, 2004). The latent content of categories was formulated into two main themes (Graneheim & Lundman, 2004). Agreements about interpretations of the latent content were made in consultation between the first, second and fourth authors. The decisions stemming from these consultations support the fit of the evidence to the final interpretations of latent content (Tavory & Timmermans, 2014, pp. 105–106).

3.6 | Ethics

This study did not require ethical approval or client consent.

4 | RESULTS

4.1 | Study selection

First and third authors reviewed 1555 titles and abstracts independently. Full-text review for screening was performed in 257 sources due to abstract inconsistency. The fourth author and a research assistant provided support when agreement was not reached, and 80 sources were selected for review (Maternity *n* = 58, Neonatal *n* = 22; See Figure 1; Page et al., 2021).

4.2 | Study characteristics

Thirty-nine maternity programs and 17 neonatal programs were included in this review (*n* = 56). See Table S1 for charted data. Programs were delivered mainly in North America, the United Kingdom and Europe (See Table 2). Twelve eHealth modalities (See Figure 2) and 15 different treatments (Figure 3) were used in the programs. Programs integrated one to four of the WHO DHI person-centred categories (Table S1). Healthcare providers included nurses, midwives, primary and special practice doctors, as well as public health, breastfeeding and co-parenting experts, dieticians, lifestyle coaches and community health workers. In 53.6% (*n* = 30) of perinatal programs nurses were involved in provision of care, program development or research activities. All neonatal programs integrated nurses in provision of care, alternatively maternity programs reported nurses' work in 16 out of 42 programs (38.1%). Fifteen percent of the studies were published in recognized nursing journals (Scimago Lab, 2021).

4.3 | The nature of perinatal eHealth programs: Emergence of a complex structure of practice

Perinatal eHealth programs make up a structure of practice that developed through new interactions and processes mediated by eHealth modalities. The design and implementation of perinatal eHealth programs are emerging as the availability of new eHealth systems (i.e. applications and machine learning-based tailored feedback), and ubiquitous devices (i.e. smartphones and wearables) increases. The current generation of new families identifies with perinatal eHealth (Danbjørg et al., 2015; Gund et al., 2013; Herring et al., 2019; Soltani et al., 2015). The modality combinations and use within programs are complex, used for a broad range of person-centred care goals (See Figure 2). All programs are divided according to maternity or neonatal contexts (See Figure 3).

Programs for supporting parents at home in the care of their infants were found to be easy to use, relevant and understandable

to users (Abbass-Dick et al., 2017; Danbjørg et al., 2015). In one case, using an early discharge digital support for parents, a father was showing nurses how to use the technology and his partner stated, 'my boyfriend is technical, so it was [basically] him showing the nurses how it worked' (Danbjørg et al., 2014). Pregnant women expressed comfort in using devices and applications that they could take with them anywhere, to receive information anytime (Himes et al., 2017; Wierckx et al., 2014). Users expressed wanting to use the programs beyond the study periods and wished for more harmonized systems throughout the entire perinatal period (Krishnamurti et al., 2017; Shorey et al., 2018). Most programs across both maternity and neonatal contexts were focused on a single care objective.

4.4 | Practising patient engagement within perinatal eHealth

Unique practices related to each attribute of patient engagement are summarized in Table 3 and described below in a more detailed narrative synthesis. Access and personalization were integrated into each program, whereas commitment and therapeutic alliance were absent from 3 and 8 programs respectively (See Supplementary Material S4: Table S3).

4.4.1 | Access

Access is practised in programs through the provision of eHealth modalities that support new opportunities for new or expectant parents to participate in self-care, health promotion and illness prevention. eHealth modalities mediate new interactions that support the access to appropriate care and potentiate support for increased knowledge, skill and capacity for self-management of pregnant persons' and families' wellness and development.

eHealth programs aimed to give access to on-demand health information and resources, communication and tailored feedback intended to support families in building confidence, familiarity, knowledge and awareness in health promotion and illness prevention activities (Banerjee et al., 2020; Baron et al., 2018; Cramer et al., 2018; Doherty et al., 2019; Fontein-Kuipers et al., 2016; Shorey et al., 2018; Spargo & Vries, 2018; Strand et al., 2021; Wierckx et al., 2014). Patients had more convenient communication experiences with their health professionals, timely information through feedback and self-monitoring modalities, and could lead content and timing of communication (Dalton et al., 2018; Doherty et al., 2019; Herring et al., 2019; Holm et al., 2019). Medical and non-medical issues were brought to the forefront of the maternity patients' minds through access to information and communication (Carrilho et al., 2019; de Mooij et al., 2018; Himes et al., 2017; Krishnamurti et al., 2017; O'Brien et al., 2013; Soltani et al., 2015). Parents had opportunities to be involved in the care of their infants in new ways through access to NICU automated updates through
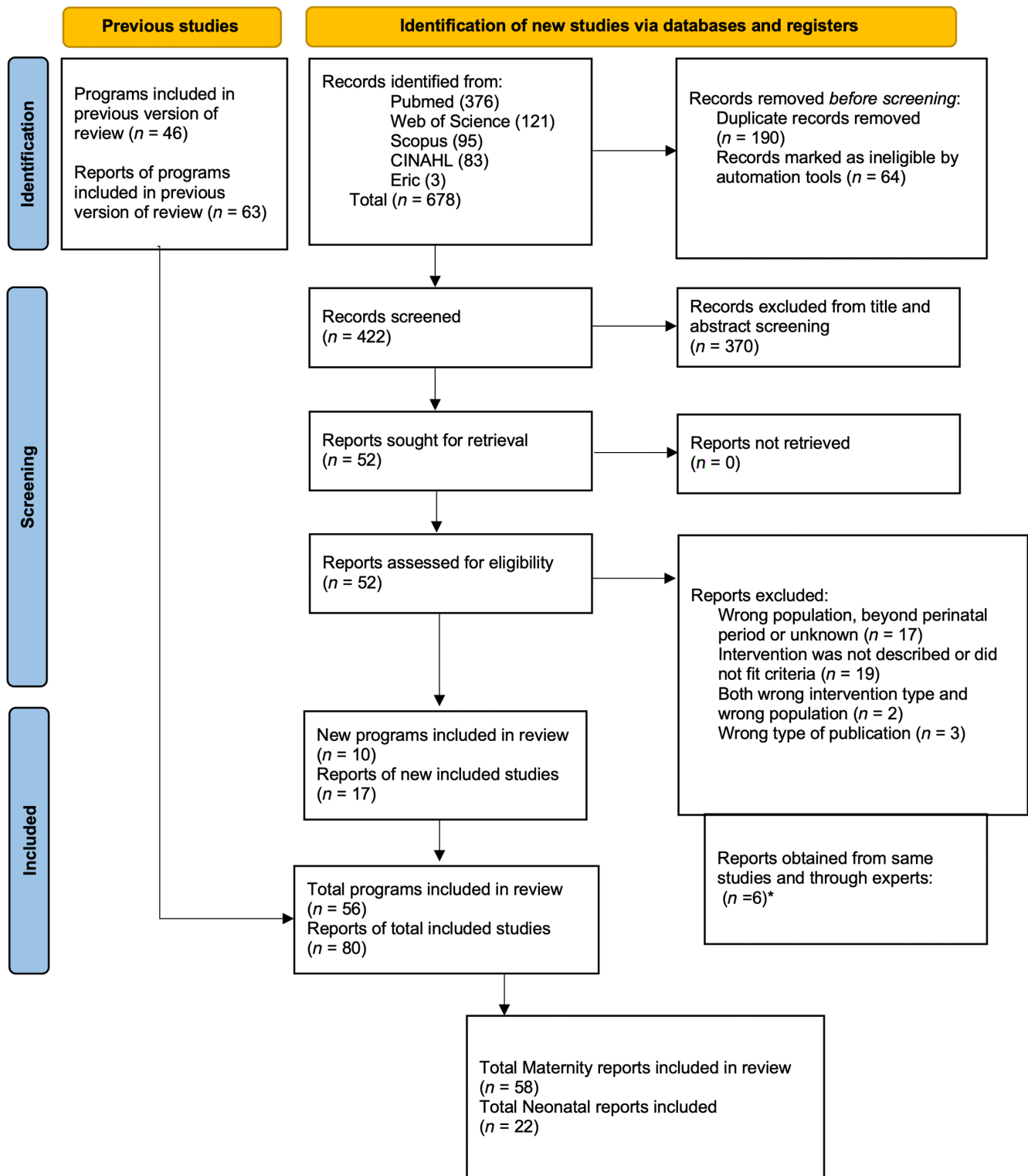
Identification

Previous studies

Programs included in previous version of review (*n* = 46)

Reports of programs included in previous version of review (*n* = 63)

Identification of new studies via databases and registers

Records identified from:
Pubmed (376)
Web of Science (121)
Scopus (95)
CINAHL (83)
Eric (3)
Total (*n* = 678)

Records removed *before screening*:
Duplicate records removed (*n* = 190)
Records marked as ineligible by automation tools (*n* = 64)

Screening

Records screened (*n* = 422)

Records excluded from title and abstract screening (*n* = 370)

Reports sought for retrieval (*n* = 52)

Reports not retrieved (*n* = 0)

Reports assessed for eligibility (*n* = 52)

Reports excluded:
Wrong population, beyond perinatal period or unknown (*n* = 17)
Intervention was not described or did not fit criteria (*n* = 19)
Both wrong intervention type and wrong population (*n* = 2)
Wrong type of publication (*n* = 3)

New programs included in review (*n* = 10)
Reports of new included studies (*n* = 17)

Reports obtained from same studies and through experts: (*n* = 6)*

Included

Total programs included in review (*n* = 56)
Reports of total included studies (*n* = 80)

Total Maternity reports included in review (*n* = 58)
Total Neonatal reports included (*n* = 22)

FIGURE 1 PRISMA 2020 flow diagram for updated systematic reviews.

short message service (SMS) (Globus et al., 2016), and infant care and collaboration training using education and coaching applications (Banerjee et al., 2020; Platonos et al., 2018). Women and their families received new access to the care team from remote locations which supported timely appropriate care, in many cases from the comfort of their own homes (Doherty et al., 2020; Garne et al., 2016; Gund et al., 2013; Holm et al., 2019; Payakachat et al., 2020; Shorey et al., 2018; Strand et al., 2021; Triebwasser et al., 2020).

4.4.2 | Personalization

User-centred program design practices supported personalization. eHealth practices included the provision of personal care experiences that were founded on woman-and family-centred approaches.

TABLE 2 Included studies' context and characteristics.

Study characteristics (N = 80)	Number of studies % (N)
Continent	
Asia	2.5 (2)
Australia/New Zealand	7.5 (6)
United Kingdom	18.7 (15)
Europe	17.5 (14)
North America	52.5 (42)
South America	1.2 (1)
Study design	
Qualitative Exploratory	18.75 (15)
User-Centred/Design Research	13.75 (11)
Participatory Action Research/Implementation	10.0 (8)
Conference and other Reports of Development	7.5 (6)
Randomized control trial	50.0 (40)[a]
Nursing journal publications	
Maternity (N = 58)	10.3 (6)
Neonatal (N = 22)	27.3 (6)
Characteristics of eHealth programs (N = 56)	
Perinatal setting	
Maternity	75.0 (42)
Neonatal	25.0 (14)
Nurse involvement in perinatal eHealth	
Maternity N = 42	38.1 (16)
Neonatal N = 14	100.0 (14)

[a]Eight of which were protocol reports; Two of which were mixed methods.

Personalization practices encompass tailored, on-demand, flexible programs and consider new and expectant parents' preferences, needs, values and diversity.

Programs were very often designed using a participatory design (PD), or user-centred design model. Involving key stakeholders (e.g. professional, informal caregivers and patients) in the design of eHealth programs was seen to encourage engagement and sustainable uptake of perinatal programs (Danbjørg et al., 2015; Payakachat et al., 2020; Strand et al., 2021). One research team in Canada developed a way of recording interactions with the C-Care application throughout real-time testing and modified the program during testing to accommodate higher interaction with the system (Ke et al., 2021). Functions included automated text messages personalized to the individual's unique circumstances, which supported core woman-and family-centred concepts such as reciprocity, tailored care and shared decision-making (Danbjørg et al., 2015; Doherty et al., 2020). Users expressed that having understandable, individualized, relevant and timely information met their support needs during pregnancy, labouring at home and in early days at home with their infants (de Mooij et al., 2018; Frize et al., 2013; Gibson et al., 2021; O'Brien et al., 2013; Ridgeway et al., 2015; Willcox et al., 2015; Yee et al., 2021). One woman described that she felt a personal care experience while using remote foetal monitoring system at home, because nurses could see what was happening on their own monitors and coordinate with her at a distance (O'Brien et al., 2013). While parents using an Application to support early discharge home after birth found that staying home and getting timely answers to their questions using remote communication had a positive impact on their affinity within the family (Danbjørg et al., 2015).
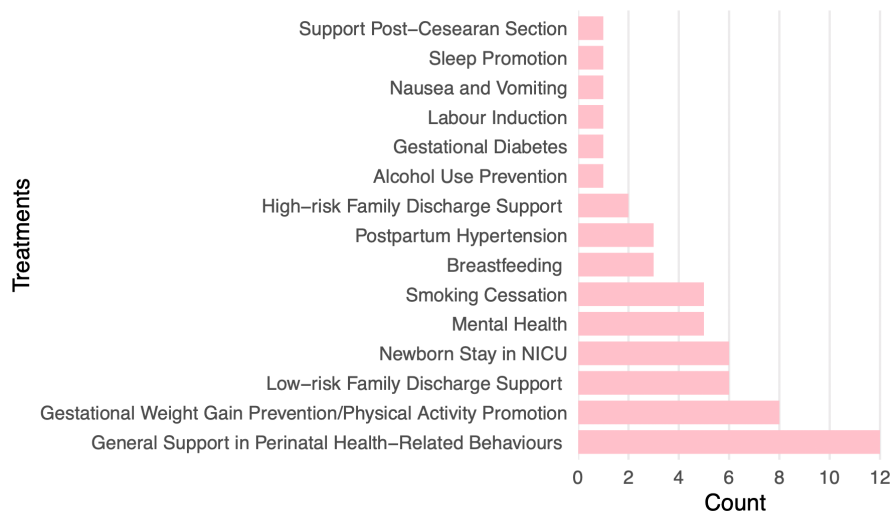
4.4.3 | Commitment

Commitment is practised in programs through integration of behavioural change and self-efficacy theories during the development and design (See Supplement Material S3: Table S2). eHealth modalities mediated new opportunities for patients to become meaningfully
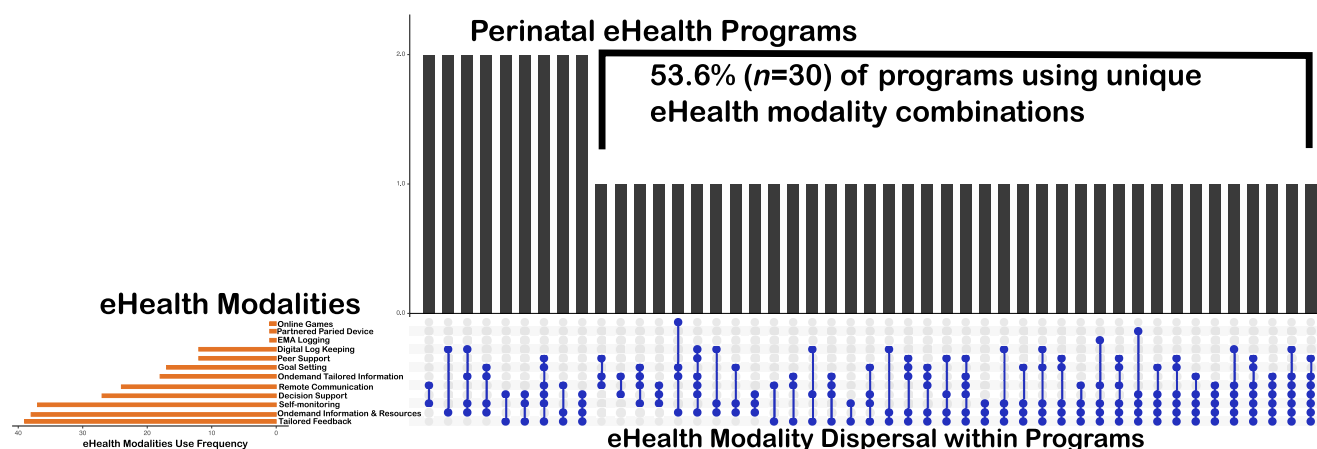
FIGURE 2 Perinatal eHealth programs and modalities.

FIGURE 3 Treatments within Perinatal eHealth programs.

involved in their own care processes. Commitment was also practised through the supporting of new ways to coach and connect with patients. Lastly, new interactions mediated by eHealth modalities supported new processes of becoming committed to self and newborn care.

Perinatal eHealth programs change the face of connectivity and coaching for new or expectant parents. Tailored alerts and information sharing directed to the personal handheld devices of patients changes their capacity to interact as members of the care teams (Choi et al., 2015; Danbjørg et al., 2015; Davis et al., 2018; Frize et al., 2013; Herring et al., 2019). eHealth patients have a chance to view information and their own personal health data and trends on demand (Abbass-Dick et al., 2017; Isetta et al., 2013; Valencia et al., 2020; van der Wulp et al., 2014). These opportunities are mediated by eHealth modalities such as tailored feedback, decision-making supports, digital log keeping and self-monitoring. Perinatal patients can participate in shared decision-making with new confidence and receive contact and coaching when and where they would like it (Danbjørg et al., 2015; de Mooij et al., 2018). Meaningful involvement in perinatal care processes was a motivating factor for many perinatal patients. They could look at their own personal trends, record and report their findings (i.e. for newborn assessment or pregnancy weight gain or blood pressures) and support care decisions and goal setting with their professional care givers (Davis et al., 2018; Dougall et al., 2020; Garfield et al., 2016; Isetta et al., 2013; Rhoads et al., 2017).

Perinatal patients experienced becoming committed for self and newborn care enabled through new interactions mediated by eHealth modalities. Maternity programs supported motivation for behaviour changes through interactive tools, and feedback, as was seen in Doherty and colleagues 'ideas machine' a feedback system that used user input about preferences and experiences to deliver tailored tips for achieving goals for mental wellness in the moment (Doherty et al., 2019). Parents of newborns were able to become committed to learning and practising their new roles when just returning from hospital with access to on-demand information and resources that were provided in many formats, instructional videos,

links to go deeper on topics, and pages they could 'favourite' for reading later (Danbjørg et al., 2015; Garfield et al., 2016; Isetta et al., 2013; Shorey et al., 2018; Strand et al., 2021).

4.4.4 | Therapeutic alliance

Perinatal eHealth practices that integrate therapeutic alliance encompass new provider–patient interactions, and eHealth-driven emotional and lifesaving supportive activities. eHealth components are seen as partners in care, and the fostering of teamwork through remote communication are important features from the patients' perspective. Therapeutic alliance is supported through consideration for the integration of eHealth modalities into workflows, and eHealth policies.

Therapeutic alliance is practised through considering policy and physical infrastructure and staff attitudes, and capacity to use eHealth modalities as guiding factors for successful implementation of new eHealth practices (Banerjee et al., 2020; Baruth et al., 2019; Bower et al., 2005; Dalton et al., 2018; Danbjørg et al., 2015; Doherty et al., 2020; Frize et al., 2013; Globus et al., 2016; Herring et al., 2019; Jefferson et al., 2019; Strand et al., 2021; Triebwasser et al., 2020; Wierckx et al., 2014). Self-monitoring and sharing of data to aid in collaborative clinical interpretations and decision-making emerged as new patient–provider interactive processes. Some perinatal patients used data to guide conversations, and other times clinicians were triggered through the automated systems to contact patients because of concerning data or events (i.e. abnormal blood pressure readings or mental health alerts) (Hantsoo et al., 2018; Krishnamurti et al., 2017; O'Brien et al., 2013; Rhoads et al., 2017; Strand et al., 2021). Self-monitoring and remote communication modalities mediated lifesaving and emotional support provision by professional caregivers at a distance (Doherty et al., 2020; Holm et al., 2019; Jefferson et al., 2019; Ledford et al., 2017; Marko et al., 2016; Rhoads et al., 2017; Strand et al., 2021). Perinatal eHealth patients explained that they felt companionship with some eHealth

TABLE 3 Novel practices of patient engagement within eHealth: Categories and sub-categories from content analysis.

Patient engagement categories	Subcategories of practices of patient engagement within eHealth % (N) of programs		
Access Receival of resources, guidance and tools. Adaptability of services for personalized access.[a]	Maternity 100 (39)	• Access has the potential to support increasing health knowledge, skill and management of care needs with new eHealth modalities 56.4 (23) • Access supports new opportunities for participation 94.9 (37) • Access to eHealth allows for receiving appropriate care through new care interactions 89.7 (35)	Neonatal 100 (17) • Access gives opportunities for support for increasing health knowledge, skill and confidence building with new eHealth modalities 70.6 (12) • Parents get to practise new ways of caring for self and newborns by having access to eHealth 70.6 (12) • Access to eHealth program modalities allows for more opportunities for appropriate care 41.2 (7)
Personalization Provision of unique and tailored services that align with clients' life circumstances and diversity.[a]	Maternity 100 (39)	• Designed systems consider the diversity and preferences of target users 61.5 (24) • The individual perinatal eHealth user is considered throughout healthcare journey 43.6 (17) • Perinatal eHealth users receive a personal care experience 43.6 (17)	Neonatal 100 (17) • Designed systems consider the diversity of target users 76.5 (13) • The individual family is considered throughout healthcare journey 58.8 (10) • Parents experience personal eHealth care interactions 58.8 (10)
Commitment Harnessing cognitive and emotional factors that empower clients to exploit health resources available. Commitment is demonstrated by client efforts over time and is more inclusive than simple motivation that may waiver according to changing circumstances.[a]	Maternity 94.9 (37)	• Commitment examined through behaviour theories of change 56.4 (22) • New ways of becoming committed were stimulated through new eHealth care interactions 59.0 (23) • eHealth supported coaching and connectivity in new ways 74.4 (29) • Meaningful involvement is a demonstration of commitment and was enabled in new ways with the use of digital health 56.4 (22)	Neonatal 94.1 (16) • Commitment examined through behaviour and self-efficacy theories 5.9 (1) • New ways of Becoming committed were stimulated through new eHealth care interactions 52.9 (9) • eHealth supported coaching and connectivity in new ways 58.8 (10) • eHealth mediates new opportunities for parents to become meaningfully involved in the care processes of their infants 17.6 (3)
Therapeutic Alliance Incorporates elements of the client-provider relationship including quality of the clinical interaction, communication, empathy, or mutual understanding.[a]	Maternity 82.1 (32)	• Professional caregivers and patients interact in new ways with the use of eHealth modalities 46.2 (18) • Some eHealth functionalities are seen as 'partners in care' 76.5 (13) • Emotional and lifesaving support can be received using eHealth modalities 58.8 (10) • Integration of eHealth modalities into current practice structure has potential to support sustainability of programs (ensure capacity for eHealth practice is supported) 41.0 (16) • Perinatal eHealth users want to have communication and perform teamwork with professional caregivers using eHealth modalities, but this was not used in the program 2.6 (1)	Neonatal 94.1 (16) • Professional caregivers and patients interact in new ways with the use of eHealth modalities 64.7 (11) • Some eHealth functionalities are seen as 'partners in care' 29.4 (5) • Emotional and lifesaving support can be received using eHealth modalities 23.5 (4) • Integration of eHealth modalities into current practice structure has potential to support sustainability of programs (ensure capacity for eHealth practice is supported; involve the perspectives for sustainability from care staff to ensure possibility for 'buy in') 64.7 (11) • Perinatal eHealth users want to have communication and perform teamwork with professional caregivers using eHealth modalities, but this was not used in the program due to objections from providers 5.9 (1)

[a]Higgins, T., Larson, E., & Schnall, R. (2017). Unraveling the meaning of patient engagement: A concept analysis. *Patient Education and Counseling, 100*(1), 30–36. https://doi.org/10.1016/j.pec.2016.09.002.

components, with one women saying that the eHealth program was the 'only person in [her] life who asked...how [she] was doing everyday' (Krishnamurti et al., 2017). Interactions between perinatal patients and the eHealth modalities provided new forms of support to supplement face-to-face visits (Banerjee et al., 2020; Danbjørg et al., 2015; Doherty et al., 2020; Herbec et al., 2014; Himes et al., 2017; Hirshberg et al., 2018; Holm et al., 2019; Ledford et al., 2017; Shorey et al., 2018; Soltani et al., 2015; Strand et al., 2021; van der Wulp et al., 2014; Yee et al., 2021).

5 | DISCUSSION

5.1 | Principal results

This is the first review to bring together perinatal eHealth programs, treatments and modalities, with the aim of describing the range of practices and conceptualizing the nature of perinatal person-centred eHealth. Perinatal eHealth programs in the developed world make up a structure of practice that contains person-centred eHealth modalities and separates care between maternity and neonatal practices. Nursing leadership might be lacking in the structure development and process evaluation of perinatal eHealth due to the high percentage of studies and programs that are not reporting on nursing expertise. Access and personalization are being practised in all perinatal eHealth programs, and commitment and therapeutic alliance are lacking in a 19.6% ($n=11$) of all programs. Findings from this review reveal that person-centred and patient engagement practices are being used within the current structure; however, development and design of these programs lack harmonization between maternity and neonatal care, and consistency of commitment and therapeutic alliance practices.

5.2 | The nature of perinatal eHealth programs

A summary of the programs captured in this scoping review illustrates that perinatal eHealth is being provided across various perinatal treatments; from health promotion and symptom management in pregnancy, to parental skill development in caring for, breastfeeding and monitoring infants and supporting parental-infant closeness (See Figure 3). No programs have harmonized maternity and neonatal treatments across the continuum of the perinatal period into a single eHealth program. A structure of siloed care has been persistent in perinatal care programs internationally due to the growing complexity and specialization of services (Liu, 2016; Molenaar et al., 2020). Uncoordinated services have led to low engagement by families (Molenaar et al., 2018). Research has revealed that new and expectant parents desire an expanded integrated service that supports easy navigation and a smoother continuity of care throughout their perinatal journeys (Abbass-Dick et al., 2017; Danbjørg et al., 2015; Garne Holm et al., 2017; Himes et al., 2017; Liu, 2016; Wierckx et al., 2014). Our findings reveal that although eHealth

programs could provide a system for harmonizing maternity and neonatal care programs this potential has not yet been harnessed.

A lot has been learned about how to integrate numerous eHealth modalities into routine and common perinatal care processes (i.e. management and monitoring of gestational diabetes and hypertension; and supporting parent participation in the care of a sick neonate). Programs included in this review have innovated clinical care practices to include eHealth modalities with the aim of improving patient satisfaction, health and clinical outcomes. The WHO recommends clearly articulating how technology will address specific person-centred health system problems, such as poor patient experience and delayed provision of care (World Health Organization, 2018). Therefore, the WHO person-centred digital health interventions being implemented by each perinatal eHealth program in this review could be more clearly identified by researchers in the future to support better understanding of the usefulness of eHealth innovation towards solving person-centred health system challenges. In combination with this nursing-led research about perinatal eHealth practice and program development should be considered. Exemplary nursing leadership has been found to positively impact on structural outcomes for quality care, supports common visions and goals for care among staff and promotes effective information sharing (Cook & Leathard, 2004; Kiwanuka et al., 2021; Sfantou et al., 2017).

5.3 | Practising patient engagement within perinatal eHealth

5.3.1 | Access

Access has been identified as a precondition for patient engagement (Kelders, van Zyl, & Ludden, 2020) and as a metric that should be considered when examining the presence of patient engagement within eHealth programs (Barello et al., 2016). Our review expands on this by illustrating that practices of access provide opportunities for developing partnerships at a distance and allow for new participation in perinatal care processes. Pregnant persons and families can integrate perinatal practices into their daily lives. New access can lead to care approaches that connect providers with patients in their natural settings. This has provided relief to parents who find it hard to make the trips to medical offices, and balances power dynamics as providers are assessing families in their own home environments through video conferencing (Lieu et al., 2021). Pregnant persons monitor their own goals for health-related behaviours without waiting to have important assessments and collation of lifestyle pattern data during antenatal clinic visits (Naughton et al., 2013; van der Wulp et al., 2014). Research about self-monitoring has suggested that self-care activities might introduce increased burden related to worry and stress (Auxier et al., 2023; Mol, 2018, p.19). Further study should be conducted on the nature of care processes occurring at home from a variety of perspectives and user groups. Perinatal eHealth practitioners should also consider tailoring the

level of access provided and the amount of engagement that suites each client when using eHealth programs.

5.3.2 | Personalization

In this review, eHealth modalities were mechanized for personalization practices, and user-centred design of programs contributed to the integration of personalization from a development perspective. Past literature shows that perinatal services do not always support women and families' expectations for personalized care (Auxier, 2017; Platonos et al., 2018). This scoping review reveals that eHealth modalities mediate new personal care experiences. By using eHealth modalities purposefully for the sustainment of person-centred care, and the tailoring of care journeys to unique patients some of the persistent challenges with enabling person-centred care might be combated. Patient involvement was common in programs from this review and in line with the best practice recommendation of ensuring stakeholder involvement in eHealth program design (Oberschmidt et al., 2022).

5.3.3 | Commitment

Our findings reveal that consistency in the use of process measures to guide evaluation of commitment and participation within perinatal eHealth programs is lacking. Process evaluation, also described as process monitoring by the WHO is needed for collecting and analysing data to understand how well our programs are meeting the aims of care (World Health Organization, 2016). Commitment can be measured through behaviour and cognition, as seen in Kelders, Kip, and Greeff (2020) measure, Twente Engagement with Ehealth Technologies Scale (TWEETS). Neonatal eHealth person-centred practices that support commitment can be evaluated by using a newly developed process evaluation measure, the CO-PARTNER tool (van Veenendaal et al., 2021). More process measures could be developed in the future to guide the monitoring of perinatal eHealth user engagement and care processes related to commitment as these are not being consistently reported in the scientific literature. This scoping review highlights the potential to monitor behavioural engagement and participation over time using digital log keeping and ecological momentary assessment modalities.

5.3.4 | Therapeutic alliance

Therapeutic alliance sets patient engagement as a concept apart from others such as empowerment, and involvement (Higgins et al., 2017). While there has been a plethora of knowledge accumulated about collaboration and connectedness between perinatal care providers and their clients, very little is known about how therapeutic alliance is enacted within perinatal eHealth programs. Our findings illustrated that in 12.5% of programs therapeutic alliance practices were not

reported. Current research shows that increased connectivity can aid in collaboration and continuity of perinatal care and our review highlights which functionalities help to enact these practices. More purposeful inquiry into this attribute of patient engagement would support deeper understandings of the nuanced interactions between patients, providers and eHealth modalities. All care begins with building trust, this is being investigated in relation to face-to-face perinatal practice (Korstjens, 2021; Wreesmann et al., 2021); however, researchers and clinicians need to appreciate the importance of investigating how trust is built with eHealth systems as a partner-in-care. Person-centred eHealth modalities are helping to bring relevant, personal and timely resources, information, and support to perinatal clients and help to provide safer transition from hospital to home. In the wake of a revolution in perinatal practice, providers need to be supported to interact with eHealth systems in ways that enhance and support the co-creation of therapeutic alliances.

5.4 | Implications for nursing research and practice

This review demonstrates a synthesis of knowledge from many disciplines. From this, we have a diversity of perspectives that provides a shared understanding of the range and nature of perinatal eHealth. However, nursing inquiry and practice are scarce in the literature related to maternity eHealth practice, neonatal literature has integrated nursing expertise and inquiry to a larger extent. Although multidisciplinary work is of high importance, nursing knowledge and inquiry are lacking in the research and development of services overall. Health Science literature indicates that nursing and midwifery inquiry is integral to the development, implementation and evaluation of eHealth resource use in perinatal services (Richardson et al., 2018). More collaborative research should be conducted that combines user design theory with nursing science perspectives.

Findings from our review illustrate that eHealth modalities support women and families towards accessible, and personalized health service, eHealth modalities should be paired with relational nursing approaches (Korstjens, 2021; Stelwagen et al., 2020). Commitment and therapeutic alliance integration within perinatal eHealth fulfils perinatal nursing practice goals of woman- and family-centred care; parent–infant closeness and health-related behaviour promotion in pregnancy (Fontein-Kuipers et al., 2018; Franck & O'Brien, 2019; van den Heuvel et al., 2018). In this review, we recommend prioritizing defining and implementing commitment and therapeutic alliance interventions within perinatal eHealth as this will support more clarity for nursing practitioners working towards evidence-based practices (EBP).

5.5 | Limitations and strengths

While this scoping review provides a new entry point in which to discuss and appreciate perinatal eHealth, the nature of terminology usage in the available publications is inconsistent and we suspect

some sources have been missed due to the complexity and interdisciplinary nature of the literature. Key terms were not used to capture pregnancy experiences of person's not identifying as women, (i.e. trans, trans/masculine and non-binary and transgender). Future reviews discussing perinatal care should include this group, to better identify the level of their involvement in perinatal eHealth evaluation. Further, this work is limited in its form as a scoping review and the level of evidence cannot be evaluated as such. We attended to credibility through careful consideration of suitable meaning units that were based on definitions of patient engagement attributes and WHO digital service person-centred categories (Graneheim & Lundman, 2004). Transferability can be judged through our clear descriptions of the practice structure context and presentation of findings (Graneheim & Lundman, 2004). We suggest avenues for perinatal eHealth implementation, clinical practice and policy considerations and future research based on descriptions of the nature and range of perinatal eHealth and current knowledge gaps.

6 | CONCLUSIONS

Perinatal eHealth is emerging as a complex and potentially harmonized practice, the next generations of new families demand access to personalized, relevant, stimulating, integrated and connected perinatal care. To date, current evaluations of perinatal eHealth programs have been mainly focused on satisfaction of care, feasibility and medical-based patient outcomes. Process evaluation and purposeful eHealth program development should be carried out more commonly in the future and can incorporate more nursing perspectives. Based on the findings from this review, access and personalization are being practised in all included programs, but therapeutic alliance and commitment can be reported more often. The integration of all attributes is important for embedding core values of person-centred perinatal care into practice. The next steps stemming from this review are to conduct an interpretive synthesis to inform a patient engagement model for perinatal eHealth development and quality assurance.

CONFLICT OF INTEREST STATEMENT

We have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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