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Scoping Review of Interventions to Support Families with Preterm Infants Post-NICU Discharge

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Abstract

Background: A successful transition from the NICU to home is fundamental for the long-term health and well-being of preterm infants. Post-NICU discharge, parents may experience a lack of support and resources during the transition to home. The purpose of this scoping review was to identify post-NICU discharge interventions that may reduce parental stress and provide support to families with preterm infants.

Method: Systematic searches of databases, i.e., PubMed, Web of Science, and CINAHL. Inclusion criteria were data-based articles: (1) published in English between 2011-2021, (2) published in peer-reviewed journals, (3) focused on families with preterm infants, and (4) focused on interventions to reduce parental stress and provide support to families with preterm infants post-NICU discharge.

Results: 26 articles were included and synthesized. We identified the following face-to-face and remote communication interventions: in-person home visits, phone/video calls, text messages, periodic email questionnaires, mobile/website apps, and online social networking sites.

Discussion: Families may highly benefit from a comprehensive family-focused post-NICU discharge follow-up intervention that includes face-to-face and remote communication and support. Post-NICU discharge interventions are imperative to provide education related to infant care and health, increase parental confidence and competency, increase parent-infant relationship, promote emotional and social support, reduce unplanned hospital visits, parental stress, and maternal post-partum depression.

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Declarations of Interest

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Keywords

preterm infants; family; post-discharge intervention; stress reduction; support

INTRODUCTION

In the United States, the preterm birth rate (birth occurring prior to 37 gestational weeks) is 10.48% in 2021, highest reported since at least 2007 (Hamilton, Martin, & Osterman, 2022). Preterm birth is associated with an increased risk for numerous complications such as delayed growth and development, decreased cognitive and neurobehavioral functioning, and increased infant mortality (Hsu, Chen, Lin, Wang, & Hsu, 2018; van Wassenaer-Leemhuis et al., 2016). The unexpected delivery of a preterm infant and the Neonatal Intensive Care Unit (NICU) hospitalization are frequently described as an emotional journey for parents (Baía et al., 2016). Parents are often confronted with uncertainties and stressors related to survival of the infant, medical comorbidities, and long-term complications (Baía et al., 2016; Schappin, Wijnroks, Uniken Venema, & Jongmans, 2013). A stressful perinatal experience for these parents and infants may begin during pregnancy and can persist for months to years after NICU discharge (Ghetti et al., 2021; Lakshmanan et al., 2017). Such an overwhelming and prolonged stressful experience negatively impacts the developing parent-infant relationship, breastfeeding, and health outcomes of the infant and parents (Ghetti et al., 2021; Purdy, Craig, & Zeanah, 2015; Ravn et al., 2012; Silva, Zilly, Nonose, Fonseca, & Mello, 2020). Investigators have focused on stress and support prior to preterm birth and during NICU hospitalization. However, there is limited research focusing on parental stress and support post-NICU discharge.

Shillington and McNeil (2021) stated that a successful transition from the NICU to home is fundamental for the long-term health and well-being of preterm infants. They compiled the defining attributes of parental experience during the transition from NICU to home (Shillington & McNeil, 2021). The defining attributes include mix of emotions, uncertainty, and coming into parenthood. In clinical settings, we continue to emphasize the importance of getting infants ready for discharge as early as possible. Yet, following NICU discharge, parents may experience a lack of support and resources during the transition to home. It is imperative to recognize that regardless of abundant discharge educational materials and methods, many parents may still feel overwhelmed and unprepared for bringing home their medically fragile infant. Therefore, parental stress post-NICU discharge may be exacerbated by the lack of preparedness, competency, confidence, support, and guidance from health care professionals. It is a clinical and research priority to identify effective interventions to facilitate successful transition from NICU to home. The purpose of this scoping review was to identify post-NICU discharge interventions that may reduce parental stress and provide support to families with preterm infants.

METHOD

Using Arksey and O'Malley's (2005) five steps for conducting a scoping review, the authors 1) identified research questions, 2) identified relevant studies, 3) selected studies, 4) charted the data, and 5) collated/summarized, and reported the findings (Arksey & O'Malley, 2005).

Eligibility Criteria

The inclusion criteria for this review were data-based articles: (1) published in English between 2011 and 2021, (2) published in peer-reviewed journals, (3) focused on families with preterm infants, and (4) focused on interventions to reduce parental stress and provide support to families with preterm infants post-NICU discharge. The exclusion criteria were: 1) literature review articles or case reports, and 2) not focused on families with preterm infants, interventions, or post-NICU discharge.

Information Sources and Search Strategy

We performed a literature search using databases, i.e., PubMed, Web of Science, and CINAHL, to identify research articles published between 2011 and 2021 that focused on interventions to reduce stress and/or provide support to parents and preterm infants post-NICU discharge. Search terms used to ensure data saturation were: "premature infant", "parents", "family", "stress reduction", "support", "discharge intervention", "transition to home", "post-discharge", and "home visits". Boolean operators were used to combine search terms. Manual citation searches were also completed.

Selection Process

Database searches were reviewed independently by two authors in a standardized manner to assess eligibility criteria. Disagreement was resolved by discussion between the two reviewers. Articles retrieved via database searches were reviewed for duplication. The reviewers independently screened database search results, titles, and abstracts to determine inclusion for full-text review. Full-text articles were then assessed for inclusion eligibility.

Data Collection Process and Data Items

We reviewed the full-text of the selected articles. We used a modified extraction form based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist (Page et al., 2021) to guide our data extraction. Information extracted from the articles included author, year, country, aims/purposes, method and sample, intervention, measurements of outcomes, and key findings.

Results

Study Selection

We identified 159 potential articles via database and citation searches. We excluded 133 articles based on the inclusion and exclusion criteria. This scoping review included a total of 26 articles. Figure 1.

Study Characteristics

Several different study designs were noted, i.e., 13 randomized control trials, 4 non-randomized, 3 qualitative, 2 mixed methods, 2 survey and 2 retrospective observational. Study sample sizes ranged from 6 to 500 families. Studies were conducted in the United States, Norway, Sweden, Netherlands, Denmark, Brazil, Australia, Germany, Korea, Japan, or India. Infants, mothers, and/or fathers were included. Full-term infants were also included in three studies. Time of initial intervention implementation varied between studies, including prior to discharge, at discharge, and post-discharge. However, all selected studies included interventions while infants were at home post-NICU discharge. Upon reviewing the articles, we observed two main categories of interventions: (1) face-to-face communication and support, and (2) remote communication and support. Thus, we structured the results into these two categories. Table 1 included summary of the extracted data from each article.

Face-to-Face Communication and Support: In-Person Home Visits

We found 17 articles in this scoping review that included reports of several intervention programs, such as the Mother-Infant Transaction Program (MITP) (Hauglann et al., 2015; Kynø et al., 2013; Landsem, Handegård, Ulvund, Kaaresen, & Rønning, 2015; Ravn et al., 2012), Visiting Nurse Association (VNA) (Awindaogo, Smith, & Litt, 2016), the Stockholm Preterm Interaction-Based Intervention (SPIBI) (Baraldi et al., 2020), the Hospital to Home: Optimizing the Infant's Environment (H-HOPE) (Vonderheid et al., 2016; White-Traut et al., 2013), the additive responsive parenting program (the ToP+) (Flierman et al., 2016), the Following Baby Back Home (FBBH) (McKelvey et al., 2021), the Victorian Infant Brain Studies (VIBeS) Plus home-based preventive care program (Spencer-Smith et al., 2012), a community-based follow-up program (dos Santos, Balaminut, Hegeto de Souza, & Rossetto, 2014; Gund et al., 2013; Ji & Shim, 2020; Kusanagi, Hirose, Mikuni, & Okamitsu, 2011), interview with parents at home (Silva et al., 2020), and music therapy at home (Ghetti et al., 2021). These intervention programs shared similar characteristics, including one or more in-person home visits, which were conducted within the first week post-NICU discharge and may continue to age 3, depending on each specific protocol. With one exception, that Flierman et al. (2016) provide the home visits between 18 and 22 months corrected age. The in-person visits generally included (1) assessment of infant health, home environment, and parents' concerns and challenges, (2) guidance and support to parents regarding infant care and development, and (3) facilitation of transition to home. Otherwise, families who were in the control group received the current standard of care in their NICUs and no additional in-person home visits. Ghetti et al. (2021) also incorporated music therapy during the in-person home visits.

The face-to-face communication and support provided by in-person home visits was shown to reduce parental stress, anxiety, and fear, increase parental confidence, competency, feeling of being supported, sense of security, and trust in the infant's capacity (Baraldi et al., 2020; dos Santos et al., 2014; Gund et al., 2013; Kynø et al., 2013; Ravn et al., 2012; Spencer-Smith et al., 2012). Parental coping behaviors were higher in the intervention group compared to the control group (Ji & Shim, 2020). At 1-month post-discharge, only 14% of mothers in the intervention group versus 27% in the control group reported elevated depressive symptom scores (Ravn et al., 2012). The researchers noted the control group

parents were more anxious about their infant's development compared to the intervention group (Kynø et al., 2013). Whereas parents in the intervention group reported learning valuable information regarding their infant's development (Baraldi et al., 2020). Mothers in the intervention group had higher breastfeeding rates compared with the control group at 9-months (66% vs. 40%) and 12-months (38 % vs. 20%) post-discharge, respectively (Ravn et al., 2012). In-person home visits facilitated greater relationship and dialogue between mothers and healthcare providers, as well highlighted the needs for communication, guidance, and support from health care professionals (dos Santos et al., 2014; Silva et al., 2020). In addition, at 6 weeks corrected age, compared with the control group, the H-HOPE intervention group demonstrated higher scores for mother-infant interaction, including maternal social-emotional growth fostering, as well as infant clarity of cues and responsiveness (White-Traut et al., 2013). When music therapy was incorporated as part of the in-person home visits, parents described the experience as exciting, interesting, cool, cozy, fun, a 'break', something 'different', and a valuable opportunity to get to know each other and do something together as a family (Ghetti et al., 2021).

Regarding infants' outcomes, there was a significant increase in the clarity of cues, social-emotional growth, and cognitive growth from the first home visit to the second home visit (Kusanagi et al., 2011). According to the information about health care visits since NICU discharge collected at 6 weeks corrected age, infants who were in the intervention group were half as likely to have acute care episodes (acute illness visits to the clinic or emergency department or hospital readmission) compared with the control group (Vonderheid et al., 2016). However, infants in the intervention group were more likely to have higher numbers of routine medical appointments and more compliant immunization history (McKelvey et al., 2021). The investigators noted an improvement overtime at the 24 months corrected age assessment in the intervention group regarding cognitive, motor, and behavioral development, as well as parent-infant relationship (Flierman et al., 2016). However, mothers in the intervention group reported less smiling, laughter, and activity in their infants at 6-months and 12-months post-discharge compared with the control group (Ravn et al., 2012). Furthermore, compared to the control group, children in the intervention group had lower scores for internalizing behaviors at age 4 (Spencer-Smith et al., 2012) and higher physical well-being at age 9 (Landsem et al., 2015). Parental proxy report showed that children in the intervention group had higher emotional well-being, contentment in school, and relationships with friends than in the control group (Landsem et al., 2015). Parental proxy report also demonstrated that children in the intervention group had similar quality of life as the full-term reference group and higher than the control group (Landsem et al., 2015). On the other hand, there was no significant difference in the cognitive and motor functioning outcomes at age 4, 7 and 9 (Hauglann et al., 2015; Spencer-Smith et al., 2012).

Interestingly, the perception of in-person home visit helpfulness varied among parents. Parents who perceived that in-person home visits were helpful also had low maternal parity and low discharge readiness scores; as well their infants had low 1-min Apgar score, low birth weight, young GA, and diagnosis of respiratory distress syndrome and/or intraventricular hemorrhage. Similarly, parents whose infants did not have severe complications during the first year at home acknowledged that the intervention was helpful but not critically important (Baraldi et al., 2020).

Remote Communication and Support

Phone/Video Calls and Text Messages—The rapid growth of technology within the past decade has allowed for the implementation of phone/video calls (Ericson, Eriksson, Hellström-Westas, Hoddinott, & Flacking, 2018; Gund et al., 2013; Hägi-Pedersen, Dessau, Norlyk, Stanchev, & Kronborg, 2022; Mohammadian, Maleki, & Badfar, 2021; Robinson, Gund, Sjöqvist, & Bry, 2016; Silva et al., 2020; Vonderheid et al., 2016; White-Traut et al., 2013) and text messages (Silva et al., 2020) as a form of remote communication and support intervention provided to parents post-NICU discharge. Phone/video calls and text messages may be initiated by the research team or by parents. Depending on the specific protocol, phone/video calls and text messages may be conducted within 1-month post-NICU discharge and last up to 6 months corrected age; and the average number of phone/video calls ranged from 1 to 14.

Mothers received daily phone call support reported lower parental stress (Ericson et al., 2018) compared to the control group and an increase in breastfeeding self-efficacy during the 4 months after discharge compared to baseline (Mohammadian et al., 2021). Silva et al. (2020) reported that contact via phone calls or text messages facilitated troubleshooting opportunities, as well addressed doubts and concerns that arose in daily life related to health, development, and basic infant care. Parents in the intervention group reported higher sense of security compared to the control group (Robinson et al., 2016). All families who received phone calls in addition to the in-person home visits reported feeling more confident in caring for their infants at home (Gund et al., 2013). Approximately 26% of the parents in the intervention group thought that they did not need all their check-up visits at the hospital, whereas only 6% in the control group thought so (Robinson et al., 2016). The total number and frequency of emergency visits were significantly lower in the intervention group than in the control group (Robinson et al., 2016; Vonderheid et al., 2016). In addition, at 6 weeks corrected age, compared with the control group, the H-HOPE intervention group demonstrated higher scores for mother-infant interaction, including maternal social-emotional growth fostering, as well as infant clarity of cues and responsiveness (White-Traut et al., 2013). All families were satisfied with video calls and found that they were easy to use (Gund et al., 2013). Of note, Hagi-Pedersen et al. (2022) implemented a different protocol in which they compared the use of video calls (intervention group) vs. in-hospital consultations (control group) as an addition service to early in-person visits at home. The investigators reported no significant difference between the intervention group and control group regarding exclusive breastfeeding rate, parental confidence, and mother-infant interaction (Hägi-Pedersen et al., 2022).

Email Follow-up Questionnaires—Another form of remote communication and support intervention is the repeated post-discharge email follow-up questionnaires (Litt et al., 2018). Litt et al. (2018) sent follow-up questionnaires to parents at 44 weeks post-menstrual age and 6 months corrected age. The email questionnaires identified issues post-discharge, e.g., challenges in transition to home, feeding problems, special health care needs, and maternal depression. These issues identified from the questionnaire were associated with the adverse outcomes that were assessed at the 6 months corrected-age check-up visit (Litt

et al., 2018). Repeated post-discharge email questionnaires were feasible and acceptable to families (Litt et al., 2018).

Mobile/Website Apps—The use of mobile/website apps were examined in five studies. The mobile apps include the NICU-2-Home (Garfield et al., 2016), the NeoRaksha (Nayak et al., 2019), Care@Distance (Gund et al., 2013), family mobile app (Hägi-Pedersen et al., 2022), and the web app (Robinson et al., 2016). Parents had access to the NICU-2-Home app during the final two weeks of NICU hospitalization, discharge, and first two weeks at home (Garfield et al., 2016). The NICU-2-Home app had four main features including: 1) Passport-2-Home: a self-guiding discharge checklist; 2) Education Center: curated, multimedia educational information on NICU infant care; 3) Baby Connect©: a commercially available app for tracking activities of daily living; and 4) Mood Tracker: synchronized updates of parents current mood (Garfield et al., 2016). Parents who used the NICU-2-Home app reported higher satisfaction, self-efficacy, and discharge readiness compared with the control group (who received standard care) (Garfield et al., 2016). Higher usage of the app was associated with higher parental satisfaction and self-efficacy when compared to average usage (Garfield et al., 2016).

The web app in Robinson et al. (2016) is similar to the NICU-2-Home mobile app in Garfield et al. (2016) and included 10 daily questions about the infant's health and nutrition and parental coping at home, direct messages to the neonatal nurses, and data regarding infant growth curve. A major difference is that in the Robinson et al. (2016) study, the neonatal nurses reviewed parents' answers and provided same-day feedback. The total number and frequency of emergency visits were significantly lower in the intervention group than in the control group (Robinson et al., 2016). Parents in the intervention group reported higher sense of security compared to the control group (Robinson et al., 2016).

Similarly, the NeoRaksha, Care@Distance, and family mobile apps allowed for remote monitoring of infant growth, developmental milestones, health status post-discharge, immunization status, scheduling clinic visits, identification of risks, referrals, and infant care and development information (Gund et al., 2013; Hägi-Pedersen et al., 2022; Nayak et al., 2019). Only 50% of families who received access to the web app in addition the in-person home visits reported feeling more confident in caring for their infants at home (Gund et al., 2013). Approximately 83% of families was satisfied with the web app and all families found the web app was easy to use (Gund et al., 2013). Of note, about 7% of families felt there was no need for the web app since their infants were stable post-discharge (Gund et al., 2013). Hägi-Pedersen et al. (2022) did not report the findings related to the family mobile app (Hägi-Pedersen et al., 2022). The study by Nayak et al. (2019) is still on-going and holds promises to elicit the effectiveness of NeoRaksha app to empower parents, enrich interactions and networking among mothers, community health workers, and hospital healthcare providers.

Online Social Networking Sites—The booming of websites and online social media platforms, i.e., Facebook, Instagram, Twitter, etc., within the last decade has also allowed for a new form of remote communication and support post-NICU discharge. One study by Gabbert et al. (2013) reported the experiences of parents who used internet and online

social networking sites that primarily targeted parents of very low birth weight infants. Parents described common topics of discussion including individual development of the child in comparison with others, specific prematurity-associated diseases and therapies, and/or follow-up care (Gabbert, Metze, Bührer, & Garten, 2013). However, the majority of parents reported that neither currently available general social networking sites (e.g., Facebook, etc.) nor dedicated websites (e.g., parenting sites, mother-child sites, pregnancy sites, etc.) adequately met their need for information exchange (Gabbert et al., 2013).

Access to Internet, Email, Text Messaging, and Smart Phone—It is common for families to have access to more than one form of remote communication and support technology, i.e., internet, email, text messaging, and smart phone. Flores-Fenlon et al. (2019) aimed to evaluate the impact of access to communication technology on caregiver quality of life, and infants' neurodevelopmental and medical outcomes. The characteristics of parents who have and do not have access to communication technology were unclear. However, Flores-Fenlon et al. (2019) found access to these communication technologies was not associated with infant neurodevelopment or other medical outcomes, i.e., readmission, emergency visits, or need for surgery (Flores-Fenlon et al., 2019). Parents who had access to email, text messaging, and smartphone reported higher quality of life and increased enrollment of their infants in early interventions compared to those who did not (Flores-Fenlon et al., 2019).

Discussion

Summary of Evidence

We identified 26 articles that examined various interventions directed towards reducing stress and supporting families of preterm infants post-NICU discharge. These studies included the following post-discharge interventions: in-person home visits, phone calls, video calls, text messages, periodic email questionnaires, website/mobile app, and online local social networking moderated by healthcare professionals.

The findings were suggestive that in-person home visits, phone/video calls, text messages, and mobile/website app were beneficial for families during the transition from NICU hospitalization to post-discharge. They may decrease parental stress and anxiety, as well as increase parental competency and sense of security in caring for their infants, thus may indirectly reduce the need for unplanned hospital visits (Robinson et al., 2016). Researchers also noted that the in-person home visits and web app may be more beneficial for families whose infants had higher medical risk factors or complications (Awindaogo et al., 2016; Baraldi et al., 2020; Gund et al., 2013). Repeated post-discharge email questionnaires may be feasible and acceptable to families, and offer an opportunity for remote assessment (Litt et al., 2018). Access to internet, email, text messaging, and smart phone and outcomes were examined but not clearly described (Flores-Fenlon et al., 2019). The long-term outcomes of post-discharge interventions included higher physical and emotional well-being in children at age 9 (Landsem et al., 2015). However, there was no evidence of long-term effect at age 4, 7 and 9 for cognitive and motor functioning outcomes (Hauglann et al., 2015; Spencer-Smith et al., 2012). Outcomes regarding long-term parent-child relationship was not examined.

In addition, parents did not seem to receive satisfactory support from online social networking sites (Gabbert et al., 2013). Parents' suggestions to improve social networking sites included: community non-commercial online networks, opportunity for interpersonal communication with other parents in regional, hospital-based, native-language, a medical expert moderator, general information on prematurity, explanations of commonly used abbreviations in the hospital settings, explanations of common medical problems and the treatments, availability of local therapists, and follow-up needs (Gabbert et al., 2013).

Limitations

There are several limitations in this scoping review. The studies varied based on different countries and settings such as rural or urban locations. This generated diverse sample sizes and characteristics based on the number of preterm infants admitted to the NICUs and the resources available for infants and families. Selection bias evidence was also evident in qualitative and survey studies. For example, data of only those parents who were willing to take the time to complete the questionnaires was obtained (Gabbert et al., 2013). Parents whose infants died were excluded from the study due to ethical considerations, thus no information regarding their use of social networking, experiences and bereavement support could be gathered (Gabbert et al., 2013).

Several post-discharge intervention programs in this review included both face-to-face and remote communication methods, e.g., in-person home visits and phone calls, phone calls and text messages, or video calls and website app, etc. As well, several intervention programs were initiated during the NICU hospitalization, and continued with post-NICU discharge follow-ups. However, the research reports only included the general outcomes of the intervention programs. Thus, it was challenging to determine the specific methods/components that were directly associated with the parental and infant outcomes. The significant variability among the intervention programs (e.g., number of follow-up visits, the duration of the program) and the implementation of 'modified' program (e.g., the modified MITP versus the original MITP protocol) makes it difficult to compare the results across studies and determining the effectiveness of the intervention. Additionally, the investigators examined the longitudinal effects of the post-NICU discharge intervention at age 4, 7 and 9 (Hauglann et al., 2015; Landsem et al., 2015; Spencer-Smith et al., 2012). However, they did not conduct a formal assessment of the home environment for all the subjects. Outcomes can be influenced by the opportunities the children have through the longitudinal period.

Parents who simply had access to email, text messaging, and smartphone reported higher quality of life and increased enrollment of their infants in early interventions compared to those who did not (Flores-Fenlon et al., 2019). However, the majority of studies only examined the effects of one or two special modes of communication and support, such as phone calls and text messages, or mobile app, etc., and did not control for access to other technologies. With the immerse growth of technologies within the past decade, it is common for parents to have access to multiple communicative and support technologies, which may have influenced the study outcomes.

Furthermore, the COVID-19 pandemic has posed numerous changes to care delivery to preterm infants and families. As well, various online resources and modes of remote

communication have been developed and adopted by health care organizations in response to the pandemic. The majority of the articles included in this review were reports of studies conducted prior to the COVID-19 pandemic. Thus, the generalizability and applicability of the study findings once again may be limited.

Implications for Practice

The physical and emotional health of infants and parents should be considered and cared for as one unit to facilitate an optimal home environment for infant growth and development as well as overall family's well-being (van Wassenaer-Leemhuis et al., 2016). Face-to-face and remote communication and support interventions may be effective in reducing stress and support families of preterm infants through two critical aspects. The first aspect focuses on infants: supporting a reliable and responsive parent-infant relationship, reducing infant stress, supporting infant's self-regulation, and scaffolding their next developmental steps (van Wassenaer-Leemhuis et al., 2016). The second aspect focuses on parents: enhancing parents' knowledge of caring for their preterm infant, providing emotional and social support, empower parents, as well as facilitating optimal executive skills in self-regulation, monitoring, planning, and problem solving (van Wassenaer-Leemhuis et al., 2016).

In-person visits by healthcare providers may be implemented prior to discharge from the NICU and continued post-discharge. The frequency and duration of post-discharge in-person follow-up may be determined based on the need of families, infants' health status, and other risk factors. In-person home visits may be supplemented with regular phone/video calls, and text messages (Ericson et al., 2018; Robinson et al., 2016; Silva et al., 2020). Additionally, website/mobile apps and online local social networking moderated by healthcare professionals may offer significant benefits to families with preterm infants (Gabbert et al., 2013; Garfield et al., 2016; Nayak et al., 2019).

Implications for Research

Preterm birth and caring for preterm infants is a stressful experience for parents (Schappin et al., 2013). Many of these infants have chronic medical conditions and experience high rates of emergency department visits and readmission after discharge (Berman et al., 2019). Additionally, the transition from NICU hospitalization to home is a process full of a myriad of emotions and uncertainties (Shillington & McNeil, 2021). However, research focusing on parental stress and support post-NICU discharge is limited and inconsistent. Thus, it is a research priority to identify standardized and effective interventions to facilitate successful transition from NICU to home.

Additional validated assessments, i.e., Impact on Family Scale, Parenting Stressor Scale, may be utilized to assess the extent of the stressors present in families, and allow for identification and timely implementation of interventions that may help to reduce stress (Kynø et al., 2013; Landsem et al., 2015; Ravn et al., 2012). However, measurement of stressors in parents and their preterm infants post-NICU discharge are generally limited. Thus, further research to validate the current stress assessments or to develop additional assessments which may be utilized post-NICU discharge is warranted.

The coronavirus disease 2019 (COVID-19) pandemic has affected care for preterm infants and families in many areas and likely be sustained beyond the pandemic response (Lemmon et al., 2020). Lemmon et al. (2020) highlighted three areas that warrant targeted attention in practice and research: (1) inpatient care: visitation policies, developmental care, and communication practices; (2) outpatient care: high-risk infant follow-up and early intervention programs; and (3) parent psychosocial distress: mental health, social support, and financial toxicity. It is a clinical and research priority to understand how changes to care delivery in these areas impact parents, family, and infant outcomes. This critical understanding may provide an opportunity to identify and implement novel strategies to provide family-centered care during COVID-19 and beyond.

Conclusion

Extended continuation of care from NICU hospitalization to post-discharge is a clinical priority. Families are often overwhelmed with stress, uncertainties, and feeling unprepared to care for their preterm infants at home. In this scoping review, post-NICU discharge interventions were generally effective to provide knowledge related to infant care and health, increase parental confidence and competency, improve patterns of parent-infant interaction, promote emotional and social support, reduce unnecessary emergency department visits and maternal post-partum depression. The findings demonstrate that families may highly benefit from a comprehensive family-focused post-NICU discharge follow-up program that includes a combination of in-person visits, phone/video calls, text messages, periodic email questionnaires, website/mobile app, and online local social networking moderated by healthcare professionals. Innovative research to develop and assess such post-discharge follow-up program are instrumental to further support infants and families as well as improve their outcomes.

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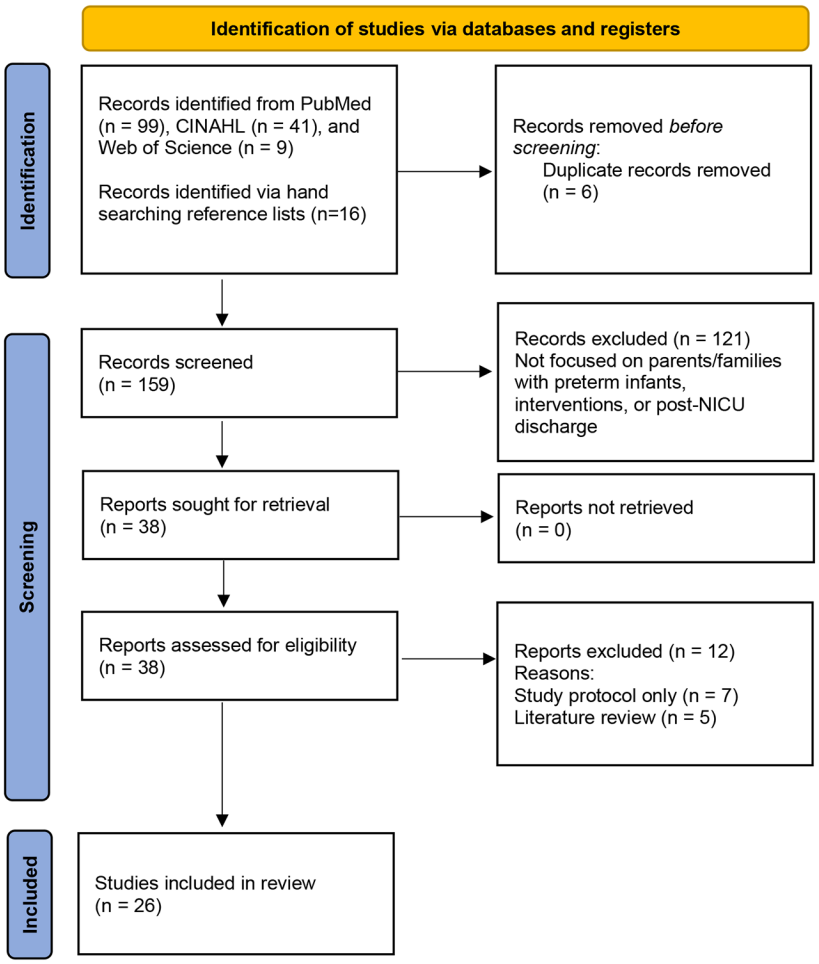

Figure 1.
PRISMA 2020 Flow Diagram

Table 1.

Summary of Extracted Data from Included Articles

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
Awindaogo et al. 2016 United States	To identify factors predictive of family satisfaction with Visiting Nurse Association (VNA) services post-NICU discharge	Retrospective observational study 1119 infants (born between 23 to 42 weeks gestational age) and their families	VNA services The VNA nurses conducted one home visit within 2 weeks post-discharge and additional visits thereafter if needed. The VNA visit generally involved assessments of infant health, home environment, support of infant feeding and maternal lactation, assistance with medication administration and medical equipment use, and determination of the need for further intervention and follow-up care.	Evaluated as part of the routine quality assurance phone calls to families at 2-weeks post-discharge Families responded to the question: “Did you find VNA visit helpful?”	Perception of VNA visit helpfulness was associated with lower maternal parity, lower 1-min Apgar score, lower birth weight, and gestational age, diagnosis of respiratory distress syndrome and intraventricular hemorrhage, and low discharge readiness scores.
Baraldi et al. 2020 Sweden	To qualitatively explore the situation for parents of children born extremely preterm in Sweden during the first year at home.	The on-going primary study is a mixed method: randomized control trial and qualitative Findings from qualitative data is reported in this article. 17 parents of 14 extreme preterm infants (born before 28 weeks gestational age). 8 parents from the intervention group and 9 parents from the control group.	Stockholm Preterm Interaction-Based Intervention (SPIBI) SPIBI is a strength-based early intervention program focuses on parental sensitivity to infant cues, enhancing positive parent-child interaction, improving self-regulation, and supporting the infant’s next small developmental step. The intervention consisted of ten home visits during the first year from a trained interventionist.	Two semi-structured interview guides were utilized to examine parents’ experiences of how the first year at home was perceived, as well as to ask follow-up questions to the parents’ answers when applicable. Interviews were included at the end of the intervention and at two to four weeks prior to the 1 year corrected age of the child. In-person interview at home or phone interview (due to COVID-19)	Three main themes: (1) Child-related concerns: continued medical concerns, child regulation difficulties, incomplete recovery when coming home; (2) Parental inner state: loneliness, ambivalent feelings, and the premature parental identity; (3) Family dynamics: parental dyad, thoughts relating to siblings, intergenerational support Parents in the intervention group reported feeling supported, sense of security, lack of fear, and trust in the infant’s capacity. They also reported learning valuable knowledge regarding their child’s development. Parents whose children did not have severe complication during the first year at home acknowledge that the intervention was helpful but not critically important.
dos Santos et al. 2014 Brazil	To understand the meaning of home visits by neonatal nurses for mothers of preterm infants	Qualitative 21 mothers who participated in a project that support families of preterm infants	Follow-up program by health staff: pre-discharge visit and post-discharge visit within seven days after discharge	Semi-structured individual interviews: meaning of home visits	The home visit was helpful to support the family, provided individualized home care.
Ericson et al. 2018	To evaluate the effectiveness of proactive telephone support provided	Randomized control trial	Daily proactive phone calls up to 14 days after discharge from the support team.	Exclusive breastfeeding eight weeks after discharge, maternal satisfaction with	No differences between group for exclusive breastfeeding, maternal satisfaction with breastfeeding, or quality of life.

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
Sweden	to breastfeeding mothers of preterm infants after discharge from NICUs	493 mothers (231 in the intervention group and 262 in the control group)	Phone calls by the Breastfeeding Support Team	breastfeeding, attachment, quality of life, and parental stress	Lower parental stress in the intervention group.
Flierman et al. 2016 Netherlands	To examine the feasibility of the additional ToP+ intervention, and its effectiveness in cognitive, motor, and behavioral development of the child and the parent-child relationship	Randomized control trial (pilot) 60 children who were born very prematurely (30 in the intervention group and 30 in the control group)	4-6 home visits by a physical therapist when the infants were between 18 and 22 months corrected age	Evaluated at 18 and 24 months corrected age Parent satisfaction The Infant Toddler Social and Emotional Assessment The Ages and Stages Questionnaire The Dutch Schlichting Lexilist for receptive language The Bayley Scales of Infant and Toddler Development for cognitive development The Emotional Availability Scales for parent-infant relationship	Parental compliance and satisfaction with the intervention was high. Significant improvement overtime in the intervention group for externalizing behaviors and dysregulation behaviors, personal-social, motor and cognitive development. The control group had a small delay in receptive language.
Flores-Fenlon et al. 2019 United States	To evaluate the impact of access to communication technology on caregiver quality of life, neuro-developmental, and medical outcomes in preterm infants, and enrollment in public assistance programs	Cross-sectional survey study. 169 parents of preterm infants (born less than 37 weeks) responded to the 120-item survey (85% response rate).	The survey included assessment of access and frequency of use of the following communication technology: internet, email, text, and ownership of a smartphone. Parents received the survey when their infants were 24 months corrected age.	The survey included: assessment of quality of life via the Multicultural Quality of Life Index; and enrollment in public assistance program Parents received the survey when their infants were 24 months corrected age. Neurobehavioral assessment (Bayley Scales of Infant and Toddler Development, Third Edition, and the Vineland Adaptive Behavior Scale II)	Access to these communication technologies was not associated with infant neurodevelopment or other medical outcomes, i.e., readmission, emergency visits, or need for surgery. Parents who had access to email, text messaging, and owning a smartphone reported higher quality of life and increased enrollment in early interventions compared to those who did not. No significant change in the Bayley-III or Vineland neurodevelopmental scale scores between parents with and without access to the Internet, email, mobile technology, and text.
Gabbert, Metze, & Buhrer 2013 Germany	To explore the experiences of parents of preterm infants who use social networking sites and the potential of such sites for gathering information and facilitating personal exchange	Qualitative 278 parents of infants who were born below 1,500 g at birth received the questionnaire, and 141 responded.	Social networking sites	Experiences of parents of preterm infants who use social networking sites Self-administered questionnaire, 39 questions, 5 topics.	More than 50% all respondents reported to be members of such social networking sites and logged in at least once every day. Parents described common topics of discussion included individual development of the child in comparison with others, specific prematurity-associated diseases and therapies, and/or follow-up care.

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					The majority of parents reported that neither currently available general social networking sites (e.g., Facebook, etc.) nor dedicated websites (e.g., parenting sites, mother-child sites, pregnancy sites, etc.) adequately met their need to exchange information. Parents' suggestions to improve social networking sites included: non-commercial online network, opportunity for interpersonal communication with other parents in regional, hospital-based, native-language, a medical expert moderator, general information on prematurity, explanations of commonly used abbreviations in the hospital settings, explanations of common medical problems and the treatments, availability of local therapists, and follow-up needs.
Garfield et al. 2016 United States	To determine whether parents of very low birth weight infants in the neonatal intensive care unit transitioning home with the NICU-2-Home smartphone application have greater parenting self-efficacy, are better prepared for discharge, and have shorter length of stay than control parents	Randomized control trial 90 parents of very low birth weight infants 40 in the control group, and 46 in the intervention group	The intervention included giving each mother and father a smartphone with the NICU-2-Home app, mobile phone service, a data plan, and orientation to the app The study period included the final two weeks of NICU hospitalization, discharge, and first two weeks at home. NICU-2-Home app had four main features including: 1) Passport-2-Home: a self-guiding discharge checklist; 2) Education Center: curated, multimedia educational information on NICU infant care; 3) Baby Connect©: a commercially available app for tracking activities of daily living; and 4) Mood Tracker: synchronized updates of parents current mood.	Parenting self-efficacy, preparedness for discharge and length of stay	Parents in the intervention group also reported feeling prepared at discharge than the control group. Higher usage of the app was associated with higher parental satisfaction self-efficacy when compared to average usage.
Ghetti et al. 2021 Norway	To evaluate the feasibility, acceptability, and suitability of the longitudinal music therapy in preterm infants and their caregiver.	Longitudinal non-randomized (pilot) 3 families of infants who were born less than 25 weeks gestational age	An individualized music therapy in conjunction with a high level of parental involvement. The intervention implementation was initiated during the NICU hospitalization, twice a week, for approximately 40 to 50 minutes per session. Time spent actively making music with infants varied depending upon their tolerance (typically 15 to 40 minutes), and the remaining	Feasibility, acceptability, and suitability of the music therapy	Parents described the experience of music therapy as exciting, interesting, cool, cozy, fun, a 'break', something 'different', and a valuable opportunity to get to know each other and do something together as a family.

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
			time consisted of the music therapist providing psychotherapeutic support to parents and coaching them in how to musically relate with their infants. The intervention was continued during the first 3 months post-discharge, at home or at the hospital, twice a month, approximately 50 to 60 minutes. Post-discharge music therapy was consisted of a verbal checking-in with parents regarding progress and concerns, trying out of various parent–infant musical exchanges based on infant needs, modeling by music therapist when needed, and discussion of potential adaptations and variations that could facilitate infant self-regulation or parent–infant musical interaction.		
Gund et al. 2013 Sweden	To investigate whether the use of video call or a web app improves parents' satisfaction in taking care of a preterm infant at home and decreases the need of home visits	Randomized control trial 34 families	Control group: received home visits by nurses Intervention group 1: received home visits and web app Care@Distance Intervention group 2: received home visits and video calls	Questionnaire regarding the home visits Semi-structure interviews parents' satisfactory regarding the usage of video calls or web app when compared with home visits	94% families were satisfied with the home visits: number and length of home visits were appropriate, well prepared for transition to home, and confident with the care of their infants at home. 3% felt that they would have needed more home visits 83% of families was satisfied with the web app and all families found the web app was easy to use. 50% felt the web app helped them feel more confident in the care of their child. 33% thought the web app usage could reduce the need of home visits but not completely replace them. 7% of families felt no need for the web app since their infants were stable post-discharge. All families found video calls were easy to use and were satisfied. All reported that the video calls helped them feel more confident in the care of their child at home. 87.5% felt that the instructions received via video calls were important. 50% if families felt that the video calls were less stressful than home visits.

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
					75% thought video calls could reduce the need of home visits.
Hagi-Pedersen et al. 2022 Denmark	To compare the in-home care involving the use of video communication and a mobile app with those of in-home care involving in-hospital consultations	Randomized control trial 188 families (88 in the intervention group and 100 in the control group)	Both intervention and control group received early in-home care after discharge The intervention group received video calls consultations and mobile app vs. regular in-hospital consultations in the control group	Mothers' self-reported questionnaires at enrollment, discharge, and 1-month post-discharge Exclusive breastfeeding, breastfeeding experiences, breastfeeding self-efficacy, mother-infant interaction, and parental confidence	No significant improvement in the intervention group compared with the control group No unfavorable effects of video calls consultations compared with the in-hospital consultation.
Hauglann et al. 2015 Norway	To examine the effecct of an early intervention program on cognitive outcome at 7 and 9 years in children who were born prematurely	Randomized control trial 147 infants (72 in the intervention group and 74 in the control group)	Mother-Infant Transaction Program (MITP) 8 ession shortly before discharge and 4 home visits by nurses	Wechsler Intelligence Scale of Children	No significant difference in the cognitive outcomes at age 7 and 9.
Ji & Shim 2020 Korea	To evaluate the efficacy of a community-based follow-up program on parenting stress, parent efficacy, and coping among parents with premature infants	Non-equivalent control group pre-post quasi-experimental design (non-randomized) 56 mothers, 29 in the intervention group, 27 in the control group	Community-based follow-up program: home visits, support group meetings, including special lectures, and self-help meetings. 6 months in duration.	Parenting stress, parenting efficacy, parenting coping	Parent's coping behavior significantly differed in the intervention group compared to the control group. There were no significant between group differences in parenting stress of parenting efficacy.
Kusanagi et al. 2011 Japan	To examine the effects of early intervention on mother-interaction	Non-randomized, 2 intervention groups 51 mother-infant dyads. 21 in the intensive intervention group, 30 in the mild intervention group.	Intensive intervention group: service was provided when the infant was in NICU and continued as 2 home visits at 46 weeks corrected age and 60 weeks corrected age, respectively: assist mothers in using state modulation and infant cue reading; provide support and advice, as well as listen to mothers' concerns about their infants and parenting. Mild intervention group: service was provided when the infant was 46 weeks corrected age which was post-discharge. Same service as the intensive intervention group.	Mother-infant interaction, infant sleep and awake states, infant development, and parenting stress	No difference in mother-infant interaction between groups. Significant increase in the clarity of cures in the intensive intervention group from the 1st home visit to 2nd home visit. Significant increase in the social-emotional growth, cognitive growth, and clarity of cues in the mild intervention group. No significant change in sleeping and waking rhythms between groups. No significant difference in infant development and parenting stress between group. No significant changes in infant development and parenting stress between 1st home visit and 2nd home visit.

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
Kyno et al. 2013 Norway	To investigate the differences in parents' experience of stress and concerns about caring for their preterm infants according to whether they participated in the Mother-Infant Transaction Program.	Randomized control trial 31 parents of preterm infants (born between 30 to 36 weeks gestational age)	Mother Infant Transaction Program (MITP) Intervention The MITP is a semi-structured intervention program comprising 11 one-hour sessions with each mother (and father) and child the intervention nurse teaches and guides the parents individually and the parents can ask questions and get feedback in how they assess and handle the infant. The first seven sessions took place at the hospital, with the individual parents in a separate room in the NICU, during the last week before discharge. The last four sessions occurred during home visits at 3, 14, 30 and 90 days after discharge, and these focused on adjustment to the domestic environment, mutual enjoyment through play and the concept of child temperament. In the last session, the intervention nurse assessed the infant's development.	Semi-structure focus group interviews when infants were 36 months old: differences in stress level between parents of preterm vs. full-term infants, feedback regarding their experiences with the MITP, reflection and discussion regarding their overall experiences	Parents in the intervention group reported feeling less stress and more confident, competent, and secure caring for their infants. Parents in the control group reported feeling less involved and emotionally supported. Parents in the control group seemed more anxious about their infant's development.
Landsem et al. 2015 Norway	To investigate the potential influence of Tromso Intervention on children's and parents' quality of life when children is at the age of nine	Longitudinal randomized control trial 146 preterm infants (born less than 37 weeks gestational age) and their parents Included a full-term reference group	Tromso Intervention: a modified version of the Mother Infant Transaction Program Intervention eight one-hour sessions during the last week before discharge and four home visits at 1, 2, 4 and 12 weeks post-discharge.	Children's and parents' quality of life via the Kid Kinder Lebensqualität Fragebogen (KINDL) and KINDL questionnaires when the child is 9 years old, respectively Parenting stress index questionnaire Children's behavior problems via the Child Behavior Checklist	Children in the intervention group reported higher physical well-being than the control group. Parents in the intervention group reported their children had higher emotional well-being and relationships with friends. Parents in the intervention group reported quality of life similar to parents in the full-term reference group. Parents in the control group reported moderately lower quality of life than the full-term reference group.
Litt et al. 2018 United States	To assess the feasibility and acceptability of emailing parent-reported measures of infant health and development after NICU discharge; and to examine whether post-discharge questionnaire data helps identify infants most likely	Survey 48 parents of infants (born less than 32 weeks gestational age)	Email questionnaires at 44 weeks post-menstrual age and 6 months corrected age	Adverse outcomes were assessed by the Bayley Scales of Infant Development-III In-person hospital visit at 6 months corrected age	The email questionnaires identified issues post-discharge, e.g., challenges in transition to home, feeding problems, special health care needs, and maternal depression. These issues predicted adverse outcomes at an in-person visit at 6 months corrected age. Repeated post-discharge email questionnaires were feasible and acceptable to families. The

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
	to benefit from specialized follow-up care				email questionnaires offered an opportunity for remote assessment which may help to identify infants at risks and who are most likely to benefit from specialized follow-up care.
McKelvey et al. 2021 United States	To compare the health care use, immunization, and infant mortality rate of low-birth-weight infants enrolled in the Following Baby Back Home (FBBH) with similar infants not in the program	Retrospective chart review 498 children who were born prematurely and enrolled in the FBBH. Infants in the FBBH were match with children in the control group with similar characteristics	FBBH Registered nurses and licensed social workers 2 home visits per month for the first months after enrollment as close as possible to the transition to home, then 1 home visit per month until age 1, and/or alternating home and phone and/or virtual visits every month until age 3	Infant mortality status, immunization visits, and health use in the first year of life	In the first year after discharge, infants in the FBBH were more likely to have higher numbers of medical appointments and more compliant immunization history
Mohammadian et al. 2021 Iran	To determine the effect of continuous supportive telephone counseling on improving breastfeeding self-efficacy in mothers with late preterm infants	Randomized control trial 65 mothers (33 in the intervention group and 32 in the control group)	14 days of daily continuous supportive counseling by phone calls after discharge	Dennis Breastfeeding Self-Efficacy Questionnaire Monthly up to four months after discharge	Mother's breastfeeding self-efficacy increased significantly during the four months after discharge (compared to baseline)
Nayak et al. 2019 India	To describe a randomized control trial protocol that examines the mobile health based Preterm Home Care Program (mHealthPHCP) in preterm infants (born less than 37 weeks gestational age) and parents	Randomized control trial On-going	mHealthPHCP integrates a mobile app called "NeoRaksha" installed on mobile smart phones as part of the healthcare services at the remote geographical areas	Preterm infant growth and development, parent-child interaction, compliance to the intervention	The study is on-going and holds promises to elicit the effectiveness of the mobile health based Preterm Home Care Program in facilitating a smooth transition from NICU hospitalization to home.
Ravn et al. 2012 Norway	To assess the effects of the Mother-Infant Transaction Program on maternal depression and stress, breastfeeding, mothers' perception of infant temperament, and preterm infant communication skills at 12 months.	Randomized control trial 106 preterm infants (born between 30 to 36 weeks gestational age) and their mothers.	Mother-Infant Transaction Program (MITP) The MITP is an eleven-session one-hour standardized intervention program. Neonatal nurses from the neonatal intensive care unit (NICU) received formal program training with clinical supervision by a psychologist. 7 intervention sessions were carried out 7–10 days before discharge 4 intervention sessions were given at home during the first three months with infant and mother present, and whenever possible also the father.	Maternal stress and depression, breastfeeding, and parent-report infant behaviors, infants' communication skills Outcomes were assessed at 1-, 6-, 9-, and 12-months post-discharge.	Mothers in the intervention group reported fewer somatic symptoms on the Center for Epidemiological Studies Depression Scale and lower depression scores at 1-month post-discharge compared to the control group (received standard care). 14% of mothers in the intervention group versus 27% in the control group reported depression scores in the at-risk levels after the intervention. Mothers in the intervention group had higher breastfeeding rate compared with the control group at 9-months (66% vs. 40%) and 12-months (38 % vs. 20%) post-discharge, respectively. Mothers in the intervention group reported less smiling, laughter, and activity in their infants

Author, Year, Location	Aims/Purposes	Method/Sample	Intervention	Measurements of Outcomes	Key Findings
			Both groups followed the unit's standardized protocol before discharge.		at 6-month and 12-months post-discharge compared with the control group.
Robinson et al. 2016 Sweden	To examine the use of telemedicine to follow up after infants were discharged from the NICU to home health care	Randomized control trial 89 families whose infants were born between 26 to 2 weeks gestational age	Telemedicine	Scheduled and emergency visits to the hospital and hospitalization episodes during the home healthcare period Use of video calls and the web application Use of conventional telephone calls Families' opinions about the use of video calls Families' opinions about using the web application Nurses' opinions about the use of Skype and the web application	Parents reported that the web application and video calls were easy to use. The total number of emergency visits and their frequency were significantly lower in the intervention group than in the control group. Parents in the intervention group reported higher sense of security in caring for their infants than the control group. A large percentage of the parents in the telemedicine group thought that they did not need all their visits to the hospital, whereas few parents in the control group thought so.
White-Traut et al. 2013 United States	To examine the impact of H-HOPE on mother-premature infant interaction patterns during feeding and play at 6-weeks corrected age (CA).	Randomized control trial 198 preterm infants (born between 29 to 34 weeks GA)	H-HOPE	Mother-infant interaction Mother–infant interaction was assessed at 6-weeks CA using the Nursing Child Assessment Satellite Training–Feeding Scale (NCAST, 76 items) and the Dyadic Mutuality Code (DMC, 6-item contingency scale during a 5-min play session).	Compared with the Control group, the H-HOPE group had higher overall NCAST scores and higher maternal Social-Emotional Growth Fostering Subscale scores. The H-HOPE group also had significantly higher scores for the overall infant subscale and the Infant Clarity of Cues Subscale H-HOPE dyads were also more likely to have high responsiveness during play as measured by the DMC.
Silva et al. 2020 Brazil	To analyze opportunities for orientations to promote the care of premature infants during home visits and telephone support	Qualitative 18 mothers whose infants were born less than 37 weeks gestational age	At 15 days post-discharge, in-person interview during home visits. Two additional interviews via telephone calls and/or instant text messages at 45-days post-discharge and when infant was 6 months chronological age.	Guiding question: "Tell me how your daily care with your child has been?" Maternal concerns, guidance and support for care, lack of follow-up, family environment and security, opportunities for guidance and resolution of doubts, and promoting child development	Home visits facilitated greater bonding and dialog with mothers and highlighted the needs for communication with and guidance/support from healthcare providers. During home visits, mothers had the opportunities to express the needs, difficulties, and concerns caring of their preterm infants, discuss environmental and social-emotional aspects with the interviewer. Telephone calls and text messages facilitate troubleshooting opportunities, especially helpful to address doubts and concerns arise in daily life

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					related to health, development, and basic care of child.
Spencer-Smith et al. 2012 Australia	To determine the long-term effectiveness of the Victorian Infant Brain Studies (VIBeS) Plus home-based preventive care program	Randomized control trial 120 preterm infants (who were born less than 30 weeks gestational age) and their families (61 in the intervention group and 59 in the control group)	VIBeS Plus home-based preventive care program 9 home visits over the first year of life Team of physiotherapists and psychologists	Evaluated at 4 years of age Child cognitive, behavioral, and motor functioning Caregiver mental health	Parents in the intervention group had fewer anxiety symptoms, and were less likely to exhibit “at-risk” anxiety when compared to the control group. Children in the intervention group had lower scores for child internalizing behaviors than the control group, but no difference in cognitive and motor functioning.
Vonderheid et al. 2016 United States	To compare health care use from initial hospital discharge through 6 weeks corrected age in two groups of mother–preterm infant dyads: those who received an intervention, Hospital to Home: Optimizing Premature Infant’s Environment (H-HOPE), and an attention control group	Randomized control trial 198 preterm infants (born between 29 to 34 weeks GA)	H-HOPE	When infants reached 6 weeks corrected age, information about health care visits since their hospital discharges was collected through an interview.	Only half of all infants received all recommended well-child visits. Infants in H-HOPE were half as likely to have acute care episodes (illness visit to the clinic or emergency department or hospital readmission) as control infants. Infants of mothers with high trait anxiety were nearly 3 times more likely to have an acute care episode and mothers who had low education levels were less likely to have acute care episodes.

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