OBJECTIVE: To describe an electronic parent support tool for the neonatal intensive care unit (NICU), and to assess whether support requests changed with staff availability.

METHODS: We implemented secure text- or email-based parent support in the NICU and in the week after discharge. Questionnaires asked whether a parent would like psychology, social work, child life, chaplain, or post-discharge nurse support. Requested referrals were placed, and customized online resources and contacts were provided. We assessed whether requests changed based on in-person resource availability.

RESULTS: Of 378 infants in our NICU from May to December, 202 parents agreed to participate. The proportion agreeing to participate increased over time (38–59%, p = 0.012). Post-discharge nurse requests decreased over time (90–45%, p = 0.033); other requests did not change significantly.

CONCLUSIONS: An electronic tool increased parent support availability in the NICU and following discharge, even after staff were available at the bedside.

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BACKGROUND

The neonatal intensive care unit (NICU) setting presents significant challenges to parents facing recovery from a high-risk pregnancy, difficult birth experience, and critical illness of their infant [1–8]. Increasingly we also understand the risks of perinatal mental health concerns. Both mothers and fathers are vulnerable to depression and anxiety in the perinatal period, with increased rates of distress for parents of children hospitalized in the NICU [9–13]. Additionally, parents may then face the stress of caring for their child’s complex medical needs after discharge. As the medical field has recognized the challenges of parents in the NICU setting, psychosocial support has increased to include social work, case managers, chaplains, child life, and psychology, whose expertise is designed to mitigate these stressors and meet the mental health needs of infants and families. Despite this, parents’ needs may often get lost while caring for a critically ill child [14].

Since parent health and access to resources are crucial for child well-being, better systems to support parents in the NICU have the potential to improve the lives of both parents and children [7].

Like most hospitals, at the beginning of the COVID-19 pandemic Children’s Wisconsin added stricter limits on the number of allowed visitors [15]. Families were restricted first to one parent or caregiver per child through June, then two parents or caregivers per child. At the same time, support staff including social work, psychology, chaplains, and child life were asked to refrain from attending rounds or being at the bedside unless called or consulted by a nurse or provider. Since remote staff included those who are essential to supporting parent well-being in the NICU, we were concerned that these changes would lead to unmet parent needs. In addition, we were concerned that reduced parent visitation due to both hospital visitor restrictions and school-closure-associated childcare demands would result in unmet teaching needs after an infant’s NICU discharge. In response, we designed and implemented a multi-disciplinary secure text- or email-based system of checking in with parents in the NICU and in the week after discharge. As staff returned to working in-person, we continued offering the electronic check-ins. This allowed us to continue offering families support while assessing next steps for our NICU in terms of outreach and follow-up.

Our objectives were to describe infant and parent characteristics associated with the use of an electronic parent support tool in the NICU and in the week following discharge, and to assess whether requests for support changed based on the availability of in-person staff resources.

METHODS

This was a single-center prospective pilot project starting in May 2020, designated exempt from human subjects review by the Children’s Wisconsin Institutional Review Board. The project was conducted in the Children’s Wisconsin NICU, a 70-bed level IV single-bed NICU with a fetal consult coordinating center attached to a delivery hospital. There are no designated sections of higher versus lower acuity beds in this unit; any infant was eligible for family participation regardless of illness or acuity.

Parents who spoke English and were anticipated to have custody of their child after NICU discharge were eligible to be offered this service. Language criteria were used because of the text nature of our pilot outreach. Custody criteria were used because of the goal to reach parents post-discharge caring for their babies; in addition, parents with custody...
been juggling in-person and remote schooling. To assess how our outreach resulted in number of actual services delivered, we counted documentation of social work and chaplain contacts in the six months pre-pandemic (9/1/19–3/1/20), 1 month pre-project (4/1/20–5/1/20), and six months into the project (6/1/20–1/1/21); psychology contacts are not always documented to maintain parent confidentiality. Differences in proportions were compared with chi-squared or Fisher’s exact tests; differences in medians were compared with Kruskal–Wallis tests. Trends over time were assessed with Mantel–Haenszel tests. Documentation counts were presented as counts/month and counts/month/admission, and examined descriptively. STATA version 16 (STATAcorp, College Station, TX) was used for analyses. A p value of <0.05 was used to indicate statistical significance.

RESULTS
Of a total of 399 patients cared for in our NICU during the study period, we attempted to contact 378 eligible infant-parent dyads. Of the 21 categorized as ineligible for outreach, four were due to custody concerns, 11 language, two infant death, and four anticipated transfer prior to discharge. We were able to reach 239 (63%) parents; 202 agreed to participate (85% of those reached; 53% of eligible). Figure 1 shows proportions of parent-infant dyads eligible, contacted, and enrolled by study period. When grouped by study period (first month of enrollment, summer, and fall), over 50% of eligible parents agreed to participate at all study periods (85–90% of those who reached by phone) except for the first month of enrollment, when many parents indicated that this would have been helpful earlier in their NICU stay but was no longer needed at the time we launched the pilot. There were no significant differences over time in proportion of those reached by phone (p = 0.442), but significant increases over time in the proportion who agreed to participate both overall (p = 0.012) and among those who were reached by phone (p = 0.005).

Of the 202 parents who were interested in participating, 105 (52%) responded to the inpatient questionnaires. Of the 202 participating parents, 186 infants were discharged from the NICU; 81 (44%) responded to a home questionnaire. Table 1 displays characteristics of eligible infant-parent dyads. 105 parents

Statistical analysis
We first compared infant and parent characteristics between eligible parents who did or did not opt to enroll in our pilot service, and between parents who enrolled but did or did not respond to questionnaires. For parents who responded to questionnaires, we evaluated which infant or parent characteristics were associated with resource requests; we also compared the proportion of resource requests over time to determine whether specific needs changed as our staffing and visitation improved. To compare differences over time, we grouped admissions into time periods based on our staff availability and potential differences in family logistics: (1) May, the first month of enrollment, when many staff were working remotely and visitors were limited to one per infant; (2) June–August, when visitors increased to two per infant, and staff began returning to in-person availability; (3) September–December, when there were no further staffing changes; parents with older children may have
who responded to the inpatient questionnaire, 22 (21%) reported related follow-up appointments. Questions were related to feeding equipment or gastrostomy-tube-related medical equipment and appointment questions, the most common had questions about feeding and breastfeeding. Of parents with follow-up, 23 (28%) had questions about routine infant care, and 22 (27%) referred for a psychologist call. For needs referred for nursing follow-up questionnaire, 45 (56%) had a question that required information or child life resources. Among parents responding to the home questionnaire, 29 requests for psychology resources, and 8 requests for support, 29 requested for chaplain support, 29 requests for psychology resources, and 8 requests for child life resources. Among parents responding to the home questionnaire, 45 (56%) had a question that required information or follow-up; 38 (47%) were referred for a nurse call, and 17 (21%) were referred for a psychologist call. For needs referred for nursing follow-up, 23 (28%) had questions about routine infant care, and 22 (27%) had questions about feeding and breastfeeding. Of parents with medical equipment and appointment questions, the most common questions were related to feeding equipment or gastrostomy-tube-related follow-up appointments.

Table 1. Participation and questionnaire completion characteristics.

| Variable               | All eligible | Agreed to participate |
|------------------------|-------------|-----------------------|
| n                      | 378         | 176                   | 202   | p            |
| Inborn                 | 232 (61%)   | 109 (62%)             | 123 (61%) | 0.975 |
| Gestational age (weeks)| 35 (32–38)  | 37 (33–39)            | 34 (31–37) <0.001 |
| Birth weight (kg)      | 2.5 (1.7–3.2)| 2.9 (1.9–3.4)        | 2.2 (1.5–2.9) <0.001 |
| Ever intubated         | 129 (34%)   | 61 (35%)              | 68 (34%) | 0.839 |
| Surgery in NICU        | 93 (25%)    | 40 (23%)              | 53 (26%) | 0.429 |
| LOS NICU (days)        | 16 (5–38)   | 9 (2–28)              | 20 (10–42) <0.001 |
| Maternal age (years)   | 30 (26–33)  | 30 (25–34)            | 30 (26–33) 0.906 |
| Race/ethnicity         |             |                       |       | 0.666 |
| Black                  | 77 (21%)    | 32 (18%)              | 45 (22%) |
| White                  | 197 (52%)   | 96 (55%)              | 101 (50%) |
| Asian                  | 14 (4%)     | 8 (5%)                | 6 (3%) |
| Hispanic               | 21 (6%)     | 8 (5%)                | 13 (6%) |
| Other/unknown          | 69 (18%)    | 32 (18%)              | 37 (18%) |
| PPD > 14               | 22 (6%)     | 11 (6%)               | 11 (5%) | 0.886 |

Characteristics of the sample: all eligible infants, then those who did or did not agree to participate at initial contact. There were no significant differences in these characteristics between parents who agreed to participate who did versus did not respond to the NICU or home questionnaires (data not shown). NICU Neonatal intensive care unit, LOS Length of stay, PPD > 14 a postpartum depression screening score of >14 on the Edinburgh Postpartum Depression Scale (scores >14 prompt psychology or social work referral).

Table 3 displays characteristics of responding parents who did versus did not request resources. In the NICU, psychology resource requests were more common among parents of infants with smaller birth weight, who were ever intubated or who required surgery in the NICU. Chaplain requests were more common among parents of infants with a longer NICU stay. No infant or parent characteristics distinguished those who requested social work support. The proportion of responding parents who requested resources was not significantly different across study periods. After NICU discharge, nursing call requests were more common among parents of infants born at an earlier gestational age, lower birth weight, and longer NICU length of stay; the proportion of nursing requests decreased over the study periods. Characteristics that were not significant between groups included inborn, gestational age, race/ethnicity, need for discharge equipment, or number of specialist appointments. All resource requests were manually received by our team and relayed via secure message to the appropriate staff for follow-up, with the parent’s preferred contact information and available time; in all cases, staff members communicated with us to confirm that the request had been received and contact made. Counts of documented contacts from social work and chaplains pre-COVID, pre-outreach, and during this project are presented in Fig. 2. There was a reduction in monthly contacts at the beginning of the pandemic compared to pre-pandemic baseline, which increased after beginning our outreach project to near-baseline levels.

In general, both the inpatient and post-discharge questionnaires were well received by staff and parents. Parents’ suggestions for additional electronic communication included a better record of members of a large care team, especially when most communication happens via phone rather than in person; better access to clinical status updates such as oral feeding and respiratory support changes; communication about transportation or parking issues that might change daily in the event of construction; a ready list of resources available that might be missed if a NICU tour could not happen in the first day of an infant’s stay; more systematic asking about community resource needs and social support at home. Staff chaplains, social workers, and psychologists commented that it was helpful to have access to additional contact information that helped them connect with families that they had been previously unable to reach. The nurses calling families after discharge commented that they appreciated knowing families’ specific concerns prior to a phone call to direct their conversation.

DISCUSSION

Our goal was to describe infant and parent characteristics associated with the use of an electronic parent support tool in the NICU and in the week following discharge, and to assess whether requests for support changed based on the availability of in-person staff resources. We found the that overall proportion of parents enrolling in our pilot service increased over time, even as staff were increasingly available at the bedside. Earlier gestational age, lower birth weight, and longer NICU length of stay were associated with more parent requests for inpatient and outpatient support. Electronic access to health care has become a high priority. Many systems have accelerated their efforts in telehealth to increase access to non-emergent care during the COVID-19 pandemic [19–21]. Further, the 21st Century Cures Act has increased system efforts to make electronic health records more accessible to patients and families [22, 23]. Unlike these major system changes, our REDCap text-based questionnaire system was neither telehealth nor embedded in the electronic health record. Advantages to our approach were the speed and low cost of set-up; our project began because our original vision for telehealth-enabled NICU follow-up was delayed due to system constraints.
This "lower-tech" approach has mixed advantages and disadvantages for families. Text rather than video limits the applicability to families with lower health literacy, but not every family has access to reliable internet to support video clinic visits as compared to the 97% of families in the world with access to a smart phone [24–27]. Similarly, patient portals directly connected to the electronic health record would allow more direct communication with members of the health care team; however, participants may be more likely to respond to a text message than log onto a patient portal [27–29]. In that context, it was interesting that an increasing proportion of parents agreed to participate in this service over time, rather than decreasing as staff returned to the bedside. There are many potential explanations for this finding. Parents may be increasingly accustomed to remote access to health care and find this mode of communication more acceptable; increasing system-wide knowledge of the project may have increased staff promotion of the service; parents juggling other children may have found this more useful as the school year began [27]. These pilot findings now can help inform our system efforts to expand and adapt parent support strategies for our NICU.

Table 2. Questionnaire responses.

| INPATIENT QUESTIONNAIRE (n = 105) | Options | n (%) |
|----------------------------------|---------|-------|
| It is normal to feel more sadness, anxiety, or loneliness with a baby in the NICU. How would you describe your experience managing your feelings of sadness, anxiety, or loneliness during this time? | No problems | 35 (34%) |
| | Some extra difficulty | 37 (45%) |
| | Moderate difficulty | 17 (16%) |
| | Significant difficulty | 5 (5%) |
| We have psychologists on staff who help take care of parents of babies in the NICU. Would you like any support from a psychologist? | Online resources | 21 (20%) |
| | Call or in person | 8 (8%) |
| | Already working with psychologist | 10 (10%) |
| Social workers can provide emotional support. They may have ideas about financial or other resources to help you through this challenging time. Would you like a social worker to contact you? | Email | 16 (15%) |
| | Call or in person | 7 (7%) |
| | Already working with social work | 17 (16%) |
| It is common for older siblings of babies in the NICU to have feelings of anxiety, jealousy, or sadness with a big life change. How are your other kids doing? | No other children | 36 (34%) |
| | Doing well, no concerns | 41 (39%) |
| | Some issues but overall ok | 21 (20%) |
| | Definitely stressed or anxious | 6 (6%) |
| Child life specialists can help suggest ways to help older siblings cope with a baby in the NICU. We can also provide developmentally appropriate education to help siblings understand a new diagnosis. Can we help you with any of the following? | Online resources | 5 (5%) |
| | Speak with a child life specialist | 3 (3%) |
| | Already working with child life | 5 (5%) |
| We have chaplains who offer emotional, spiritual or religious support according to your values and beliefs. Chaplains are available both in person and by phone. Would you like any support? | Speak with a chaplain | 1 (1%) |
| | Prayer or blessing said for my child | 19 (18%) |
| | Already working with a chaplain | 7 (7%) |

| HOME QUESTIONNAIRE (n = 81) | Options | n (%) |
|-----------------------------|---------|-------|
| We are so glad that your child is home with you! How can we help you adjust? Check all that you might need help with: | Feeding and breastfeeding | 22 (27%) |
| | Home medical equipment | 10 (12%) |
| | Appointments | 10 (12%) |
| | Baby care questions | 23 (28%) |
| | Managing my stress, sadness or anxiety | 10 (12%) |
| Feeding a newborn infant is hard, especially a baby who has been in the NICU. Which of these questions can we help with? Choose all that apply. | Need to talk to lactation consultant | 6 (7%) |
| | How do I know if my baby is eating enough? | 4 (5%) |
| | How long can my baby go between feeding? | 4 (5%) |
| | My baby keeps spitting up. | 5 (6%) |
| Coming home from the NICU is both exciting and scary. Being home feels better than being in the hospital, but the team that was there for you in the NICU feels very far away. Would you like one of our psychologists to help connect you with some support? | I would like a call from a psychologist | 8 (10%) |
| Indicated any need for information or follow-up | 45 (56%) |
| Had a question that was referred to nursing | 38 (47%) |
| Had a question referred to psychology | 17 (21%) |
Table 3. Characteristics of infant/parent dyads requesting support services.

**A. INPATIENT**

| Variable                  | Psychology | Social work | Chaplain |
|---------------------------|------------|-------------|----------|
|                           | None       | New contact | Already working with psych | p   | None       | New contact | Already working with social work | p   | None       | New contact | Already working with chaplain |
| Birth weight, kg          | 2.4 (1.7–3.0) | 1.7 (1.1–2.5) | 1.6 (1.1–3.3) | **0.037** | 2.3 (1.7–3.0) | 1.9 (1.2–2.9) | 1.7 (1.1–2.9) | **0.355** | 2.3 (1.5–3.0) | 1.8 (1.1–2.6) | 1.7 (1.5–2.4) | **0.227** |
| Ever intubated            | No         | 51 (72%)    | 13 (18%)     | 7 (10%)    | **0.085** | 45 (63%)    | 16 (23%)     | 10 (14%)    | **0.061** | 56 (79%)    | 10 (14%)     | 5 (7%) | **0.319** |
|                           | Yes         | 18 (53%)    | 13 (38%)     | 3 (9%)     | 21 (62%)    | 6 (18%)     | 7 (21%)     | 23 (68%)    | 9 (26%)     | 2 (6%) | 2 (6%) |
| Surgery in NICU           | No         | 55 (70%)    | 14 (18%)     | 10 (13%)   | **0.007** | 49 (62%)    | 20 (25%)     | 10 (13%)    | **0.063** | 61 (77%)    | 12 (15%)     | 6 (8%) | **0.436** |
|                           | Yes         | 14 (54%)    | 12 (46%)     | 0          | 17 (65%)    | 2 (8%)      | 7 (27%)     | 18 (69%)    | 7 (27%)     | 1 (4%) | 1 (4%) |
| LOS NICU, days            | 23 (11–41) | 28 (14–50)  | 30 (7–50)    | **0.653** | 20 (10–40)  | 25 (11–39)  | 41 (28–50)  | **0.055** | 20 (10–37)  | 40 (20–72)   | 41 (8–50) | **0.025** |
| EPDS                      | <14        | 67 (68%)    | 24 (24%)     | 7 (7%)     | **0.002** | 62 (63%)    | 20 (20%)     | 16 (16%)    | **0.639** | 75 (77%)    | 16 (16%)     | 7 (7%) | 0.179 |
|                           | 14+        | 2 (29%)     | 2 (29%)      | 3 (43%)    | 4 (57%)     | 2 (29%)     | 1 (14%)     | 4 (57%)     | 3 (43%)     | 0 | 0 |
| Study period              | May        | 6 (46%)     | 6 (46%)      | 1 (8%)     | **0.302** | 5 (38%)     | 3 (23%)      | 5 (38%)     | **0.13** | 7 (54%)     | 4 (31%)      | 2 (15%) | **0.243** |
|                           | June–Aug   | 24 (63%)    | 9 (24%)      | 5 (13%)    | 28 (74%)    | 6 (16%)     | 4 (11%)     | 30 (79%)    | 5 (13%)     | 3 (8%) | 0.003 |
|                           | Sept–Dec   | 39 (72%)    | 11 (20%)     | 4 (7%)     | 33 (61%)    | 13 (24%)    | 8 (15%)     | 42 (78%)    | 10 (19%)    | 2 (4%) | 0 |

**B. HOME**

| Variable                  | Any home request | Nursing request | Psychology request |
|---------------------------|-------------------|-----------------|--------------------|
|                           | No | Yes | p  | No | Yes | p  | No | Yes | p  |
| n                         | 36 (44%) | 45 (56%) | 43 (53%) | 38 (47%) | 43 (53%) | 38 (47%) | 64 (79%) | 17 (21%) | 0.033 |
| Gestational age, wks      | 36 (32–38) | 34 (30–36) | 0.009 | 36 (32–38) | 34 (30–35) | **0.021** | 34 (31–37) | 34 (31–36) | 0.622 |
| Birth weight, kg          | 2.6 (1.7–3.0) | 2.1 (1.5–2.7) | 0.104 | 2.6 (1.8–3.1) | 1.9 (1.3–2.7) | **0.033** | 2.2 (1.5–2.9) | 2.3 (1.7–2.6) | 0.885 |
| LOS NICU, days            | 16 (8–38) | 27 (17–47) | 0.059 | 16 (8–35) | 29 (18–50) | **0.021** | 22 (12–45) | 26 (11–30) | 0.803 |
| Study period              | May | 1 (10%) | 9 (90%) | **0.033** | 1 (10%) | 9 (90%) | **0.003** | 9 (90%) | 1 (10%) | 0.748 |
|                           | June–Aug | 14 (42%) | 19 (58%) | 16 (48%) | 17 (52%) | 25 (76%) | 8 (24%) |
|                           | Sept–Dec | 21 (55%) | 17 (45%) | 26 (68%) | 12 (32%) | 20 (79%) | 8 (21%) |

Selected characteristics of infant/parent dyads whose parents did or did not request support services, either (A) in the NICU or (B) at home after discharge. “New contact” refers to a parent request for contact with a specific support service. All requests were directly relayed to the appropriate clinical team for consultation, with the parent’s preference for mode and time of follow-up; 100% resulted in successful contact between parents and the team. Study period is presented for each questionnaire, reflecting May, the first month of the electronic support tool, most staff working remotely and one visitor per patient; June through August, staff returning to bedside and two visitors per patient; September through December, staff all available at bedside and two visitors per patient. Other characteristics were included in the tables only if p values <0.1 for brevity. Characteristics that were not significant between groups included in born, gestational age, race/ethnicity, need for discharge equipment, or number of specialist appointments. Values are proportions or median and interquartile ranges; p values indicate chi-squared or Fisher’s exact tests or Kruskal–Wallis tests, as appropriate. Bold values highlight p values <0.05.

NICU Neonatal intensive care unit, EPDS Score >14 on Edinburgh Postpartum Depression Scale (triggers psychology or social work consult), LOS Length of stay.
Supporting parents’ needs in the NICU requires a broad range of expertise. We were able to place additional requests for psychology consultation both in the inpatient and outpatient settings. Although parents with higher scores on the Edinburgh Postpartum Depression scale were more likely to be working with a psychologist already, new requests were most common among parents with lower postpartum depression scores, reinforcing that screening alone does not detect the entirety of parents’ needs. These findings highlight opportunities to increase the availability of mental health resources for parents in the NICU and after discharge [30]. Our own NICU has started screening for anxiety in addition to postpartum depression; [2, 5, 31] based on these findings we are also working toward incorporating electronic methods of mental health screening to supplement our current model of bedside nurses doing the screening and referring for psychology consultation. We are also in the process of incorporating psychologists into our neonatal follow-up clinic to increase access to post-discharge mental health support. Similarly, we were able to place additional requests for social work and chaplain support, which were not more frequent when our staff were working remotely as opposed to their usual daily accessibility in the NICU, and not associated with a specific infant or parent characteristics. As hospitals like ours consider how to optimize the use of electronic health tools, allowing parents direct access to request support for themselves may be an area for future exploration.

Preparing parents for their infants’ home health needs requires significant nursing and case management effort during the NICU stay; multi-faceted individualized approaches have been identified as a key factor in successful discharge planning leading to reduced outpatient healthcare utilization [32–41]. After discharge, we found that requests for support were more common among infants with earlier gestational age and longer NICU length of stay, although nursing requests decreased over time as parent visiting and in person outpatient clinic visits resumed. A one-time electronic outreach is certainly less comprehensive than many transition home programs that have been shown to reduce readmissions and promote better health of preterm infants [32, 40]. At the same time, securing comprehensive follow-up for infants after the NICU is a significant challenge in many parts of the country [42–44]. Our own center is working to adopt remote care strategies as part of our strategy to improve our neonatal follow-up program.

Strengths of our study include the availability of data over a period of several months including visitor and staffing changes, which allowed us to get a broader sense of the potential impact of electronic outreach strategies, the multidisciplinary tool development, and parent and staff feedback. Weaknesses that limit generalizability include the single-center nature of the project, the English-only and text-only availability at this stage. Reaching 63% of parents in the first days after NICU admission is lower than we had hoped. We were limited by non-clinical staff being restricted from visiting the bedside, such that we were not able to confirm contact information in person. We also did not restrict eligibility by infant length of stay, such that some families were discharged before we were able to reach them. While we were able to count the number of documented social work and chaplain contacts to assess the impact of our outreach, we were not able to assess the quality of that contact. Nurses, social workers, psychologists, and chaplains commented that it was helpful to have an idea of parents’ concerns and best modes of contact prior to initiating communication, but that is not feasible to measure by chart review. In future research and quality improvement efforts to improve the value of NICU follow-up, it will be important to measure explicitly how an intervention impacts the use of preventive and acute healthcare utilization.

In summary, the use of a text- and email-based electronic parent support tool increased the availability of parent support services in the NICU and in the week following discharge, and was utilized to access resources both while staff and parents were remote and allowed at the bedside. As efforts to increase electronic access to health care accelerate, maintaining direct connections between parents and needed resources has the potential to improve the health of both parents and children.
REFERENCES

1. Bakewell-Sachs S, Gennaaro S. Parenting the post-NICU premature infant. MCN Am J Matern child Nurs. 2004;29:398–403.
2. Carter JD, Mulder RT, Darlow BA. Parental stress in the NICU: the influence of personality, psychological, pregnancy and family factors. Personal Ment Health. 2007;1:40–50.
3. Enlow E, Herbert SL, Jovel J, Lorch SA, Anderson C, Chamberlain LJ. Neonatal intensive care unit to home: the transition from parent and pediatrician perspectives, a prospective cohort study. J Perinatol. 2014;34:761.
4. Herzer M, Godiwala N, Hommel KA, Driscoll K, Mitchell M, Crosby LE, et al. Family functioning in the context of pediatric chronic conditions. J developmental Behav pediatrics. JDBP. 2010;31:26–34.
5. Malin KJTT, McAndrew S, Westerdahl J, Leuthner J, Lagatta J, editor. Infant Illness Sensitivity and the development of parent posttraumatic stress disorder after the neonatal intensive care unit. Advances in Neonatal Care. 2019;19:104930.
6. McAndrew S, Acharya K, Westerdahl J, Brousseau DC, Panepinto JA, Simpson P, et al. A prospective study of parent health-related quality of life before and after discharge from the neonatal intensive care unit. J Pediatrics. 2019;213:38–45.e3.
7. Muall ME. Promoting parenting supports and engagement for infants born pre-term. The J Pediatrics. 2019;210:10–12.
8. Singer LT, Salvador A, Guo S, Collin M, Lilien L, Baley J. Maternal psychological distress and parenting stress after the birth of a very low-birth-weight infant. JAMA 1999;281:799–805.
9. O’Hara MW, McCabe JE. Postpartum depression: current status and future directions. Annu Rev Clin Psychol. 2013;9:379–407.
10. Fairbrother N, Young AH, Janssen P, Antony MM, Tucker E. Depression and anxiety during the postnatal period. BMC Psychiatry. 2015;15:206.
11. Paulson JF, Bazezmore SD. Prenatal and postpartum depression in fathers and its association with maternal depression: a meta-analysis. Jama 2010;303:1961–9.
12. Mental health trajectories of fathers following very preterm birth: associations with parenting [press release]. United Kingdom: Oxford University Press 2020.
13. Mounts KO. Screening for maternal depression in the neonatal ICU. Clin Perinatol. 2009;36:137–52.
14. Hynan MT, Steinberg Z, Baker L, Cicco R, Geller PA, Lassen S, et al. Recommendations for mental health professionals in the NICU. J perinatology: Of J Calif Perinat Assoc. 2015;35:514–8.
15. Darcy Mahoney A, White RD, Velasquez A, Barrett TS, Clark RH, Ahmad KA. Impact of restrictions on parent presence in neonatal intensive care units related to coronavirus disease 2019. J perinatology: Of J Calif Perinat Assoc. 2020;40:36–46.
16. Project REDCap [Available from: https://www.project-redcap.org/.
17. Thombs BD, Benedetti A, Koda LA, Levis B, Riehm KE, Azar M, et al. Diagnostic accuracy of the Edinburgh Postnatal Depression Scale (EPDS) for detecting major depression in pregnant and postnatal women: protocol for a systematic review and individual patient data meta-analyses. BMJ Open. 2015;5:e009742.
18. Cox J, Holden J, Sagovsky R. Detection of postnatal depression, development of the 10-item edinburgh postnatal depression scale. Br J Psychiatry: J Ment Sci. 1987;150:782–6.
19. Hong Y-R, Lawrence J, Williams D Jr, Mainous Iii A. Population-level interest and internet preferences of parents: information needs and desired involvement in infant care and pain management in the NICU. Adv Neonatal Care. 2017;17:131–8.

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AUTHOR CONTRIBUTIONS

JL was responsible for study concept and design, leading design of the parent support tool used in this study, leading data analysis, and writing the first draft of the manuscript. MM was responsible for data collection. PRC contributed to data management and analysis and review of the manuscript. EF, MD, CW and SC were responsible for content contributions to the design of the parent support tool and review of data. All authors reviewed and contributed to the manuscript and approve the final version as submitted.
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COMPETING INTERESTS
The authors declare no competing interests.

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