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## Approaches to addressing social determinants of health in the NICU: a mixed methods study

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### Abstract

**Objective**—Examine current approaches to addressing social determinants of health (SDOH) in the NICU and perceived appropriateness of a standardized screening and referral process.

**Study design**—We performed a mixed methods study in two Massachusetts safety-net NICUs. We examined rates that unmet basic needs were assessed and identified among 601 families. We conducted focus groups with NICU staff to understand current methods to assess unmet basic needs and perceived appropriateness of a standardized SDOH screening and referral process.

**Result**—Except employment (89%), other unmet basic needs were infrequently assessed (housing 38%, food/hunger 7%, childcare 3%, transportation 3%, utilities 0.2%). Staff believed: (1) processes to assess SDOH were not standardized and inconsistently performed/documented; (2) addressing SDOH was important; and (3) using a standardized screening and referral process would be feasible.

**Conclusions**—Current NICU assessment of SDOH is limited and use of a standardized screening and referral process could be useful.

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## Introduction

Social determinants of health (SDOH)—the conditions in which people are born, grow, work, live, and age—are key drivers of health disparities [1]. The correlation between child poverty and SDOH is well-established and families with young children living in impoverished conditions are more likely to have adverse SDOH, such as unmet basic needs like food and housing insecurity [2, 3]. Because of this, in 2016, the American Academy of Pediatrics (AAP) recommended universal screening for adverse SDOH and delivery of referrals for community resources for unmet basic needs within pediatric clinical care [4]. Medicaid managed care organization programs in over 30 states also now encourage screening for basic needs and referrals for social services [5].

Infants born preterm represent a highly vulnerable pediatric population with tremendous medical and social risk. Income and racial disparities in preterm birth as well as preterm infant morbidities, mortality, and quality of care persist [6-8]. During the prolonged weeks to months of the hospitalization in the neonatal intensive care unit (NICU), families travel to and from the hospital and incur tremendous costs from transportation and childcare in conjunction with foregone income from lost time at work [9, 10]. This heightened financial stress likely exacerbates the impact of underlying unmet basic needs among low-income families with preterm infants. In a national cohort of families of premature infants 12 months of age, 26% experienced food insecurity, 33% experienced housing insecurity, and 28% experienced energy insecurity [11].

Despite the high prevalence of unmet basic needs among families of hospitalized preterm infants, current approaches to addressing SDOH and the perceived appropriateness of standardized SDOH screening and referral processes in the NICU setting are unclear. Fulfilling the AAP recommendation of universal screening and referral for SDOH among at-risk families in the NICU setting requires a deeper understanding of existing processes and gaps. Therefore, we conducted a mixed methods pilot study to examine current approaches to addressing SDOH in the NICU, perceived appropriateness of a standardized SDOH screening tool, and perceived strategies for implementing a standardized system of screening and referral.

## Methods

### Population and setting

We performed a mixed methods study using sequential explanatory methods [12] (chart review followed by focus groups that would provide context to the chart review findings) at two safety-net hospitals with level 3 NICUs in Massachusetts (MA): (1) Boston Medical Center (BMC), which serves a predominately urban community in Boston, MA, where ~70% of patients have public insurance, 50% of NICU mothers are non-Hispanic Black, 25% are Hispanic, and 15% are non-Hispanic white; and (2) UMass Memorial Medical Center (UMass), which serves a predominately urban and suburban community in Worcester, MA, where ~50% of patients have public insurance, 20% of NICU mothers are non-Hispanic Black, 25% are Hispanic, and 50% are non-Hispanic white. Both hospitals care for critically ill preterm infants of all gestational ages and infants with

congenital anomalies. Infants with symptoms of neonatal abstinence syndrome are cared for predominately in the nursery and general pediatric floor (i.e., not the NICU) at BMC and are cared for in the NICU at UMass. BMC has ~2800 annual births and 22 NICU beds and UMass has ~4400 annual births and 49 NICU beds. With respect to personnel, both NICUs have multidisciplinary teams comprised of nurses, dietitians, social workers, and physicians and medical trainees. At both hospitals, social work consultation is automatic upon admission to the NICU. Social work assessments include review of family structure, mother's employment, maternal mental health, history of substance use, domestic violence, and other social issues, in conjunction with unmet basic needs.

Typical of many NICUs in Massachusetts, the general goal of timing of social work contact with families of admitted NICU infants is within the first 48 h after birth and as needed depending on the individual family during the remainder of the hospital stay, but no less than one time per week. At both centers, NICU social workers perform a detailed initial chart review of previous social work consultations and mental health evaluations that occurred during the prenatal course. In addition to a general psychosocial assessment, findings from the chart review will also drive the initial NICU social work consultation and follow-up interactions. There are no standardized procedures for assessment of unmet basic needs at either NICU as part of the initial social work consultation. Social workers document summaries of their meetings in social work notes that are entered in the infants' electronic medical record. At BMC, there is no templated social work note; an open-ended text box format is used. However, social workers generally aim to include the presenting problem, any active concerns, pertinent family history, psychiatric issues, and assessment of parental engagement in care, as well as clinical impressions and any actions taken by the social worker. A summary of this assessment is included in social work notes. At UMass, there is a detailed, templated note for the initial assessment only that has headers for different aspects of the psychosocial assessment. Follow-up consultation notes use a free-text format that include clinical impressions and any actions taken. If bedside nurses or physicians learn of unmet basic needs or other social issues, they typically alert the NICU social work team. During the study time period, at BMC, there was 1.0 full-time equivalent (FTE) social work coverage for the NICU, the postpartum area and labor and delivery (one person). At UMass, there was 1.6 FTE social worker coverage for the NICU (two people). The Institutional Review Boards at BMC and UMass approved this study.

### **Quantitative analysis**

First, we performed a retrospective chart review of infants cared for at BMC and UMass to examine the extent to which unmet basic needs were assessed and identified during the NICU hospitalization. We included infants of all gestational ages in our chart review that were discharged or transferred from 09/2017 until 09/2019 that did not die during the NICU hospitalization. We ascertained unmet basic needs from history and physical and discharge notes written by physicians, social work notes, and family meeting event notes written by any provider. Within both NICUs, these note types were the most likely to contain information about the family social situation and summarize interviews with mothers or other family members. (Other notes such as nursing, respiratory, dietary, or physician progress were largely focused on medical issues and therefore not reviewed.)

We abstracted sociodemographic (maternal age, race/ethnicity and insurance type, and infant sex), pregnancy and delivery characteristics (mode of delivery, plurality, and medical conditions), and infant characteristics (gestational age and weight at birth, medical conditions, length of stay, and disposition) from the medical record. We also determined the number of social work assessments as documented in the medical record per week. We examined the following unmet basic needs: childcare, food/hunger, housing, transportation difficulties, utilities (e.g., heat), and employment. We defined “unmet basic need assessed” as any mention of these factors in any of the aforementioned notes at any time during the hospitalization (yes/no). We defined “need identified” for childcare, food/hunger, housing, transportation difficulties, and utilities as any mention of these factors as needs (yes/no) within the household. We defined “employment need” as unemployment for the mother and/or partner. We did not have a method to ascertain whether unmet needs were assessed or identified and not documented in the medical record. Therefore, we defined these factors according to documentation in the medical record as described. With respect to statistical analysis, we first examined rates of mother–infant dyad characteristics stratified by NICU. Then we determined rates of unmet basic needs assessed and identified among families of all infants in our study and we determined rates that unmet basic needs were identified among those assessed; we used fisher’s exact tests to compare the rates between BMC and UMass and used excel for our analysis. (Chi-square tests were not used due to small cell sizes).

### Qualitative analysis

We also conducted qualitative analysis to contextualize the chart review data and understand (1) the general approach to assessing unmet basic needs and making referrals for resources in the NICU; (2) perceptions of the appropriateness of using a short screening tool (i.e., 6–8 needs assessed) and referral system that is similar to ones implemented in many pediatric outpatient settings; and (3) potential implementation strategies for integrating a standardized screening and referral system into routine care. We conducted four focus groups, two at UMass and two at BMC. In order to gain a wide range of perspectives, at each site, one of the focus groups was comprised of physicians and the other was comprised of nurses, social workers, and dietitians. No incentives were given for participation. We constructed a qualitative focus group guide with questions asked in an open-ended format. To reduce any potential bias among the NICU staff participating in the group, the focus group leaders (EF and AB) were not clinicians or staff members who worked in any NICU setting. We asked about current practices for addressing unmet basic needs, including timing, personnel involved and documentation, and the perceived role of NICU staff in addressing unmet basic needs. Then we told participants that SDOH screening and community-resource referral were recommended by the AAP in pediatric clinical care and we showed participants an example of a short, SDOH screener (six needs assessed with 12 questions, written at 5th grade level) and sample referral sheets that are used in many outpatient pediatric settings and specifically recommended by the AAP [13]. We then asked participants what they thought of this screener and how they thought this tool or something similar may or may not work in the NICU setting. Focus groups lasted about 60 min and were audiotaped and transcribed verbatim. We recorded the provider type to describe our population of participants.

We employed a systematic, iterative process of data collection and analysis consistent with a grounded theory approach [14]. Transcripts were reviewed by investigators (EF, MD, MP, AB) with expertise in neonatology, SDOH screening and referral systems in pediatrics, and qualitative methods. To maximize trustworthiness of the analysis, each transcript was independently reviewed by four members of the group to identify tentative codes. The group met at regular intervals to review and revise the coding structure before independently coding the transcripts and meeting again to assure uniform coding of each transcript. Any disagreements were resolved through group discussion.

## Results

Characteristics of infants cared for in the BMC and UMass NICUs are shown in Table 1. Overall, 57% of mothers had public insurance and the most common admission diagnoses at both centers were prematurity and respiratory distress syndrome. The average length of stay was  $38.4 \pm 26.9$  days and corrected gestational age at discharge or transfer was  $38.5 \pm 3.2$  weeks. Overall, 32% of infants were very low birth weight (< 1500 grams), which ranged from 29% at UMass and 42% at BMC. Reflective of the organizational differences between the two NICUs, at BMC 2% of infants had an admission diagnosis of neonatal abstinence syndrome/perinatal opioid exposure, while UMass had 10%, as BMC cares for infants with these conditions in a different clinical area. BMC had no outborn infants, as BMC does not have a transport system for outborn infants, while UMass had 10% outborn infants. On average, at BMC, infants had  $0.8 \pm 1.4$  social work notes per week and, at UMass, infants had  $1.5 \pm 1.1$  social work notes per week.

Table 2 shows rates of assessment and identification of unmet basic needs as documented in the medical record. Employment was assessed among caregivers of 89% of infants and the other unmet needs were assessed infrequently (0.2–38%). With the exception of employment (30%), unmet needs were identified extremely rarely (0–0.05%). When unmet basic needs were assessed, unmet basic needs were identified 24–59% of the time, except for utilities. Rates of assessment varied substantially between NICUs for some of the individual unmet basic needs we examined. For example, food/hunger was assessed among 31% of families of NICU infants at BMC and 0% at UMass ( $p = 0.001$ ), housing was assessed among 82.1% of families of NICU infants at BMC and 25.1% at UMass ( $p = 0.001$ ), and transportation difficulties were assessed among 12.7% of families of NICU infants at BMC and 0% at UMass ( $p = 0.001$ ).

Each focus group was comprised of six to ten NICU providers. Overall, 29 providers were included (16 physicians, 9 nurses, 3 social workers, and 1 dietician). Themes and quotations are shown in Table 3.

Theme 1: NICU providers reported that current methods of assessing unmet basic needs are not standardized and are inconsistently performed and documented. NICU providers described the array of social needs that social workers are expected to assess—mental health, family structure, substance use, domestic violence, and other issues—in conjunction with unmet basic needs. One provider described the social work consultation as a “black box,” implying that there were so many issues to address that it was unclear what issues

were prioritized. There was no standardized template that social workers used in either site to assess needs, nor to document their assessment in the medical record. Social workers that participated in our focus groups expressed that it was nearly impossible to cover all topics and to conduct meetings with families as often as desired.

Theme 2: NICU providers felt that addressing families' unmet basic needs was a central part of care for preterm infants. NICU providers believed that health promotion of preterm children relies on support of caregivers and commented on the importance of addressing unmet basic needs as a central way to support families to best care for their infants, particularly after NICU discharge. In particular, many providers felt that it was an obligation of the NICU team to ensure that infants have a safe and supportive home environment after discharge; therefore, addressing unmet basic needs during the NICU stay before discharge was necessary.

Theme 3: use of a standardized screening tool is feasible and beneficial. NICU providers agreed with the AAP recommendation to address SDOH in a standardized way in pediatric care and were generally excited to see and hear about a screening tool. None of the providers expressed that they had ever seen or heard of an SDOH screening tool used in the NICU setting or knew of the AAP recommendation. Providers felt that the use of a standardized screening and referral system would be very appropriate in the NICU setting and would help ensure that families would have their unmet basic needs assessed and addressed more consistently than the current practice. In particular, nurses stated that they appreciated the standardization invoked by use of a tool because currently the nurses hear about unmet basic needs frequently at the bedside when talking to families and lack a robust system to report the findings to the rest of the NICU team. Nurses remarked that ascertainment of unmet basic needs via informal interactions at the bedside was helpful, but not standardized. They felt that use of a tool would augment their informal interactions to assess unmet basic needs with families; it would ensure that assessment of unmet basic needs was universal and create a system for communication and sharing with the rest of the medical team.

Theme 4: some community resources are increasingly scarce; families do not always recognize the limitations of the NICU team to address unmet basic needs. Many providers commented on the paucity of community resources compared to the high demand among families, especially with regard to housing. NICU providers explained that many families have false expectations regarding what NICU teams can provide in a timely manner. This feeling was agonizing to many providers as they recognized how much families were struggling and the providers felt hopeless to assist. Some providers felt conflicted as to whether certain items from the example screening tool we showed should be included, such as housing. They felt that if the NICU team could not ensure that a family got housing when asked about this need within the NICU time period, it should not be assessed at all. This feeling was not universal, however. Other providers felt that the solution was to fully explain to families that some of the needs identified may not be addressed during the NICU period, rather that the role of NICU teams was to start the process of obtaining community resources for families. Finally, providers felt that families should understand that immediate issues that may be exacerbated by the NICU stay, such as parking and transportation, may be more easily addressed by NICU teams.



Theme 5: use of an SDOH screening and referral system in the NICU should be tailored to the emotional needs of families with hospitalized infants. Many providers commented on the stress and exhaustion felt by parents during the preterm birth hospitalization; and one provider called this time period a “crisis.” During the NICU hospitalization, mothers are recovering from childbirth, pumping breast milk and addressing their own medical issues, while simultaneously navigating frequent visitation to the NICU and other work and household duties. Providers commented that this experience makes families feel overwhelmed. Many providers felt that families would require assistance in reaching out to community resources by NICU staff when an unmet basic need was identified and thought that social workers may be the best personnel to do this.

Theme 6: use of an SDOH screening and referral system in the NICU should be incorporated into existing NICU work flow. Providers had several ideas as to how use of an SDOH screening and referral system could be best administered. Providers suggested using the screening tool in the first family meeting and others suggested that parents complete the screener with primary nurses at the bedside. There was general agreement that the results of SDOH screeners should be included in the electronic medical record and made easily accessible for social work and other NICU staff.

## Discussion

In our mixed methods study of two safety-net NICUs in Massachusetts, according to retrospective review of notes in the medical record, we found that unmet basic needs, such as childcare, food/hunger, housing, transportation difficulties, and utilities were assessed 38% of the time and identified <1% of the time. Employment, in contrast, was frequently assessed. Qualitative analysis of focus groups of NICU providers corroborated our quantitative findings that assessments of unmet basic needs were variable and inconsistent, and further, that standardized processes were lacking. NICU providers were very receptive to the idea of SDOH screening and referral systems and felt that addressing SDOH was a key component of their goal to promote the health and well-being of preterm infants. Finally, NICU providers offered insights as to how an SDOH screening and referral system may optimally be adopted in the NICU setting.

Approximately 40% of U.S. children live in poverty or near poverty [15] and adverse SDOH are extremely common. We found that within two safety-net NICUs in Massachusetts using a non-standardized approach to identification of unmet basic needs, rates of support needed for childcare, food/hunger, housing, and utilities were <1%. This is strikingly different from a recent examination of unmet basic needs using a standardized approach among families with young children in low-income primary clinics in Boston, where need for childcare was 29%, need for food was 20%, need for housing was 43%, and need for help with utilities was 9% [13]. This suggests that use of standardized approaches to screening and documentation are critical for identification of unmet basic needs, representing adverse SDOH.

Further, use of SDOH screening and referral systems have been shown to increase parental receipt of community resources [13] that alleviate unmet basic needs. Many evidence-based

SDOH screening and referral systems are simple enough to rely only on existing staff and to occur within the confines of a 10–15 min office visit and use of these systems have steadily increased in the outpatient pediatric setting in the past decade [16]. In contrast to relatively short pediatric outpatient visits, the NICU length of stay is several weeks to months, providing many more opportunities for screening. However, to date, integration of SDOH screening and referral systems have not yet occurred at scale in the pediatric inpatient setting, including the NICU. A previous study found that pediatric providers' report of screening for social needs substantially less often in the pediatric inpatient compared to outpatient setting (98 vs. 37%), although barriers such as time constraints, lack of knowledge about available resources and discomfort in asking these questions occurred in both settings [17]. Our study fills an important study gap to understand current processes to assess and identify unmet basic needs and begin to identify strategies to integrate a systematic SDOH screening and referral process in the NICU setting.

Despite the frequent contact with social workers and other providers in the NICU, we found that assessment of unmet basic needs was infrequent in our retrospective medical chart review. While it is very likely that unmet material needs were assessed more often and simply not documented in the electronic medical record in the two safety-net NICUs we studied, we suspect that universal or near universal assessment of unmet basic needs, as recommended by the AAP, did not occur, and is unlikely to occur elsewhere in the absence of a systematic checklist or tool. Use of checklists or tools and leveraging the electronic medical record to address social needs in the NICU is highly plausible. Like most ICU settings, the NICU is a highly protocolized environment and NICU teams are wellversed in use of clinical tools in routine care (e.g., nutrition protocols, central line and maintenance checklists, use of early onset sepsis calculators). As indicated by NICU staff in our study, adding a systematic SDOH screening tool for families of hospitalized infants that triggers referrals for community resources is appropriate and feasible. In addition, NICU staff in our study felt that addressing basic needs of families fit squarely within the role of the NICU team. Participants recognized that addressing the social needs of families was crucial to optimizing the longer-term health and well-being of preterm infants cared for in the NICU setting. Indeed, previous studies have demonstrated that improvement in family socioeconomic status were associated with better child neurologic outcomes [18, 19] and several researchers have emphasized the importance of addressing social issues as key interventional mechanisms to enhance outcomes of preterm infants [20, 21]. It is likely that increased knowledge of unmet basic needs among families may increase empathy among providers and help tailor treatment and post-discharge management plans that consider these important challenges. However, it is also possible that knowledge of unmet basic needs, which are common among poor families, may negatively impact provider–family interactions. Previous studies have shown that implicit bias toward socioeconomic status can impact counseling among neonatal providers [22]. Considering how common unmet basic needs are among NICU families, future investigation of SDOH screening and referral systems should additionally address how use of these systems may impact provider–family interactions.

Our findings do not indicate that use of standardized tools to address and identify unmet basic needs should replace existing face-to-face assessments with social workers or other



NICU providers. Rather, a standardized SDOH screening may be used to assist or augment current social work assessments and may even justify the need for expanded social work services. Social workers care for an array of highly complex issues of NICU families, such as mental health, domestic violence, family structure, and substance use. The use of a standardized assessment tool could help social workers streamline the assessment and treatment planning process during the NICU hospitalization and through the transition home after NICU discharge. In addition, standardized SDOH screening may aid social workers in identifying gaps in available community resources, ultimately helping them advocate for NICU families on the community level. Finally, use of SDOH screening tools may streamline social work documentation. In our study, NICU providers suggested a variety of implementation strategies that may work to integrate use of standardized SDOH tool into their local context. Some suggested that primary nurses or pediatric residents could administer SDOH screening tools and then communicate findings to social work via embedded electronic record notes. Others suggested using a tool during the first family meeting and emphasized the need to help overwhelmed NICU parents through the process of obtaining referrals.

This study represents a first step toward translating use of SDOH screening tools from the outpatient environment into the NICU setting. Strengths of our study were using both quantitative and qualitative methods to understand current approaches to SDOH screening and referral and examining a large array of common unmet basic needs among NICU families. A limitation is that we only included two safety-net hospitals in Massachusetts, which may not be generalizable to other NICUs. A larger study to understand the extent that standardized SDOH screening and referral systems among NICUs across the U.S. and any hospital characteristics that may be associated with standardized SDOH screening and referral is needed. Further, examination of perspectives of NICU providers among different geographic regions and NICU structures may elucidate different views about appropriateness and implementation of SDOH screening and referral systems in the NICU. It is likely that assessment and identification of unmet basic needs were underreported in our study, as this could have occurred and not been documented. Further, we did not assess all NICU medical record notes, and focused on those that were most likely to have information on social needs (i.e., social work notes, family meeting notes, history and physical and discharge notes), according to providers in the BMC and UMass NICUs. It is possible that documentation of assessment of SDH were reported in notes we did not examine. We also did not collect data on language status; it is possible that non-English language status impacted communication regarding unmet basic needs. In our qualitative analysis, it is possible that providers may have been reluctant to speak negatively about current approaches to SDOH screening and referral or use of standardized processes. We tried to minimize this by using interviewers that did not work in the NICU setting and reiterating that responses were anonymous to investigators. We also did not assess the extent that social workers may examine some unmet basic needs more than others or social workers' perceptions of the reliability of their current documentation.

## Conclusion

Addressing SDOH is relevant for families of preterm infants as unmet basic needs are highly prevalent among this population. Use of a systematic SDOH screening and referral system is recommended by the AAP and may greatly enhance the capacity to address unmet basic needs in the NICU setting. Further, use of screening tools is highly plausible in the NICU environment where NICU providers are familiar with tools and checklists in clinical care and families frequently interact with providers for weeks to months at a time. Understanding best implementation strategies to translate use of SDOH screening and referral systems into the NICU setting is urgently needed.

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**Table 1**

Characteristics of mother–infant dyads.

	<b>Total</b>	<b>BMC</b>	<b>UMass</b>
<i>N</i> , (% of total)	601 (100)	134 (22.3)	467 (77.7)
Maternal characteristics			
Age, years, mean (SD)	30.1 (5.9)	31.0 (5.8)	29.8 (5.8)
Mode of delivery, <i>N</i> (%)			
Cesarean section	300 (49.9)	85 (63.4)	215 (46.0)
Vaginal	224 (37.3)	49 (36.6)	175 (37.5)
Unknown	77 (12.8)	0 (0)	77 (16.5)
Mother's insurance, <i>N</i> (%)			
Public	344 (57.2)	95 (70.9)	249 (53.3)
Private	232 (38.6)	34 (25.4)	198 (42.4)
Uninsured	18 (3.0)	5 (3.7)	13 (2.8)
Unknown	7 (1.2)	0 (0)	7 (1.5)
Ethnicity/race, <i>N</i> (%)			
Non-Hispanic Black/African American	87 (14.5)	45 (33.6)	42 (9.0)
Non-Hispanic White	284 (47.3)	9 (6.7)	275 (58.9)
Hispanic or Latino, any race	100 (16.6)	21 (15.7)	79 (16.9)
Other	31 (5.2)	1 (0.7)	30 (6.4)
Declined/unknown	99 (16.5)	58 (43.3)	41 (8.8)
Plurality, <i>N</i> (%)			
Singleton	429 (71.4)	113 (84.3)	316 (67.7)
Multiple	135 (22.5)	21 (15.7)	114 (24.4)
Unknown	37 (6.2)	0 (0)	37 (7.9)
Infant characteristics			
Gestational age, <i>N</i> (%)			
<28 weeks	66 (11.0)	20 (14.9)	46 (9.9)
28–31 weeks	130 (21.6)	32 (23.9)	98 (21.0)
32–37 weeks	323 (53.7)	70 (52.2)	253 (54.2)
38 weeks	82 (13.6)	12 (9.0)	70 (15.0)
Birth weight, <i>N</i> (%)			
1500g	191 (31.8)	56 (41.8)	135 (28.9)
1501–2500	265 (44.1)	46 (34.3)	219 (46.9)
2500	145 (24.1)	32 (23.9)	113 (24.2)
Sex <i>N</i> (%)			
Female	276 (45.9)	61 (45.5)	215 (46.0)
Male	325 (54.1)	73 (54.5)	252 (54.0)
Admission diagnosis, <i>N</i> (%) <sup>a</sup>			
Prematurity	457 (76.0)	82 (61.2)	375 (80.3)
Respiratory distress syndrome	258 (42.9)	91 (67.9)	167 (35.8)
NAS/prenatal opioid exposure	52 (8.7)	3 (2.2)	49 (10.5)

	Total	BMC	UMass
Congenital anomaly	13 (2.2)	2 (1.5)	11 (2.4)
SGA/IUGR	14 (2.3)	4 (3.0)	10 (2.1)
Other <sup>b</sup>	77 (12.8)	16 (11.9)	61 (13.1)
Location of birth, <i>N</i> (%)			
Inborn	558 (92.8)	134 (100.0)	424 (90.8)
Outborn	35 (5.8)	0 (0)	35 (7.5)
Unknown	8 (1.3)	0 (0)	8 (1.7)
Disposition, <i>N</i> (%)			
Discharged home	589 (98.0)	124 (92.5)	465 (99.6)
Transferred	12 (2.0)	10 (7.5)	2 (0.4)
Length of stay, days, mean (SD)	38.4 (26.9)	39.5 (27.6)	38.0 (26.8)
Corrected gestational age at discharge or transfer, weeks, mean (SD)	38.6 (3.2)	38.0 (2.7)	38.8 (3.3)

Infants were discharged or transferred between 9/2017 and 9/2019.

*NAS* neonatal abstinence syndrome, *SGA* small for gestation age, *IUGR* intrauterine growth restriction.

<sup>a</sup>One or more admission diagnoses were selected for each patient (select all that apply).

<sup>b</sup>Other diagnoses included surgical diagnoses ( $n = 11$ ), hypoxic ischemic encephalopathy ( $n = 4$ ), hypoglycemia ( $n = 9$ ), meconium aspiration ( $n = 3$ ), and rule out sepsis ( $n = 6$ ).

**Table 2**

Assessment and identification of unmet basic needs in the NICU.

Factors	Unmet basic need assessed among families of infants		Unmet basic needs identified among families of infants		Unmet basic needs identified among families of infants assessed	
	n assessed/601	%	n identified/601	%	n identified/n assessed	%
Childcare	17/601	2.8	4/601	0.01	4/17	23.5
Food/Hunger	42/601	6.9	22/601	0.04	22/42	52.4
Housing	227/601	37.8	31/601	0.05	31/227	24.6
Transportation difficulties	17/601	2.8	10/601	0.02	10/17	58.8
Utilities (e.g., heat)	1/601	0.2	0/601	0	0/1	0
Employment [1]	537/601	89.4	181/601	30.1	181/537	33.7



**Table 3**

Themes and quotes.

Themes	Quotes
Current methods of assessing unmet basic needs are not standardized, inconsistently performed and documented	<p>“Everyone gets the social work consult. The problem is- what’s contained within that consult is a black box. I don’t think that there is a systematic way that it happens each and every time. There’s definitely not a systematic way that it gets documented” (BMC Physician 2)</p>
Addressing social needs of families is a central part of care for preterm infants	<p>“In pediatrics, you don’t treat only the patient, you end up treating the family. I think that’s true here in the NICU, too, especially for the patients that are here for months and months and months.” (UMass Physician 5)                      “I think when we in the NICU discharge complex patients the effect of the social determinants of health is amplified.... I think it is an important job to identify if [SDOH] are there and at least try to address them, because it has an enormous impact on more than some of the things that happen in the NICU on the long term outcome.” (UMass Physician 10)</p>
Use of a standardized screening tool is feasible and beneficial	<p>“I do think it’s great to ask these questions and have standardization.... As nurses a lot of it’s [discussions of unmet basic needs] at the bedside. We’ll have conversations and recognize that they need help from different sources, but we don’t necessarily have, this is what we need to ask and this is where it’s documented that you find out this information.” (BMC Nurse 5)                      “I love this and I love how it’s organized and how the resources are organized” (UMass Physician 3)</p>
Some community resources are increasingly scarce; families do not always recognize the limitations of the NICU team at addressing unmet basic needs	<p>“I think a lot of people have heard by word of mouth on the street, ‘Come to BMC, they’ll give you everything you need.’ And, that’s just not so anymore. There was a time when this hospital was extremely generous. People were given car seats for free, they were given Pack ‘n Plays for free, they were given a lot of things for free. Those days are long, long gone, and yet the expectation is still there. So, I hear from many patients, ‘Well, my friends told me to ask you to help me get an apartment that you could help me get an apartment.’ I can’t do that. I just can’t. So, that’s the only thing that I worry about [with] a screener like this. You don’t know how it’s interpreted. It also depends [on] how questions are asked. Like, ‘Do you always have enough food?’ That’s a perfectly reasonable question.” (BMC, Social Worker 1)</p>
Use of a SDH screening and referral system in the NICU needs to be tailored to the emotional needs of families with hospitalized infants	<p>“People don’t always read things when they’re in a crisis. I know it firsthand. Working with families for the period of time I have, I give them resources and they disappear sometimes.” (UMass Social Worker 1)</p>
Use of a SDH screening and referral system in the NICU needs to be tailored to existing NICU work flow	<p>“I think that it could be something that we could do in the first family meeting.” (UMass Physician 5)                      “I would feel better about [a SDOH screener] if it was electronic. I always get concerned with paper being lost or like you said, not passed on to you. So, if at least it was electronic, [our NICU Social Worker] could go in and be like, ‘Oh look, they’ve done their screening and they need support here.’” (NICU BMC Nurse 5)</p>