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Implementing Social Risk Screening and Referral to Resources in the Neonatal Intensive Care Unit

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Abstract

Objective: Social risk screening is recommended by the American Academy of Pediatrics, but this practice is underutilized in neonatal intensive care units (NICU). To address this gap in social care, we aimed to increase rates of: (1) systematic social risk screening and (2) connection with community resources, each to ≥50% over a 14-month period.

Methods: We conducted a quality improvement initiative from 11/2020–01/2022. We adapted an evidence-based screening tool and utilized Plan-Do-Study-Act cycles to integrate screening and referral to resources into routine workflow. Primary outcome measures included percent of: (1) families screened and (2) connection with resources. We examined screening by maternal race/ethnicity and primary language. Process measures were: (1) time from admission to screening and (2) percentage of referrals provided to families reporting unmet needs and requesting assistance. We used statistical process control to assess change over time and chi-square tests to compare screening by race/ethnicity and language.

Results: Rates of systematic screening increased from 0 to 49%. Among 103 families screened, 84% had ≥1 and 64% had ≥2 unmet needs, with a total of 221 needs reported. Education,

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Contributors' Statement Page:

Drs. Cordova-Ramos and Parker contributed to the conceptualization and design, analysis, and drafted and edited the manuscript.

MS Jain, Torrice, and McGean contributed to the design, data collection and edited the manuscript.

Drs. Drainoni, Buitron de la Vega, and Vinci and RN Burke and Stickney contributed to the design and reviewed and edited the manuscript.

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employment, transportation and food were the most common needs. Screening rates didn’t vary by race/ethnicity or language. Among families requesting assistance, 98% received referrals. Iterative improvement of a written resource guide, and community partnerships led to increased rates of connection with resources from 21% to 52%.

Conclusion: Leveraging existing staff, our social risk screening and referral intervention built capacity to address the high burden of unmet needs among NICU families.

Article summary:

In a safety-net NICU, we examined whether social risk screening improved not just identification of unmet needs, but also connection with community resources.

INTRODUCTION

In the United States, 44% of children under the age of 3 live in poor or near poor households,[1] which places them at risk of worse health and developmental outcomes than their more privileged peers.[2] Families with young children who live in poverty are more likely to have unmet basic needs such as food or housing insecurity.[1] To offset the detrimental effects of poverty on child health, the American Academy of Pediatrics (AAP) recommends universal social risk screening and referral to community resources in pediatric clinical care.[3,4] While uptake of social risk screening has increased rapidly in outpatient pediatric settings,[5] it remains largely underutilized in neonatal intensive care units (NICU),[6] representing a missed opportunity to address social adversity at the earliest stage of life.[7]

A randomized trial in Boston demonstrated that a social risk screening and referral intervention in pediatric outpatient settings increased families’ receipt of resources.[8] No such evidence exists for inpatient pediatric settings. One recent study examined prevalence of social risks identified through inpatient screening, but did not report on the outcome of referrals.[9] How social risk screening and referral interventions perform in NICUs; and whether implementation of this evidence-based practice improves not just identification of unmet needs, but also connection with community resources among families of hospitalized infants, is unknown.

Systematic social risk screening and referral is particularly relevant for the NICU setting because families of preterm infants are disproportionally low-income,[10] and the burden of unmet needs is higher in the preterm compared to the term population.[11] Unmet needs are exacerbated during the prolonged NICU hospitalization owing to the costs associated with frequent meals and transportation, childcare for other children at home, and forgone income from lost time at work.[12,13] Prior to this quality improvement (QI) initiative, social risk screening had been broadly implemented across outpatient settings in our health system,[14] but this practice had not been integrated into inpatient settings including the NICU. A 2017–2019 chart review indicated that in our NICU and in another safety-net NICU in Massachusetts, without a systematic approach, unmet needs were assessed and documented infrequently and variably (0.2% for utilities, 2.8% for transportation difficulties, 6.9% for food insecurity, and 38% for housing instability).[15] While the vast majority of NICUs employ social workers, staffing models and the scope of their role is variable across NICUs and spans a large array of tasks including assessments of family structure, caregiver mental health, domestic violence, substance use, and other complex social issues (i.e. custody), in conjunction with assessments of unmet basic needs. In safety-net settings like ours, the bandwidth of social workers and the resources at their disposal are often limited.[16]

To fill this gap in social care, we launched a QI initiative to implement social risk screening and referral in our NICU in November 2020. In order to understand both the uptake of screening and the effectiveness of referrals, we established the following SMART aims: Increase systematic social risk screening of eligible families (length of stay ≥1 week); and increase rates of families' connection with resources from baseline to ≥ 50% over 14 months. In addition, we aimed to achieve no disparity in use of screening by race/ethnicity and primary language.

METHODS

Context

Boston Medical Center (BMC) is the largest safety-net hospital in New England, with approximately 2800 births annually. BMC serves an urban community; ~80% of patients have public insurance, and ~50% and ~25% identify as Black and Hispanic, respectively. Nearly 30% of patients have limited English proficiency. The NICU at BMC is a 21 bed, level III unit with ~300 admissions annually. There is one full-time social worker who covers the NICU, labor and delivery and postpartum. Social work consultation is automatic upon admission to the NICU. The goal is for the social worker to meet with each family within 7 days of admission (goal attained 72% of the time) and as needed for the remainder of the infant hospitalization. The social worker documents her meeting summaries in the mother and infant's electronic health records (EHR).

Intervention

We developed a multidisciplinary QI team including NICU leadership (nursing director and physician QI lead), social service researchers, neonatologists, nurses, social worker, a medical student and a family partner. This team developed our SMART aims and key driver diagram (Figure 1) comprised of four drivers: (1) Lack of systematic social risk screening using a standardized tool; (2) Lack of standardized processes to connect families with resources to address unmet needs identified through screening; (3) Lack of a unit-wide approach to integrate social risk screening and resource referrals into routine workflow; and (4) Variable levels of staff's knowledge and skills conducting social risk screening and providing referrals.

During the pre-implementation period, we conducted interventions related to the first two drivers, including selection of a social risk screening tool and development of a one-page resource guide for unmet needs. Our screening tool was adapted from an existing tool –"THRIVE"- which was already being used across outpatient settings and integrated into our health system's EHR (Supplementary figures 1 and 2).[14]

To develop the resource guide, we followed guidance from the AAP child poverty website,[17] used publicly available community resource aggregators[18,19] and engaged social workers and family navigators who had previously participated in the development of resource guides for the outpatient pediatric clinic. This process entailed weekly meetings over 2 months. For each domain of screening, the one-page guide listed information on local community resources and services (Supplementary figure 3). The resource guide was translated into six languages. The workflow for social risk screening and provision of referrals is presented in Figure 2.

Plan-Do-Study-Act cycles

We used the Institute for Healthcare Improvement (IHI) Model for Improvement as a framework for this project.[20] The third and fourth drivers guided our Plan-Do-Study-Act (PDSA) cycles focused on improvements in both systematic screening and connection with resources (Table 2).

For PDSA 1 (November 2020), we trained six champion nurses to conduct social risk screening using a verbal prompt (supplementary figure 4). Using feedback from nurses and families, we selected verbal screening in the form of a structured conversation because this format was perceived as more appropriate for caregivers of hospitalized newborns to allow caregivers space to share concerns and ask questions. Nurses documented screening responses and referrals provided in the EHR. In PDSA 2 (February 2021) and PDSA 3 (May 2021), we focused on increasing screener’s capacity and improving the quality of resources. We trained residents and subsequently all bedside nurses to perform screening, leveraging the original group of nurse champions as internal facilitators to provide ongoing problem-solving support. In parallel, we revised the resource guide based on feedback from families about resources or services that were not helpful (e.g. long wait times, lack of availability of language services). To update the resource guide, we contacted various local organizations and gathered additional input from social workers. The revised guide was presented to NICU staff in webinars attended by agency representatives. Over time, we built relationships with community-based organizations, which resulted in our first partnership in PDSA 4 (June 2021). This meant that families in our NICU reached out to a specific person at the community organization who provided guidance on how to enroll in various services for housing, food, utilities, and childcare.

In PDSA 5 (August 2021), we further streamlined screening and referral processes by creating a “THRIVE station” in the NICU with accessible printed copies of the resource guide, and developed a one-page “resources cheat sheet” with information that nurses could use in their discussions with families about resources. During this time, our team also secured institutional philanthropic funding from the Department of Pediatrics[21] to launch a “Parking and Uber Health Program” to provide improved transportation resources including free parking or rides for families throughout the NICU hospitalization. In October 2021 (PDSA cycle 6), we introduced a second partnership with a community-based organization that specialized in programs for employment and education. This organization provided a multilingual link for an intake form that allowed families to receive a list of available programs, with the option to book an appointment with agency representatives to discuss next steps. Both community partners reported monthly on the outcome of the referrals received by their organizations.

Measures

We tracked data on all infants admitted to the NICU with a length of stay ≥ 1 week. For multiple gestations, we only included the first-born infant.

Main outcomes: The primary screening outcome was the percent of eligible families that were screened for seven social risk factors using the THRIVE tool within 2 weeks of admission based on documentation in the EHR. Timing of screening aimed to maximize time for receipt of resources. Screening was not restricted to this timeframe. The primary referral outcome was the percentage of unmet needs for which families connected with resources within three months of referral. Connection with resources was defined as enrollment in new hospital or community program or service.[8]

Process measures: The screening process measure was time from admission to screening. The referral process measure was percent of families with ≥1 unmet need identified through screening who were provided a resource guide if they desired assistance.

Balancing measure: Percent of eligible families that declined screening as documented in the EHR. We used this measure as a proxy for acceptability and appropriateness of social risk screening in the NICU context.

Other characteristics: Infant characteristics abstracted from the EHR included gestational age, sex, birth weight, and length of hospital stay. We also collected maternal race/ethnicity and primary language to track outcomes by these metrics with the goal of identifying and addressing disparities in the implementation process.[22] We categorized maternal race/ethnicity as non-Hispanic Asian, non-Hispanic Black, non-Hispanic White, Hispanic (any race) and other. Primary language was categorized as English vs. non-English.

Data about screening and provision of referrals was obtained from the EHR. Data on the outcome of referrals was obtained through three main sources: follow-up calls with families 2–4 months after NICU discharge, report from community partners, and Uber Health use logs.

Analysis

Descriptive statistics were calculated for maternal and infant demographics. The outcome and process measures were analyzed using statistical process control charts.[23] For rates of screening, we used the total number of families screened over the total number of eligible families with infants hospitalized that month. For rates of connection with resources, we used the total number of unmet needs for which families enrolled in new resources within 3 months of referral over the total number of unmet needs identified among families in a given month. We used probability-based rules to identify changes in the data that have <5% probability of occurring by chance: a “shift” of 6 or more consecutive points increasing or decreasing.[24] When a shift occurred, the average of the shifted points represents the new mean. Chi-square tests were used to compare screening by maternal race/ethnicity and language. Analysis were conducted using QI macros for Microsoft Excel and STATA/SE 17.0.

This QI project was deemed exempt by the Boston Medical Center/Boston University Medical Campus Institutional Review Board.

Results

A total of 212 infants were eligible for screening from 11/2020–01/2022 (Table 1). The median length of hospital stay was 31.0 (range 7 – 109) days. Non-Hispanic Black and Hispanic mothers of any race represented 41.5% and 29.3% of the population, respectively. Forty-five percent of mothers had a non-English primary language.

Systematic social risk screening did not exist prior to project implementation. Rates of screening reached 49% during the implementation period (Figure 3). Among 103 families screened, 84.4% reported ≥1 and 64.1% reported ≥2 (range 2–6) unmet needs. Overall, 221 unmet needs were reported, and families desired assistance for 190 (86%). Education, transportation, employment and food were the most prevalent reported needs (Figure 4). Median time to screening was 10 days (range 5–16); and 98% of families who reported ≥1 unmet need and requested assistance received referrals. Rates of connection with resources increased from a mean of 21% to 52% over time. There were no significant differences in screening rates by maternal race/ethnicity (p=0.92) or primary language (p=0.84) (Figure 5). Zero families declined screening.

Discussion

Using a QI approach, we implemented a systematic social risk screening and referral intervention within a safety-net NICU in Massachusetts. In this acute inpatient care setting serving primarily low-income families, integrating this practice into routine workflow was feasible and acceptable. We observed no disparities in screening by maternal race/ethnicity or primary language. Systematic screening revealed a substantial burden of unmet needs among families of hospitalized infants. Iterative improvement of a written resource guide and community partnerships increased our capacity to address unmet needs.

Neonatal hospitalizations, which may last weeks to months, provide numerous opportunities for identifying unmet needs and connecting families to resources. Thus, instituting systematic social risk screening and referral during NICU hospitalizations represents a unique opportunity to address unmet needs of families. We found a high prevalence of both short and longer-term needs among families in our NICU. Short-term needs related to the NICU hospitalization itself, such as food, parking and transportation, are financially burdensome and stressful for families of hospitalized children, particularly for low-income families.[13,25] Addressing these short-term needs contributes to greater frequency of family presence in the NICU, thereby increasing opportunities for families to participate in their infants’ care and engage in key health-promoting behaviors such as breastfeeding and skin-to-skin care.[26] Systematic screening in our unit also revealed a substantial burden of longer-term needs, which are essential for families’ economic mobility (e.g. workforce development, educational advancement). While the processes to address these higher-order needs are often complex, early involvement of social services as well as cross-sector partnerships yielded positive referral outcomes. Overall, our rates of connection with resources were higher than those reported in previous prospective studies conducted in outpatient pediatric settings (range of 39% to 47%).[8,27]

The strategies used to integrate our intervention into the NICU setting have implications at multiple levels. At the NICU level, standardizing the assessment of social risks may help units understand the burden of unmet needs of the population they serve. NICU teams may use this information to better address systematic barriers to family engagement, allocate resources, and design interventions. At the hospital level, QI initiatives like this can begin the process of building sustainable cross-sector partnerships to effectively address the most prevalent unmet needs. Successful partnerships are a win-win for both hospitals and community organizations, and have the potential to scale-up within other clinical settings. At the state level, perinatal quality collaborations may be leveraged to disseminate standardized social risk screening and referral across multiple NICUs, which can accelerate the spread of this potentially better practice for greater public health impact.[28]

We have many “lessons learned” from this project regarding facilitators and barriers to implementation of social risk screening and referral in the NICU setting. Facilitators that bolstered uptake of the intervention and staff buy-in included: (1) leveraging the EHR and streamlining procedures to reduce the time burden on clinically busy staff, (2) having an engaged group of nurse champions, and (3) frequently soliciting and incorporating feedback from nurses and families. Mounting evidence on the influence of social risk on health has led to greater recognition that clinical teams have a responsibility to practice social as well as technical medicine.[28] Consequently, social risk screening and referral interventions have involved physicians, nurses, and residents, and not just social workers.[29] In our setting, the social worker did not serve as the primary screener due to limited bandwidth. Thus, it was critical to ensure clarity of roles, and to establish procedures whereby screening results and referrals were communicated to social work. We view the intervention as an augmentation, not a replacement, of the crucial role of social workers in the NICU.

Contextual factors that may have hindered the uptake of screening included that most of this project occurred during the COVID-19 pandemic, which imposed unique challenges due to visitation restrictions for COVID-19 exposed families, as well as issues related to nursing understaffing that limited opportunities for screening. Additional barriers were that some staff lacked confidence and/or comfort conducting social risk screening. This finding aligns with previous reports of inpatient providers’ perceptions around discussions of social needs.[30,31] We overcame this challenge by: (1) conducting training using interactive role-play; (2) using standardized language to introduce the purpose of screener using a family-centered approach; and (3) having champions as internal facilitators. To address staff’s concerns that providing referrals to resources was ineffective we: (1) shared data on referral outcomes and highlighted success stories through family testimonials; (2) conducted informational webinars led by community organizations; and (3) replaced resources that were reported as unhelpful by families.

The intervention was acceptable to families, as demonstrated by the zero screening refusal rate. High caregiver acceptability of social risk screening interventions as part of pediatric well-child visits has been previously reported.[32] However, less is known about the perspectives of families of hospitalized infants. We informally asked families in a follow-up phone call after discharge how they perceived the screening while their infant was in the NICU. Families indicated that highlighting the universal nature of the screening (“we offer this to all families”) was important, as it offered a less stigmatizing way to engage them in conversations about unmet needs. Families largely trusted nurses and believed that the purpose of the screening was “helping families to help the babies.” Families also appreciated being asked in subsequent encounters during the hospitalization whether the resources provided were helpful or not, which prompted efforts to overcome barriers. While families valued having a realistic picture of the multiple steps necessary to enroll in certain resources (i.e. childcare), they reported having limited bandwidth to carry out these requirements, and that they would have liked additional hands-on support (e.g. assistance filling out applications).

Strengths of this study include the use of an equity-focused quality improvement framework.[22,33] To achieve equity, our intervention was designed to preferentially addressed the needs of vulnerable social groups, and our team set equity goals from the project’s inception, and ensured equity of implementation by tracking screening by race/ethnicity and primary language. In addition, we made considerable efforts to track the outcome of referrals, which guided iterative improvements of the resource guide. Limitations include our lack of baseline information on connection with community resources. However, we observed increase in rates of connection over time. Because the families served in our NICU lived in a relatively small geographic area, we tailored our resource guide accordingly. NICUs that serve large geographic areas may need to develop multiple resource guides.

Conclusion

This QI initiative demonstrates the feasibility and acceptability of implementing a systematic social risk screening and referral intervention to address unmet needs in a NICU setting with limited social work support. Universal screening coupled with systematic use of a resource guide and community partnerships increased families’ connection with resources. Careful attention to integrating processes into routine workflows, and utilizing existing staff and resources, will ensure sustainability. Further studies are needed to establish best practices for inpatient social risk screening; we offer implementation strategies that can be adopted or adapted by other teams.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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The funders had no role in the design and conduct of the study.

Abbreviations:

AAP	American Academy of Pediatrics
BMC	Boston Medical Center
EHR	electronic health record
IHI	Institute for Healthcare Improvement
QI	Quality Improvement

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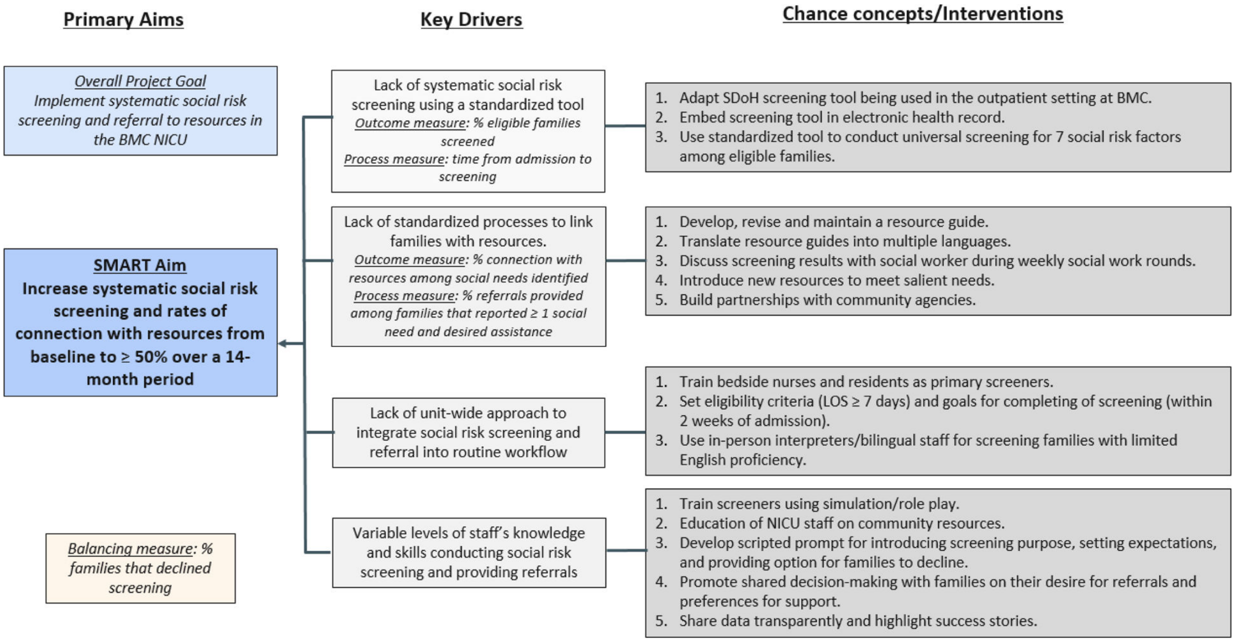


Primary Aims

Overall Project Goal
Implement systematic social risk screening and referral to resources in the BMC NICU

SMART Aim
Increase systematic social risk screening and rates of connection with resources from baseline to ≥ 50% over a 14-month period

Balancing measure: % families that declined screening

Key Drivers

Lack of systematic social risk screening using a standardized tool
Outcome measure: % eligible families screened
Process measure: time from admission to screening

Lack of standardized processes to link families with resources.
Outcome measure: % connection with resources among social needs identified
Process measure: % referrals provided among families that reported ≥ 1 social need and desired assistance

Lack of unit-wide approach to integrate social risk screening and referral into routine workflow

Variable levels of staff's knowledge and skills conducting social risk screening and providing referrals

Chance concepts/Interventions

1. Adapt SDoH screening tool being used in the outpatient setting at BMC.
2. Embed screening tool in electronic health record.
3. Use standardized tool to conduct universal screening for 7 social risk factors among eligible families.

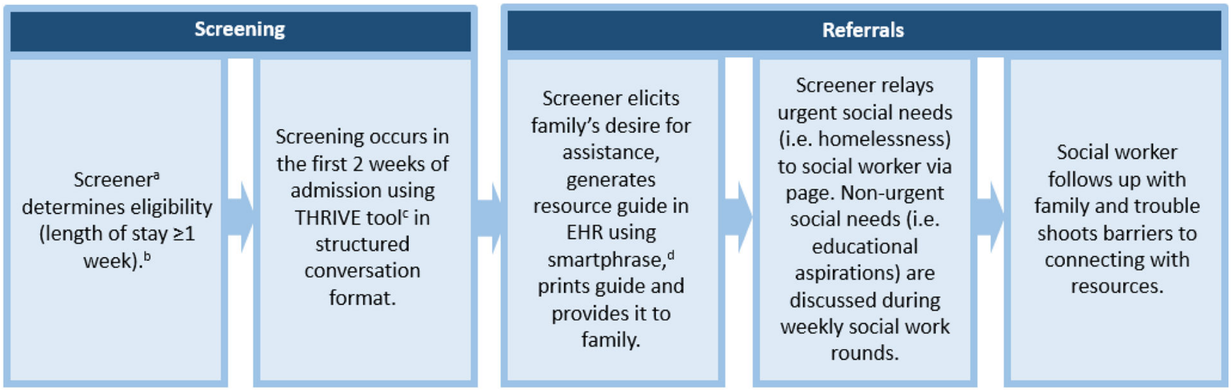
1. Develop, revise and maintain a resource guide.
2. Translate resource guides into multiple languages.
3. Discuss screening results with social worker during weekly social work rounds.
4. Introduce new resources to meet salient needs.
5. Build partnerships with community agencies.

1. Train bedside nurses and residents as primary screeners.
2. Set eligibility criteria (LOS ≥ 7 days) and goals for completing of screening (within 2 weeks of admission).
3. Use in-person interpreters/bilingual staff for screening families with limited English proficiency.

1. Train screeners using simulation/role play.
2. Education of NICU staff on community resources.
3. Develop scripted prompt for introducing screening purpose, setting expectations, and providing option for families to decline.
4. Promote shared decision-making with families on their desire for referrals and preferences for support.
5. Share data transparently and highlight success stories.

Figure 1.

Key Driver Diagram Including SMART aim, Primary Drivers and Change Concepts.



Screener[a] determines eligibility (length of stay ≥1 week).[b]

Screening occurs in the first 2 weeks of admission using THRIVE tool[c] in structured conversation format.

Screener elicits family's desire for assistance, generates resource guide in EHR using smartphrase,[d] prints guide and provides it to family.

Screener relays urgent social needs (i.e. homelessness) to social worker via page. Non-urgent social needs (i.e. educational aspirations) are discussed during weekly social work rounds.

Social worker follows up with family and trouble shoots barriers to connecting with resources.

Figure 2.

Workflow for Social Risk Screening and Provision of Referrals.

[a] Nurses were selected as screeners because they spend the most 1:1 time with families at the bedside and often engage in conversations about unmet needs. Nurses also didn't "turn over" like pediatric residents.

[b] Infants discharged in <1 week would receive social risk screening during their outpatient follow-up visit shortly after discharge.

[c] The adapted THRIVE tool included questions to assess for homelessness, housing insecurity, food insecurity, transportation difficulties, utilities, caregiving, unemployment, and educational aspirations.

[d] SmartPhrases are short phrases used to insert templates into a note in the electronic health record. This was later replaced by readily available resource guides (printed).

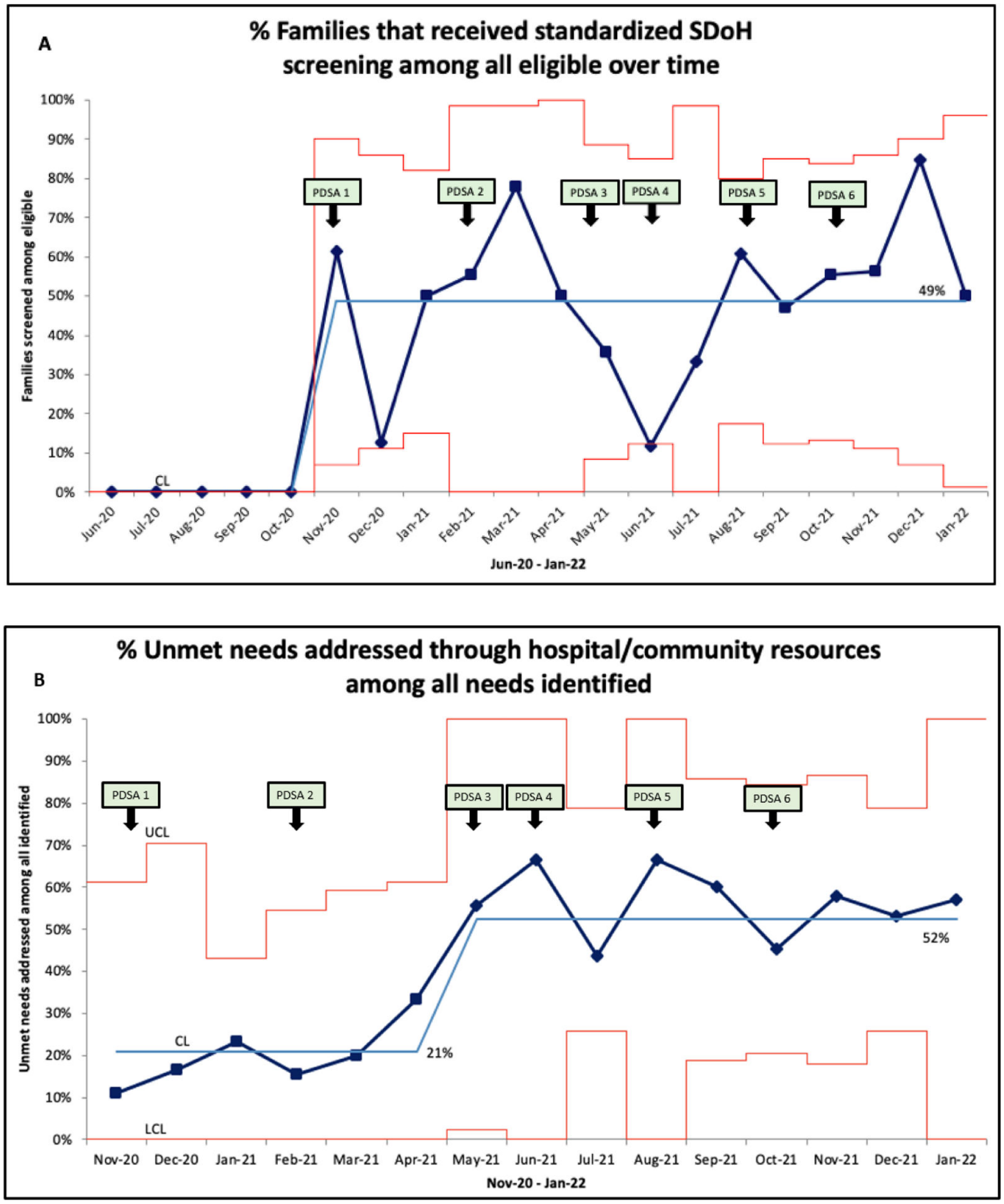


Figure 3.

Statistical Process Control Charts of Outcome Measures Over Time Among Eligible Infants (length of stay ≥1 week). A. Percent of Families Screened Among All Eligible. B. Percent of Unmet Needs Addressed by Community Resources Among All Needs Identified.

PDSA 1: Training champions in screening/referral. PDSA 2: Support EHR documentation. PDSA 3: Training bedside nurses, resource guide revision. PDSA 4: Community partnership #1. PDSA 5: Reduce referral time burden, Uber Health. PDSA 6: Community partnership #2.

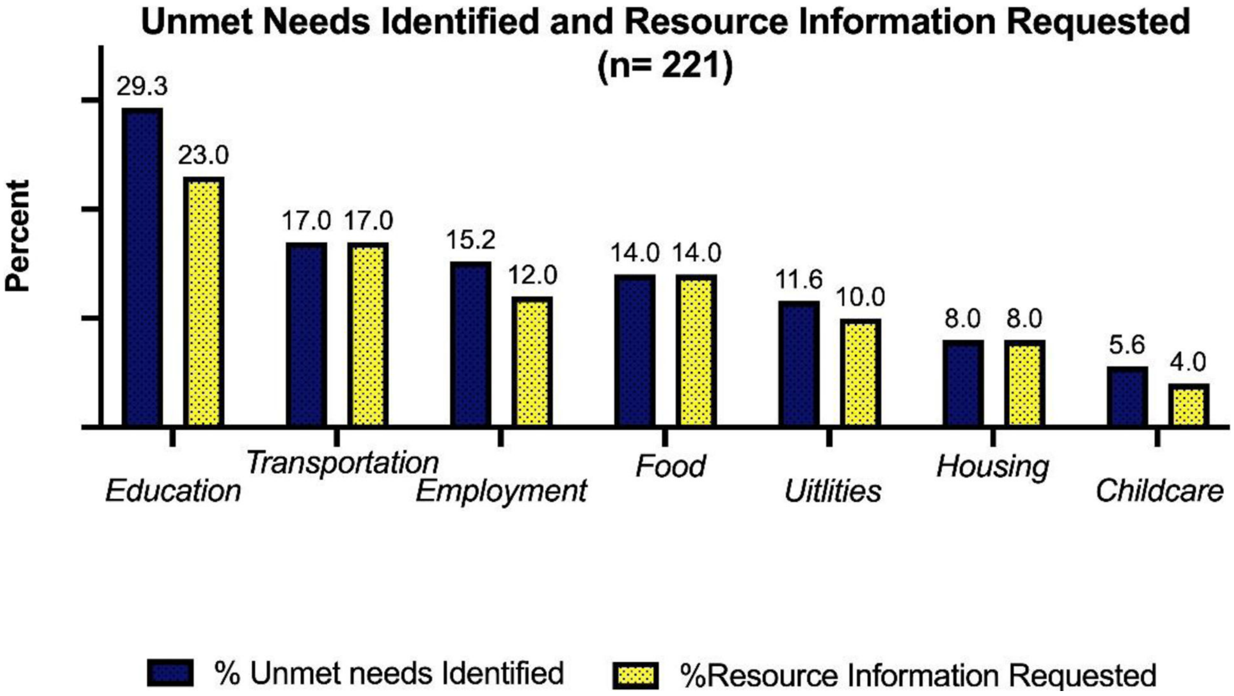


Figure 4.

Percent of Unmet Needs Identified Through Standardized Screening and Percent of Requests for Resource Information.

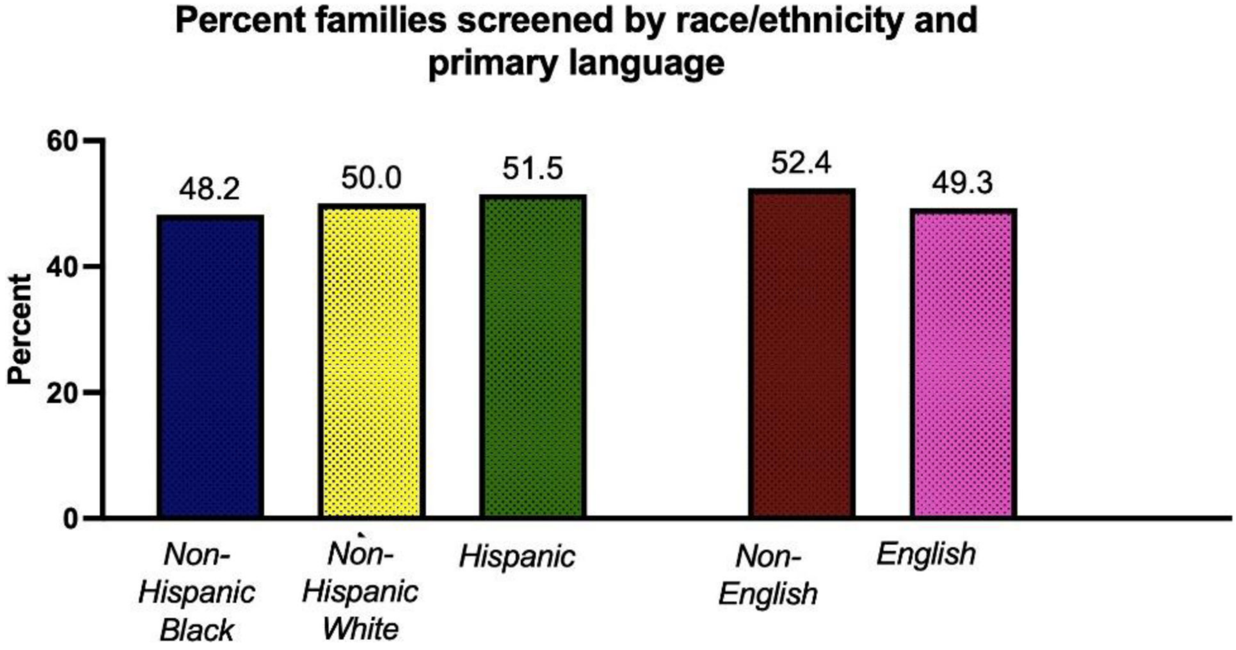


Figure 5.

Stratification of Social Risk Screening by Race/ethnicity and Primary Language.[a]

[a] Two non-Hispanic Asian families who were screened are not shown.

Table 1.

Characteristics of Mother-infant Dyads among Infants Hospitalized ≥1 week in the Boston Medical Center NICU from November 2020 to January 2022 (n=212)

Infant characteristics	**n (%)**
Gestational age at birth	
<28 weeks	28 (13.2)
28–31 weeks	37 (17.4)
32–37 weeks	128 (60.4)
≥38 weeks	19 (9.0)
Birth weight	
≤1500 g	58 (27.4)
1501–2500 g	97 (45.7)
≥2500 g	57 (26.9)
Female sex	95 (44.8)
Length of stay, days, median (range)	31 (7–109)
Maternal characteristics	
Race/ethnicity	
Non-Hispanic Black/African American	88 (41.5)
Non-Hispanic White	39 (18.4)
Non-Hispanic Asian	2 (0.9)
Hispanic or Latino, any race[a]	62 (29.3)
Other[b]	9 (4.3)
Unknown	12 (5.7)
Primary language	
English	110 (51.9)
Spanish	47 (22.2)
Haitian Creole	29 (13.7)
Portuguese	7 (3.3)
Other	14 (6.6)
Unknown	5 (2.4)

[a] Country of origin: South America n=8 (Brazil, Colombia), Puerto Rico n=10, Central America n=31 (Dominican Republic, El Salvador, Guatemala, Honduras), Mexico n=2, unknown n=11.

[b] Arab n=1, Middle Eastern n=2, Indian=2, Multiracial n=4.

Table 2.

Plan-Do-Study-Act Cycles

PDSA cycles[a]		Date	Lessons learned
#1	• Training of six champion nurses to perform universal screening, provide one-page resource guide to families, and document in EHR	November 2020	• Nurse champions were highly engaged but unable to reach screening targets during times of high census and acuity. • Nurse champions had technical difficulties with EHR documentation.
#2	• Training of residents to perform screening/referral • Availability of step-by-step instructions for EHR documentation in nurses' station	February 2021	• Training of residents was difficult to maintain due to frequent turnover (biweekly to monthly) so this plan was abandoned.
#3	• Training of all beside nurses to perform screening/referral • Revision of resource guide based on family feedback	May 2021	• Increased awareness of families' social needs during bedside rounds allowed clinical team to address barriers to caregiver presence in the NICU (i.e. transportation difficulties). • Bedside nurses had variable levels of comfort engaging in conversations about unmet social needs. • Nurses reported higher level of confidence/comfort screening families with whom they had an existing relationship.
#4	• Webinars on community resources by agency representatives • Partnership with community organization #1	June 2021	• Increased shared knowledge among NICU staff of available community resources • Families received direct assistance from community partner on enrollment in specific services/resources.
#5	• Created "THRIVE station" with resource guides readily available (printed) and "resource cheat sheet" • Launched Parking and Uber Health Program	August 2021	• Launching a new resource bolstered staff's buy-in and increased uptake of the intervention. • High family satisfaction with transportation program.
#6	• Partnership with community organization #2	October 2021	• Launching a new resource bolstered staff's buy-in and increased uptake of the intervention.

[a] Throughout our PDSA cycles, we incorporated activities related to staff education and motivation (e.g. on-site trainings, family testimonials), and transparent data sharing (e.g. monthly meetings to share data, dashboard panel in NICU) in order to promote awareness and acceptability of the intervention