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Screening and Referring for Unmet Social Needs in the Pediatric Emergency Department:  
A Pilot Study in San Francisco

by  
Jacob DeWees

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of the  
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by

Jacob R. DeWees

## **Dedication and Acknowledgements**

I dedicate this thesis to my wife, a flowing spring of light and beauty in this world.

*Your soul gives flame to my coldest days*

*Your eyes kindle starlight where I am in darkness*

I would like to offer my utmost appreciation to Professor Linda Franck, who graciously provided me with extraordinary amounts of her time, patience, and support during this process. She has been a great source of insight and guidance throughout the many months of planning, writing, and editing this work. I also give thanks to Professor Nisa Atigapramoj and Professor Angel Kuo for kindly lending me their time, experience, and scholarly counsel over the last year.

I give thanks to my loving parents and my brother for providing me with the type of childhood I wish all children could experience. Finally, I give thanks to Christ our Lord, with Whom all things are possible.

### **Epigraph**

You pass by a little child, you pass by, spiteful, with ugly words, with wrathful heart; you may not have noticed the child, but he has seen you, and your image, unseemly and ignoble, may remain in his defenseless heart. You don't know it, but you may have sown an evil seed in him and it may grow, and all because you were not careful before the child, because you did not foster in yourself a careful, actively benevolent love. Brothers, love is a teacher; but one must know how to acquire it, for it is hard to acquire, it is dearly bought, it is won slowly by long labor.

– Fyodor Dostoevsky, *The Brothers Karamazov*, 1879

# Screening and Referring for Unmet Social Needs in the Pediatric Emergency Department: A Pilot Study in San Francisco

Jacob R. DeWees

## Abstract

**Background:** Unmet social needs (USN) are defined as a privation of basic resources or services (e.g., a lack of food or medicine) that contributes to adverse health effects. Screening for USN in healthcare settings is an increasingly common strategy to connect patients and families with social assistance services. Some studies suggest that people with USN are more likely to seek healthcare services at the emergency department (ED) than those without USN. Screening and referral for USN in the pediatric emergency department (PED) may be a useful approach to help alleviate the health burden of USN on families and children. **Purpose:** The primary aim of this pilot study was to evaluate feasibility and acceptability of USN self-screening (i.e., self-initiated and self-completed USN screening) and self-referral at a single academic PED in San Francisco. Secondary aims were to estimate the proportions and demographics of PED patients and caregivers with USN and to describe the types of reported USN. **Design:** This pilot study used a quasi-experimental, single-group, survey design. **Methods:** Patients and caregivers presenting to the PED were first screened by PED nurses for emergent USN (i.e., expected lack of food or housing within the following 48 hours). PED nurses then facilitated administration of a self-report digital or paper USN survey that assessed six domains of non-emergent USN: concern for lack of food, housing, utilities, medications, healthcare transportation, or interpersonal safety within the following four weeks. Demographic information was collected from survey participants. Referral information for 211, a social assistance service staffed 24/7 by resource specialists, was provide to all participants. Those with emergent USN were offered a

consult with the PED social worker. A follow-up survey was sent to participants two weeks after discharge from the PED to assess the status of USN, use of resources, and perceptions about usefulness. Survey response data was analyzed using Chi-square tests of independence, Fisher's exact tests, and descriptive statistics. Field notes were used to identify themes related to the acceptability and feasibility of the intervention. **Results:** The USN self-screening and self-referral intervention was impeded by several barriers to feasibility and acceptability, including inadequate integration with the PED workflow and a lack of patient or caregiver willingness to engage with USN self-screening. In addition, some nurses described being ambivalent about how USN screening fit with their role or were uncertain about discussing USN screening with patients and caregivers. Only 1.6% (n=111) of the estimated 6,771 eligible individuals seen in the PED completed the USN survey. Of the 111 participants who completed the USN survey, 13.5% (n=15) endorsed at least one USN. Emergent needs were reported by 3.6% (n=4) of respondents. The two most frequently reported USN were utilities (80.0%, n=12) and food (73.3%, n=11). Participants were more likely to endorse USN if they were single, had lower income, or had lower levels household education compared to participants who were married or partnered, had higher income, or had higher levels of household education. Respondents who identified as Black, Indigenous, People of Color, (BIPOC) or Hispanic were more likely to report USN compared to White-identifying respondents. Of the five respondents who endorsed USN during the study period and completed the follow-up survey, four used either 211 or PED-provided resources. Insufficient data precluded determination of participant acceptability. **Conclusion:** Additional research is needed to determine acceptability and feasibility of nurse-facilitated, multi-domain, non-emergent USN screenings and surveys in the PED. In this pilot study, screening implementation and survey enrollment barriers were major obstacles to USN

identification. These barriers were related to inadequate workflow integration, discretionary screening and survey enrollment practices, and indeterminate acceptability of nurse-facilitated USN screening. There also appeared to be a lack of interest or willingness to engage with self-screening among the PED population. Given the lack of outreach and engagement associated with discretionary self-initiated USN screening in this PED, USN initiatives in the PED may want to explore universal staff-initiated screenings in order to improve the likelihood of USN identification. Self-referral was reported by some participants as effective at helping them meet their USN, but there was insufficient data to determine whether self-referral reliably decreased USN. The substantial loss to follow-up of participants with USN suggested participants might have benefitted from automated referral systems or in-person resource navigation that would have allowed for improved service and follow-up capabilities.

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## **List of Abbreviations**

BIPOC: Black, Indigenous, and People of Color

ED: emergency department

HIPAA: Health Insurance Portability and Accountability Act of 1996

IRB: Institutional Review Board

MD: medical doctor

OASIS: Outcomes from Addressing SDOH in System Framework

PED: pediatric emergency department

QR: quick response code

REDCap: Research Electronic Data Capture

RN: registered nurse

SDOH: social determinants of health

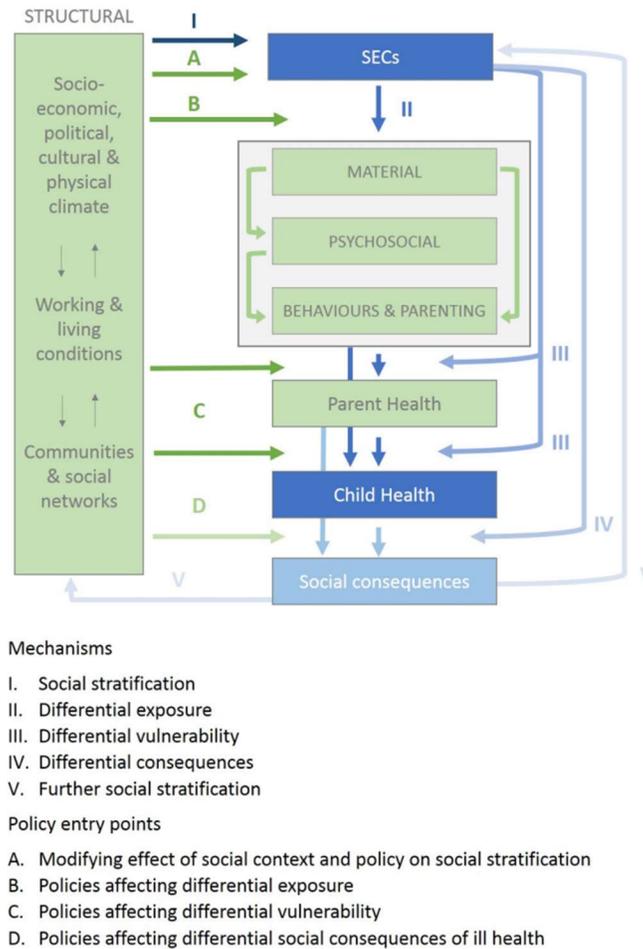
UCSF: University of California, San Francisco

USN: unmet social need(s)

## Background

Social determinants of health (SDOH) are defined as the resources, environments, and relationships that improve, maintain, or impair a person's state of health (Sokol et al., 2019). Recent studies have demonstrated that many pediatric health problems, such as asthma, sickle cell disease, obesity, stress, and mental illness, are influenced by SDOH (Sullivan et al., 2020; Power et al., 2020; Yusuf et al., 2020; Thompson, 2019; Dunn et al., 2013). SDOH strongly affect life trajectories by inducing biological, social, and psychological responses during sensitive and critical periods of child development (Diderichsen et al., 2012; Felitti et al., 1998; Kishiyama et al., 2009; Essex et al., 2014). The effects of adverse SDOH in early childhood are difficult, and sometimes impossible, to reverse once established (Baird et al., 2017; Hanson et al., 2015).

Children of families with fewer socioeconomic resources are more likely to experience adverse SDOH (Hajat et al., 2015; Lemstra et al., 2008; Darmon et al., 2008). For these children, exposures to health-damaging conditions may accumulate over a lifetime, making the children increasingly susceptible to the interacting effects of compounding exposures. Diderichsen's (2012) Model of Social Inequality in Health describes this process. It depicts relations, mechanisms, and positive-feedback loops between societal structures, SDOH, adverse exposures, illness susceptibility, sickness and injury, and socioeconomic consequences. The Conceptual Model Demonstrating the Pathways to Child Health Inequalities (Pearce et al., 2019), seen in Figure 1, is an adaptation of Diderichsen's model that emphasizes the intergenerational nature of these processes. The model also illustrates the structural pathways by which mitigation of the causes of adverse SDOH may contribute to greater social equity and improved health outcomes for the current and next generation of children.



**Figure 1**  
*Conceptual Model Demonstrating the Pathways to Child Health Inequalities (Pearce et al., 2019)*  
 Note. SECs: Socioeconomic circumstances.

“Social needs” is a term used to describe SDOH that have a clear and immediate relationship with health. Most developed societies seek to provide or facilitate resources and services that meet basic social needs. Examples include food, housing, utilities (e.g., water, electricity), and basic healthcare. Screening and referring for unmet social needs (USN) in healthcare settings is increasingly common. A recent systematic review identified thirty-five peer-reviewed studies on the subject within the last twenty years (Ruiz Escobar et al., 2021). Of these, twenty (57%) were published within the last six years. Several approaches to USN screening and referral in healthcare settings have been developed in the United States, but one

approach that deserves further investigation is the referral of patients and families to the 211-service.

The 211-service is a national non-profit entity (United Way, 2018) that provides the public with free information and referrals to local health, human, and social service organizations. Specially trained staff are available twenty-four hours per day, every day of the year, and can be contacted by phone call or text message. Translation services enable communication in over one hundred and fifty languages. Client information is confidential and stored on a HIPAA-compliant database. The 211-service also maintains a resource database that can be accessed by the public online. Using 211 as a referral resource for USN in the ED setting is a novel approach first studied by Wallace et al. (2020, 2021).

In 2018, 211 Bay Area, which covers San Francisco and six surrounding counties in California, received over fifty-six thousand calls for assistance (United Way, 2018). The five most common domains of need were housing (20%), mental health and addiction (15%), health care (13%), food insecurity (9%), and individual, family, or community support (9%). More than sixty-two thousand referrals were placed by 211 Bay Area to other agencies in this same period. Of individuals who used the 211 Bay Area service and responded to a survey about their experience, 98% said that their expectations were met and 88% said the information they were given was accurate. Using 211 as a referral resource is a promising intervention to address USN identified through USN screening in healthcare settings.

### **Statement of the Problem**

Primary care clinics are important healthcare settings in which USN screenings are commonly conducted (Drake, 2021), but in 2019, 6.2% of children in the United States did not receive a well-child check within 12 months prior to being surveyed (National Center for Health

Statistics, 2019). Families may not regularly visit their primary healthcare provider or may not have one at all. Moreover, USN can develop and progress rapidly in the interval between annual primary care visits and not all clinics consistently perform USN screening. One study found that 33.3% of outpatient physician practices do not screen for USN, and only 15.6% screen for the five domains of USN prioritized by the Centers for Medicare & Medicaid Services (CMS): food insecurity, housing instability, utility needs, transportation needs, and risk for interpersonal violence (Fraze et al., 2019; Billioux et al., 2017).

Individuals with USN may utilize the ED at higher rates than those without USN (Wallace et al., 2020). Higher rates of ED utilization and hospitalization are also associated with lower continuity of pediatric primary care (Christakis et al., 2001). One possible reason for this is that the ED is more accessible than outpatient-based healthcare services. In one study of low-acuity visits to the PED, parents most frequently cited the anticipation of specialists and testing (17%), the perceived severity of the child's condition (16%), after-hours closure of primary care (16%), and long primary care appointment wait-times (14%) as reasons for seeking care at the PED (Farion et al., 2015).

Given this context, there is a need and opportunity for the development of USN screening and 211 referral interventions in the PED setting. However, there may be significant implementation barriers to introducing such interventions in the PED setting. Few studies have examined this issue. One study noted that the two barriers to USN screening and referral most frequently cited by clinicians were a lack of time and a lack of resources to address identified USN (Schickedanz et al., 2019). Therefore, the purposes of this study were to pilot a USN screening and referral program, identify barriers and facilitating factors, to gain a better understanding of the USN experienced by those who present to the PED for care, and to gather

insight about the willingness of patients and caregivers to engage with USN screening and the 211-service.

### **Specific Objectives**

The objectives of this research were to:

1. Determine the preliminary feasibility and acceptability of USN self-screening (i.e., self-initiated and self-completed screening) and self-referral in the PED from the perspective of PED nurses and other healthcare professionals.
2. Determine the proportion of families and individuals seen at the University of California, San Francisco (UCSF) PED experiencing USN.
3. Describe the types of USN experienced by families at the UCSF PED.
4. Determine the proportion and characteristics of participants who follow-through with self-referral and access services to meet their USN.
5. Determine the preliminary feasibility and acceptability of USN self-screening and self-referral from the perspective of survey participants.

### **Significance**

The findings from this pilot study of USN screening and referral in a single urban PED provided preliminary data on the challenges and opportunities in introducing USN screening and referral to the 211-service in a busy PED setting. It also provided insights into the attitudes and behaviors of PED patients and caregivers related to USN self-screening and self-referral to 211. The findings may inform future research and quality improvement initiatives relating to USN screening and referral programs in the PED. This study may also contribute to the identification of best practices and raise awareness about magnitude and types of USN experienced by PED patients and families.

## **Nursing Implications**

Nurses are responsible for initiating medical, psychological, and social assessments of patients and families seen in the ED and PED. These responsibilities are broad, but congruent with the holistic philosophy of nursing theory and practice. USN screening and referral interventions are accordingly within the purview of the nursing role. However, USN studies in the ED and PED have previously assigned the task of screening to registration clerks and research staff (Gottlieb, 2014; Wallace, 2020). Some studies utilized teams of resource navigators to facilitate screenings and referrals (Lieberman, 2022; Gottlieb, 2016). This pilot study was unique in that it designated nurses as the primary facilitators of USN screening in the PED.

While it may be practical for registration clerks to facilitate USN screenings in some settings, it is a conceptually appropriate activity for the nursing role. Nurses are healthcare professionals trained in the holistic model of care, which emphasizes the powerful interactions between health and social structures. One study showed that families in the PED were more comfortable asking nurses about community resources compared to registration clerks (Semple-Hess, 2019). Patients and family members place a high degree of trust in the nursing profession (Saad, 2021) and nurses spend more time with patients and families than other staff members. This allows nurses to form relationships with patients and family members that are supportive of sensitive conversations, such as those about USN. While USN interventions could also be appropriately implemented by resource navigators and social workers, not every ED or PED has access to resource navigators and there are unlikely to be enough social workers on staff to meet the workload of universal screenings.

Whether screening for USN is a more appropriate activity for nurses than other staff may also depend on the modalities and methods of screening administration. USN assessments may be subjective or objective, discretionary or protocolized. In some settings, USN screening is structured within the EHR. Once needs are identified, nurses may collaborate with social workers and other professionals to identify and provide social resources to families in need. New USN screening and intervention protocols must be commensurate with nursing workflows and offer adequate education and support to nursing staff. Without buy-in from nurses, USN interventions are likely to encounter significant implementation barriers in settings where nurses facilitate screenings. Nurses must therefore be recognized as key stakeholders in the planning, implementation, and evaluation of USN interventions. Advanced practice nurses, in addition to their involvement in direct USN assessment and referrals, may lead research efforts, provide education to healthcare staff on SDOH, identify methods to reduce screening bias, and implement quality improvement initiatives to streamline screening and referral workflows.

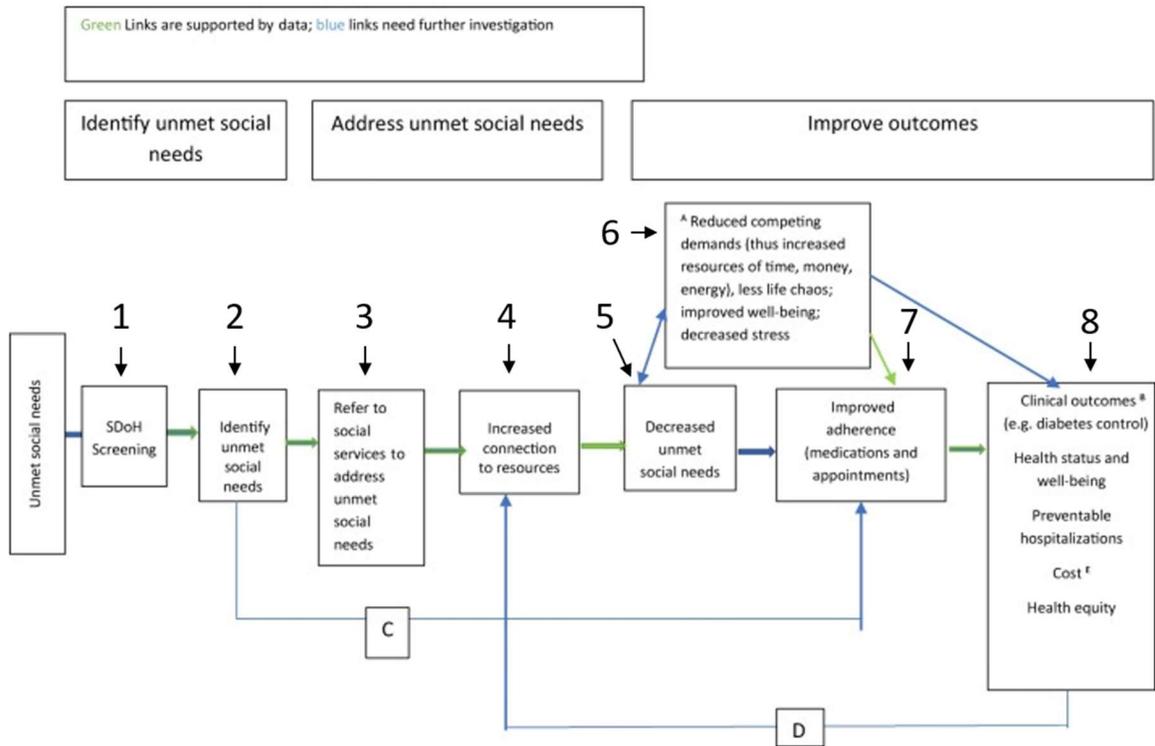
### **Conceptual Framework**

The Outcomes from Addressing SDOH in Systems (OASIS) Framework (Figure 2) (Gurewich et al., 2020) proposes the pathways by which screening and referral for USN in healthcare settings may increase access to resources, decrease USN, and improve the health status and well-being of patients and families. There are eight evidence-based components of the framework.

The first four components of OASIS are 1) SDOH screening, 2) identification of needs, 3) social service referral, and 4) increased connection to resources. These components are supported by studies demonstrating that screening and referral in healthcare settings can successfully identify a variety of needs, provide referral, and facilitate connections with social

resources and services (Garg et al., 2015). The fifth OASIS component, 5) USN reduction, is well supported by a systematic review of sixty-seven studies (Gottlieb et al., 2017). Overall, these studies found that referrals made in healthcare settings decreased USN among participants. The sixth component of the model is 6) the reduction of competing life demands. Gurewich (2020) proposes that such a reduction leads to greater accessibility to the time, energy, money, and resources necessary to improve or sustain health. The seventh component is 7) increased adherence to medications and healthcare appointments. The final component of the model consists of 8) improvements to clinical outcomes, health status and well-being, preventable hospitalizations, cost, and health equity.

The OASIS framework components 1–5 provided a basis for the design of the present pilot study. The framework supported the acquisition of preliminary data on the proportions of individuals and families with USN at an urban PED, as well as proof-of-concept data to determine whether USN self-screening and 211 self-referrals for PED patients and families is feasible, acceptable, and effective in connecting families with needed resources.



**Figure 2**  
OASIS Framework (Gurewich, 2020)

## Review of Literature

Previous research on USN screening and referral interventions most commonly occurred in primary care settings, but research in the ED and PED is growing. Several studies have shown that families benefit from USN screening and referral, with demonstrated improvements in health and social stability (Garg et al., 2015; Andermann et al., 2018).

Seven studies inform this research (see Appendix A.1–A.4 for details of the four most relevant studies). Gottlieb et al. (2014) randomized 552 caregivers of PED patients to receive either computer-based USN self-screening or in-person USN screenings. The computer-based screening group endorsed significantly higher frequency of need on 16 of 23 items (70%) compared to the in-person screening group. Findings suggest that self-report, computer-based screenings may have higher sensitivity for the detection of USN than screenings administered by

research staff. Gottlieb et al. (2016) showed in a randomized control trial in pediatric primary care and urgent care settings that in-person social resource navigation significantly decreased USN and improved caregiver-reported health status when compared to the provision of printed social resource information alone. Oldfield et al. (2021) investigated USN resource information format preferences of caregivers in a pediatric community health center. When asked by which means they preferred to receive information on social needs resources, most caregivers preferred to receive the information by text message (37.7%, n=57), paper printout (31%, n=48), or email (22%, n=24) and only 6.4% (n=10) of the 154 caregivers whose families were experiencing USN preferred an in-person consultation with a care coordinator. However, the types of USN and other characteristics of the caregivers preferring in-person consultations were not reported. Tong et al. (2018) found that while 85% of 123 adult patients in a primary care clinic reported at least one USN, only 3% of patients wanted assistance with USN resources, whereas Wallace et al. (2020) found that 52% of patients with USN in the ED were willing to receive assistance. Schickedanz et al. (2019) conducted a survey of clinicians and healthcare staff in a wide variety of inpatient and outpatient setting on barriers to USN screening reported and found the most common barriers were lack of time and lack of resources to address USN.

The studies that most directly inform the present study were conducted by Wallace et al. (2020, 2021). The original quasi-experimental USN screening pilot study was conducted in 2018 at a large academic medical center ED in Utah (Wallace et al., 2020). The objectives were to 1) develop a process for social needs screening, referral and evaluation; 2) assess the ongoing sustainability of this process; and 3) integrate data from social needs screenings with electronic health records and referral agency databases. The USN screening tool consisted of 10 questions adapted from the validated Health Leads screening toolkit (Health Leads, 2018). The questions

began with the phrase: “In the last 12 months...” to assess USN over a one-year period, acknowledging that USN may be seasonal. Registration staff primarily administered the screening verbally because it was perceived by staff to be more time-efficient than for participants to self-complete the survey. Survey responses were documented on a tablet using the REDCap (Salt Lake City, Utah) data collection platform. Survey data from participants who agreed to be referred was sent automatically from REDCap to the local 211-service upon survey completion. Specialists from the 211-service then contacted participants within 72 hours to assist them with their needs. Participants who agreed to be recontacted by research staff had their needs reassessed two weeks after their ED visit to determine the effectiveness of the pilot study interventions.

Wallace et al. (2020) enrolled 210 patients over a 25-day period. Results showed that 61.4% (n=129) of participants indicated at least one social need. Of those with at least one need, 56.6% (n=73) agreed to be referred to 211 Salt Lake City. Of those who agreed to be referred, 43.8% (n=32) were successfully contacted by 211 within one week of ED discharge. A significant number (56.2%, n=41) of participants who initially agreed to be referred were unable to be contacted again. Overall, 25% (n=32) of participants who initially expressed at least one need were connected with services and an average of four social assistance referrals were placed for each participant successfully contacted by the 211-service. Comparison of the rate of medical service utilization for each participant three months before and three months after screening showed that participants who indicated one or more need were more likely to utilize the ED both before and after screening when compared to those who indicated zero USN. This finding may indicate that patients and families with USN are more likely to utilize ED services and that USN

screening is a useful service in this setting. Those without USN were more likely to see their primary care providers during the same timeframe.

A major strength of Wallace et al., (2020) study was the automated referral system between the ED and 211 Salt Lake City. Leveraging existing community resources such as 211 may be a cost-effective intervention that allows EDs to implement actionable screening and obviate common concerns related to USN interventions. The automated referral system placed the onus on the referred agency to initiate contact, which likely improved follow-up and resource access for individuals with USN. However, such a system may come with additional costs or challenging technology infrastructure requirements. Building HIPAA-compliant data pathways between institutions may be a lengthy and expensive endeavor.

The study had limited validity because of the quasi-experimental design and limited generalizability due to the small sample size and the unique technological capabilities of the intervention. Another study limitation was the high loss to follow-up. The screening workflow may have introduced bias into the recruitment process because the registration staff decided on a case-by-case basis whether to collect survey responses. Staff was also given discretion to administer the screen verbally or to provide a tablet for self-screening. Staff admitted to skipping screenings based on individual appearance or insurance status. Some staff also expressed discomfort asking questions they felt to be stigmatizing, which could have introduced bias through poorly communicated screenings or interactions. Additionally, registration staff only collected responses in English despite self-report screening being available in both English and Spanish. Despite the limitations of the study, it introduces a promising approach to USN screening and referral that deserves further inquiry.

## Literature Synthesis

Collectively, the growing research literature suggests that USN screening and referral may be an appropriate intervention in the ED and PED settings. At least four prior studies have successfully implemented multi-domain USN screening and referral interventions for families in the ED (Gottlieb et al., 2016; Semple-Hess et al., 2019; Wallace et al., 2020, 2021). In these studies, 61.4%–96.8% of participants screened positive for at least one USN. The proportions of patients with USN who were willing to receive assistance with their needs ranged from 3% in Tong et al. (2018) to 52% in Wallace et al. (2020). It is important to note that these studies screened for USN over different timeframes. For example, Wallace et al. (2020) screened for USN experienced in the previous twelve months, while Semple-Hess et al. (2019) screened for USN that were anticipated in the coming twelve months. Rates of reported USN are likely to vary based on the timeframes over which they occurred, or are expected to occur (i.e., higher rates of reported USN within longer timeframes and lower rates of reported USN within shorter timeframes). Differences in sample characteristics are also likely to affect the rates of reported USN.

USN screening and referral programs in primary care, urgent care, and ED settings have been successfully implemented. Strategies to overcome time and resource constraints include computer-based screening, automated referrals, and collaboration with established social support organizations. While at least one study (Gottlieb et al., 2016) concluded that patients and families benefit from USN screening and referral in pediatric urgent care and primary care settings, more research is needed in the PED. As suggested in Gottlieb et al., (2014, 2016), some screening and referral modalities may be more effective than others at identifying and reducing

USN. The findings of Wallace et al. (2020, 2021) suggest that referral to 211-services may be feasible and acceptable.

## **Methodology**

### **Research Design**

This pilot study used a quasi-experimental, single-group, survey design. The study was approved by the UCSF Institutional Review Board on June 14, 2021 (IRB #: 20-31843) (Appendix A.8).

### **Setting**

This study took place at a single urban, academic, PED in San Francisco, California that had 13,104 patient encounters in 2021. Patient-facing staff in the PED included pediatric nurses, patient care technicians, physicians, registration clerks, and social workers.

### **Preliminary Work**

A multidisciplinary working group of pediatric emergency medicine physicians, social workers, pediatric emergency nurses, patient care technicians, and 211 Bay Area representatives met several times from May to September of 2020 to develop the project aims and procedures.

The emergent USN screen, research survey, and implementation workflow were designed with input from the multidisciplinary team. The invitation to participate in the survey was to be presented to patients and caregivers after they had been screened for emergent USN as part of the new standard of care screening protocol. The plan to implement the emergent USN screening protocol concurrently with the USN research survey presented some initial confusion and additional preliminary work was needed to clarify the two separate, but related, activities. The preliminary working group also explored how to incorporate each into the PED workflow and how to motivate staff to engage with families about this sensitive topic.

## **Sample, Inclusion Criteria, and Consent**

This study recruited a convenience sample from a single PED in San Francisco, California. Inclusion criteria for research survey participation were:

- Patients receiving care in the PED between 18 and 21 years of age.
- Adult caregivers of pediatric patients receiving care in the PED.
- Able to read, write and verbally communicate in English or Spanish.

Medically unstable patients and their caregivers were excluded, as determined by the clinical team. An enrollment target of 150–450 participants was established based on an estimate that 5–15% of families seen in the PED over three months would participate in the research survey. Information about the study, including anonymity, confidentiality and right to refuse to participate, was displayed as the first page of the research survey. Completion of the survey implied consent.

## **Procedures**

### ***Emergent Screen***

The emergent USN screening protocol was introduced to staff as a requirement that all pediatric visits in the PED be screened by a nurse for emergent USN. The one-item emergent USN screening question was: “Are you worried you or your family will not have enough food or adequate housing in the next 48 hours?”. The question was provided in English and Spanish on a paper sheet. The screening form included a brief task checklist to be completed by nurses and physicians if the patient or caregiver answered affirmatively to the question. Families and individuals who indicated emergent USN were offered an immediate consultation with a PED social worker. PED physicians were also notified and prompted to contact the patient’s primary care provider for long-term follow-up. Additional print resources and social assistance

information were provided to patients or caregivers by nurses and social workers at their discretion.

### ***USN Research Survey***

Immediately following emergent USN screening, PED nurses were asked to provide eligible participants with an informational QR code flyer and a brief explanation of the study and explain that participation was voluntary. While nurses were responsible for introducing and facilitating the survey, the survey was nonetheless considered to be self-initiated since the decision to complete the survey could be made by the patient or caregiver at any time during the PED visit. If the patient or caregiver wished to participate, they scanned the QR code on the flyer with their smart phone. The QR code opened a link to the survey on REDCap, a web-based HIPAA-compliant and secure electronic data capture and storage platform. A tablet was provided for participants without a smartphone or for whom the QR code did not scan correctly. A paper survey was made available in English and Spanish beginning week 17 of the study. Completed paper surveys were entered into REDCap by the research team before being destroyed. All survey data was stored on REDCap and was accessible only to study investigators.

The emergent screen question was repeated in the research survey as a redundancy safeguard in the event that a participant did not receive emergent USN screening. Participants who indicated emergent USN on the research survey were prompted to notify staff if they had not already done so.

### ***USN Referral***

For participants with emergent USN, a follow-up phone call was to be made by social work within seventy-two hours of PED discharge. Participants who reported USN through the QR survey were guided through an electronic self-referral process to 211 Bay Area. The survey

provided links to a pre-filled text message or initiated a pre-dialed phone call to the 211-service. A 211-service contact card (Appendix A.12) was attached to each paper survey. The contact card was double-sided and contained information in English and Spanish. One side showed two QR codes, one of which initiated a pre-dialed phone call to the 211-service while the other created a pre-filled text message to the service. The other side of the card listed regular contact information for the 211-service.

### ***Follow-up Survey***

A follow-up survey was automatically sent through REDCap by email two weeks after the initial survey to all participants who provided an email address and indicated willingness to be contacted. Reminder emails to complete the follow-up survey were sent automatically up to three additional times if the follow-up survey was not completed.

### **Instruments**

#### ***Measures of Implementation and Staff Perceptions of Feasibility and Acceptability***

Weekly rates of USN survey participation were monitored through the REDCap database. Implementation of the emergent USN screen was tracked through manual counts of the completed screening forms. Weekly screen and survey counts were logged on a spreadsheet and inserted into a run chart that monitored screening and survey participation rates alongside process improvement measures. Process improvement measures and changes in protocol were kept in a research log. The weekly email updates provided by one of the project champions were also used to make assessments of the implementation process.

Study perceptions and insights were gathered from nurses, physicians, medical students, and social workers on a regular basis and recorded as field notes in order to evaluate the feasibility and acceptability of the intervention from staff perspectives. Staff perceptions of the

emergent USN screen were gathered in a similar fashion to the USN survey, primarily through informal conversations, staff meetings, and emails.

### ***Initial USN survey***

The initial research survey utilized survey questions from the Health Leads Social Needs Screening Toolkit (Health Leads, 2018). These questions were designed and validated to assess USN in the following six domains: 1) housing instability, 2) food insecurity, 3) utility services, 4) medication access, 5) healthcare transportation, and 6) risk of interpersonal violence. Many of the original Health Leads questions assessed USN experienced within the twelve months prior to screening. For this study, the time frame was modified to inquire about USN anticipated within the four weeks following the PED visit (e.g., Are you worried that within the next four weeks your family will not have adequate housing?). The reason for this change in time frame was to screen for current and anticipated, rather than past, USN and to then provide referral resources as needed. Additionally, in an attempt to reduce perceived stigma with USN questioning, questions were phrased to be directed non-specifically towards the respondent's family rather than the individual respondent.

The research survey included seven questions about USN (the six questions above plus the PED-developed emergent USN question), seven questions about follow-up permissions and contact information, and seven demographics questions for a total of 21 questions. Demographic questions included household size, gender, monthly household income, marital status, race and ethnicity, household education level, and citizenship status. Branching logic was used in the survey so that the number of questions displayed to participants ranged between 16–21 depending on the responses to the initial questions. Only “yes” or “no” answers were provided as

options for USN questions. Survey responses were to be primarily evaluated based on number and types of USN endorsed. See Appendix A.5 for the full initial USN survey.

### ***Follow-up survey***

The follow-up survey asked questions related to the status of previously identified USN, the emergence of new USN, resource utilization and effectiveness, as well as perceived benefits to health and wellness. Additionally, participant feedback related to the intervention was elicited through a single open-ended question. The follow-up survey was customized for each participant based on their responses to the initial survey to reduce the burden of questions on participants and to increase the likelihood of follow-up completion. The number of questions displayed to participants on the follow-up survey ranged from 8 to 32, depending on initial survey responses and branching logic within the follow-up survey.

The follow-up survey assessed the status of each USN endorsed on the initial survey by asking if the USN had been experienced within the last two weeks or was being experienced currently. The presence of newly developed USN was determined by asking respondents to select from a list or name any USN that were presently being experienced, even if no USN were endorsed on the initial survey. The number of USN endorsed on the initial survey were to be compared to the number endorsed on the follow-up survey. For each USN reported on the initial survey, respondents were asked whether they received assistance with the USN from the 211-service. If the answer was no, respondents were asked to select from a list of reasons why they did not obtain assistance from the 211-service. Selectable reasons included failure to contact the service, the service being unable to provide assistance, no longer requiring assistance, and receiving assistance from somewhere else. If participants indicated they contacted the 211-service, they were asked to rate the effectiveness of the 211-service at meeting their USN on a

Likert-type scale from 1 (completely ineffective) to 5 (completely effective). A similar set of questions were presented to participants who indicated they used PED-provided resources to meet their USN. A final open-ended question with a free-text response field concluded the follow-up survey by asking the respondent for their thoughts, feelings, and opinions relating to the study and their participation. See Appendix A.7 for the complete USN follow-up survey.

### **Data Analysis**

Several analytic strategies were used to evaluate data collected and address the study objectives. The preliminary feasibility and acceptability of USN self-screening and self-referral from the staff perspective were assessed through the descriptive analysis of field notes, conversations with staff, department meetings, and email correspondence. Weekly screening, survey participation rates, and process improvements were summarized and described.

The proportion of families and individuals seen at the UCSF PED experiencing USN was calculated over the project period from three sources: the emergent USN screen, the initial USN survey, and the follow-up USN survey. Descriptive statistics were used and proportions of participants with USN among different characteristic groups were compared using Chi-square tests and Fisher's exact tests.

The frequencies of USN domains reported by participants at each timepoint were calculated. Descriptive statistics were used to examine the proportions and types of USN endorsed at the initial, interim, and follow-up time periods.

The proportion of participants who followed through with self-referral and accessed referral services was calculated. The study plan included non-parametric test comparison of rates of self-referral by participant characteristic; however, insufficient data were acquired to perform this analysis.

Survey completion rates, proportion of 211-service contact versus non-contact, rates of non-response to particular survey items, and Likert-type scale ratings of the intervention were analyzed using descriptive statistics. Open-ended feedback collected from participant follow-up survey responses were summarized.

## **Results**

Enrollment began on June 30<sup>th</sup>, 2021. The proposed enrollment end date of September 30, 2021 was extended to December 31<sup>st</sup> to allow for additional time to implement recruitment strategies. During the study period, the department saw 6,771 patients under 18 years of age, which accounted for 86.4% of all patients seen. While it was planned that 5–15% (n=150–450) of patients and caregivers seen in a three-month period in the PED would participate in the USN survey, only 1.6% (n=111) of the 6,771 patients or caregivers seen in the PED during the extended six-month study period participated. See Appendices A.10 and A.11 for the race and ethnicity of patients served by the department during the study period.

### **Feasibility and Acceptability of USN Self-Screening by PED Staff**

Several barriers to enrollment were observed and strategies to improve feasibility and increase recruitment were implemented throughout the study to improve outreach. The first encountered barrier to enrollment was that staff would frequently forget or decline to introduce the study to families or provide families with the QR survey flyer. This was partially remedied by posting a QR survey flyer on the wall of every exam room in the PED, so that nurses did not have to remember to carry the forms with them. However, the survey continued to be inconsistently discussed or introduced to families by nursing staff at bedside. When these observations were discussed with nurses, some nurses explained that there were competing demands between introducing the emergent USN screening protocol and the USN research

survey, and that it took too much time to introduce both while they cared for up to four patients and complied with universal COVID-19 personal protective equipment precautions. One nurse stated, “It’s hard to do it [screen/introduce survey] when we are busy”. Another nurse told the research team, “Most aren’t going to do it [screen] unless they have to”. A lack of priority when compared to other nursing tasks was also reported, as one nurse commented, “This is too much, there is too much going on for this”. One nurse told the research team that USN screening and survey provision “is not our job” and that the task was more suitable for a social resource navigator, registration clerk, or social worker. Similarly, another nurse asked, “Shouldn’t social work be doing that [screening and introducing surveys]?”

It was also observed that nurses at bedside would skip screenings and surveys when caregivers presented with children or multiple children who were screaming, crying, fearful, anxious, or in pain. Some nurses believed there would be better opportunities to screen and introduce the survey in the registration and triage environment. Therefore, the primary location of emergent USN screening and USN survey introduction was moved from the exam room to the registration and triage window at the entrance to the PED beginning on week 9 of the study. The QR survey flyers remained posted in each exam room as an additional opportunity for enrollment.

Challenges to implementation persisted in the triage area. COVID-19 related barriers such as plexiglass windows, masks, and social distancing often made verbal and non-verbal communication between nurses and families difficult. The frequent need to repeat oneself or speak with a raised voice sometimes limited discussions of sensitive topics in this area. Triage was also described by nurses as frequently understaffed, which made screening and introduction of the survey difficult when multiple families were in the waiting room or when more than one

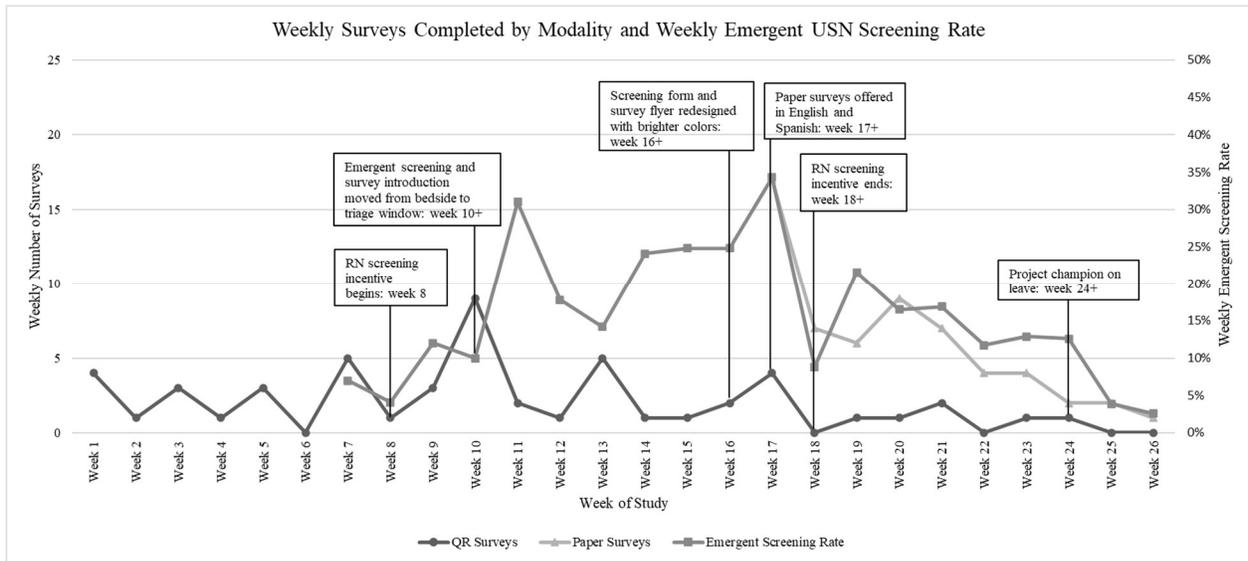
patient would check into triage at the same time. Another barrier was the placement of the survey flyer and the emergent USN screening form in two separate stacks at the triage window. This resulted in some staff introducing the emergent USN screen without introducing the survey. To correct this, the USN screening form and the QR survey flyer were stapled together from weeks 10–16. This change led to more families receiving the survey flyer, as demonstrated by a peak in QR survey participation on week 10 (Figure 3).

Additional strategies were used to improve enrollment. Email reminders and project updates were sent to PED nursing staff by a project champion on a weekly basis starting at week 8. Scripts were posted in triage beginning on week 9 to standardize introductions to the USN screen and survey for those nurses who felt unsure of how to best approach the subject with families. Survey flyers and USN screens were printed in bright colors as visual cues to staff beginning on week 16. As an incentive to administer screenings, a \$15 DoorDash gift certificate was awarded to the nurse with the most weekly emergent USN screens between weeks 8–17. The spike in screening and survey completion rates seen on week 10 and the decline in weekly screening and survey participation rates after the incentive ended on week 17 suggest that the incentive was an effective strategy to increase nursing engagement and survey enrollment (Figure 3).

A QR-based survey was originally proposed by the planning group as a strategy to promote enrollment due to the simplicity of QR technology, the near-ubiquity of smartphones, and the associated sense of confidentiality and anonymity QR surveys can provide. However, survey participation was lowest during weeks 1–16 when the survey was exclusively QR-accessible. During this period, only 43 QR surveys at an average of 2.7 surveys per week were received. Due to the low response rate, the survey was additionally provided in a paper format in

both English and Spanish beginning on week 17. The paper survey replaced the QR survey flyer that was stapled to the emergent USN screening form and was distributed at the triage and registration window. The QR survey remained accessible from the flyers on the exam room walls or from the study's loaner-tablet that was housed in the PED. From weeks 17–26, 59 paper surveys were received at an average of 6.6 paper surveys per week, peaking on week 17. During the same period, the study received 9 QR surveys at an average of 1 QR survey per week.

Prior to the attachment of the paper survey to the USN screen, the weekly QR survey response rate appeared to be largely independent of the weekly emergent USN screening rate. After attachment, the number of paper surveys completed each week tracked more closely to the number of screens administered. These data indicate that more surveys were completed when offered in a paper format compared to QR only. Chi-square tests of independence demonstrated no significant differences in the rates of USN reporting between paper and QR survey modalities ( $p=0.272$ ). See Figure 3 below for week-by-week survey modality frequencies and emergent USN screening frequencies.



**Figure 3**  
*Weekly Number of Paper and QR Surveys Completed and Emergent USN Screening Rate*  
 Note. Paper surveys offered beginning week 17. Weekly emergent USN screenings tracked beginning week 7.

As the study enrollment period continued past week 18, there was a steady decline in screening and survey recruitment. Staff voiced disappointment when the DoorDash incentive was discontinued, and some nurses appeared to show signs of fatigue with the study. For example, one triage nurse was observed removing the screening and survey forms from the triage station and placing them out of sight and reach.

### Barriers to Implementation

Throughout the study period, the research team and some of the nursing staff made several administrative requests to integrate the emergent USN screening question into the EHR, but integration was ultimately unsuccessful due to IT constraints. This created a lapse in screening accessibility, consistency, and accountability. The inability to integrate the screen into the workflow required nurses to deviate out of their routine workflow in order to facilitate screens and surveys. This may have fostered perceptions among nursing staff that the study was burdensome or disruptive to their jobs. Such feelings would oppose a natural assumption of

professional responsibility for the task and would foster a desire to reassign USN screenings and surveys to social workers, registrations clerks, or resource navigators.

Failure to make the screen a required assessment within the EHR created a situation where screens were administered at the discretion of the staff. Throughout the study, the screening rate was primarily sustained by nursing staff who remembered to screen, were motivated to screen, and were able to prioritize screening. Several nurses stated that while they supported the concept of emergent USN screening, it was challenging to screen without having the question built into the EHR. Multiple conversations with nursing staff over time suggested that a lack of EHR integration was the most significant barrier to emergent USN screening. Future emergent USN screens in the PED should be required documentation within the EHR in order to support the nursing workflow, encourage professional accountability, promote consistency, and mitigate screening bias.

There were other barriers to screening as well, including staffing shortages, high and low census periods, COVID-19 related barriers, and a lack of study funding. It is also possible that nursing support and education efforts were inadequate. Persistent prompting and email reminders to complete screenings and provide surveys to families may have exacerbated study fatigue for some nurses and contributed to a drop-off in screening and survey participation rates after week 17. Several inquiries to reassign USN screening to social workers or registration clerks suggest there may have been a lack of conceptual support for nurse-facilitated USN screening. However, it is not known whether this was the predominant viewpoint, and the desire to reassign these activities was likely to some extent moderated by the lack of nursing workflow integration. A small group of nurses offered frequent and vocal support for the intervention. Future USN initiatives in the PED should make preliminary assessments of staff attitudes towards USN

interventions and thoroughly explore the perceptions of proposed changes to nursing responsibilities.

Many of the barriers to emergent USN screening were also indirect barriers to USN survey participation. While independent of one another, the screen and the survey were intended to be introduced to families concurrently. Therefore, correlations between screening rates and survey participation rates were anticipated. However, this was not observed until week 17 of the study when paper USN surveys were physically attached to the emergent USN screening forms. This change was a forced function, and it appeared to greatly decrease the likelihood that nurses would screen for emergent USN without providing or discussing the survey. However, while survey participation was higher after this change than before, the screening rate began to steadily decline from week 17 until the conclusion of the study. One possible explanation for this is that nurses were less likely to administer the screen if they also had to introduce the survey. Given that the PED setting is traditionally and culturally centered upon concepts of urgent and emergent medical acuity, surveying for non-emergent USN may have been perceived as less congruent with the primary purposes of the PED compared to emergent USN screening, though more research would be needed to accurately characterize these attitudes.

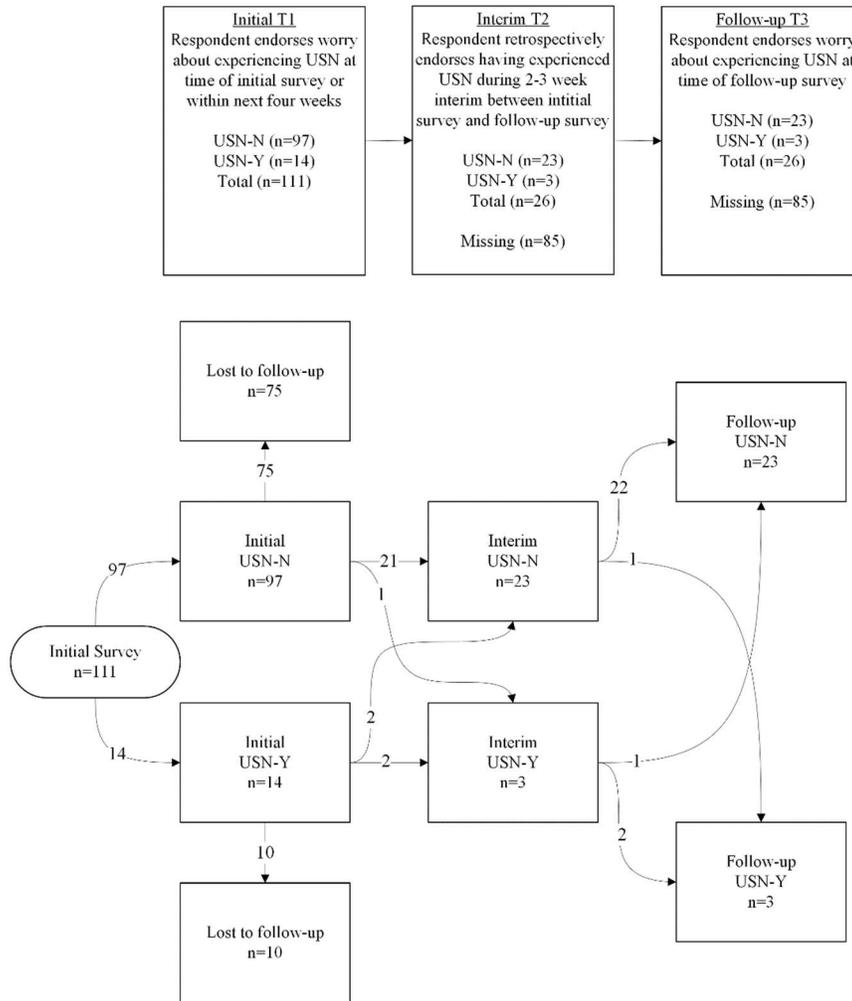
### **Emergent Unmet Social Needs Screening Protocol**

The emergent USN screening protocol was concurrent with but independent of the USN survey. Nonetheless, the findings are useful for comparison with respect to implementation in the PED. During the same USN survey period, the emergent USN screen was completed for 927 (13.7%) of the approximately 6,771 individuals who were eligible for screening. Of the 927 screened, 30 (3.2%) endorsed emergent USN. While the 13.7% (n=927) emergent screening rate

is higher than the USN survey response rate of 1.6% (n=111), it also represents a small proportion of the eligible individuals.

### **Survey Response Rate and Loss to Follow-up**

The initial survey was completed by 111 respondents, falling short of the target enrollment of 150 participants. There appeared to be a lack of interest or willingness to engage with self-screening among the PED population, as the research team observed that surveys and recruitment flyers were frequently declined, discarded, or left in the exam room uncompleted. The follow-up survey was completed by 26 (23.4%) respondents. The loss-to-follow-up rate for respondents with and without USN on the initial survey was 71.4% and 78.1%, respectively. See Figure 4 for participant tracking.



**Figure 4**  
Tracking Survey Responses and Follow-up

### Sample Characteristics

Most respondents to the initial survey were female (68.5%, n=76), White-identifying (36.9%, n=41), U.S. citizens (94.3%, n=98), married or partnered (70.6%, n=72), with a college-degree in the household (68.3%, n=71), and a household size between 1–4 members (74.7%, n=74). The median monthly household income category was greater than \$15,000. There was a higher ratio of White respondents to BIPOC or Hispanic respondents (1:1.4) compared to the overall PED patient ratio of White to BIPOC or Hispanic patients (1:5.9). See Table 1 for complete sample characteristics.

**Table 1**  
*Sample Characteristics*

		n	%
Total sample		111	100%
Gender	Female	76	68.5
	Male	28	25.2
	Transgender Male	1	0.9
	Missing	6	5.4
Race/Ethnicity	White	41	36.9
	Hispanic	24	21.6
	Asian	16	14.4
	Two or more	12	10.8
	Black	9	8.1
	Hawaiian/Pacific Islander	3	2.7
	Missing	6	5.4
	Monthly household income	No income	6
\$0-2k		9	8.1
\$2k-5k		14	12.6
\$5k-10k		12	10.8
\$10-15k		10	9.0
\$15k+		39	35.1
Missing		21	18.9
Marital status	Married	66	59.5
	Single	23	20.7
	Domestic partners	6	5.4
	Separated	3	2.7
	Divorced	2	1.8
	Widowed	2	1.8
	Missing	9	8.1
	Highest level of education in household	Some HS	7
HS diploma		9	8.1
Some college		17	15.3
College degree		71	64.0
Missing		7	6.3
Number of household members	1	1	0.9
	2	18	16.2
	3	32	28.8
	4	23	20.7
	5	15	13.5
	6+	10	9.0
	Missing	12	10.8
U.S. citizenship	Yes	98	88.3
	No	6	5.4
	Missing	7	6.3

### Characteristic Comparisons

Pearson's Chi-square tests of independence and Fisher's exact tests were used to compare the demographic characteristics between respondents with and without USN. Characteristics were dichotomized and compared using Fisher's exact test when the cell sizes did not meet the assumptions of the Chi-square test and when conceptually appropriate.

Respondents who endorsed USN were more likely to report household incomes less than \$5,000 per month than respondents with higher incomes ( $p < 0.001$ ). A monthly income cutoff of \$5,000 was used in the analysis because it approximates “extremely low-income” for a family of 4-5 people in the San Francisco Metropolitan Area in 2021 (United States Department of Housing and Urban Development, 2021). This designation is defined as 30% of the median family income (MFI) of San Francisco, Marin, and San Mateo Counties. Low-income (80% MFI), very low-income (50% MFI), and extremely low-income levels are often required to access government-subsidized social services, including below-market-rate housing programs. Some services, such as supplemental nutrition programs, use the federal poverty level in their calculations to determine eligibility (California Department of Social Services, 2022).

Respondents living in households with a college degree were less likely to report USN than those living in a household without a college degree ( $p = 0.011$ ). Respondents were less likely to endorse USN if they were married or partnered compared to those who were single ( $p = 0.024$ ). White-identifying respondents were less likely to report USN compared with those who identified as BIPOC or Hispanic ( $\chi^2 = 4.162, p = 0.041$ ). No significant differences in the proportions of respondents with or without USN were observed between those with household sizes less than five members and those with larger households ( $p = 0.197$ ), respondents who identified as male versus female genders ( $p = 0.345$ ), or between U.S. citizens and non-citizens ( $p = 0.561$ ).

**Table 2**  
*Characteristic Analysis*

		USN-Y (n=15)		USN-N (n=96)		P-Value <sup>1</sup>
		n	%	n	%	
Total sample		15	100	96	86.5	
Gender	Female	13	86.7	63	70.8	0.345
	Male	2	13.3	26	29.2	
	Total	15	100	89	100	
	Missing	0	0	7	7.3	
Race/Ethnicity	BIPOC or Hispanic	12	85.7	52	57.1	0.041
	White	2	14.3	39	42.9	
	Total	14	100	91	100	
	Missing	1	6.7	5	5.2	
Monthly Household Income	\$0-\$5k	12	100	17	3.8	<0.001
	\$5k or more	0	0	61	88.2	
	Total	12	100	78	100	
	Missing	3	20	18	18.8	
Marital Status	Single	6	42.9	22	25	0.024
	Partnered	8	57.1	66	75	
	Total	14	100	88	100	
	Missing	1	6.7	8	18.8	
Household Education	No college degree	9	64.3	24	12.2	0.011
	College degree	5	35.7	66	73.3	
	Total	14	100	90	100	
	Missing	1	6.7	6	6.3	
Household Size	1-4	9	60.0	65	77.4	0.197
	5 or more	6	40.0	19	22.6	
	Total	15	100	84	100	
	Missing	0	0	12	12.5	
U.S. Citizenship	Yes	12	92.3	86	94.5	0.561
	No	1	7.7	5	5.5	
	Total	13	100	91	100	
	Missing	2	13.3	5	5.2	

*Note.* Column percentages

<sup>1</sup>The P-Value for Race/Ethnicity was calculated using Chi-square test of independence. All other P-Values were calculated using Fisher's exact test.

### Proportions of Respondents with Unmet Social Needs

On the initial survey (T<sub>1</sub>), 12.6% (n=14) of the 111 respondents endorsed at least one USN. Of these 14, 78.6% (n=11) indicated they wanted assistance with their USN. A total of 13.5% (n=15) respondents endorsed at least one USN at any time during the study period.

On the follow-up survey (T<sub>3</sub>), 11.5% (n=3) of 26 respondents recalled having experienced at least one USN during the interim period (T<sub>2</sub>) between the initial survey and the follow-up survey. The same number of respondents, although not all the same respondents, reported at least USN at the time of the follow-up survey (T<sub>3</sub>). See Table 3 for the proportions of respondents with USN over time.

**Table 3**  
*Respondents And USN Over Time (T)*

	Initial survey (T <sub>1</sub> )		Interim (T <sub>2</sub> )		Follow-up (T <sub>3</sub> )		Total	
	n	%	n	%	n	%	n	%
USN-N	97	87.4%	23	88.5%	23	88.5%	96	86.5%
USN-Y	14	12.6%	3	11.5%	3	11.5%	15	13.5%
Total sample	111	100%	26	100%	26	100%	111	100%

*Note.* Column percentages.

It is important to acknowledge that the questions on the follow-up survey concerning USN experienced during the interim period were retrospective, and that they differed from the other questions asked on the initial and follow-up surveys concerning the present or prospective status of USN. The interim USN questions asked if the respondent “experienced” any USN during the interim period, whereas the initial and follow-up USN questions asked if the respondent was presently “worried” about any USN. The language of “worry” was intentionally used to identify individuals and families at risk of experiencing USN in the near future, as well as those currently experiencing USN.

### **Frequencies of Unmet Social Needs**

The percentage of respondents who endorsed emergent USN within the study sample was 3.6% (n=4), similar to the 3.2% (n=30) of families and individuals who endorsed emergent USN via the emergent USN screening protocol. Emergent USN were endorsed on the survey by 26.7% (n=4) of respondents who reported at least one USN. The median number of USN endorsed by respondents on the initial survey was three (range: 1–6). Of the 14 respondents with USN on the initial survey, 14.3% (n=2) endorsed all six domains of USN.

On the initial survey, the most frequently reported USN was food, endorsed by 71.4% (n=10) of the 14 respondents with USN. Almost two-thirds of respondents were worried about their ability to pay for utilities (64.3%, n=9). Nearly half of the respondents with USN were worried about housing (42.9%, n=6), medications (42.9%, n=6) and transportation (42.9%, n=6). Concern for interpersonal safety was the least frequently reported USN (14.3%, n=2) and also

the most frequently unanswered USN question (3.6%, n=4). Throughout the entire study period, the most frequently endorsed USN were food and utilities, which together comprised 48.9% of all reported USN. The most persistent USN appeared to be utilities, which was endorsed by three respondents at the time of follow-up survey completion. See Table 4 for the USN domain frequencies observed over the entire study period.

**Table 4**  
*Total Frequencies of USN Per Domain Observed During Study Period*

USN Domains	Utilities	Food	Housing	Medications	Transportation	Safety	Total USN
	12	11	7	7	7	3	47
	25.5%	23.4%	14.9%	14.9%	14.9%	6.4%	100.0%
	80.0%	73.3%	46.7%	46.7%	46.7%	20%	

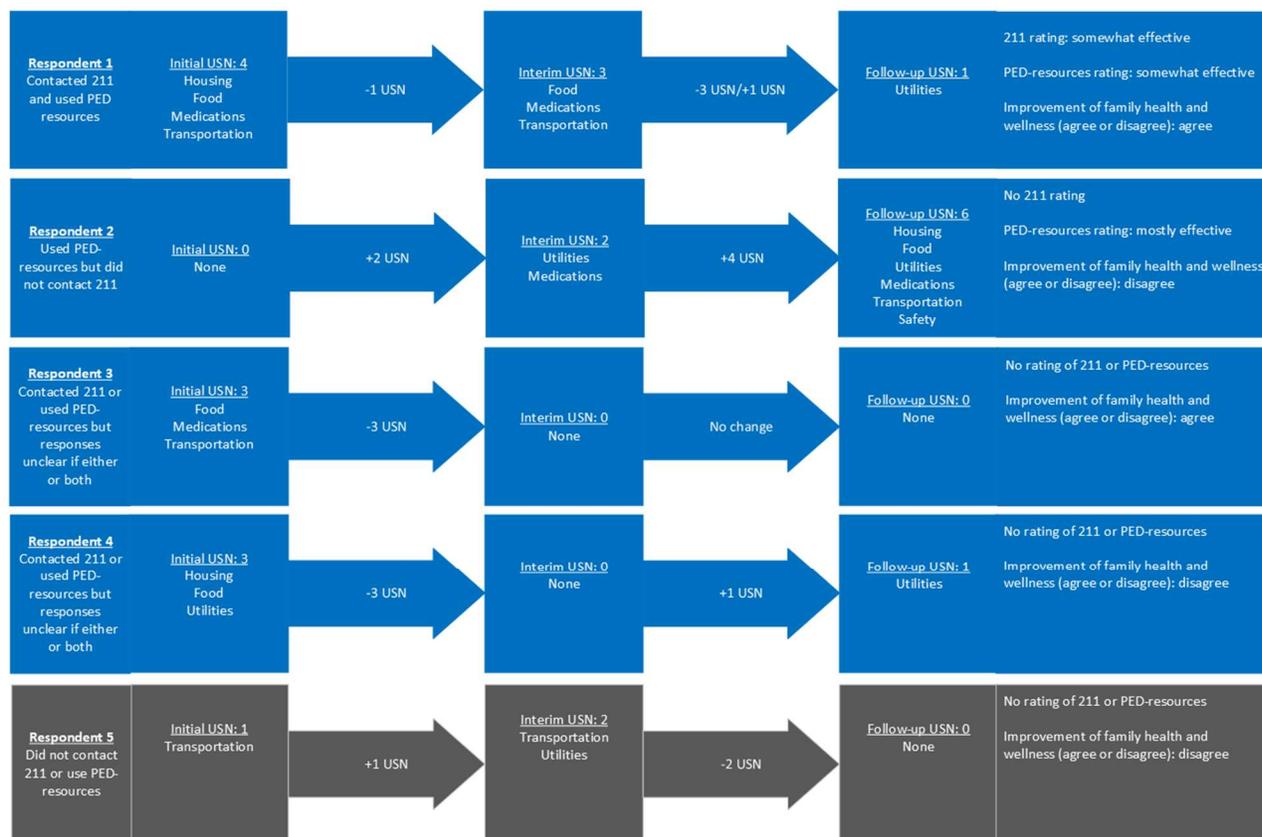
Analysis of interim and follow-up USN was limited to describing the frequencies due to the small number of respondents who endorsed USN during the study period and completed the follow-up survey (n=5). Three respondents reported USN during the interim period. The most frequent USN domains experienced during the interim period were medication affordability (n=2), healthcare transportation (n=2), and utilities (n=2), followed by food (n=1). Two respondents who initially reported USN endorsed no USN during the interim period.

Three respondents (two of which also reported interim USN) reported USN at the time of the follow-up survey. The most frequently endorsed USN at the time of the follow-up survey was utilities (n=3). Because one respondent endorsed all six domains of USN at follow-up, the other five domains of USN were each endorsed once at the time of follow-up. This same respondent did not endorse any USN at the time of the initial survey. Two respondents (one of which did report interim USN) endorsed no USN at the time of follow-up survey completion.

Of the four respondents who endorsed USN on the initial survey and completed the follow-up survey, there was a median reduction of two USN (range: -3 to +1) from the time of

initial survey to the interim period. Three of the four respondents endorsed fewer or no USN during the interim period. One respondent endorsed one additional USN at the interim period.

Of the five respondents who endorsed USN during the study period and completed the follow-up survey, four reported a reduction in their total number of USN at the time of follow-up. Two of these respondents did not report any USN. The median reduction of USN between the initial survey and completion of the follow-up survey was -2.5 (range: -3 to -1) for respondents who endorsed at least one USN on the initial survey. See Figure 5 for USN mapping of the five respondents who endorsed USN at any point over the study period and completed the follow-up survey.



**Figure 5**  
*USN Map of Respondents Who Completed Follow-up Survey (n=5)*  
 Note. Blue respondents used PED-provided resources or the 211-service while the gray respondent did not.

### Participants Who Used Social Resources

Of the five respondents who endorsed USN at any point over the study period and completed follow-up, one indicated that they contacted the 211-service and used the PED-resources. Another participant used the PED-resources but did not contact 211. Two participants had conflicting responses on the follow-up survey, and while it is evident that these participants used at least one of the resources, it is impossible to determine which was used or if both were used. For instance, both respondents answered “yes” to the question “Was your family able to get help obtaining food using 211 or the resources provided by the emergency department?”. However, they answered “no” to the questions “Did you contact 211 in the last two weeks?” and “In the last two weeks, did you use any resources provided by the emergency department to help

meet your family's needs?". During analysis it was noted that the phrasing of the follow-up survey questions likely contributed to the inconclusive responses. The discrepancies could be explained by the fact that the respondents did not complete the follow-up survey exactly two weeks after the initial survey. This lack of clarity was a consequence of the narrow phrasing of the questions and the false assumption that respondents would always complete the follow-up survey within two weeks of the initial survey. In fact, several respondents did not complete the follow-up survey until more than three weeks after the initial survey.

To summarize, a total of four participants either contacted 211 or used the PED-resources. Only one participant indicated definitive contact with the 211-service. One participant did not use 211 but used the PED-resources instead. Two used either 211 or the PED-resources or both. The one participant who did not use the services indicated on the initial survey that they did not want assistance with their USN and reported on the follow-up survey that they "received help somewhere else".

While 80% (n=4) of the five respondents with USN who completed follow-up used the study-designated resources or services; this represents only 26.7% of the fifteen respondents who reported USN at any time during the study period. It cannot be determined whether participants who were lost to follow-up used services or not. The four participants who contacted 211 or used PED-resources endorsed a median of four USN (range: 3–6) over the study period while the one participant who did not use 211 or the PED-resources endorsed two USN.

Comparisons of social resource utilization rates between different characteristics groups could not be made due to the small number of respondents. Social service history questions indicated that all five of the five participants who endorsed USN over the study period and completed the follow-up survey had first used social assistance services after March 2020. One

of these respondents used social assistance services for the first time as part of participating in this pilot study.

### **Feasibility and Acceptability of USN Self-Screening and Referral by Participants**

Insufficient data was gathered to make accurate conclusions related to the feasibility and acceptability of the intervention from participant perspectives. Nonetheless, there were some indications that the USN self-screen survey was acceptable to the patients and caregivers who participated. Also, the low rates of survey participation and high loss to follow-up may indicate that the feasibility of USN self-screening in the PED is limited.

Examination of the response rate for each individual survey question showed that the least frequently answered questions, which may be taken to represent the most unacceptable questions, were questions related to demographics. For example, the least frequently answered question throughout the study period was the question of monthly household income, left unanswered by 18.9% (n=21) of respondents. In contrast, the least frequently answered USN question was the question of interpersonal safety, which was left unanswered by 3.6% (n=4) of respondents but was still answered more often than the most frequently answered demographic question. It is possible, however, that the nonresponse rate for a particular question may reflect a lack of question clarity or a language barrier rather than, or in addition to, participant discomfort with the question.

Two participants provided Likert-type scale ratings of the effectiveness of the 211-service and the PED-provided resources. One participant rated the 211-service as “somewhat effective”. The PED-provided resources were rated by one participant as “somewhat effective” at helping their family meet their USN and as “mostly effective” by the other participant. Of the four participants who used 211 or the PED-provided resources, two agreed that participating in

the study led to an improvement of their family's health or wellness while two participants disagreed. The participant who did not contact 211 or use PED-resources did not agree with the statement that the study led to an improvement of their family's health and wellness. Ultimately, there was inadequate data to accurately characterize the feasibility and acceptability of USN self-screening and self-referral from the participant perspective.

## **Discussion**

### **Key Findings**

The main aims of this pilot study were to explore the feasibility and acceptability of USN self-screening and self-referral from PED staff and patient/caregiver perspectives, to describe the proportions and characteristics of families seen in the PED with USN, and to identify the types of USN being experienced. Preliminary results were obtained for all objectives, with the exception of the assessment of the feasibility and acceptability of the intervention from the patient/caregiver perspective, for which too few data were obtained.

Over six months, the survey identified only 15 (0.2%) individuals who reported USN out of the 6,771 who were eligible to take the survey. A recent study estimated that nearly 30% of Bay Area residents "frequently" run out of money to pay for food, utilities, housing, and medicine (Bloemraad et al., 2020). This suggests that the method of identifying USN with an optional, self-initiated survey was only partially implemented and that USN were likely under-identified in this pilot project. Nonetheless, the proportion of participants with USN (13.5%, n=15) among survey respondents (n=111) more closely approximated the local estimates, suggesting that if greater coverage with screening could be achieved, more families with USN could be identified and connected with resources.

Facilitating the USN self-screen survey was regarded by several nurses to be neither an acceptable nor feasible nursing intervention. Although it is not known exactly what proportion of nursing staff held this viewpoint, the low rates of survey engagement suggest it may have been a significant number. Field notes suggest that nursing perspectives of the intervention were often mediated by workflow barriers, time constraints, and doubts about whether screening for non-emergent USN in the PED was an appropriate activity for PED nurses. Some nurses stated that screening for multiple domains of non-emergent USN would be more appropriate if performed by a resource navigator, registration clerk, or social worker. Additionally, some nurses reasoned that reliance on the discretion of nursing staff to facilitate self-screening compromised the feasibility of the intervention. While the emergent USN screen was reported by many PED nurses to be an acceptable nursing intervention, the feasibility was often said to depend on whether it could be administered through the EHR.

Rates of USN reported in this study were lower than rates reported in other studies, likely in part due to sample characteristic differences and this study's shorter timeframe (i.e., experience/anticipation of USN within next four weeks) compared to the longer timeframes (i.e., experience/anticipation of USN within previous/following 12 months) used in other studies (Wallace, 2020, Semple-Hess, 2019). Despite the low rates of screening and survey enrollment, patients and families with USN were identified and experiences of USN in all six domains were reported. Most respondents who reported USN reported more than one domain of USN. This finding supports the premise that the etiologies of USN are shared between different USN domains, as proposed by Diderichsen's (2012) and Pearce's (2019) models of health inequality.

Participants with USN in this pilot study indicated that they wanted assistance with USN at a higher rate than seen other studies (Wallace et al., 2020; Tong et al., 2018), suggesting that

the shorter, prospective timeframe may be more sensitive to present needs. Associations between USN and respondent demographic characteristics were identified and are consistent with previous research (Semple-Hess, 2019, Wallace, 2021).

Over six months, the emergent USN screening protocol identified 30 families and individuals with emergent USN. Each were provided an immediate consult with a social worker and were recontacted within a few days of discharge as part of follow-up. Study participants were able to receive help with USN through the use of the 211-service and the PED-resources. However, because of the small sample size, it could not be determined whether use of the 211-service or the PED-resources was associated with reductions of USN over time. The few respondents who rated the effectiveness of the services reported that the services were effective at helping their family meet their USN. Some respondents agreed that the study led to an improvement of their families' health and wellness, although others disagreed.

USN questions appeared to be acceptable to participants, as suggested by higher completion rates of USN questions compared to demographic questions, but the data was insufficient to make any conclusions. Four respondents provided open-ended comments on their follow-up surveys that commended the PED for offering the survey and distributing social resource information to the community. However, these comments were submitted by participants who did not endorse USN, and the acceptability of the survey for participants with USN can only be inferred from their participation. The voluntary nature of the survey may have contributed to higher acceptability, as participants were not required to answer any questions that they did not find acceptable. These preliminary findings are consistent with previous studies that showed USN questions in the PED are acceptable from patient and family perspectives (Byhoff

et al., 2019; Semple-Hess et al., 2019). However, further research will be needed to confirm acceptability.

It was observed that staff facilitated or discussed the USN survey with families less consistently than they did the emergent screen. The focus on current emergent (i.e., urgent) USN, rather than on assessing potential for future USN in a busy PED is understandable in a healthcare setting where the focus is on addressing urgent and emergency health problems. As noted in observations and field notes, some PED nurses expressed views that USN screening is better aligned with primary healthcare settings rather than the PED, except if nurses believe they are screening for USN ‘emergencies’, such as a family without food or housing at the time of the PED visit. A cultural shift to a broader view of the purpose of the PED healthcare model and the role of nurses and staff members may be needed if USN screening in PEDs is to be fully adopted and sustained.

### **Implications for Research**

Further inquiry is needed to determine whether nurse-facilitated screenings for multiple domains of non-emergent USN in the PED are feasible or acceptable. Qualitative data collection in the form of surveys or interviews is needed to better elucidate nursing and staff perspectives towards screenings. Determining to what degree the acceptability and feasibility of USN screening is contextualized by setting (i.e., PED, primary care), professional role (i.e., nurse, registration clerk), and acuity of need (i.e., emergent, non-emergent) may help characterize the types of education efforts and cultural shifts needed to include USN screening as a standard of care in the PED. Staff education should focus on the importance and effectiveness of USN screening and how to do it in a standardized and sensitive way. This pilot study also suggests a need for PED nurses and staff to be highly involved in the co-design of screening and referral

workflows, since interventions that do not cohere with PED routines are at risk of being only partially implemented.

One promising intervention suggested by some staff to address workflow concerns and improve feasibility of USN screening in the PED is integration into the EHR. Completed surveys or screens that endorse USN could be forwarded directly to 211 or similar referral agencies, allowing them to contact the patient with foreknowledge of their USN and connect them with the appropriate services. This could be an ideal system for identifying and addressing USN in a variety of healthcare settings but may come with additional costs and administrative complexity, and this will need to be evaluated in future implementation studies.

Integrating USN surveys or screens into the PED workflow as a standard of care does not necessarily require an entire EHR build. For instance, the PED administers a universal paper suicide screening to all patients older than 10 years of age in a similar format to the paper emergent USN screen. However, while the paper suicide screen consistently demonstrates a 90% completion rate, the emergent USN screen resulted in only a 13.7% completion rate. The difference between these two screens is that patient responses to the paper suicide screens are required to be documented in the EHR and that screening audits conducted through the EHR hold staff accountable to complete these screenings. Thus, incorporating USN screening as a standard of care, requiring documentation of completion (even if the screen is paper-based), and regular audits could lead to improved screening and referral rates and should be evaluated in a future study.

An important limitation of the intervention was that it was unable to replicate the automated 211-service referral modality implemented in Wallace et al. (2020, 2021). This was due to administrative complexity, IT infrastructure constraints, and cost-prohibitive service

estimates. Accordingly, participants were required to initiate contact with the 211-service or the PED-provided resources if they wanted to receive assistance with USN. This may have been a significant barrier to receiving assistance compared to an intervention that allows the referred-to agency to contact the participant directly. For example, one participant in the present study provided “did not contact 211” as the reason why they did not receive assistance with their USN. Future projects wanting to explore utilization of the 211-service in healthcare settings should recognize high-level hospital administration and IT departments as crucial stakeholders, especially if the aim is to build an automated referral partnership.

Further research is also needed to address the higher likelihood of USN among PED patients and caregivers with certain demographic characteristics such as low income or education, single parents or those who self-identify as BIPOC (Dunn, 2000; Song, 2011; Kolak, 2020). The association between these characteristics and increased USN, are an indication of structural and historical disenfranchisement or exclusion from health and social resources for individuals with these characteristics, rather than an indication of any inherent deficits with those individuals (Heller et al., 2020; Crear-Perry et al., 2021; Kreuter et al., 2021). Future research is urgently needed to inform policy changes that will improve structural social and health equity so that future minoritized communities do not disproportionately experience USN.

### **Implications for PED Practice**

Future USN initiatives in the PED should consider implementing comprehensive nursing education and support efforts to encourage nurses to embrace the importance of SDOH and USN in the PED setting. Engaging nurses in discussions that raise awareness of how USN screening and referral are congruent with the holistic philosophy and practice of nursing practice may also increase motivation to incorporate USN screening (Schoon et al., 2022)

USN screening requires collaboration among a multidisciplinary team. Successful implementation will require further team discussion and consensus about an appropriate division of labor to maximize coverage while minimizing impact on workload. In prior studies where registration clerks and resource navigators were responsible for USN screening, higher rates of screening completion were demonstrated compared to the present pilot study (Wallace et al., 2021, 2022; Gottlieb, 2016). Thus, alternative staff responsibilities should be explored.

Finally, given that the two most frequent USN identified in this pilot study were food and utilities, an important and immediate practice change should be to identify local food resources and utility bill assistance programs and to make the information for these services readily accessible to families in the PED.

### **Implications for Advanced Practice Nursing**

There were no advanced practice registered nurses (APRN) employed at the PED during the study period. However, an APRN student served as one of the key project champions. The contributions of this individual included providing input towards study planning and design, meeting with 211 administration, designing and building the study surveys into the REDCap data platform, creating the emergent USN screening form, compiling a comprehensive resource binder of local social assistance services, introducing the project to PED staff, supplying the department with study materials, responding to questions of nursing staff and administration, consulting with the social worker team to ensure adequate assistance was being provided to families with emergent USN, tracking screens and surveys, identifying and implementing process improvement measures, directing a team of medical students who were assisting with the project, providing weekly emails, project updates, and progress reports to PED staff, and managing and collating study data.

The contributions of the APRN student supports the proposition that APRNs can provide integral support and leadership to USN projects and initiatives in the PED. Advanced practice nurses may also become the primary investigators of their own USN research. For instance, Andrea Wallace, PhD, RN was the first author of Wallace et al. (2021, 2021), studies that were instrumental in the conception of this pilot study.

### **Limitations**

The findings from this pilot study should be considered in light of several design limitations. The descriptive, comparative design and small sample size provides only preliminary suggested associations, not causal inferences, regarding the effectiveness of USN self-referral at reducing USN in the PED. Larger studies with experimental designs are needed to determine the efficacy and effectiveness of the screening and referral intervention. The measures of feasibility and acceptability, particularly for PED staff, were rudimentary. In addition, staff responses may have been biased because implementation, feasibility and acceptability data were collected by PED colleagues. Further research with validated measures, anonymous surveys and rigorous qualitative approaches are needed. There was also insufficient data collection to accurately assess the acceptability and feasibility of the intervention from participant perspectives. Lastly, the single-site design limits the generalizability of the findings.

### **Conclusion**

More research is needed to provide insight into the acceptability and feasibility of nurse-facilitated, multi-domain, non-emergent USN screenings and surveys in the PED. In this pilot study, screening implementation and survey enrollment challenges were major barriers to USN identification. These barriers consisted of inadequate workflow integration, discretionary screening and survey enrollment practices, and tenuous acceptability of nurse-facilitated USN

screening. There also appeared to be a generalized lack of interest or willingness to engage with self-screening among the PED population. Given the lack of outreach and engagement associated with discretionary, self-initiated, self-complete USN screening in this pilot study, USN initiatives in the PED may want to explore universal, staff-initiated, self-complete screenings in order to improve the likelihood of USN identification. Self-referral to 211 and social assistance services was reported by some participants to be effective at helping them meet their USN, but there was insufficient data to determine whether self-referral reliably decreased USN. The substantial loss to follow-up of participants with USN suggested participants might have benefitted from automated referral systems or in-person resource navigators that would have allowed for improved service and follow-up capabilities. However, more research is needed to truly identify the best practices, screening methods, and referral strategies to address USN in the PED.

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## Appendix

### A.1

#### Literature Review Table: Wallace et al.

<b>Citation</b>	Wallace et al., 2020, USA
<b>Aims</b>	<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>▪ Develop a USN assessment, referral, and evaluation process</li> <li>▪ Investigate the feasibility of implementing the USN intervention during routine care in the ED</li> <li>▪ Explore the benefits of electronically linking data from the USN assessment to a social referral organization</li> </ul>
<b>Designs &amp; Methods</b>	<p><b>Design:</b> Mixed-methods feasibility study</p> <p><b>Methods:</b> ED patients were electronically screened for USN. Results for participants with needs were then transmitted to 211, which then contacted the patient within 72 hours to provide assistance and referrals for needs</p>
<b>Setting &amp; Sample</b>	<p><b>Setting:</b> Large academic hospital ED in Salt Lake City, Utah</p> <p><b>Sample:</b> Convenience sample of 210 patients seen in the ED between 11/2017 and 7/2018</p>
<b>Variables</b>	<p><b>Independent variable:</b> USN screening and referral</p> <p><b>Dependent variable:</b> Number of healthcare visits 3 months before versus 3 months after the ED visit date</p>
<b>Measurement &amp; Analysis</b>	<p><b>Survey tool:</b> 10 questions adapted from HealthLeads toolkit to screen for different USN. All questions prefaced with “In the last 12 months...”</p> <p><b>Statistical tests:</b></p> <ul style="list-style-type: none"> <li>▪ Wilcoxon signed rank test used to compare ED and primary care visit frequencies 3 months pre- and post- ED index visit date according to need vs no need and referral vs no referral</li> </ul>
<b>Findings and Limitations</b>	<p><b>Findings:</b></p> <ul style="list-style-type: none"> <li>▪ USN screening took 80 seconds to complete on average</li> <li>▪ 61% (n = 129) of patients reported 1 or more need</li> <li>▪ 52% (n = 67) of the 129 wanted follow-up.</li> <li>▪ 49% (n=32) of the 67 were reached by 211</li> <li>▪ 211 provided an average of 4 referrals to each contact</li> <li>▪ Significantly higher ED utilization for patients with at least one USN compared with those without needs (mean 1.36 visits vs 0.56, respectively; <math>P= 0.03</math>)</li> <li>▪ Significantly higher ED utilization for patients who received 211 referrals compared to those who did not receive referrals (mean 2.56 visits vs 0.61, respectively; <math>P=0.006</math>)</li> <li>▪ Significant increase in ED utilization for patients with at least one USN when comparing 3 months pre- and post- ED index visit date (mean 1.07 visits vs 1.36, respectively; <math>P=0.03</math>)</li> <li>▪ Significant increase in primary care visits for patients with no USN when comparing 3 months pre- and post- ED index visit date (mean 0.24 visits vs 0.56, respectively; <math>P=0.03</math>)</li> </ul> <p><b>Limitations:</b></p> <ul style="list-style-type: none"> <li>▪ Registration staff sometimes decided whether to screen based on the patient’s insurance status</li> <li>▪ Registration staff sometimes skipped patients who appeared well off</li> <li>▪ Patients rarely allowed to self-complete screen because verbal administration was faster</li> <li>▪ Screening tool was available in Spanish, but all completed screens were in English</li> <li>▪ Study conducted at 1 medical center</li> <li>▪ Setting was highly resourced with well-supported data infrastructure that may not exist in lesser resourced settings</li> </ul>

## A.2

### Literature Review Table: Schickendanz et al.

<b>Citation</b>	Schickendanz et al., 2019, USA
<b>Aims</b>	<b>Objective:</b> Describe clinician perceptions of USN screening and referral in the healthcare setting
<b>Designs &amp; Methods</b>	<b>Design:</b> Multi-center cross-sectional clinician survey  <b>Methods:</b> Clinicians completed paper survey at staff meetings or accepted invitation by email to complete electronic survey
<b>Setting &amp; Sample</b>	<b>Setting:</b> 14 Kaiser Permanente medical centers in Southern California. <i>Clinician care settings:</i> <ul style="list-style-type: none"> <li>▪ Outpatient only: 124 (49.4%)</li> </ul> <b>Sample:</b> Convenience sample of 258 clinicians. <i>Professions:</i> <ul style="list-style-type: none"> <li>▪ 154 physicians (59.7%)</li> <li>▪ 41 pharmacists (15.9%)</li> <li>▪ 33 RNs (12.8%)</li> <li>▪ 12 social workers (4.7%)</li> <li>▪ 8 administrators (3.1%)</li> </ul>
<b>Variables</b>	<b>Independent variable:</b> USN screening in the healthcare setting  <b>Dependent variable:</b> Clinician attitudes towards USN screening in the healthcare setting
<b>Measurement &amp; Analysis</b>	<b>Survey tool:</b> Likert scale rating and multiple-choice questions to assess attitudes toward USN screening, barriers to screening, and strategies to address USN. Total of 29 questions. Survey is free to access here: <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6721844/bin/NIHMS1045707-supplement-Appendix.docx">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6721844/bin/NIHMS1045707-supplement-Appendix.docx</a>  <b>Statistical tests:</b> <ul style="list-style-type: none"> <li>▪ Chi-square tests, Fisher's exact tests, students t-tests, and tests of proportions used to analyze clinician responses according to profession, setting, experience, and demographics.</li> <li>▪ Statistics software used: STATA 13</li> </ul>
<b>Findings and Limitations</b>	<b>Findings:</b> <ul style="list-style-type: none"> <li>▪ 84% (217) supported USN screening in the healthcare setting</li> <li>▪ 23% (59) were currently screening for USN</li> <li>▪ 41% (106) were confident in ability to address USN</li> <li>▪ Clinicians recognized several barriers to USN screening</li> <li>▪ 60% (155) believe lack of time to be significant barrier to USN screening (79.3% outpatient clinicians vs 47.9% inpatient clinicians, <math>P&lt;0.001</math>)</li> <li>▪ 50% (129) believe lack of resources to be significant barrier to USN screening (59.5% outpatient clinicians vs 42.5% inpatient clinicians, <math>P&lt;0.01</math>)</li> </ul> <b>Limitations:</b> <ul style="list-style-type: none"> <li>▪ Response rate may have led to nonresponse bias</li> <li>▪ No sites had a standardized USN screen and refer workflow</li> <li>▪ Survey tool was not validated, though it was reviewed by content experts</li> </ul>

### A.3

#### Literature Review Table: Gottlieb et al.

<b>Citation</b>	Gottlieb et al., 2016, USA
<b>Aims</b>	<b>Objective:</b> Study the effects of USN screening combined with in-person resource navigation on health and USN and compare outcomes against USN screening combined with the provision of print resources alone
<b>Designs &amp; Methods</b>	<b>Design:</b> Randomized control trial  <b>Methods:</b> All participants received standard screening. The control arm then received written information on relevant community services. The intervention arm or received in-person social referral navigation with telephone follow-up if needed
<b>Setting &amp; Sample</b>	<b>Setting:</b> Pediatric primary and urgent care clinics at 2 hospitals in Northern California. Enrollment dates: 10/2013 - 08/2015  <b>Sample:</b> <ul style="list-style-type: none"> <li>▪ Total of 1809 caregivers enrolled</li> <li>▪ Primary care setting: 31.6% (n = 572)</li> <li>▪ Urgent care setting: 68.4% (n = 1237)</li> </ul> <b>Demographics</b> <ul style="list-style-type: none"> <li>▪ White Hispanic: 50.9% [n = 921])</li> <li>▪ Black non-Hispanic: 26.2% (n = 473)</li> <li>▪ Mean age of caregiver's child (SD): 5.1 (4.8) years</li> </ul>
<b>Variables</b>	<b>Independent variable:</b> Provision of in-person social referral navigation services  <b>Dependent variables:</b> <ul style="list-style-type: none"> <li>▪ Number of self-reported unmet social needs after 4 months</li> <li>▪ Caregiver Likert scale rating of child's health after 4 months</li> </ul>
<b>Measurement &amp; Analysis</b>	<b>Screening tools:</b> <ul style="list-style-type: none"> <li>▪ 14-item social needs screening survey</li> <li>▪ 1-item Likert scale rating of child health ranging from 1 (excellent) to 5 (poor)</li> </ul> <b>Statistical tests:</b> <ul style="list-style-type: none"> <li>▪ Differences between intervention and control arms were identified using generalized estimating equation analyses</li> <li>▪ Differences in continuous outcomes of intervention and control arms were identified with mixed linear regression models</li> </ul> <p><i>Power calculation: 80% power in 2-sided tests with a type I error rate of 5%. Sample size</i></p>
<b>Findings and Limitations</b>	<b>Findings:</b> <ul style="list-style-type: none"> <li>▪ Baseline mean (SD) of USN was 2.7 (2.2), with a range of 0 to 11 out of a maximum of 14</li> <li>▪ Intervention arm change in USN mean (SE) was -0.39 (0.13) vs control arm at +0.22 (0.13) (<math>P &lt; .001</math>)</li> <li>▪ Intervention arm significantly reduced USN compared to the control</li> <li>▪ Intervention arm child health mean (SE) rating change was -0.36 (0.05) vs control arm at -0.12 (0.05) (<math>P &lt; .001</math>)</li> <li>▪ Intervention arm significantly improved caregiver perceptions of child health compared to control arm</li> <li>▪ Navigators averaged under 2 follow-up contacts with caregivers</li> <li>▪ In-person navigation was found to be more effective at reducing USN and improving child health compared to print resources alone</li> </ul> <b>Limitations:</b> <ul style="list-style-type: none"> <li>▪ 1-item caregiver perception of child health may not reflect actual health status</li> <li>▪ Low enrollment rate and study attrition may have led to biased findings</li> <li>▪ Randomization by day and unmasking of navigators and RAs may have led biased findings</li> <li>▪ Absence of differences in attrition, number of follow-up calls, and completed follow-up surveys suggests systematic biases between the intervention and control arms is unlikely</li> </ul>

## A.4

### Literature Review Table: Semple-Hess et al.

<b>Citation</b>	Semple-Hess et al., 2019, USA
<b>Aims</b>	<b>Objective:</b> Identify USN among families receiving care at a PED
<b>Designs &amp; Methods</b>	<b>Design:</b> Cross-sectional caregiver survey  <b>Methods:</b> Caregivers in the PED were approached and consented by research assistants (RA). Survey was administered by RA verbally in a private room. Interpreters were used for Spanish speaking caregivers if the RA was not proficient in Spanish. Consult with SW provided to those with emergent USN
<b>Setting &amp; Sample</b>	<b>Setting:</b> PED at an urban children's hospital in Los Angeles County  <b>Sample:</b> Convenience sample of 768 Spanish- or English-speaking caregivers of pediatric patients <i>Demographics:</i> <ul style="list-style-type: none"> <li>▪ 75% Hispanic</li> </ul> <i>Exclusions:</i> Caregivers of: <ul style="list-style-type: none"> <li>▪ critically ill patients</li> <li>▪ patients with durable medical equipment</li> <li>▪ patients with history of cancer or sickle cell disease</li> <li>▪ patients with acute psychiatric symptoms</li> </ul>
<b>Variables</b>	<b>Independent variable:</b> Families presenting to the PED  <b>Dependent variable:</b> Prior and anticipated USN
<b>Measurement &amp; Analysis</b>	<b>Survey tool:</b> 12-question USN survey based on established USN screening tools and physician and social worker input. Reviewed for face validity after piloting with 20 PED families  <b>Statistical tests:</b> <ul style="list-style-type: none"> <li>▪ Independent t-tests were used to analyze differences between families with USN to those without.</li> <li>▪ Descriptive statistics were used to analyze means, standard deviations, frequencies, and percents</li> <li>▪ Point-biserial correlations were used to analyze relations between continuous variables and binary variables (e.g., USN frequency and yes-or-no anticipation of USN)</li> <li>▪ Odds ratios with 95% confidence intervals through binary logistic regression were used to analyze the relation between language and resources.</li> <li>▪ Pearson Chi-square tests with post-hoc standardized residuals were used to analyze relations between categorical variables.</li> <li>▪ Statistics software: IBM SPSS, version 23</li> <li>▪ Zip code and USN data was mapped with median household income layering using Tableau v. 10.1.2 and OpenStreetMap</li> </ul>
<b>Findings and Limitations</b>	<b>Findings:</b> <ul style="list-style-type: none"> <li>▪ 83% of respondents had used social resources in the past</li> <li>▪ 67% anticipated needing at least 1 resource in the next 12 months</li> <li>▪ Positive correlation seen between the number of household members and USN</li> <li>▪ Monolingual Spanish-speaking caregivers were more likely to experience food insecurity compared to other groups</li> <li>▪ Most caregivers reported feeling very or somewhat comfortable asking staff about social resources               <ul style="list-style-type: none"> <li>○ Most comfortable with social workers, nurses, physicians, and translators (if Spanish-speaking)</li> </ul> </li> <li>▪ Correlations were found between the types of past and anticipated USN and the child's age</li> </ul> <b>Limitations:</b> <ul style="list-style-type: none"> <li>▪ Convenience sampling may have created selection bias</li> <li>▪ Retrospective survey questions may have created a recall bias</li> <li>▪ Social desirability bias may have led to underreporting of some USN</li> <li>▪ Single-center study with large majority of Hispanic participants</li> <li>▪ No data on USN referrals</li> </ul>

**A.5**  
*Initial USN Survey*

First Name:	Phone:	Email:
<p><b>1. Are you worried that your family will not have enough food or adequate housing in the next 48 hours?</b></p> <p><input type="checkbox"/> Yes (please let ED staff know about these concerns if you have not already)</p> <p><input type="checkbox"/> No</p> <p><b>2. Select all that apply: Are you worried that within the next four weeks...</b></p> <p><input type="checkbox"/> Your family will not have adequate housing?</p> <p><input type="checkbox"/> Your family will eat less food than they should because there won't be enough money for food?</p> <p><input type="checkbox"/> Your utility company will shut off your service (water, heat, electricity) for not paying your bills?</p> <p><input type="checkbox"/> Your family will need to buy medications but won't be able to because of cost?</p> <p><input type="checkbox"/> Your family will go without healthcare services or miss healthcare appointments because they don't have a way to get there?</p> <p><input type="checkbox"/> Someone in your family might be hurt by someone in your apartment building or house?</p> <p><b>3. If you selected yes to any of the questions above, would you like to receive assistance with any of these needs?</b></p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Not applicable</p> <p><b>4. May UCSF contact you again in two weeks with another brief survey? This will help researchers determine whether asking about basic needs in the emergency department is helpful for families.</b></p> <p><input type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p> <p><b>5. Please remove card</b> → <span style="border: 1px solid black; display: inline-block; width: 200px; height: 100px; vertical-align: middle;"></span></p>		
<p><i>This optional section of the survey collects demographic data that helps UCSF researchers learn about the social and health disparities that exist in our community.</i></p> <p><b>1. How many household members do you live with?</b> <input style="width: 30px;" type="text"/></p> <p><b>2. What is your gender?</b></p> <p><input type="checkbox"/> Male <span style="margin-left: 150px;"><input type="checkbox"/> Transgender female</span></p> <p><input type="checkbox"/> Female <span style="margin-left: 150px;"><input type="checkbox"/> Other</span></p> <p><input type="checkbox"/> Transgender male <span style="margin-left: 150px;"><input type="checkbox"/> Decline to state</span></p> <p><b>3. What is your household income per month before taxes?</b></p> <p><input type="checkbox"/> No income <span style="margin-left: 50px;"><input type="checkbox"/> \$5,000 - \$10,000</span> <span style="margin-left: 50px;"><input type="checkbox"/> Decline to state</span></p> <p><input type="checkbox"/> \$0 - \$2,000 <span style="margin-left: 50px;"><input type="checkbox"/> \$10,000 - \$15,000</span></p> <p><input type="checkbox"/> \$2,000 - \$5,000 <span style="margin-left: 50px;"><input type="checkbox"/> More than \$15,000</span></p> <p><b>4. What is your marital status?</b></p> <p><input type="checkbox"/> Single <span style="margin-left: 100px;"><input type="checkbox"/> Partnership</span> <span style="margin-left: 100px;"><input type="checkbox"/> Separated</span></p> <p><input type="checkbox"/> Married <span style="margin-left: 100px;"><input type="checkbox"/> Remarried</span> <span style="margin-left: 100px;"><input type="checkbox"/> Decline to state</span></p> <p><input type="checkbox"/> Divorced <span style="margin-left: 100px;"><input type="checkbox"/> Widowed</span></p> <p><b>5. What race or ethnicity do you identify with?</b></p> <p><input type="checkbox"/> African American <span style="margin-left: 50px;"><input type="checkbox"/> Hispanic or Latino</span> <span style="margin-left: 50px;"><input type="checkbox"/> White</span></p> <p><input type="checkbox"/> American Indian or Alaska Native <span style="margin-left: 50px;"><input type="checkbox"/> Native Hawaiian or Other Pacific Islander</span> <span style="margin-left: 50px;"><input type="checkbox"/> Other</span></p> <p><input type="checkbox"/> Asian <span style="margin-left: 150px;"><input type="checkbox"/> Decline to state</span></p> <p><b>6. What is the highest level of education in your household?</b></p> <p><input type="checkbox"/> Some high school <span style="margin-left: 100px;"><input type="checkbox"/> College degree</span></p> <p><input type="checkbox"/> High school diploma <span style="margin-left: 100px;"><input type="checkbox"/> Decline to state</span></p> <p><input type="checkbox"/> Some college</p> <p><b>7. Are you a US citizen?</b></p> <p><input type="checkbox"/> Yes <span style="margin-left: 150px;"><input type="checkbox"/> Decline to state</span></p> <p><input type="checkbox"/> No</p> <p><b>8. Please return survey or notify staff when completed</b></p>		
<b>Pediatric Emergency Department Social Needs Assessment Pilot</b>		

**A.6**

*USN Survey Recruitment Flyer*



## UCSF Study on Social Needs in the Pediatric Emergency Department

A survey-based study for our families in the emergency department



Please scan the QR code with your smartphone camera to take a brief survey about your family's basic needs<sup>1</sup>

### Eligibility and Information

- You are an adult caregiver of a pediatric patient being seen in the emergency department **OR**
- You are a pediatric patient 18 to 21 years of age being seen in the emergency department
- Consent is indicated by participation
- Follow-up survey is optional but strongly encouraged

### Goals of study:

- Help families with urgent needs<sup>2</sup>
- Learn about the disparities in our community
- Assist families with food, shelter, utilities, medications, safety, and medical transportation
- Learn how COVID-19 has affected demand for social assistance services

<sup>1</sup> If you do not have a smartphone but still want to participate, please let staff know and a tablet will be provided to you.  
<sup>2</sup> If you do not want to participate but your family has urgent needs, such as no food or shelter, please let staff know.

## A.7

### Follow-up USN Survey

Follow-up USN Survey	
Questions	Responses
Are you worried that your family will not have enough food or adequate housing in the next 48 hours?	<input type="checkbox"/> Yes <input type="checkbox"/> No
1. We would like to follow up with you in a few days to make sure your family's needs are being met. May our discharge coordinator or social worker call you in 2-3 days?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
1.1. What is your phone number? Please include your area code.	[open text response field]
1.2. In the last two weeks, did your family eat less food than they should because there wasn't enough money for food?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Was your family able to get help obtaining food using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else
2.1.1. In the last two weeks, was your family ever without adequate housing?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
3. Was your family able to get help obtaining adequate housing using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else
3.1.1. In the last two weeks, have you lost any basic utility service (water, heat, electricity) for not paying your bill(s)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
4. Was your family able to get help paying for utilities (water, heat, electricity) using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else
4.1.1. In the last two weeks, has your family needed to pay for medications but couldn't because of cost?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
5. Was your family able to get help paying for medications using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else

Follow-up USN Survey	
Questions	Responses
In the last two weeks, did your family ever go without healthcare services or miss healthcare appointments because they didn't have a way to get there?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
6. Was your family able to get help arranging transportation to healthcare services or appointments using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6.2. 6.1.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else
In the last two weeks, were you afraid someone in your family might be hurt by someone in your apartment building or house?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
7. Was your family able to get help finding safety from harm using 211 or the resources provided by the emergency department?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7.2. 7.1.1. Why not? Please select all that apply	<input type="checkbox"/> We did not contact 211 or use resources provided by the emergency department <input type="checkbox"/> 211 was unable to help us <input type="checkbox"/> The resources provided by the emergency department were unable to help us <input type="checkbox"/> We no longer needed help <input type="checkbox"/> We got help from somewhere else
Did you contact 211 in the last two weeks?	<input type="checkbox"/> Yes <input type="checkbox"/> No
8. How effective was 211 at helping you meet your family's needs?	<input type="checkbox"/> Completely effective <input type="checkbox"/> Mostly effective <input type="checkbox"/> Somewhat effective <input type="checkbox"/> Mostly ineffective <input type="checkbox"/> Completely ineffective
8.1. In the last two weeks, did you use any resources provided by the emergency department to help meet your family's needs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
9. How effective were the resources provided by the emergency department at helping you meet your family's needs?	<input type="checkbox"/> Completely effective <input type="checkbox"/> Mostly effective <input type="checkbox"/> Somewhat effective <input type="checkbox"/> Mostly ineffective <input type="checkbox"/> Completely ineffective
9.1. When has your family used social assistance services? (Examples include supplemental nutrition programs, 2020 rent relief programs, 211 services, low-income assistance programs, medication discounts...etc). Please select all that apply:	<input type="checkbox"/> We used social assistance services before March 2020 <input type="checkbox"/> We used social assistance services after March 2020 <input type="checkbox"/> We used social assistance services for the first time in the last two weeks <input type="checkbox"/> We have never used social assistance services
10. Do you think your participation in this study has led to an improvement of your family's health or wellness?	<input type="checkbox"/> Yes <input type="checkbox"/> No
11. In the last two weeks, has your family experienced Housing unmet basic needs in any of the following categories? Please select all that apply:	<input type="checkbox"/> Housing <input type="checkbox"/> Food <input type="checkbox"/> Utilities <input type="checkbox"/> Medication affordability <input type="checkbox"/> Transportation to healthcare <input type="checkbox"/> Safety from harm <input type="checkbox"/> Other <input type="checkbox"/> None of the above
12. Could you tell us what this other need was?	<input type="checkbox"/> <i>[open text response field]</i>
12.1. Are you currently worried about your family experiencing unmet basic needs in any of the following categories? Please select all that apply:	<input type="checkbox"/> Housing <input type="checkbox"/> Food <input type="checkbox"/> Utilities <input type="checkbox"/> Medication affordability <input type="checkbox"/> Transportation to healthcare <input type="checkbox"/> Safety from harm

Follow-up USN Survey	
Questions	Responses
	<input type="checkbox"/> Other None of the above
13. 12.2. Could you tell us what this other need was?	[open text response field]
	<input type="checkbox"/>
Do you have any thoughts, feelings, or opinions about this study that you would like to share?	[open text response field]
14.	

A.8  
IRB Approval Letter



University of California  
San Francisco

**Human Research Protection Program  
Institutional Review Board (IRB)**

**Expedited Review Approval**

Principal Investigator  
Nisa S Atigapramoj

Co-Principal Investigator  
Anneka M Hooft

**Type of Submission:** Initial Review Submission Packet  
**Study Title:** Implementing a Pediatric Emergency Department Social Needs Assessment Pilot During the COVID-19 Pandemic

**IRB #:** 20-31843  
**Reference #:** 311816  
**Committee of Record:** San Francisco General Hospital Panel  
**Study Risk Assignment:** Minimal

**Approval Date:** 06/14/2021 **Expiration Date:** 06/13/2022

**Regulatory Determinations Pertaining to this Approval:**

The research meets all of the conditions of 45 CFR 46.204 for the involvement of pregnant women or fetuses.

This research is not subject to HIPAA rules.

A waiver of the requirement to obtain a signed consent form is acceptable for this study because, as detailed in the application, the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. The waiver applies to all subjects.

**This submission was eligible for expedited review as:**

Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

**IRB Comments:**

**All changes to a study must receive UCSF IRB approval before they are implemented.** Follow the [modification request](#) instructions. The only exception to the requirement for prior UCSF IRB review and

**A.9**

*Emergent USN Screen*

<b>UCSF Basic Needs Screen</b>	
Are you worried that you or your family will not have enough food or adequate housing in the next 48 hours?	<input type="checkbox"/> YES <input type="checkbox"/> NO
¿Le preocupa que usted o su familia no tengan suficiente comida o una vivienda adecuada en las próximas 48 horas?	<input type="checkbox"/> SI <input type="checkbox"/> NO
<b>For UCSF Staff Only</b>	
<u>Positive Screen Checklist for RNs</u>	
<input type="checkbox"/> MD notified	
<input type="checkbox"/> SW notified	
<input type="checkbox"/> QR survey completed (optional)	
<u>Positive Screen Checklist for MDs</u>	
<input type="checkbox"/> PCP notified	
<input type="checkbox"/> Check this box if patient is without PCP	
<input type="checkbox"/> Social resources provided	
RN Name:	

**A.10***UCSF PED Patient Ethnicity Values Table (June 30, 2021 – December 31, 2021)*

Patient Age	Ethnicity Values			Total
	Hispanic	Not Hispanic	Missing Data	
<1 y	238	590	19	847 (10.8%)
1-12 y	1301	3022	88	4411 (56.3%)
13-18 y	475	1024	14	1513 (19.3%)
19-25 y	119	194	1	314 (4.0%)
25+ y	124	599	28	753 (9.6%)
Total	2257 (28.8%)	5429 (69.3%)	150 (1.9%)	7838 (100%)

**A.11***UCSF PED Patient Racial Values Table (June 30, 2021 – December 31, 2021)*

Patient Age	Racial Values								Total patients
	American Indian or Alaska Native	Asian	Black or African American	More than one race	Other	Hawaiian/Pacific Islander	Unknown/Unrecorded/Declined	White	
< 1y	7	118	110	95	232	10	17	258	847 (10.8%)
1-12 y	14	654	600	430	1390	47	69	1207	4411 (56.3%)
13-18 y	4	147	261	149	494	20	22	416	1513 (19.3%)
19-25 y	2	28	54	22	106	2	3	97	314 (4.0%)
25+ y	6	103	150	35	165	8	26	260	753 (9.6%)
Total	33 (0.4%)	1050 (13.4%)	1175 (15.0%)	731 (9.3%)	2387 (30.5%)	87 (11.1%)	137 (1.7%)	1,117 (14.3%)	7838 (100%)

**A.12**  
*211 Contact Card*

**For social assistance, scan QR code to contact a specialist**

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<p>Phone call</p>  <p>Llamada telefónica</p>	<p>Text message</p>  <p>Mensaje de texto</p>
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Para asistencia social, escanee el código QR para contactar a un especialista

Social Assistance Contact 211 Bay Area	Asistencia Social Contaco 211 Bay Area
<p><b>Call:</b> dial 2-1-1 to speak with a Specialist.</p> <p><b>Click:</b> 211bayarea.org</p> <p><b>Text:</b> text a live Specialist at 898211</p>	<p><b>Llame:</b> marque 2-1-1 para hablar con un Especialista.</p> <p><b>Clic:</b> 211bayarea.org</p> <p><b>Texto:</b> texto a una Especialista en vivo al 898211</p>

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Jacob DeWees  
DCA852126132484... Author Signature

5/19/2022  
Date