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Publication Date

2024-12-01

DOI

10.1016/j.pecinn.2024.100283

Peer reviewed

PEC Innovation 4 (2024) 100283

Contents lists available at ScienceDirect

PEC Innovation

journal homepage: www.elsevier.com/locate/pecinn

A family-centered approach to social needs awareness in the pediatric emergency department

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ARTICLE INFO

Keywords:
Health-related social need
Pediatric emergency department

ABSTRACT

Objective: We aimed to understand family preferences around reporting and receiving health-related social needs (HRSN) information by assessment modality during pediatric emergency department (PED) visits.
Methods: Families were randomized into paper (control), cell phone, or tablet modality groups by their child's exam room. Nurses alerted families to complete a single HRSN assessment during routine workflow. We used logistic regression and McNemar's test to assess discordance in modality preference.
Results: Forty-seven percent of families disclosed at least one HRSN across a total 611 assessments. Disclosure of HRSN was similar by modality. Twenty-three percent of those assigned tablet preferred cell phone ($p < 0.001$). Two-thirds of families preferred receiving digitally formatted community resources (email or text). There was no difference in preferred timing of HRSN assessment completion.
Conclusions: Assessment modality did not appear to influence family HRSN disclosure. Families were generally satisfied with all HRSN assessment modalities but demonstrated a particular preference in using personal cell phones over tablets. Digitally formatted community referrals also pose numerous advantages over conventional paper handouts.
Innovation: Use of personal cell phones is a novel, streamlined method of HRSN interventions in the clinical setting, performing similar to more conventional modalities, with a preference among families when compared to tablets.

1. Introduction

Health-related social need (HRSN) spans housing instability, food insecurity, affordable health care, basic expenses, transportation, and child care, and is commonly reported in the pediatric emergency department (PED) [1-8]. Social risk comprises social conditions at the population level associated with poor health, whereas social needs are patient-reported and influenced by individuals' perceptions, preferences, and priorities [9,10]. Given the PED serves as a population health safety net, including those without access to services from general pediatricians, there are calls to enhance its role in HRSN awareness and assistance [10-12]. In this context, *awareness* refers to healthcare system activities that identify HRSN and better understand patient social circumstances [10]. *Assistance* refers to healthcare system activities that connect patients and their families with relevant community resources [10]. PED-based interventions promoting awareness and assistance of patient social circumstances are valued by patients, physicians, and nurses alike [13-17].

Despite mounting evidence on the benefits of addressing HRSN in healthcare and development of organizational strategies [2,8,10,13], questions remain on how to conduct and integrate screening and referral activity in PEDs [2,3,18]. Barriers to implementation include staff buy-in, family communication [2], limited time, standardizing screening technique [3], maintenance of community resource databases [13], and investment in medical education [18]. Prior studies demonstrated that computer tablet-based screening resulted in greater HRSN disclosure

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https://doi.org/10.1016/j.pecinn.2024.100283
Received 6 September 2023; Received in revised form 1 February 2024; Accepted 18 April 2024
Available online 21 April 2024

and satisfaction among families compared to in-person interviews [5,6]. However, comprehensive data on family preferences of HRSN screening and referral modality are lacking. Implementation science is particularly needed in the PED, where irregular and chaotic workflow patterns are frequent. Such information may guide best practices in the rapidly emerging landscape of PED-based interventions on social and structural factors that impact child and family wellbeing.

The primary objective of this study was to determine family preference of social needs screening modality in the PED - paper, personal cell phone, or tablet. We assessed preference objectively through volume of disclosed HRSN and subjectively through families' reported preference of modality. We hypothesized that a difference in volume of disclosed HRSN may be related to the modality used. The secondary objectives were to describe family preference for the timing of screening (at the beginning or end of the PED visit), as well as community resource information format (paper, email, or text message).

2. Material and methods

2.1. Study design and setting

This quasi-randomized study was performed in the PED of a single urban tertiary hospital in Los Angeles, California with about 45,000 annual visits [19]. Three main study arms – paper, cell phone, or tablet-based survey – were assigned to six different PED patient rooms and randomization occurred when patients and their families were moved into the PED exam room as part of routine nursing throughput. All nurses received a single 15-min orientation to the study protocol by the principal investigator and PED nursing manager prior to study launch and study procedures were reinforced by the nursing manager throughout the data collection phase. Study procedures were deemed exempt by the hospital's Institutional Review Board.

2.2. Survey development

Development of the HRSN assessment began with a comprehensive review of existing screening tools, subsequently adapting the IHELP, WE CARE, Accountable Health Communities HRSN, and Hunger Vital Sign screening tools to a pediatric, family-centered, two-generational context [20-22]. Parent-child dyad screening is based on the premise that a child's health and overall wellness are directly influenced by that of their parent [23]. Two social workers in separate health care institutions iteratively revised the draft instrument, evaluating and refining each item for clarity, comprehensiveness, and appropriateness (content validity). The survey was developed specifically for the PED setting to assess a wide breadth of social risk domains, given a high volume of unmet social needs in the pediatric literature [1-8]. Additionally, the survey was optimized for response time and readability of Flesch-Kincaid grade level 5. Six HRSN domains were assessed: Healthcare, Housing and Utilities, Nutrition and Child Activities, Family Services and Transportation, Education and Employment, and Legal Need (**Appendix 1 A**). Food insecurity screening in the validated Hunger Vital Sign two-questionnaire was adapted and captured in the Nutrition and Child Activities domain, which briefly assesses child physical wellness [22]. Our institution's Language Services department produced and verified the Spanish language content of the survey and supplemental material for all modalities (paper, cell phone, tablet). An adapted version of this instrument has been used in both English and Spanish in a large urban PED with similar patient demographics [24].

There was no difference in HRSN assessment content between modalities of paper, cell phone, or tablet. Digital modalities (cell phone and tablet) were equipped with text-to-audio functionality. Ten self-administered assessments were piloted among families in each study arm/modality with good face validity, clarity of survey instructions, suitability of survey item content, readability, and average time for completion –completed in under two minutes across all modalities. During this time, nurses did not report any significant interruptions to their routine workflow. No changes were made to the instrument content or research design following the pilot phase.

2.3. Survey implementation

The timeframe of the survey distribution occurred over five months, from September 2021 to January 2022. Families were eligible to participate seven days a week during either day (7 am to 7 pm) or night nursing shifts (7 pm to 7 am) in the PED. Recruitment via a single nursing alert to families took place during routine times of nursing contact with the patient and family, either during nursing intake at the time of patient rooming or at the end of the visit during nursing review of discharge/admission instructions. Our study did not utilize navigators (in-person resource provision), instead following a nursing-led model with the advantage of relatively rapid implementation, no maintenance funds, and no significant change to the existing PED workflow. Inclusion criteria were English- or Spanish-speaking adult parents/guardians of pediatric patients evaluated for a medical complaint in the ED. Unaccompanied pediatric patients ages 18–21 years were excluded, as well as those seen in the trauma bay.

Families were assigned to only one modality by their child's PED exam room and were not informed of the other modalities. Due to years of conventional use of paper-based screening around social determinants of health (SDH), the paper modality was designated a control group. Families then responded to the HRSN assessment. At the end of the survey, participants were asked to select their preferred HRSN assessment modality (select one: paper, cell phone, or tablet), timing for completion (select one: beginning or end of PED visit), and community resource information format (select *any* that apply: via paper, email, or text message). No personal identifying contact or demographic information (other than literate language) were collected to protect family privacy and to avoid potential stigma associated with reporting HRSN. Demographic information of all patients seen in the study PED rooms was extracted from the PED daily census. Families completed the HRSN assessment only once, in the privacy of their child's PED room. Switching into another modality was not permitted. Sampling stopped when all three major study arms (e.g., paper, cell phone, and tablet groups) reached at least 200 families.

Survey responses were collected on REDCap for digital (cell phone, tablet) modalities; paper assessments were deposited by families in a lockbox. Cell phone access to the HRSN assessment was via QR code posted inside the PED room, while tablets were programmed in “Kiosk mode” with restricted web browsing function. No HRSN assessments were reviewed in real-time and the assessment content itself was not designed to evaluate social circumstances that may potentially place the patient and/or family in imminent danger to life or property (e.g., imminent eviction, domestic violence, deportation). Per PED protocol, a social worker was always available for consultation and intervention regarding emergent conditions. There was no in-person navigation service and thus no active, personalized referral activity for community resources. Instead, all families seen in the PED including non-study participants were notified of a free curated and up-to-date paper list of community resources, organized by area of social need, geographic area, and language (English, Spanish) available in a private area of the waiting room.

2.4. Variable definition

The primary outcome was HRSN assessment modality preference which was two-fold. First, we assessed an objective measure of modality preference using patient family disclosure of the volume of HRSN. We used the six HRSN domains (each with three sub-domains) and dichotomized responses as 1 or more reported HRSN and 0 otherwise. Second, we assessed a subjective measure by asking patients, “If given the chance to take this survey again, which method would you prefer most?” with

answer choices: written on paper; on your own cell phone, or on an electronic tablet. Secondary outcomes included preference of HRSN assessment timing, as well as community resource information format. These were captured as distinct items on the HRSN assessment (**Appendix 1B**).

The primary exposure of interest was the randomly assigned modality for HRSN assessment: paper, cell phone, or tablet.

2.5. Statistical methods

A sample size of 200 subjects per major study arm (HRSN assessment modality) was calculated to detect a 10% difference in preferred modality utilizing alpha = 0.05 and power = 0.8. We assessed frequency distributions for language, modality preference, timing preference, community resource format preference, and disclosed HRSN for the study population and by modality used to complete the assessments. We then conducted an unadjusted logistic regression for assigned modality on HRSN disclosure as well as an adjusted model controlling for language. Moreover, we used McNemar's test for paired data by examining the discordance in modality preference given the modality that the participant was randomly assigned. Analyses were conducted using SAS software Version 9.4 of the SAS System for Windows (SAS Institute Inc., Cary, NC, USA).

3. Results

We collected data from September 2021 to January 2022 during the COVID-19 pandemic, which like other health systems, led to disruptions in PED throughput. **Supplement Table A** provides demographic information of all patients seen in the study PED rooms during the study period. Overall, patient median age was 6 years (interquartile rage 1–14 years); 52.6% were male; 62% Hispanic/Latinx, 16.7% Black, 3.3% White; and 83.6% publicly insured. Among these rooms, patient age, sex, race, type of medical insurance, medical acuity (emergency severity index level 2 to 5), or admission rate (on average, 5.5%) were similar, which may infer randomization of these characteristics in our study population. There were no refusals to participate in any of the study arms. All of those in the cell phone group had access to a smartphone. There were minimal partially completed surveys (paper modality $n = 5$, cell phone modality $n = 1$) which were included in analyses.

A total of 611 HRSN assessments were administered by nurses in the study PED rooms, in which a total of 16,896 patients were seen (but not necessarily approached or recruited) during the study period (3.6% administration rate). Of these assessments, 211 were paper (34%), 200 cell phone (33%) and 200 tablet (33%), of which 27% were in Spanish. Table 1 is an overview of participating families' reported preferences of reporting and receiving HRSN information, as well as rated ease of assessment completion, organized by modality used. Over half of families (54%) preferred receiving the survey at the end of visit while 46% preferred the survey at the beginning. Overall, 31% of families preferred using a paper modality, 41% their personal cell phone, and 28% a provided tablet. Two-thirds of families indicated a preference for receiving a digital format of community resource information (personal email or text message). The vast majority of families (97%) rated completion of the HRSN assessment as “easy” or “very easy,” regardless of modality used.

Overall, of the HRSN domains identified, Health Care was most common (22%), followed by Housing and Utilities (18%), Nutrition and Child Activity (17%), Education and Employment (14%), Legal Aid (10%), and Family Services and Transport (7%) (Table 2). Overall, the most common sub-domain items included: no pediatric primary doctor (15%); difficulty paying rent or utilities (12%); and worry whether food will run out before getting money to buy more (9%). Approximately 53% of families did not disclose any HRSN, with similar proportions across modalities (52% paper; 54% cell phone; 54% tablet). In the unadjusted model, the odds of reporting HRSN was 0.91 (95% confidence interval [CI] 0.62, 1.34) for cell phone and 0.89 (95% CI 0.61, 1.32) for tablet compared to paper. After controlling for language, the odds of reporting HRSN was 0.94 (95% confidence interval [CI] 0.64, 1.39) for cell phone and 0.91 (95% CI 0.62, 1.35) for tablet compared to paper (Table 3).

Table 4 depicts HRSN assessment modality preference discordance by modality used/assigned. Fifteen percent of those assigned paper preferred cell phone while 5% of those assigned to cell phone preferred paper ($p = 0.45$). There were similar proportions of those who were assigned paper but preferred tablet (7%) and those assigned tablet who

Table 1
Overview of family preferences of reporting and receiving HRSN information in the PED.

	Overall	Paper	Cell Phone	Tablet
	n (%)	n (%)	n (%)	n (%)
Total	611 (100)	211 (34)	200 (33)	200 (33)
Language				
English	445 (73)	146 (69)	152 (76)	147 (73)
Spanish	166 (27)	65 (31)	48 (24)	53 (26)
Reported Preference*				
Timing of HRSN assessment				
Beginning of ED visit	279 (46)	91 (44)	99 (50)	89 (44)
End of ED visit	327 (54)	116 (56)	100 (50)	111 (55)
Preferred modality				
Paper	187 (31)	164 (79)	9 (5)	14 (7)
Cell phone	251 (41)	30 (14)	178 (89)	43 (21)
Tablet	168 (28)	13 (6)	12 (6)	143 (71)
Community resource info format				
Paper only	161 (27)	73 (35)	37 (18.5)	51 (25.5)
Email only	190 (31)	53 (26)	77 (38.5)	60 (30)
Text message only	203 (33)	59 (29)	73 (36.5)	71 (35.5)
Paper, Email, and Text Message	12 (2)	6 (3)	0 (0)	6 (3)
Paper and Email	9 (2)	4 (2)	4 (2)	1 (0.5)
Paper and Text message	12 (2)	7 (3)	0 (0)	5 (2.5)
Email and Text message	19 (3)	4 (2)	9 (4.5)	6 (3)
Community resource info format (total cumulative)**				
Total Paper[1]	194 (32)	90 (43)	41 (20.5)	63 (31.5)
Total Email[2]	230 (38)	67 (32)	90 (45)	73 (36.5)
Total Text Message[3]	246 (40)	76 (36)	82 (41)	88 (44)
Total Email or Text Message[4]	412 (67)	116 (55)	159 (79.5)	137 (68.5)
Ease of HRSN assessment completion				
Very easy	345 (57)	118 (57)	126 (63)	101 (50)
Easy	244 (40)	82 (40)	69 (34)	93 (46)
Difficult	7 (1)	2 (1)	2 (1)	3 (1)
Very difficult	11 (2)	5 (2)	3 (1)	3 (1)

* Unreported data by modality used: Timing of HRSN assessment (4 paper, 1 cell phone); Preferred modality (4 paper, 1 cell phone); Community resource information format (5 paper); Ease of survey completion (4 paper).

** This subsection was added cumulatively as described below given participants had the option to select all responses that applied. Thus, percentages total >100 %.

[1] Total paper = paper only + paper, email, and text + paper and email + paper and text.

[2] Total email = email only + paper, email, and text + paper and email + email and text.

[3] Total text message = text only + paper, email, and text + paper and text + email and text.

[4] Total email or text message = email only + text only + email and text.

Table 2
Distribution of disclosed HRSN (domain and sub-domain) by modality used.

	Overall (*n* = 611)	Paper (*n* = 211)	Cell Phone (*n* = 200)	Tablet (n = 200)
	n (%)*	n (%)*	n (%)*	n (%)*
HRSN Domains†				
Domain 1: Health care	133 (22)	50 (24)	36 (18)	47 (24)
Child does not have primary doctor	91 (15)	32 (15)	26 (13)	33 (17)
Problems getting dental care	34 (6)	13 (6)	12 (6)	9 (5)
Problems getting health insurance and/or Rx	36 (6)	12 (6)	14 (7)	10 (5)
Domain 2: Housing and Utilities	112 (18)	47 (22)	32 (16)	33 (17)
Homeless or worried of becoming homeless	26 (4)	12 (6)	4 (2)	10 (5)
Pests, rodents, and/or mold in the home	27 (4)	13 (6)	8 (4)	6 (3)
Difficulty paying rent or utilities	75 (12)	30 (14)	22 (11)	23 (12)
Domain 3: Nutrition and Child Activity	101 (17)	31 (15)	33 (17)	37 (19)
Worried whether food will run out before getting money to buy more	52 (9)	19 (9)	14 (7)	19 (10)
Food doesn't last and not enough money to get more	28 (6)	12 (6)	9 (5)	7 (4)
Child after-school daycare, activity, or sports	42 (7)	6 (3)	17 (9)	19 (10)
Domain 4: Family Services and Transport	44 (7)	14 (7)	9 (5)	21 (11)
Family dispute and/or violence at home	7 (1)	4 (2)	1 (1)	2 (1)
Treatment of child's mental health or drug use	11 (2)	4 (2)	2 (1)	5 (3)
Transport to work, school, or doctor's office	33 (5)	9 (4)	8 (4)	16 (8)
Domain 5: Education and Employment	87 (14)	31 (15)	27 (14)	29 (15)
Child has a learning disability	34 (6)	13 (6)	10 (5)	11 (6)
Parent or child needs job training	22 (4)	9 (4)	6 (3)	7 (4)
Parent needs high school diploma/ GED	36 (6)	12 (6)	12 (6)	12 (6)
Domain 6: Legal Aid	63 (10)	26 (12)	17 (9)	20 (10)
Immigration services for self and/or family	28 (5)	12 (6)	6 (3)	10 (5)
Child custody or child support	14 (2)	4 (2)	7 (4)	3 (2)
Applying for welfare, food stamps, or disability	28 (5)	13 (6)	4 (2)	11 (6)
Number of HRSN disclosed				
0	326 (53)	109 (52)	108 (54)	109 (54)
1 to 2	199 (33)	73 (35)	66 (33)	60 (30)
3 to 4	65 (11)	22 (10)	21 (10)	22 (11)
5+	21 (3)	7 (3)	5 (2)	9 (4)

* All reported percentages are derived by utilizing the n of the modality (paper, cell phone, tablet, overall) as the denominator.

† Participants were instructed to check all that apply among the sub-domains. One or more positive responses among the sub-domains were tallied only once for the overall domain. Thus, the sum of the sub-domains is equal or greater than the tallied domain.

preferred paper (9%) ($p = 0.85$). Notably, 23% of those assigned tablet preferred personal cell phone whereas 6% of those assigned a cell phone preferred a tablet ($p < 0.001$).

4. Discussion and conclusion

4.1. Discussion

In this study, we found that patient families in the PED generally preferred HRSN assessment completion using the modality they were randomly assigned, with similar HRSN disclosure across modalities. Families demonstrated a subjective preference for personal cell phone compared to tablet. Additionally, a majority of families (67%) preferred receiving digitally formatted community resource information via email or text message over more conventional paper handouts. Access to health care, stable housing/utilities, and food were among the most common HRSN, similar to reports in existing literature [2-8]. Note that given the Hunger Vital Sign items were adapted to the Nutrition and Child Activities domain of the HRSN assessment, food insecurity prevalence could not be derived from the collected data.

The PED presents inherent challenges in collecting data on HRSN reporting preferences. When compared to a general pediatrician's office, emergency visits are unplanned with no standing follow up, creating challenges in collecting data from a single family over time. The PED itself is an environment that can be unpredictable with high task loads on medical providers. To integrate social care into medical care, HRSN interventions should be a standardized process adding minimal provider task interruption and should demonstrate high levels of family usability and satisfaction. This study integrated into nursing staff's routine patient assessments and data collection occurred at a single time point to limit additional task load. For these reasons, direct comparison of family preference of HRSN modalities could not be performed, but rather, preferences by objective and subjective measures were compared indirectly. Optimizing the way health care organizations assess HRSN has implications for social needs disclosure rates, staff perceptions of screening and referral processes, design of PED-wide interventions, and family ability to secure access to community resources [2,5,6].

In-person HRSN screening and referral faces multiple challenges, including funding/sustainability; staff availability, training, and bias; and universal application, making digital modalities an attractive, light touch option [25]. Pediatric and adult studies have demonstrated

Table 3
Logistic regression of assigned HRSN assessment modality on family disclosure of HRSN.

	Family Disclosure of HRSN		
	n (row %)	Unadjusted	[a]Adjusted
		OR (95% CI)	OR (95% CI)
Model			
Cell phone	92 (46)	0.91 (0.62, 1.34)	0.94 (0.64, 1.39)
Tablet	91 (46)	0.89 (0.61, 1.32)	0.91 (0.62, 1.35)
Paper (ref)	102 (48)	–	–

OR = Odds ratio; CI = Confidence interval.

[a] Adjusted logistic regression of assigned modality on family disclosure of HRSN controlling for language.

Table 4
Modality preference discordance among families by modality used/assigned.

	Modality Preferred			
Modality Used/Assigned	**Paper vs. Cell phone**			
		Paper	Cell phone	*P*-value
	Paper	164 (85)	30 (15)	0.45
	Cell phone	9 (5)	178 (95)	
	Paper vs. Tablet			
		Paper	Tablet	P-value
	Paper	164 (93)	13 (7)	0.85
	Tablet	14 (9)	143 (91)	
	Cell phone vs. Tablet			
		Cell phone	Tablet	P-value
	Cell phone	178 (94)	12 (6)	<0.001
	Tablet	43 (23)	143 (77)	

P-value computed for McNemar's test for paired data on discordance in assigned and preferred modality.

similar or even greater patient/family HRSN disclosure, acceptability, and comfort with tablet-based screening compared to that of face-to-face, likely due to perceived screening anonymity [5,6,13,26]. There is currently no clear recommendation for screening and referral modality, although in general, social risk screening itself has been shown to be widely acceptable by patients/families [13,26-29]. While our study demonstrated family preference for digital means of reporting and receiving HRSN information, it is important from a health equity standpoint to include alternative written means for those who may not have access to a smartphone or computer. As the current generation of technologically-inclined adolescents age into adulthood, it is likely that preference for digital screening will continue to grow. Standardized digital means for data capture will likely aid health systems in meeting growing demands of operationalization of SDH.

Personal cell phone-based HRSN screening is relatively novel and presents several advantages over tablets, including increased privacy and familiarity, wide availability, and no maintenance demands (i.e., cleaning in between use, physical security measures, connection to local internet network) – all of which may have been weighted more heavily by users during the COVID-19 pandemic and onward. Some of these factors may have driven the discordance between families' preference of using personal cell phones compared to tablet. Nursing staff cited recurring issues with tablets, including disconnection from department Wi-Fi internet, lapses in charging, and sanitizing surfaces after each use. Still, robust and secure data transfer mechanisms linking a patient's cell phone to an electronic health record (EHR) are not in widespread use. While this is beyond the scope of our study, we do find that objective and subjective measures of family preference with digital modalities may help reinforce further development efforts.

The optimal timing for HRSN screening and referral activity in the PED is unknown and not previously studied, with features such as adaptable workflow and process individualization emphasized instead [14,30]. Prior literature on HRSN navigation in emergency settings has been widely based on convenience or purposive sampling methods rather than a universal approach to screening with clearly demarcated time points of intervention [1,4,7,13-15,24,30,31]. Patients, families, and health care staff typically have limited extra time and attention during acute sick visits, creating practical barriers to effective, thorough screening [2,13]. On the one hand, families may feel better prepared or at ease to complete screening at the end of the visit, after their primary concern - the health of their child prompting the visit - has been addressed. On the other hand, families may be fatigued or pressed for time to leave the PED and thus would be less inclined to participate in screening. The two countering sets of experiences may explain a lack of an observed directional preference for timing of HRSN assessment completion. Qualitative research that explores PED staff and family preference for timing of HRSN intervention would help elucidate motivating factors and further direct optimal screening and resources. We advocate that parental choice should dictate when screening is to be completed.

The provision of targeted resources via community referrals after identification of HRSN has been shown to decrease emergency department utilization rates, however, successful follow up with families has long been a challenge among patient advocats [2,3,8,32]. Such barriers make it difficult to understand the efficacy of emergency setting referral strategies and how best to tailor community resources to patient needs. Emerging data show that digital referrals to community services are acceptable both by patients/families and healthcare providers [31]. Family preference for digitally formatted community resource information in our study specifies a convenient entry point for resource allocation and is important for several reasons. First, it identifies a mutual arena for digital capacity building and integration between healthcare systems and community health resources [31]. It can enhance follow up to aid in securing a community resource and provide an avenue for assessment of longitudinal needs [8,33,34]. Lastly, email- or text message-based referrals can be used to follow key metrics, including tracking demand for resources, rate of successful access to resources, and need for resource profile updates [31,35,36]. It is important to recognize, however, the balance of anonymity and ability to follow-up, thus allowing an opt out option of contact information and maximizing privacy and protection of individual social needs data.

Although widely advocated in the fields of both general pediatrics and adult emergency medicine, HRSN interventions in pediatric emergency medicine generally lack established pathways and infrastructure for streamlined navigation [3,4,9,18,20,34]. The result is not only disorganized and inconsistent practices, but also a possible detriment to families [2,15,37]. It has been argued that the therapeutic relationship may become compromised when HRSN are identified but not appropriately addressed due to limited referral capacity and ineffective care coordination [2,38,39]. Physicians and nurses often report poor training, comfort, and readiness with screening, while patients/families express concerns related to trust of healthcare systems, personal privacy, and stigmatization around the communication of social circumstances [3,13,16,18,38]. A health care organization's HRSN screening modality should be integrated into workflow without impacting patient throughput or utilizing significant funding, which would otherwise limit the intervention's sustainability [29]. By taking a light touch approach and utilizing personal cell phones for screening, less intensive staff training and funding would be needed [2,38,39]. Secondly, family anonymity is preserved, with less potential impact on the therapeutic relationship [2,38,39]. Designing HRSN interventions around patient/family and healthcare staff perceptions and experiences is the first step in sustainably expanding the reach of routine HRSN interventions in the PED [2,7,10,13-18].

This study featured numerous limitations. First, the quasi-randomized nature of the study was intended to account for any unforeseen selection bias in the process during which nurses alert families to the HRSN assessment during their routine workflow. For instance, nursing staff may have chosen to not administer the survey if the patient and their family appeared “more affluent” or if the nursing staff did not have ample time. Since we did not directly collect patient demographics nor patient diagnoses, we are not able to account for these factors in the analytic model. As nursing staff approached families for recruitment at their own discretion – which may have been impacted by time and clinical task load – we could not accurately calculate a study participation rate, but rather report a survey administration rate. The recruitment period was extended (September 2021 to January 2022) due to the COVID-19 pandemic that caused multiple interruptions of ED logistics including nursing staff, patient volumes, and patient room availability, all of which may influence generalizability outside of the pandemic period. Also, during this time, school services were interrupted and numerous safety net economic measures were put into place including financial assistance and eviction protections, which may have influenced the context of families' social needs. We did not implement HRSN assessments at the middle of the PED visit during which patients wait for test results and/or reassessment given this time point could not be defined for study purposes and had the potential to interrupt nursing workflow. Assessments were completed only once by families and were not directly compared by individuals across modalities or time points. Due to anonymity, we could not identify patients with repeated PED visits who may have been previously enrolled, however, there is a low rate ($< 3\%$) of frequent PED-utilizers (five or more visits in one year) among our patient population.

Despite these limitations, this quasi-randomized study provides data that captures family prespectives on preferred HRSN screening and intervention modality and timing in the PED, a setting that faces multiple challenges to systematic, workflow-integrated social care. By using data-driven interventions that leverage family preferences with pragmatic implementation, healthcare organizations can more sustainably design and maintain social care in the PED.

4.2. Innovation

Social determinants of health have rightfully increased in relevance vis á vis the healthcare sector, with increasingly structured frameworks and regulations now in existence. Despite this, conventional screening modalities face substantial barriers for widespread implementation. Use of personal cell phones as a modality for HRSN interventions is a novel method to screen, refer, and coordinate social care in a clinical setting.

In this study, personal cell phones performed as well as paper and tablet modalities in regard to HRSN disclosure rate and ease of use, and were preferred over tablets. Cell phones pose numerous advantages, both from a user and operations standpoint, making them an ideal modality for routine workflow integration. This streamlined method addresses the principal barriers of limited time and staff training for HRSN interventions in the clinical setting, but requires further protocolization and patient data safeguards for secure and wider implementation in healthcare organizations.

4.3. Conclusion

In conclusion, this quasi-randomized study addresses a knowledge gap in the literature on family preferences around reporting and receiving HRSN information in the pediatric emergency setting. Families demonstrated similar proportions of preference, HRSN disclosure, and user ease of completion across all assessment modalities. There was a noted significant preference for using personal cell phones over tablets. Families preferred receiving texts or emails regarding HRSN information such as community referrals over traditional paper handouts. Digital HRSN intervention can help address longstanding challenges to more systematic implementation of screening and referral programs – namely, limited provider time and training – in healthcare and specifically in the emergency setting. However, still in its infancy, cell phone-based HRSN intervention requires further technologic and programmatic development and application to assure its safety and practicality.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Raymen Rammy Assaf: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ryan David Assaf:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Patricia Sencer Padlipsky:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization. **Kelly Dee Ann Young:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors acknowledge the service and dedication of the pediatric emergency department nursing staff to their patients and this project.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pecinn.2024.100283.

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