

ORIGINAL ARTICLE

Diversity, Equity and Inclusion

ParallelED—A novel screening and referral intervention using emergency department wait times to identify and address unmet social needs

John Purakal MD^{1,2,3}   | Gene Moon⁴ | Grace Lee⁴ | Matthew Yuan⁴ |
Haripriya Dukkupati⁴ | James J. Zheng⁴  | Amitesh Verma⁴ | Susan Spratt MD^{5,6} |
Janet Prvu Bettger ScD, FAHA^{2,7}

¹Department of Emergency Medicine, Duke University School of Medicine, Durham, North Carolina, USA

²Duke-Margolis Center for Health Policy, Duke University, Durham, North Carolina, USA

³Samuel Dubois Cook Center on Social Equity, Duke University, Durham, North Carolina, USA

⁴Duke University, Durham, North Carolina, USA

⁵Division of Endocrinology, Metabolism, and Nutrition, Duke University School of Medicine, Durham, North Carolina, USA

⁶Population Health Management Office, Duke University, Durham, North Carolina, United States

⁷Department of Health and Rehabilitation Sciences, Temple University, Philadelphia, Pennsylvania, USA

Correspondence

John Purakal, MD, Department of Emergency Medicine, Duke University School of Medicine.
Email: john.purakal@duke.edu

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Abstract

Background: People arriving at the emergency department (ED) often have unmet health-related social needs (HRSN). We implemented an intervention that used undergraduate student volunteers to screen patients in the ED waiting room (WR) for unmet social drivers of health and subsequently referred patients to community resources.

Methods: This cross-sectional quality improvement study included patients who were approached to complete a HRSN screening questionnaire, subsequently referred to community resources, and followed up by phone from October 2021 to October 2022 in an ED WR of an academic medical center. Primary measures were the proportions of patients who had unmet HRSN and the proportions enrolled in a statewide database of social care resources—NCCARE360. Patient demographics and geospatial distribution were also assessed to better understand the population served.

Results: Our intervention reached 3297 unique patients, with 398 patients (12%) agreeing to complete screening. Of those screened, 93% were positive for at least one social need and 95% of the aforementioned were interested in receiving assistance. A total of 60% of those who screened positive were enrolled into NCCARE360.

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Persons identifying as female or non-Hispanic Black were disproportionately represented at a higher rate among those who screened positive for at least one social need, with food and housing insecurity emerging as the most common referral categories.

Conclusion: Our results demonstrate patients' willingness to be screened in the ED WR and a high identification of HRSN. Our findings show that idle time in the ED WR can be used to identify patients with unmet HRSN and refer them to resources.

KEYWORDS

social emergency medicine, screening, social needs

1 | INTRODUCTION

1.1 | Background

Health-related social needs (HRSNs) refer to nonclinical factors that significantly affect an individual's health and well-being, encompassing various social determinants that influence health outcomes, such as access to food, housing, and education.¹⁻² The emergency department (ED) patient population is at significant risk for unmet HRSN, and a disproportionately greater number of ED patients are uninsured, publicly insured, or otherwise economically disadvantaged.³⁻⁶ Furthermore, HRSN conditions such as hunger and homelessness are risk factors for ED use.⁷⁻¹¹ Previous interventions involving HRSN screening and resource referrals identified a high prevalence of unmet patient needs, and exhibited patients' willingness to follow-up.¹²⁻¹⁴ Providing support for unmet HRSN through supportive housing and supplemental food programs can decrease hospitalization rates and ED visits, Medicaid spending, and overall health care costs.^{15,16} However, the resources to fully support such unmet needs are often variable and limited.

1.2 | Importance

Historically, EDs face significant challenges in screening for and addressing the nonmedical needs of their patients, despite strong interest among ED providers in addressing HRSN.¹⁷ Providers' concerns around screening include time constraints, lack of provider education, operational impact, and ethical considerations.¹⁸ Furthermore, health systems often lack the time and personnel to screen, provide referrals, or follow-up with patients.¹⁹⁻²² Hence, investigation into more effective models to address HRSNs is warranted. Previous studies have demonstrated that student volunteers can be leveraged to screen patients.^{23,24} In this intervention, student volunteers screened patients for HRSN in the ED WR. Our approach of screening for HRSN in the ED WR allows for HRSN screening early in the patient's visit with no interruption to routine care.^{25,26}

1.3 | Goals of this investigation

The purpose of *ParalleLED* was to evaluate the feasibility of using idle time in the ED WR to support HRSN screening and identification without interrupting clinical care. In this study, we describe the volunteer-based workflow of this intervention, along with initial findings, including demographics, screening rates, and the identified HRSNs of the study site's ED patient population.

2 | METHODS

2.1 | Context

Increasing emphasis has been placed on addressing HRSN by advisory scientific societies and federal agencies given HRSNs' strong ties to health outcomes. This volunteer-based intervention was performed at an urban academic tertiary care center in Durham, North Carolina from October 2021 to October 2022. Health care systems have used volunteers to assist in delivery of care for decades, thus making this model an example of a novel use of their capacity.

2.2 | Intervention

Volunteers, mainly pre-medical undergraduates from the study site's affiliated institution, were recruited through a widely available application process. Volunteers underwent training on HRSNs, CBOs, and online platforms for referrals and follow-ups, and were required to shadow experienced volunteers. A detailed outline of this training program has been published.²⁷

Volunteers were asked to adhere to a script when approaching patients to be screened. Those who agreed to screening were brought to a semi-secluded area of the WR. Patients were then presented with a screening questionnaire. Individuals who screened positive for HRSN

received calls for resource referrals from the same volunteer within the same week after their ED care. A “positive screen” was defined as any in which patients expressed needs for food, clothing, childcare, utilities, medicine, housing, or transportation. Patients who requested assistance for such needs were offered enrollment in NCCARE360, which requires completion of a consent form. Patients who did not provide consent to be enrolled in NCCARE360 still received referrals to CBOs over the phone via alternative online resource directories such as “FindHelp.org” and “NC 2-1-1.”

NCCARE360 is a statewide-integrated resource directory that generates referrals for social resources and includes diverse organizations across social need domains. Following consent, volunteers created an NCCARE360 profile to find need-specific CBOs based on the patient’s address, and placed referrals. NCCARE360 then sends HRSNs, demographics, and contact information to CBOs, prompting them to contact patients for assistance. CBOs update patient profiles on NCCARE360 with referral outcomes. Volunteers track profiles, providing alternative referrals if needed. Patients can opt for direct contact with CBOs. The patient’s ability to connect with the provided resources was assessed during calls made 2 weeks after the initial referral, and additional resources were offered if necessary. A second follow-up call was performed 2 weeks after the first. Volunteers were overseen through this workflow by a student leadership team consisting of site and program coordinators, and an ED physician advisor.

Any patient in the ED WR was eligible for voluntary screening and enrollment if they were interested in completing the survey and enrollment process. Patients were not approached directly if they were in visible distress, sleeping, or otherwise busy. The survey was administered via two options: (1) written responses on a paper version, and (2) volunteers assisting with reading the survey and directly entering the patient’s verbal responses into REDcap.

2.3 | Study of intervention

The primary outcome of this intervention was the identification of unmet HRSN of the ED patients. The secondary outcome was the assessment of the rates at which patients agreed to be screened and subsequently consented to be enrolled in NCCARE360. We also described the demographics of patients who screened positive and enrolled into NCCARE360.

2.4 | Measurements

The total number of patients approached by volunteers was recorded. Patients who agreed to screening were assessed for unmet HRSN using the Protocol for Responding to and Assessing Patients’ Assets, Risks, and Experiences (PRAPARE) screening tool (Figure 1), which has been effective in identifying HRSN in vulnerable patient populations.^{11–13} The previously validated National Institute on Drug Abuse (NIDA) Quick Screen Single drug use question was added: “How many times in the past year have you used an illegal drug or used a prescription medication for nonmedical reasons?” This screening question was found to

The Bottom Line

Addressing social determinants of health (SDOH) within health care settings continues to be a challenge. This study explores how it may be possible to screen people seeking treatment in the emergency department for SDOH by volunteers and refer them to community services. This study identified a high number of people who screened positive for one SDOH (93%) and who were willing to accept referral (95%) resulting in a 60% rate of enrollment in an integrated resource directory generating referrals for social resources. These results add to a growing body of literature examining different and innovative approaches to addressing social threats to health within a health care setting.

be 100% sensitive and 73.5% specific for the detection of a drug use disorder in a primary care setting.¹⁵ The responses to the screening tool, the composite of PREPARE and the NIDA screening question for opioid use disorder, were recorded in Duke REDCap. Patient information (demographics, survey responses, and referrals) obtained in the ED or on follow-up phone calls were recorded using Duke REDCap.

2.5 | Analysis

Basic descriptive statistics, counts, and percentages were retrieved at each step of the workflow (outlined by Figure 2) across patient demographics, HRSN, and referrals using RStudio, with associated tables and figures primarily being generated through Microsoft Excel.

2.6 | Ethical considerations

Volunteers’ daily shifts in the ED occurred during 2 time periods: 10:00 a.m. to 12:00 p.m. and 5:00 p.m. to 7:00 p.m. These time periods were selected to increase the opportunities for screening throughout the day and reduce any biases associated with operating only during “business hours.” All patients in the WR during a scheduled volunteer shift were approached by volunteers for screening. The study sample size was determined via convenience sampling and not chosen in advance. Patients who did not agree to screening or did not complete the screening process (ie, being called to continue their medical care) were excluded from the study.

3 | RESULTS

3.1 | Evolution of the intervention

The number of student volunteers and associated time coverage of volunteer shifts varied during the course of the intervention, with

1. In the past year have you or any family members you live with been unable to get any of the following when it was really needed? Check all that apply.

food clothing childcare utilities medicine or any health care
 phone housing internet transportation other: _____

2. Are any of your needs urgent? (for example: you don't have food tonight, you don't have a place to sleep tonight) No
 Yes (please explain):

3. Would you like to receive assistance for any of these needs? No Yes Unsure

4. How many family members including yourself do you currently live with? _____

5. What is your housing situation today?
 I have housing I do not have housing (staying with others, in a hotel, in a shelter, living outside on the street, on a beach, in a car, or in a park)

6. Are you worried about losing your house? No Yes

7. What is your current work situation?
 unemployed part-time work full-time work student retired
 unpaid, primary caregiver disabled other: _____

8. Has the lack of transportation kept you from medical appointments, meetings, work, or from getting things needed for daily living?
 Yes, from medical appointments or getting my medications
 Yes, from non-medical meetings, appointments, work, or from getting things I need
 No

9. How many times per week do you see or talk to people that you care about and feel close to? less than once a week
 3 to 5 times a week
 1 to 2 times a week more than 5 times a week

10. Stress is when someone feels tense, nervous, and anxious or can't sleep at night because their mind is troubled. How stressed are you?
 not at all a little bit somewhat quite a bit very much

11. Do you feel physically or emotionally safe where you currently live?
 No Yes Unsure

12. How many times in the past year have you used an illegal drug or used a prescription medication for nonmedical reasons?
 never once or twice monthly weekly or more more than 5 times a week

FIGURE 1 Screening questionnaire.

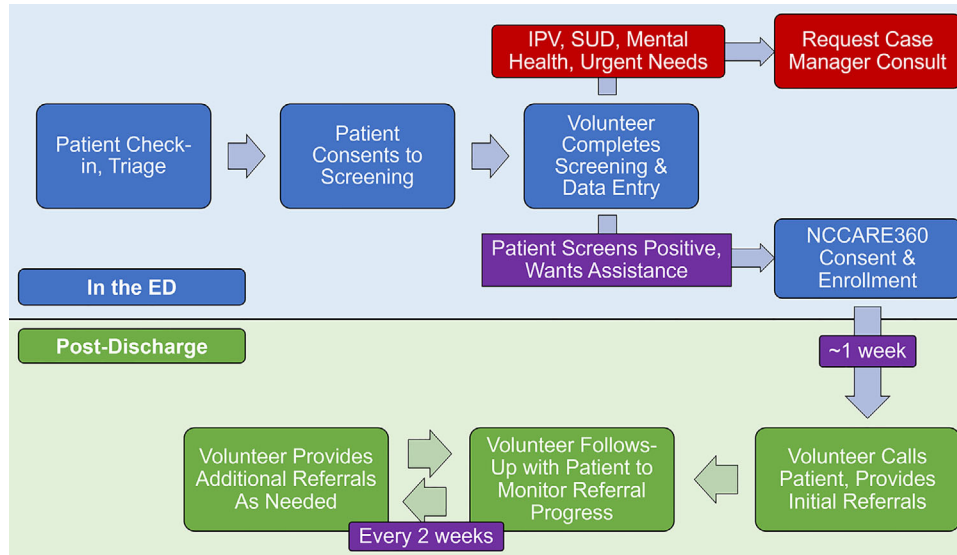


FIGURE 2 *ParalleLED* workflow beginning in the ED and ending post-discharge. The model was named *ParalleLED* because the program sought to address patients' unmet HRSN in parallel with patients' medical care, as they awaited a treatment space to complete the workup initiated in triage.

greater coverage over the course of the academic year (August–April) compared to the summer (May–July). From Fall 2021 to Spring 2022, the number of active volunteers increased from 24 to 26, whereas only 14 active volunteers were available during Summer 2022. In Fall 2022, the number of active volunteers increased to 33.

3.2 | Characteristics of study subjects

From October 1, 2021 to October 1, 2022, volunteers approached 3297 patients in the ED WR to complete the screening questionnaire. A total of 70% (2297) of these interactions were logged during evening shifts (5–7 p.m.). A total of 398 patients (~12%) completed screening, with 369 of 398 (93%) screening positive for at least one social need, and 307 of 464 (77%) screening positive for at least two HRSN. Nearly all patients with a positive screen requested assistance ($N = 350$, 95%), and 60% ($N = 262$) were subsequently enrolled in NCCARE360 (Figure 3).

Of the 398 patients who completed screening, 252 (63%) identified as female, 258 (65%) identified as non-Hispanic Black, 68 (17%) identified as non-Hispanic White, and 51 (13%) were of Hispanic ethnicity. A substantial proportion of patients ($N = 260$, 65%) had zip codes in Durham County with a mean age of 45.6 years old.

3.3 | Analysis of reported needs

Generally, patients screening positive for one or more unmet needs were more likely to identify as female ($N = 237$, 64%), non-Hispanic Black ($N = 246$, 67%), and have zip codes in Durham County ($N = 247$, 67%). A median of three unmet needs (interquartile range: 2–4) were

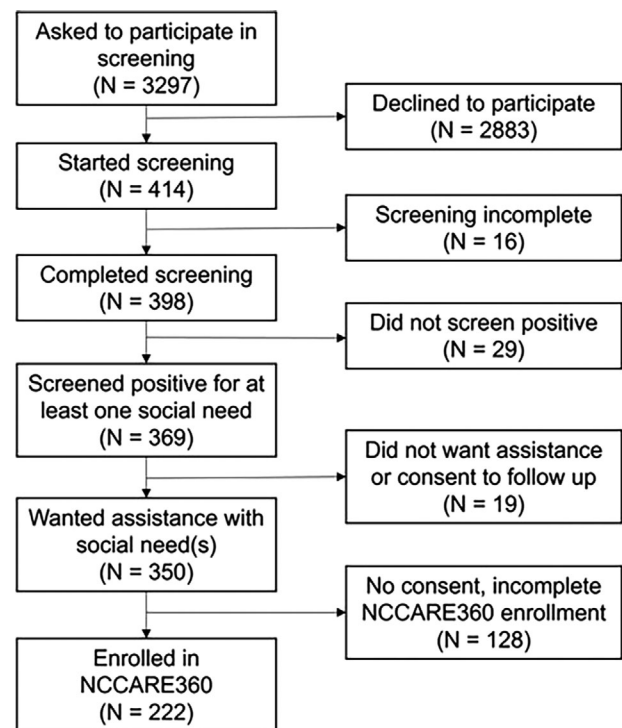
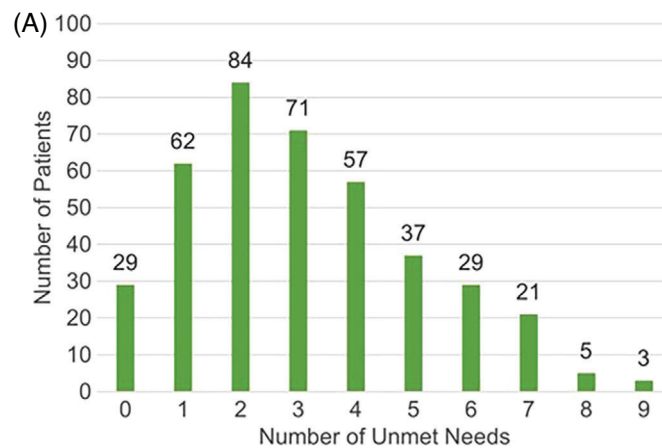


FIGURE 3 Summary of screening and enrollment protocol.

identified for each patient screening positive. Patients reporting 3 or more HRSN had a similar distribution of demographic characteristics as patients with 1 or 2 unmet needs. Notably, 71% of patients with 3+ needs had zip codes in Durham County, compared to 60% of patients with <3 unmet needs (Figure 4).

Housing insecurity ($N = 220$, 60%), food insecurity ($N = 181$, 49%), and transportation access ($N = 170$, 46%) were the most commonly



(B)

Demographic	N	%/IQR	Number of Needs			
			1 or 2 Unmet Needs	%/IQR	3+ Unmet Needs	%/IQR
Male	131	36%	51	35%	80	36%
Female	237	64%	94	64%	143	64%
Durham County	247	67%	88	60%	159	71%
Black, non-Hispanic	246	67%	96	66%	150	67%
Black, Hispanic	6	2%	1	1%	5	2%
White, non-Hispanic	61	17%	26	18%	35	16%
White, Hispanic	10	3%	6	4%	4	2%
Hispanic Only	33	9%	10	7%	23	10%
Other Race	13	4%	7	5%	6	3%
Age (years), median	45.9	32.2-58.6	48	30.1-60.3	44.5	32.6-55.2
Total	369		146		223	

FIGURE 4 (A) Distribution of the number of reported needs per patient for all patients screened. (B) Patient demographics organized by the number of reported needs. The interquartile range (IQR) is reported for age, and the percentage of patients within a specific demographic category for the respective number of needs is reported for all other demographics.

reported needs, followed by medicine/health care ($N = 159$, 43%) and utilities ($N = 148$, 40%). Patients reporting clothing needs were also likely to report food insecurity and obstacles to phone access. To a lesser extent, lack of phone access was also associated with utilities-related needs (Figure 5). Durham patients were generally more likely to screen positive for clothing and housing needs, making up 74% and

76% of the cohort for each need, respectively. Additionally, although 64% of patients screening positive were women, 75% of patients with childcare needs identified as women. A total of 57% of those with childcare needs identified as non-Hispanic Black. The full demographic distribution of patients in each social need category is reported in the Supporting Information [Appendix 1](#).

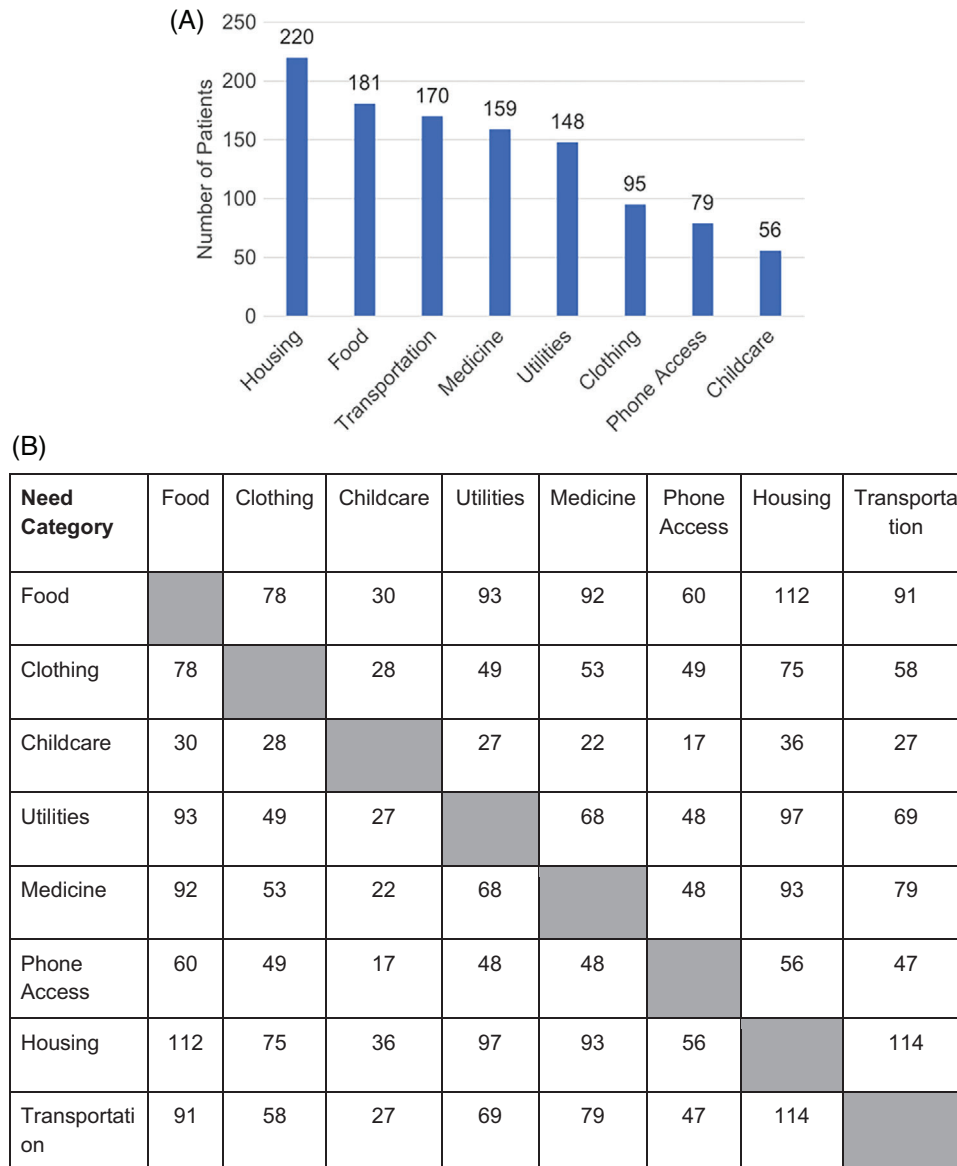


FIGURE 5 (A) Distribution of needs by screening form category for all patients completing screening, sorted from most reported to least. (B) The bottom table shows the number of patients with overlap between various categories of need.

3.4 | NCCARE360 enrollment

Across various racial groups and gender identities, no demographic differences were observed for patients enrolled in NCCARE360 compared to non-enrolled patients who wanted other forms of assistance (Table 1).

Although NCCARE360 enrollment was a specific component of the in-person screening protocol, patients could also be referred to CBOs via alternate resource directories, depending on individual patient circumstances. During the study period, 139 total patients received referrals through the *ParallelED* program, with 100 (72%) of these patients having been enrolled in NCCARE360. Food ($N = 59$, 42%) and housing insecurity ($N = 64$, 46%) have been the two most common referral categories, followed by access to medical care ($N = 43$, 31%), utilities ($N = 41$, 29%), and transportation ($N = 34$, 24%). Additionally, 22 patients were consulted to case management for urgent HRSN or

severe safety needs requiring escalation to a licensed social worker (see Supporting Information Appendix 1 for a list of case management consult criteria).

4 | LIMITATIONS

Selection bias is a significant limitation of this study. Participants were taken from a convenience sample based on which patients were in the WR, and participation in HRSN screening was not compulsory, causing certain demographics to be potentially overrepresented in our sample. Although our sampling method is a potential limitation in our data collection, we screened patients at multiple times throughout the day to prevent bias from screening time. We accounted for noncompulsory participation in our data by recording the number of patients approached compared to the number of patients who agreed to

TABLE 1 Patient demographics by NCCARE360 enrollment status.

Demographic	No.	% (IQR)	NCCARE360 enrollment status			
			Enrolled		Not enrolled	
			% (IQR)	% (IQR)		
Male	123	31	79	20	44	11
Female	226	57	142	36	84	21
Durham County	236	59	153	38	83	21
Black, non-Hispanic	236	59	153	38	83	21
Black, Hispanic	5	1	5	1	0	0
White, non-Hispanic	58	15	32	8	26	7
White, Hispanic	10	3	8	2	2	1
Hispanic only	31	8	21	5	10	3
Other race	10	3	3	1	7	2
Age (years), median	46.2	(32.4–58.6)	46.2	(31.7–59)	46	(34.3–58.2)
Total	350		222		128	

Note: The IQR is reported for age, and the percentage of patients within a specific demographic category for the respective enrollment result is reported for all other demographics.

Abbreviation: IQR, interquartile range.

participate. In addition, patient privacy concerns may have limited our patient population. To address this concern, we formally screened patients who agreed to participate in a relatively remote area of the WR.

Another possible source of bias is the discrepancy in the demographics between our student volunteers and the patients. The majority of volunteers identify as White, non-Hispanic, and Asian American with an age range of 19–22. Conversely, the majority of our screened patients identified as non-Hispanic Black with a median age of 45.6 years old. This discrepancy may discourage patients from participating in the HRSN screening in the WR.

We also had limitations in scheduling. During school holidays, volunteers were unavailable to screen patients in-person. However, a separate cohort of students was recruited to screen and call patients during the summer, and students continued to follow up remotely with patients during break periods. Finally, the use of students in this model limits scalability to EDs and health centers that are not connected to an academic institution. However, our workflow of screening patients during waiting time could be replicated with other groups, such as community health workers.

5 | DISCUSSION

The *ParallelED* model demonstrates that WR time during ED visits can be leveraged as an opportunity for intervention to screen patients for their unmet HRSN. Our volunteers identified significant unmet HRSN in our ED population during the day and were able to enroll patients into NCCARE360 to provide further referral assistance. Furthermore, our model illustrates that using undergraduate student volunteers is one means to successfully screen patients in the WR and provide resources through various modalities.

Of the 3297 patients approached in the WR of the Duke ED, approximately 13% agreed to participate in the HRSN screening intervention, with the vast majority of those patients (93%) screening positive for HRSN. Although we were unable to find data from other screening initiatives on the willingness of patients to participate in HRSN screenings, the percentage of patients who agreed to screening and screened positive was comparable to positive screening rates in other studies, which suggests that this workflow is similarly effective in identifying HRSN prevalence as other screening protocols.^{28,29}

Our findings support similar published models that have reported food, housing, utility, and transportation as the most commonly self-identified HRSN.^{16,17,30} Furthermore, the significant needs identified build on previous literature outlining the significant burden that HRSN have on the ED patient population.^{14,15} Our results further support the efficacy of using undergraduate volunteers as community resource screeners and navigators for patients.^{14,19,23} An intervention at Lincoln Community Health Center (LCHC)—a federally qualified health center in Durham, North Carolina—demonstrated the feasibility of leveraging student volunteers to follow up with patients regarding their referrals.²³ Our pilot adapted this model by using volunteers for the screening, allowing case managers increased bandwidth in the ED to address complex consults.

Improving health equity for traditionally marginalized populations requires novel ideas and engagement at all levels of the workforce for success. The patients who we served in this pilot predominantly self-identified as minorities, with 78% of the patients identifying as non-Hispanic Black or Hispanic. Compared to Duke Hospital's census during the time period our pilot was conducted, which showed 58% of ED patients identifying as the aforementioned minorities, our results highlight the racial disparities in unmet social care. More specifically, non-Hispanic Black patients exhibited disproportionate unmet HRSN. Of those who completed the screening, 67% identified as non-Hispanic

Black, whereas Duke's Hospital census indicated that the aforementioned group only make up 47% of ED patients. This could reflect both the racial disparities in unmet HRSN as well as in ED visits.^{31,32,33}

Using cross-sectoral data partnerships such as NCCARE360 is essential to advancing health equity and addressing HRSN. *ParalleLED* proved to be an effective pathway to implementing NCCARE360 in the ED because 60% (222/350) of patients requesting assistance with their HRSN agreed to enroll. Furthermore, the decision to not enroll in NCCARE360 did not vary significantly across various racial groups and gender identities.

From the volunteer perspective, the *ParalleLED* students engage in meaningful patient interviews and learn pre-professional competencies, preparing them for careers in the medical or health policy fields. The program was designed to allow students to practice 12 of 15 core competencies outlined by the Association of American Medical Colleges.²⁷ This has contributed to the ability to maintain a steady workforce, recruiting 20–30 new volunteers every year.

Previous work has provided exploratory examples of methods to screen patients for unmet HRSN in the ED.^{14,15,17,34} Many strategies have been shown to be successful, such as electronic medical record-based identification of high-risk patients, and screening performed by social workers, nursing staff, or physicians. Although these are all viable options, at this time, there are no established best practices for ED-based screening. Furthermore, widespread implementation of these strategies may be limited by adding additional tasks to staff members who are already under significant time constraints in the ED. Using student volunteers to provide resources and referrals for non-urgent needs allows ED case managers to focus on complex or urgent consults in the ED. Our work provides an additional strategy that institutions may consider employing to mitigate the aforementioned barriers, as the health care industry continues to move toward improved interventions aimed at identification and addressing of HRSN.

The *ParalleLED* model is a novel approach to HRSN screening and referral methodology for several reasons. First, our work used student volunteers, which allows clinical workflow to proceed uninterrupted without additional work for clinical staff such as social workers, nurses, or physicians. Second, we use the idle time spent in the WR for our intervention. This allows our interviews to be conducted with ample time, and allows for identification of complex or urgent HRSN earlier in a patient's visit, regardless of chief complaint, insurance status, or other demographic variables. Additionally, *ParalleLED* offers in-person resources such as community-based resources and websites, and enrollment in NCCARE360. Finally, the volunteers follow-up at 2 separate time points after the intervention to determine if the referral was successful and provide any additional assistance needed. Future directions for our program include the use of QR codes for mobile screening, and using various forms of communication for follow-up (SMS text and email). This, alongside partnerships with surrounding social work and pre-health programs to broaden our volunteer-base and educational experience, will afford our program many opportunities for growth.

In conclusion, the adoption of a HRSN screening and referral process using idle time in the ED WR could prove to be an invaluable tool

to improve health outcomes and advance health equity. Because ED physicians, nurses, and social workers already have a taxing workload, student volunteers provide one possible workforce through which social support can be provided.

AUTHOR CONTRIBUTIONS

JP, GM, GL, MY, HD, JJZ, SS, and JB conceived the study, designed the investigation. JP and JB supervised the conduct of the trial and data collection. GM, GL, MY, HD, AV, and JJZ undertook recruitment of patients and managed the data, including quality control. JJZ provided statistical advice on study design and analyzed the data. JP, GM, GL, MY, HD, AV, and JJZ drafted the manuscript, and all authors contributed to its revision. JP takes responsibility for the article as a whole.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ORCID

John Purakal MD  <https://orcid.org/0000-0001-9540-8997>

James J. Zheng  <https://orcid.org/0009-0006-2698-1515>

TWITTER

John Purakal MD  <https://twitter.com/johnpurakal>

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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AUTHOR BIOGRAPHY



John Purakal, MD, MS, is an assistant professor in the Department of Emergency Medicine at Duke University School of Medicine. He holds appointments with the Duke-Margolis Center on Health Policy and Samuel Dubois Cook Center for Social Equity in Durham, NC.