Final Progress Report

From Emergency to Community: Implementing a Social Needs Assessment and Referral
Infrastructure using Health Information Technology

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Structured Abstract

Purpose: The purpose of this study was to implement a universal, social needs assessment and referral process during Emergency Department (ED) care using existing Health Information Technology, evaluating for feasibility, usefulness and patient- and staff-experiences.

Scope: On 01/14/2019, ED registration staff began screening patients for social needs using a 10-item social needs screener on touchscreens linked to a community service outreach specialist. Data collected through 02/29/2020 were incorporated into our primary analysis. Screening and referrals continue through the date of this report.

Methods: Screening approaches, completed screens, positive screens, receipt of community service referrals, staff observations, staff interviews, and patient focus group data were collected throughout the study.

Results: As of 03/01/2020, 4608 participants were approached, and 61% (2821) completed all 10 screening questions. 47% (1324) of patients screened communicated one or more need, 34% (453) of whom agreed to community resource follow-up; 98 (20%) were ultimately referred to community agencies. Older, male, non-white, and Hispanic patients were more likely to have received outreach. Preliminary analyses suggest social needs are associated with ED service utilization patterns.

Staff experienced few technical barriers. Patient presentation impacted decisions to engage patients in screening, and staff communicated hesitancy regarding delivery and purpose of screening. In contrast, patients wished for improved understanding of unmet needs, but were universally concerned about stigma and permanent medical records.

Factor analysis identified and verified the screener's one factor structure, and suggesting items were homogenous. The reliability of Cronbach's alpha and McDonald's Omega were 0.89. Response Theory analysis showed the screener can effectively identify patients willing to engage in social needs outreach.

Key Words: social determinants of health, socioeconomic factors, emergency service, referral and consultation, health equity

I. Purpose

The purpose of this study was to implement a universal, patient-centered social needs assessment and referral process during routine ED care using existing Health Information Technology, and evaluate whether linking social needs assessment, community-based referral, and health outcomes data may facilitate an understanding of population health; and assess the needs and wishes of patients and clinicians. The specific aims of this study were

Specific Aim 1. To evaluate the technical and operational feasibility and acceptability of implementing a HIT-delivered social needs assessment and referral process during routine ED service delivery.

> 1a. We will use data collected throughout implementation of the social needs assessment and referral process between ED Care Management and 211 to evaluate the number of patients in which social needs are assessed using touch pads; the time it takes to complete the social needs assessment (patients and providers); number of patients referred to 211; number of patients contacted by 211; and the nature of referrals (e.g., health, household or transportation needs) made by 211.

> 1b. We will qualitatively examine provider- and patient-reported barriers, facilitators and recommendations for clinical adoption of universal social needs assessment and referral in EDs.

Specific Aim 2. To obtain preliminary estimates of effectiveness of Health Information Technology integration of social needs and community-based referral data within the health system.

> 2a. We will use comprehensive social needs assessments and referrals tracked through 211's ServicePoint software and the University of Utah's EPIC electronic health record to evaluate the nature, quality and usefulness of linking social needs referral (e.g. for transportation and household needs), patient characteristics that may influence effectiveness (e.g., demographics; diagnoses; and service utilization in year prior to index ED discharge); and health outcomes (e.g., primary care, inpatient admissions, ED re-visits within 60 days of index ED discharge) subsequent to the intervention.

We proposed that testing whether HIT technology can be used to meaningfully integrate existing information about patients' social needs and health outcomes has potential for _high impact_: this model could be readily configured, sustained, and scaled to communities across the country because it relies on _existing_ technology and a _free-of-charge nationwide_ service for meeting social needs with community-based resources.

II. Scope

Background

In the United States, 141 million emergency department (ED) visits occur annually, accounting for 11% of ambulatory care visits. In recent decades, ED visits have outpaced population growth, increasing by approximately 23% in the early 2000s.[1] While ED visits are characterized by high acuity, up to 25% of patients visiting EDs view it as their usual source of care[2-5] due to convenience, and referrals from and barriers to, primary care.[6-8] A specific strategy proposed for long-term cost savings in EDs has been to direct resources toward developing health information technology (HIT) linking ED clinicians with case managers and community-based services.[9,10]

EDs are the only place in the United States health care system where patients cannot be turned away for inability to pay. As a result, a disproportionate share of low-income and uninsured patients are seen in EDs, [1,11] or are disproportionately affected by "social determinants of health" (SDOH). Many variables fall under the broad umbrella of SDOH which are organized as the conditions and material attributes of "place," and patterns of social engagement.[12,13] However, questions remain about population-level SDOH measurement, payment implications,[14,15] and about how to assess and address SDOH during health service delivery.

While it's clear that SDOH affect health and outcomes after ED discharge, there is no clear evidence-base regarding the assessment of SDOH from which clinical interventions can be guided.[16] Payors and policymakers have focused on identifying **"social needs,"** and recommend that clinical systems screen for food and housing insecurity; financial strain; transportation, childcare, education, employment, and mental health needs; exposure to violence; and social isolation.[17] Screening tools that include questions of social needs have predicted ED revisits and inpatient admissions after an ED visit.[18] However, clinicians have raised concerns of how to best integrate social needs assessment into clinical care without sufficient understanding of its impact on patients and access to resources, including ethical concerns such as compromising therapeutic relationships when identified needs are not addressed.[19] Collectively, these findings suggest the importance of developing effective, sustainable methods for integrating both "social needs" assessment *and* referrals into routine ED service delivery.

Context

The work addressed in this report capitalized on academic-community-based relationships and a preliminary study during which a Social Needs Workgroup of clinician-investigators and clinical and community-based partners applied an evidence-based approach for understanding best practices and workflow related to assessing *and* addressing social needs in the landscape of ED discharge. In this work, we identified that patients are referred to the United Way's 2-1-1 (211) service by ED care management staff. The 211 service provides a free-of-charge, comprehensive list of contact information for local resource providers who address common social needs (e.g., transportation, financial advice, food and housing assistance, etc.). The 211 service is staffed 24 hours per day, 7 days per week by trained Information Specialists with access to an information pool of over 10,000 services in the Utah and surrounding states. Information Specialists, who are subject to routine quality oversight, use HIPAA-compliant ServicePoint/Mediware software to track service use, consumer demographics, reported needs, and consumer follow-up.

The Workgroup assembled social needs assessments and selected/revised screening questions to 1) focus on content important to patients discharged from the ED (e.g. health care

financial assistance and referrals, housing, transportation); 2) link to services routinely addressed by 211 information specialists; 3) limit questions to those that could be self-completed by low literacy patients in English and Spanish; and 4) integrate into ED workflow. The Workgroup then created a system for encounter data entered by 211 information specialists during their referral process to be associated with health information (e.g., ED revisits, hospital admissions) in a sustainable manner (i.e., without introducing additional staff). ED registration staff first tested screening questions into the ED admissions process, and then the paper-based, 10-item social needs screener was incorporated into the UHealth REDCap system. Using unique identifiers created in REDCap, we linked the ED screener and 211 referral details with patient data extracted from the UHealth Enterprise Data Warehouse (EDW) to test and evaluate in the study addressed in this report.

Setting and Participants

Study participants were patients seen, and registration staff working, in the ED of the University of Utah Health System's (UHealth) University Hospital. UHealth is a comprehensive tertiary care center in the Intermountain West servicing a geographic area equivalent to 10% of the Contiguous United States. The ED is a level I Trauma Center servicing 50,000 patients annually. The Care Management Team has a strong presence within the ED setting providing care coordination between the ED and inpatient and community-based settings. Care Management regularly evaluates service utilization patterns using data extracted from the EDW. Historical data show approximately 120 discharges daily. For this study, the research team focused on assessing social needs in the approximately 90 patients discharged to community-based (vs inpatient or skilled nursing) settings. In addition, we focused on eliciting in-depth qualitative data regarding the experiences of the registration staff delivering screening, and opinions of patients having sought care in the ED in the year prior to data collection.

III. Methods

Study Design

This study was informed by both community engagement and implementation science approaches. The University of Utah clinical research worked with the Social Needs Workgroup to integrate our piloted social needs screener into clinical workflow using touchscreens, directly refer patients with social needs to 211, and integrate screening and referral information collected in 211 ServicePoint, and extract EDW clinical outcomes data. During this test of the universal social needs assessment and referral process, we rigorously evaluated usage of the 211 service by patients discharged from the ED; and the linking of social needs assessment, community-based referrals with health outcomes data. We also sought to understand contextual factors impacting social needs screening and referral by 1) observing and interviewing ED staff directly engaged in social needs screening; and 2) interviewing patients who have accessed ED services within the previous year.

Data Sources/Collection

Beginning in January 2019, ED staff began screening for social needs in patients discharged to community-based (vs inpatient or skilled nursing) settings. Inclusion criteria were adult (>18 years) patients with access to a telephone (either voice or text messaging). Exclusion criteria included non-verbal patients, those in the care of Hospice, or who were residents of skilled nursing facilities (i.e., patients who are not responsible for their own self-care).

Patients completed the social needs screener on touchscreen computers linked to the HIPPA compliant REDCap system. REDCap data collection included details regarding who completed the screener, language, and reasons for non-completion. Throughout the study, the

PI and Co-Is regularly communicated with ED staff to elicit additional impressions of the assessment and referral process.

Patients indicating they had unmet needs and who wished assistance were directly referred to the United Way of Salt Lake's 211 service. Outreach specialists accessed a web-based, password protected REDCap window showing unique identifiers, contact information, zip code (to guide service referrals in patients' home communities), and social needs screening results. Information specialists then attempted to contact referred patients within 48 hours of ED discharge via phone, text, and/or email, and entered unique identifiers and referral details into 211's ServicePoint software according to standard protocol. Seven days after initial contact information specialists attempted to follow-up with patients and continued to document use of the referred services in ServicePoint. Throughout the study, the PI and Co-Is communicated with 211 staff to elicit impressions of the social needs referral process.

Details of 211's service encounters for all referred patients (calls completed, referrals made, and services used) are imported into the REDCap database using CSV files matched by a unique patient identifier. Epic EDW data fields (demographics, diagnoses, ED visits and hospitalizations during past year; 60-day primary care, hospitalizations, emergency department revisits at 60 days after index ED discharge) were added to the REDCap database. The accuracy of linking data from the 211 encounter system with Epic health records fields was continually assessed.

Throughout implementation, study research assistants, with Co-Is Luther and Guo, directly observed staff data collection, noting any difficulties encountered by staff and patients when completing the assessment. The only technical difficulties occurring during data collection occurred due to wireless network interruptions, primarily occurring during in the first two months of the intervention. From the pool of registration staff (n=20) who conducted screenings, 8 were recruited for in-depth, 60-minute qualitative interviews to explore individual approached to screener delivery, as well as attitudes toward its clinical utility, patient value, and overall acceptability. These interviews took place in June-September 2019. To help with implementation, weekly reports were sent to ED staff giving the number of approaches, screenings, and referrals along with one "case study" example of 211 outreach collected from the previous week. These reports are ongoing at the time of this report.

In March 2020, a convenience sample of patients who had accessed ED care during the previous 12 months was assembled in a "community engagement studio" by the community engagement team associated with the Center for Clinical and Translational Science. Community engagement studios are utilized in research as medium to dynamically interact with community stakeholders. We assembled a panel of participants, representative of diverse patient communities, to receive feedback regarding the planning, design, implementation, and dissemination of our intervention.[20] Each participant in the group was chosen as a representative of their community, prepared to contribute to the discussion by having the screener and interview questions beforehand, and encouraged to reach out to their communities before participating. The group as a collective is meant to represent the diverse community populations of the greater patient population, with the longer, two-hour focus group used to highlight individual responses, and co-construct meaning with unbiased facilitators.[20] Twelve patients attended the focus group.

Measures and Instruments

Evaluation was guided by the RE-AIM implementation framework (Reach, Effectiveness, Adoption, Implementation, and Maintenance).[21-24] In our proposal, reach was demonstrated by the number of individual patients benefitting from the HIT-enabled screening and referral intervention; effectiveness was demonstrated by whether HIT-enabled social needs screening and referral had potential for impacting population health (through ED visits and inpatient admissions); adoption was demonstrated by the receptiveness of patients and staff to engage in

the intervention; <u>implementation</u> was demonstrated by patient ability to complete the HIT-enabled screening; and <u>maintenance</u> was demonstrated by the ability to maintain assessment and referral over time and after the study period. See Table 1, from the original grant submission, linking framework terminology with study aims, the RE-AIM evaluation framework, data sources, and variables.

Table 1. RE-AIM Framework applied to current study

Study Aim	Framework	Data Source	Variables
1	Reach	REDCap	Number of Social Needs Assessments Completed/Overall Number of Discharges
		211 ServicePoint	Number of patients screening positive for social needs/Number of calls completed by 211 after a positive need identified; Number of patients with one or more social need who receive referrals through 211 information specialists
	Implementation	Observation Notes	Patient and Provider time to conduct screening for social need referrals; time and details troubleshooting tech; Patients' ability to complete social needs screeners using touchscreens
		REDCap	Time required for patients to complete social needs screeners; number of screeners completed/number of screeners initiated
	Maintenance	REDCap	Number of Social Needs Assessments Completed/Overall Number of Discharges over time (i.e., weekly, monthly %s)
	Adoption	REDCap	Reasons given by patients who screen positive but who do not wish to be referred to 211
		Observation Notes	Reasons given by patients who screen positive for a social need who do not wish referral to 211
		Patient Interviews	Patient-identified benefits of, and barriers to, social needs referral process
		Provider Interviews	Provider-identified benefits of, and barriers to, the social needs referral process
2	Effectiveness	REDCap	Demographics (age, gender, diagnosis, insurance, zip code (calculate urban/rural/frontier status, area deprivation index) of ED patients screening positive for social needs
		211 ServicePoint	Type (Transportation, housing, food) of referrals, and made by Information Specialists among those with social needs assessed
		REDCap-EPIC	Health outcomes of those completing social needs assessment (ED and inpatient admissions within past year of index ED visit; Utilization of primary care, ED revisit, hospitalization within 60 days of index ED visit)

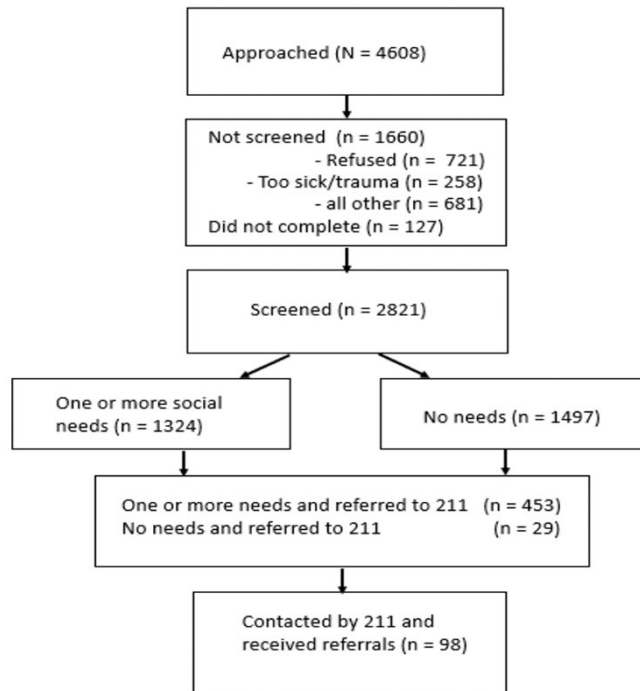All quantitative analyses were conducted with SPSS Version 27.0 (SPSS, Armonk, NY).

Limitations

The primary limitations of this study are related to generalizability; this work was conducted in one academic health sciences center, and our qualitative samples may not reflect all staff and patient experiences impacting reach, effectiveness, adoption, implementation, and maintenance. As outlined in the following results section, analyses regarding effectiveness – data that incorporated clinical EDW variables – are preliminary as we have experienced significant delays in procuring accurate insurance data. More robust models that report inactions between insurance and social needs are forthcoming. Because of the large range of diagnosis codes, to date, they have not been incorporated into our analyses. Finally, while we initially proposed service utilization for the year prior to index ED visit, we have compared service utilization for the 90 days prior and 90 days following the index ED visit. However, as also outlined in results, data collected during this study have resulted in actionable, concrete changes to our initial processes that have been leveraged to maintain screening, increase

reach, and expand to COVID-testing beyond the study period suggesting the utility of our findings, and potential for larger scale dissemination and implementation.

IV. Results

Principal Findings related to Specific Aim 1a. *We will use data collected throughout implementation of the social needs assessment and referral process between ED Care Management and 211 to evaluate the number of patients in which social needs are assessed using touch pads; the time it takes to complete the social needs assessment (patients and providers); number of patients referred to 211; number of patients contacted by 211; and the nature of referrals (e.g., health, household or transportation needs) made by 211.* Over 412 days (1/14/2019 – 2/29/2020), 4608 patients were approached. 1660 (36%) were not screened (refused – 43%, too sick/trauma – 16%). 2821 patients completed the screener. The average age of our participants was 44.4 (17.8) years (Table 1). The distribution of men and women was 45.0% vs. 55.0%, respectively. Of those completing screening, 14.2% were

Figure 1. Patient Retention from Approach to Service Referrals

identified in their health record as Hispanic/Latino ethnicity, and 79% were listed as White/Caucasian for racial background.

Of the 2821 participants screened (Figure 1), 1324 (46.9%) indicated having one or more social needs. Of the 1324 participants indicating having one or more social needs, 453 (34.2%) wished referral to 211. In addition, there were 29 participants that asked to be referred to 211 who indicated having no social needs. Of the 482 participants who were referred to 211, 98 (20.3%) were eventually reached by 211 information specialists and were given referrals to community-based agencies. The overall percentage of those with needs who were given referrals to community-based agencies was 7.4% (98/1324) or 3.5% of the total sample screened (98/2821).

Principal Findings related to Specific Aim 1b. *We will qualitatively examine provider- and patient-reported barriers, facilitators and recommendations for clinical adoption of universal social needs assessment and referral in EDs.*

Staff Observations and Interviews
Our qualitative interviews and analysis were conducted through the lens of theoretical frameworks. Based on strong evidence from our early preliminary study[25] that motivation (self-determination) plays a central role in adoption practices among front-line staff, we used self-determination theory[26-28] to guide staff interviews. In sum, themes from staff interviews (n=8) included using professional intuition to decide if, when, who to screen; determining the appropriateness of staff being the "right" group to own this workflow; and determining if the chosen screener is the "right" tool for the ED system. Those with intrinsic motivation were more likely to integrate screenings if they felt they were important members of the healthcare team,

agents of change, or could benefit the lives of patients. In contrast, those with extrinsic motivation were likely to question their role in screening or to be skeptical of referrals to outside community resource agencies.

The vast majority of registration staff report that leveraging their own "professional intuition" is effective when delivering the social needs screen. For example, staff demonstrated independent decisions regarding how to best introduce the screen to patients (the framing) and/or during the initial decision to screen (the value). Assumptions for these personal algorithms were based primarily on the staff members' view of patient needs, specifically regarding insurance coverage, patient characteristics or demographics, current diagnoses, and/or a patient's ability to engage with the screener. All such heuristics were noted as staff "judgment calls" occurring within moments of meeting the patient.

Screening approaches ran the gamut, from completely confident to unsure, skeptical, and resentful. The staff felt strongly that, given their role and experience, their professional intuition was fine-tuned enough to understand which patients may be benefit from community-based services. Staff would alter the way they approach the patient. About half of the participants also admitted to using their professional intuition to modify and/or take creative liberties "to make the screen [their] own": staff would try to maintain each items' integrity, but try to find more creative ways to ask or address the sensitive question line, etc. Staff with higher self-reported professional intuition and intrinsic motivation utilized more modifications and took more creative liberty in delivering the screen. These phenomena may be a result of the staff leveraging, and perhaps taking pride in, their cultivated experience or connection with patients. One participant noted that, "It is more than the patient, it is about the staff trusting that the information is useful." However, these data could also suggest that more engaged staff may be those who deviate most from screening protocols, even if they complete more screens. Conversely, those with lower motivation and less regard for their professional intuition may be more likely to follow the protocol.

In terms of the professional role, there was little disagreement regarding the importance of screening for unmet social needs and its impact on health. Rather, the range of approaches and adoption of the tool indicates the staff members' willingness to adopt, viewing the intervention as worthy and congruent with their own interests as members of the healthcare team. Health systems seeking to address social determinants by integrating these assessments and referral pipelines need to carefully consider policies that prepare staff by identifying and promoting their intrinsic motivation and facilitating readiness.

Of note, the only technical barrier reported or directly observed were related to occasional disruptions caused by the hospital's wireless system; these were experienced twice between February-March 2019, with no reported issues thereafter.

Patient Engagement-Focus Group

The Theory of Reasoned Action (TRA) underpinned the questions asked and analytic process of patient focus group data. Because TRA assumes the predictors of a behavior are a person's actions and beliefs regarding a behavior and attitude[29-31], it was seen as a useful lens as we sought to discover individuals' motivation and beliefs related to social needs screening, and willingness to engage in the subsequent social needs referral process. As such, TRA components of attitudes, norms, and perceived control were examined to explain the intention and beliefs, and to understand behaviors of these participants.

The research team focused on the substantive content shared during the 2-hour focus group, as well as the conversational dynamics[20]. As outlined below, patients expressed a desire to have their needs known. However, because they feel social needs questions could make them feel vulnerable, they strongly communicated the need to have them presented with "sincerity" vs a task to complete by a staff member. They preferred questions be asked by a nurse, but believed others could be trained. Because they felt that questions could be

stigmatizing, patients felt strongly that screening should be done universally (e.g., vs only patients who are uninsured), that the intent and potential benefit is shared before asking, and that the information not be left as part of their permanent health record.

Theme 1: "Would I answer? Yes, Maybe, No"

Participants reviewed the screening tool used to screen for social needs. The resulting participant open commentary regarding the screening were coded as mostly positive with exemplar quotes: 'for me, I won't have any problem', 'I'd be fine', 'I've done these before'. The tone of initial conversations were casual and confident; the majority of participants continued to state they would have no problem answering questions screening themselves for social needs. Yet, quickly the participants moved their responses from themselves to thoughts about what other people would do when asked to fill out the social needs screener. When they discussed what others would do, the responses transitioned to neutral (maybe they would do it) to negative (no, they would not do).

As the participants continued to respond in through the view of what 'others' may feel they identified negative comments such as people could be embarrassed or the screening could be seen as an invasion. The conversation explored more negative comments. These comments were divided out and developed into the second theme of vulnerability.

In a practical sense, patients did not express any concerns about the length of screening. They suggested that, other than concerns about embarrassment of others, their willingness to answer would be influenced about how physically ill they felt while waiting in the ED; they expressed concerns that language barriers could impact patients' ability to answer.

Theme 2: "I need to know you before I answer"

After participants agreed they themselves would answer screening questions, they were asked 'who' should ask these questions. The theme of 'I need to know you before I answer' developed from responses. Trust, comradery, familiarity were described as participants stated they would disclose the personal information of social needs to those they felt 'were genuine', 'were around the most', and 'who showed they cared'. How 'showing you care' looks to these participants was offered as a probe question and participants comments such as 'eye contact', 'good personality', 'I liked her', 'you can just tell they care' were offered. One participant commented not 'showing you care' is not expected of some staff such as registration staff offering 'I know they are here about the business, the money.

Participants in this group uncovered that for themselves to be comfortable answering to their fullest extent, they need to know the person who is asking or feel a connection to them be it personal as in caring or expectation of their job as in those caring for them such as nurses or social workers. The interactions also demonstrated how skills of communicating trust and commitment to building trust are a critical prerequisite for those staff whom are asking about a patient's unmet social needs.

Theme 3: "These questions make me vulnerable"

Vulnerability arose as a theme from these participants as they explored what 'others' may do when asked about their ability to provide to their own social needs. The implication these responses were in two parts: 1) discovering a person has needs implies they are unable to provide for themselves and 2) referring for needs increases exposure of what they are not able to do to outside agencies.

While still in a response pattern of 'what others may say/do', participants responded they themselves do not have any of these needs, yet they recognize others do. Participants reported particular community groups that would avoid disclosing their social needs due in part to their culture or past negative experiences with applying for services. Concern that disclosure of needs could increase a person's vulnerability and open their exposure to systems outside of healthcare.

Principal Findings related to Specific Aim 2a. *We will use comprehensive social needs assessments and referrals tracked through 211's ServicePoint software and the University of Utah's EPIC electronic health record to evaluate the nature, quality and usefulness of linking social needs referral (e.g. for transportation and household needs), patient characteristics that may influence effectiveness (e.g., demographics; diagnoses; and service utilization in year prior to index ED discharge); and health outcomes (e.g., primary care, inpatient admissions, ED revisits within 60 days of index ED discharge) subsequent to the intervention.*

First, in an effort to understand demographic factors contributing differences in reported social needs, we compared demographic characteristics (age, gender, race, ethnicity, and insurance status) between the 1324 participants that indicated one or more needs vs. the 1497 participants that indicated no needs. Results (Table 2) show the participants that indicated one or more needs were significantly younger in age 41.2 (15.2) years vs. 47.1 (19.4) years, $p < 0.001$; there was a higher percentage of Hispanic ethnicity (18.1% vs. 10.9%), $p < 0.001$; a higher percentage of Black or African American (5.7% vs. 2.4%), and Other racial backgrounds (15.6% vs. 9.3%), $p < 0.001$; more were on Medicaid (14.8% vs. 4.0%) and less on private insurance (17.4% vs. 32.5%), $p < 0.001$; there was no gender differences, $p = 0.136$. (Table 2)

Table 2. Comparison between participants expressing social needs vs. no social needs

Characteristic	No needs N = 1497	One or more needs N = 1324	Total N = 2821	p - value
Age in years (SD)	47.1 (19.4)	41.2 (15.2)	44.4 (17.8)	< 0.001
Gender				0.136
Female	820 (56.4%)	679 (53.5%)	1499 (55.0%)	
Male	635 (43.6%)	590 (46.5%)	1225 (45.0%)	
Ethnic Background				< 0.001
Choose not to disclose	12 (0.8%)	8 (0.6%)	20 (0.7%)	
Hispanic/Latino	158 (10.9%)	229 (18.1%)	387 (14.2%)	
Not Hispanic/Latino	1283 (88.3%)	1030 (81.3%)	2313 (85.0%)	
Race				< 0.001
American Indian and Alaska Native	9 (0.6%)	20 (1.6%)	29 (1.1%)	
Asian	41 (2.8%)	11 (0.9%)	52 (1.9%)	
Black or African American	35 (2.4%)	72 (5.7%)	107 (3.9%)	
Choose not to disclose	5 (0.3%)	7 (0.6%)	12 (0.4%)	
Native Hawaiian and Pacific Islander	25 (1.7%)	19 (1.5%)	44 (1.6%)	
Other	135 (9.3%)	198 (15.6%)	333 (12.2%)	
White or Caucasian	1203 (82.8%)	940 (74.2%)	2143 (78.8%)	
Insurance				< 0.001
No Insurance information	556 (37.1%)	612 (46.3%)	1168 (41.4%)	
Medicare - Federally Funded Insurances	257 (17.2%)	92 (7.0%)	349 (12.4%)	
Private, COBRA, Workers comp, etc	486 (32.5%)	230 (17.4%)	716 (25.4%)	
Medicare Advantage Plans (Health Maintenance Organizations)	54 (3.6%)	49 (3.7%)	103 (3.7%)	
Medicaid, Disability & State Funded Plans (All Ages)	60 (4.0%)	196 (14.8%)	256 (9.1%)	
Specialty-Based & Behavioral Health Insurances Plans (All Ages)	38 (2.5%)	73 (5.5%)	111 (3.9%)	
Self-Pay	46 (3.1%)	71 (5.4%)	117 (4.1%)	

* Overall missing demographic data = 3.5%

Next, we compared demographic characteristics between the 98 participants who received 211 referrals vs. the 384 participants who did not receive 211 referrals. Results (Table 3) indicated the participants who received 211 referrals were older in age 46.5 (17.0) years vs. 42.3 (14.2) years, p = 0.029; there were a higher percentage of Hispanic ethnicity (32.3% vs. 20.6%), p = 0.042; a higher percentage of Other racial backgrounds (32.3% vs. 16.9%), p = 0.004; and a higher percentage of males (62.8% vs. 47.5%), p = 0.008. Also, the average number of needs reported was not significantly different, 4.8 (2.8) needs in the receive 211 referrals group vs. 4.7 (2.5) needs reported in the not receiving 211 referrals group, p = 0.666; there was no differences in reported insurance, p = 0.390. (Table 3)

Table 3. Comparison between Receivers vs. Non-Receivers of 2-1-1 Referrals

Characteristic	No 2-1-1 Referrals N = 384	Received 2-1-1 Referrals N = 98	p - value
Number of needs reported (SD)	4.8 (2.8)	4.7 (2.5)	0.666
Age in years (SD)	42.3 (14.2)	46.5 (17.0)	0.029
Gender			0.008
Female	189 (52.5%)	35 (37.2%)	
Male	171 (47.5%)	59 (62.8%)	
Ethnic Background			0.042
Choose not to disclose	3 (0.8%)	0 (0.0%)	
Hispanic/Latino	74 (20.6%)	30 (32.3%)	
Not Hispanic/Latino	283 (78.6%)	63 (67.7%)	
Race			0.004
American Indian and Alaska Native	4 (1.1%)	2 (2.2%)	
Asian	2 (0.6%)	2 (2.2%)	
Black or African American	24 (6.7%)	8 (8.6%)	
Choose not to disclose	3 (0.8%)	0 (0.0%)	
Native Hawaiian and Pacific Islander	10 (2.8%)	0 (0.0%)	
Other	61 (16.9%)	30 (32.3%)	
White or Caucasian	256 (71.1%)	51 (54.8%)	
Insurance			0.390
No Insurance information	194 (50.5%)	45 (45.9%)	
Medicare - Federally Funded Insurances	22 (5.7%)	12 (12.2%)	
Private, COBRA, Workers comp, etc	42 (10.9%)	10 (10.2%)	
Medicare Advantage Plans (Health Maintenance Organizations)	17 (4.4%)	4 (4.1%)	
Medicaid, Disability & State Funded Plans (All Ages)	60 (15.6%)	18 (18.4%)	
Specialty-Based & Behavioral Health Insurances Plans (All Ages)	26 (6.8%)	5 (5.1%)	
Self-Pay	23 (6.0%)	4 (4.1%)	

* Overall missing demographics data = 5.9%

Of the 1324 patients who indicated a social need, utilities were the most requested social need (668, 50.5%), followed by rent/mortgage (663, 50.1%), and clothing/furniture (655, 49.5%). Please see Table 4 for other social needs.

Table 4. Frequency of Reported Social Needs (N = 1324)

Social Need	Yes	No	Prefer not to answer
Utilities	668 (50.5%)	632 (47.7%)	24 (1.8%)
Rent/Mortgage	663 (50.1%)	638 (48.2%)	23 (1.7%)
Clothing/Furniture	655 (49.5%)	647 (48.9%)	22 (1.7%)
Doctor/Medical visit	605 (45.7%)	707 (53.4%)	12 (0.9%)
Food	594 (44.9%)	710 (53.6%)	20 (1.5%)
Employment	540 (40.8%)	761 (57.5%)	23 (1.7%)
Medication	486 (36.7%)	818 (61.8%)	20 (1.5%)
Housing	422 (31.9%)	888 (67.1%)	14 (1.1%)
Transportation	309 (23.3%)	1005 (75.9%)	10 (0.8%)
Childcare/Eldercare	191 (14.4%)	1107 (83.6%)	26 (2.0%)

The most common referral type provided by 2-1-1 was for utility services assistance (29 participants, 29.6%), followed by rent payment assistance (26 participants, 26.5%), and food pantries (24 participants, 24.5%). Please see Table 5 for the six most common referrals provided.

Table 5. Top 6 Referral Types

Referral Type	N = 98
Utility Service Payment Assistance	29 (29.6%)
Rent Payment Assistance	26 (26.5%)
Food Pantries	24 (24.5%)
Low Income/Subsidized Rental Housing	16 (16.3%)
Navigator Programs	8 (8.2%)
Food Stamps/SNAP Applications	8 (8.2%)

Third, we have conducted preliminary analyses regarding effectiveness of social needs referrals specific to service utilization and health outcomes (e.g., primary care (PCP), inpatient admissions, ED re-visits within 90 days of index ED discharge). Multilevel regression (generalized estimating equations [GEE] with an autoregressive (1) working correlation matrix, negative binomial link function) was used to model the primary outcomes of service utilization (PCP, Hospitalizations, and ED visits) 90 days prior and 90 days after index ED visit. Independent variables included demographic variables (age, ethnicity (Hispanic vs. Non-Hispanic), race (White vs. Non-White), and insurance (7 categories). There was also a fixed factor of time (90 days before vs. 90 days after), social need (Yes/No), and a time X social need interaction. (Table 6)

Table 6. Tests of Model Effects from General Estimating Equations

	PCP Visits		Hospitalizations		ED Visits	
	Wald Chi-Square	p-value	Wald Chi-Square	p-value	Wald Chi-Square	p-value
Time (90 days before/after)	31.512	<0.001	103.139	<0.001	205.654	<0.001
Social Needs (Yes/No)	0.970	0.325	0.502	0.478	7.580	0.006
Time * Social Needs	0.049	0.824	0.572	0.449	0.413	0.521
Insurance (7 categories)	154.877	<0.001	38.691	<0.001	99.630	<0.001
Age (years)	58.314	<0.001	31.714	<0.001	1.147	0.284
Ethnicity (Hispanic/Non-Hispanic)	0.708	0.400	2.404	0.121	2.584	0.108
Race (White/Non-White)	0.330	0.566	4.805	0.028	0.646	0.422

PCP visits

There was a Time effect ($p < 0.001$), 90 days before had lower average PCP visits than 90 days after, estimated marginal means 0.42 (0.04) vs. 0.57 (0.05), respectively. There was an effect with Insurance (more PCP visits among Medicare and Medicaid patients, and fewer PCP visits among self-pay patients and patients with no insurance information). Older patients had more PCP visits.

Hospitalizations

There was a Time effect ($p < 0.001$), 90 days before had lower average hospitalizations than 90 days after, estimated marginal means 0.16 (0.01) vs. 0.31 (0.02), respectively. There was an effect with Insurance (more hospitalizations with Medicare and Medicaid patients, and fewer hospitalizations with self-pay and patients with no insurance information). Older patients had more hospitalizations. Non-Whites had fewer hospitalizations than Whites, 0.20 (0.02) vs. 0.25 (0.02).

Emergency Department visits

There was a Time effect ($p < 0.001$), 90 days before had higher average ED visits than 90 days after, estimated marginal means 1.49 (0.09) vs. 0.94 (0.07), respectively. Patients indicating at least one social need having higher ED visits than patients with no social needs, estimated marginal means 1.27 (0.09) vs. 1.10 (0.08), respectively. There was an effect with Insurance (more ED visits with Medicare and Medicaid patients, and fewer ED visits with self-pay and patients with no insurance information). There was no age, ethnicity, nor race effects.

Additional Results

ED Social Needs Screener Psychometrics

Screening patients for social needs or risk is being widely and rapidly adopted in clinical practice; however, there is little psychometric evidence regarding the screeners. Leveraging the structure of this study, we conducted additional analysis examining the psychometric properties of our 10-item ED social needs screening tool, or the tool that our study team is now calling the Screener for Intensifying Community Referrals for Health, or SINCERE.

In an analysis led by Co-I Guo, exploratory factor analysis (EFA) was performed to determine the factorial structure, or dimensionality of the SINCERE. Confirmatory factor analysis (CFA) was used to verify the EFA result. Item Response Theory (IRT) was used to assess the validity of SINCERE's individual items. The optimal cut point of the SINCERE for identifying those who preferred to be referred for their social needs was estimated.

Using a larger sample of 5081 screeners completed during the Emergency Department registration process between 01/2019 and 09/2020, EFA and CFA identified and verified one factor structure and suggested that all the 10 SINCERE items were homogenous, measuring the same construct. The reliability of Cronbach's alpha and McDonald's Omega were 0.89. The IRT suggested SINCERE can effectively identify patients who have social needs. Moreover, patients who had two or more social needs were those willing to receive referrals to low- and no-cost community resources for their needs. These findings lead us to conclude that SINCERE is a valid and reliable tool for measuring social needs for health, and should be considered as a screening option for in practice interventions seeking to address social needs.

A manuscript reporting the psychometric analysis above is currently under review.

V. Outcomes

Discussion of Primary Findings

The overall study examined the reach, adoption, and preliminary aspects of effectiveness of an HIT-facilitated social needs screening and referral intervention. Despite sparse evidence of technical and logistical barriers to universal social needs screening in the ED, and data suggesting our 10-item "SINCERE" is psychometrically sound, fewer than 60% of targeted patients were screened, and 7% of those who communicated one or more social need were ultimately connected to services to address stated needs. Themes emerged through qualitative data in the study identified concrete messaging and training that should be incorporated into screening workflow when universally screening for social needs in clinical settings. Analysis of the SINCERE suggest that having one or more needs may be key in determining patients who are receptive to outreach efforts.

Our experiences of suboptimal intervention reach are not unique in a landscape of clinical interventions attempting to address patients' social needs. A recent study found that fewer than half of their SDOH intervention participants reported resolution of social needs.[32] These findings, combined with our own, suggest that barriers to SDOH intervention effectiveness likely exist both upstream and downstream from the point of service provider connections. While our own intervention was developed with clinical implementation in mind (i.e. ease of delivery and existing staff and resources), our analysis of intervention reach clearly illustrates the impact of staff and patient level factors act at multiple intersections of the intervention, from decisions to approach, to complete screening, to accept outreach and, while not measured in this study, to ultimately act on referrals. Similar to Hsu and colleagues' conclusion that patient collaboration, empathy, and positive regard is a product of interventionists acting as advocates,[32] patients in our study communicated the need for relationship building and other signs that connote sincerity on behalf of those administering the intervention. Overall, our study results may highlight the need to firmly place SDOH interventions into the context of health behavior interventions, as influenced by concepts such as self-determination. Even in cases where a patient declines service referral, the work suggests benefits to the screen's inclusion to clinic workflow; the assessment still informs staff-provider-patient interactions through a change in prescribed care and general knowledge regard the status of the patient.

Complementary to the input of patients, staff likely need additional, structured scripting and training related to presenting the screener's questions, both in terms of overcoming time barriers but also in navigating any discomfort. Interventions to facilitate connectedness may also be useful, from the time of screening to ongoing engagement and problem solving for those open to referrals. To overcome discomfort and stigma of screenings, health systems seeking to connect screens and community referrals need to carefully consider strategies to better identify and promote staff intrinsic motivation and facilitating readiness for its implementation. If the involved staff can pick and choose if/how to implement the screen, it certainly seems to facilitate staff autonomy. However, too much customization (i.e. leaving it up to staff to skip or modify the assessment) may threaten the fidelity of the screen.

Facilitating intrinsic motivation and readiness could be further aided by more directive policies. We repeatedly found value in leveraging staff intuition about how/when to screen; they are most aware of the workflow's opportunities and challenges to integration. To maximize adoption of any intervention, it is critical to integrate the priorities and context of the key stakeholders, as well as maximize existing system infrastructure. This study argues that by formally recognizing these "human factors" of screening, we can better frame interventions to increase adoption and feasibility across clinical practice and roles. Finally, by understanding staff underlying motivation and autonomy, complex human variables, such as staff discomfort and stigma of social needs screening, can be operationalized and challenged through targeted education and workflow, thereby increasing relatedness and decreasing resistance.

One concern voiced by both patients and staff participating in this intervention is a clear reluctance in documenting social needs in the electronic medical records, most specifically concerns over what they see as a permanent documentation of what one hopes is a temporary life situation. This has important implications for efforts seeking to integrate this information. Significant efforts to insert and exchange SDOH data in EHRs are underway. Patients have concerns about this information following them over time. While clinicians may view SDOH information as an important part of personalized care, patients also see this is different – and potentially lesser – care via patient profiling. Patients viewed screening only certain patient populations (e.g. those without insurance) unfavorably, and such efforts are even likely to undermine therapeutic relationships.

While reach was limited overall, our quantitative data are somewhat reassuring in that the demographic characteristics of those ultimately engaging in the 211 outreach and receiving referrals are those who are often members of underserved and underrepresented patient populations. However, this study suggests that screening for social needs in a busy ED setting, or likely any health care setting, may be difficult to maintain as a sustained and accurate practice without reinforcement mechanisms. Health systems that seek to address social determinants by integrating social needs assessments and community-based referrals must carefully consider policies that prepare staff by identifying and promoting their intrinsic motivation and facilitating readiness for engaging in sensitive conversations. Future efforts should work to distill which individual components are the most valid and critical to include to ensure the validity and fidelity of the intervention. Additionally, research should pursue a better understanding of what and where there is flexibility within the protocol for the staff to customize their approach.

Additional Outcomes: Ongoing ED Screening Efforts
Based on preliminary analysis of staff interviews and patient focus group data, the research team incorporated scripting for staff to read that addressed three primary topics: 1) screening is being done universally with all patient in the ED; 2) the intent is to connect patients with low and no cost community services if they need them after they go home; and 3) that the information is confidential, and is not being store in their medical record. Weekly case reports continue to be shared with staff. Changes made to the screening process between 04/2020 and 09/2020 have improved 211 referral rates by 200% compared to the five months previous.

 As of December 15, 2020, A total of 8007 have been approach for screening, 5619 have completing screening, of whom 2513 have one or more needs. A total of 1162 have been referred to 211 for outreach. A quality improvement initiative to increase screenings, with dedicated staff, will continue in Spring 2021.

Additional Outcomes: Incorporation of Screening and Referrals into COVID Testing
Because of emerging data related to health disparities and COVID-19, in June 2020, our study team was approached to incorporate social needs screening and referrals as part of symptom monitoring after COVID-testing. In September 2020, after making minor adaptations to the 10

SINCERE questions, all patients tested for COVID-19 are now sent our 10-item social needs screener and referred to 211 for outreach via Epic's MyChart. Other than Epic integration, the methods replicate those used in the ED study described in this report.

As of December 15, 2020, approximately 1600 patients completing screening indicate they have one or more social needs; 600 of whom have been referred to 211 for outreach and service referrals. With an expanded research team including those in population and public health, we have incorporated these processes to conduct a randomized test of an intensified screening and follow-up approach to address the social impact of COVID-19. Our submission for NIH R01 in August 2020 was reviewed very favorably with an impact score of 18, and is awaiting council review.

Conclusions

Our approach for conducting social needs screening in the ED resulted in no significant technical barriers, and involved limited time, costs. However, only a minority of patients with social needs ultimately received community-based service referrals. Perspectives of both staff and patients suggest that the process of social needs screening during clinical encounters should incorporate structure for facilitating patient-staff relatedness and competence, and address patient vulnerability by ensuring screening is universal, private, and intent is clearly communicated. Early tests of methods to address these key insights, after the primary data collection period concluded, suggest that incorporating these insights from staff and patients will result in increased screening and referrals. Further, the fact that screening has continued past the funding period suggests its potential for sustainability over time; the fact it has been adopted into new populations suggests its potential for ready adaptation and adoption across health systems. With a feasible and affordable method for conducting social needs screening and referrals, next steps should incorporate our methods into more rigorous, experimental tests aimed at increasing patient engagement and impacting health outcomes.

Significance

To date, most efforts to facilitate social needs assessment and referrals have occurred in isolated institutions without understanding generalizability, or with health specific and proprietary referral services with associated costs to clinical systems. With approximately ~5600 patients to date, we demonstrated that existing, low-cost and readily available HIT can integrate social needs screening into ED discharge processes, and make direct referral to expert community resource specialists who are part of a nationwide system and data. The fact that the intervention has been readily adopted into COVID-testing, and that it continues beyond the funding period provides strong evidence of our approach as a cost-effective solution for health systems and researchers seeking cost-effective solutions for better understand how to address social needs and health disparities.

Implications

Our methods for incorporating social needs screening into routine ED care and connecting to community information specialists was associated with limited time, costs, and technical barriers. However, few patients with social needs ultimately received community-based service referrals. Our qualitative analysis suggest that, when screening for unmet social needs, health care systems need to acknowledge the potential role of patient stigmatization based on appearance, presentation, and insurance status; make efforts to decrease staff discomfort in asking difficult questions about unmet social needs that will address patients' desire for genuine engagement, or sincerity; and thoughtfully engage in efforts to better understand patient concerns regarding privacy and other ethical implications of fully integrating social needs information into permanent medical records.

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VI. List of Publications and Products

Manuscript reporting preliminary study published during funding period:

Wallace AS, Luther B, Guo J, Wang C, Sisler S, Wong B. Implementing a social determinants screening and referral infrastructure during routine emergency department visits, Utah, 2017–2018. Prev Chronic Dis 2020;17:190339. DOI: http://dx.doi.org/10.5888/pcd17.190339.

Manuscripts reporting study findings included in this final report:

Wallace, AS, Luther, BL, Wong, B, Guo, J, Sisler, S, Grigorian, E, Britte, B, Flake, N, Schneider, C., Carpio, S. Integrating social determinants of health screening during routine emergency department care: Evaluation of reach and implementation challenges. (Under Review)

Guo, J., Wallace, AS., Luther, B., Wong, B. A psychometric evaluation of the screener for intensifying community referrals for health (SINCERE). (Under Review)

Wallace, AS., Wong, B., Guo, J., Tran, M.J., Luther, B. Social needs on service utilization during an intervention to implement screening and referrals during routine emergency department care. (Under Development)