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Can the Hunger Vital Sign™ act as a prescreen for other social needs?

Authors

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BACKGROUND

Over the past decade, the health care community has demonstrated growing interest in and commitment to addressing social determinants of health (SDOH) and patients' social needs – the midstream manifestations of the impact of SDOH¹ – in clinical settings. Four out of 5 US hospitals demonstrate leadership commitment to systematically address social needs as part of clinical care.² Extensive literature documents the strong relationship between unmet social needs and costly poor health outcomes, including chronic disease, emergency health care utilization, and poor disease management.^{3,4} Often driven by a lack of financial resources, unmet social needs are interrelated and may be experienced simultaneously, compounding the health risk posed to children and their families.^{5,6} In response, movement toward value-based payments is motivating providers and payers to invest in screening for and addressing multiple unmet social needs, such as food insecurity and housing instability, among others.⁷

Surges in financial instability and exacerbated hardships precipitated by the COVID-19 crisis, compounded by pre-existing racial and other health disparities and inequities, have highlighted the urgent need for more providers to screen for and address social needs. Moreover, these efforts are particularly essential now, given their association with poor health and chronic conditions believed to aggravate the symptoms and severity of COVID-19.⁸

Prior to the COVID-19 crisis, many large physician organizations had published guidance to their members on identifying and addressing SDOH and their impact. For example, the American Academy of Family Physicians published a policy statement highlighting the crucial importance of consistently identifying SDOH and patients' social needs in health care settings.⁹ Similarly, the American Academy of Pediatrics recommends pediatric clinicians screen all children and their families for food insecurity with the 2-item Hunger Vital Sign™ (HVS™).¹⁰ In addition to recommendations to address SDOH in health care settings from physician organizations and prominent health agencies, the Centers for Medicare and Medicaid Services (CMS) has also provided policy levers – such as 1115 waivers – for state Medicaid agencies to drive uptake of social needs screening and interventions. CMS also initiated research and funding opportunities to support screening for social needs and patient

navigation for community resources among Medicare and Medicaid beneficiaries through the Accountable Health Communities (AHC) Model.^{11,12} Initial evaluation of the AHC Model found that among navigation-eligible beneficiaries who reported unmet social needs, 41% had one unmet social need and nearly 60% reported having multiple unmet social needs.¹³ Food insecurity was the most common hardship identified among all patients screened, with a 69% median prevalence among navigation-eligible beneficiaries.¹³ Since the onset of COVID-19, these organizations and agencies have re-emphasized the importance of screening, in recognition that the pandemic has and will continue to further erode patients' ability to meet basic needs that already influence their overall health and well-being.

While there is increasing consensus that social needs are important risk factors to identify and address in clinical settings, some providers have expressed concern about the time burden of screening across multiple domains in short office visits.^{14,15} To address this concern and promote uptake by physicians, it is important that screening tools effectively and efficiently identify the presence and absence of social needs among patients. In other words, establishing how accurately screening tools identify people experiencing social needs is an important factor in determining which tools to use and why.

In this paper, we explore whether screening for risk of food insecurity alone is sufficient to identify those requiring no additional social needs screening. Through our analyses, we assess whether the validated and widely implemented food insecurity screening tool, the HVS™, has adequate negative predictive value to serve as a prescreen for other social needs.¹⁶ In addition to the quick ease of administration and the wide use and endorsement of the HVS™ by numerous professional associations, this initial screener was chosen to build on its initial development and validation using the Children's HealthWatch sample.¹⁷ Furthermore, as illustrated by the AHC Model evaluation and other data, food insecurity is the most common social need identified during patient screening. Assessment of the most common screening tool used to identify risk for the most prevalent need is likely to capture the greatest number of people who may report additional social needs.

METHODS

Study setting. Data were collected as part of Children’s HealthWatch, an ongoing cross-sectional research and policy study monitoring the health and well-being of young children and their families in medical centers in 5 U.S. cities: Baltimore, MD, Boston, MA, Little Rock, AR, Minneapolis, MN, and Philadelphia, PA.¹⁷ Each study site obtained institutional review board approval prior to study initiation and yearly thereafter. Caregivers of children <48 months old were approached in private settings when seeking care in primary care sites (Baltimore, MD and Minneapolis, MN) and emergency departments (ED) (Baltimore, MD, Philadelphia, PA, Boston, MA, and Little Rock, AR). Eligibility criteria included: child age <48 months; state residency; fluency in English, Spanish, or (Minneapolis only) Somali; and knowledge of child’s health and household. Caregivers of critically ill or injured children were not approached. After caregiver consent was obtained and eligibility determined, the Children’s HealthWatch survey was administered orally by trained research assistants in the ED or primary care clinic. During the survey, caregivers were asked about demographics, child health and development, caregiver health, housing, household food security, federal assistance program utilization and access, employment, income, oral health and health care access, utilities, and child care. Caregivers self-reported information about their households. From 2007-2015, Children’s HealthWatch interviewed 28,611 publicly insured caregivers from households with low incomes.

Outcome measures. The independent variable, household food security status, was identified using the HVS™. The HVS™ identifies households as being at risk for food insecurity if they respond that either or both of the following 2 statements has been “often true” or “sometimes true” (versus “never true”) in the past year: (1) “We worried whether our food would run out before we got money to buy more” and (2) “The food we bought just didn’t last and we didn’t have money to buy more.”¹⁶

The dependent variables were other household hardships including housing instability, energy insecurity, and forgone health care. Housing instability was indicated by caregivers’ report of 1 or more of the following in the past year: (1) behind on rent or mortgage; (2) 2 or more moves; and/or (3) homelessness in the child’s lifetime.¹⁸ Homelessness was defined by endorsement of living in a shelter, motel, temporary or transitional living situation, scattered site housing, or no steady place to sleep at night. Energy insecurity was indicated by caregivers’ report of 1 or more of the following in the past year: (1) utility shutoff threatened; (2) actual utility shutoff; (3) 1 or more days without heat or cooling; and/or (4)

use of cooking stove to heat the home.¹⁹ Forgone health care was indicated by caregivers' report of unmet needs for health care services, prescriptions, and/or dental care due to the inability to afford care. This was reported separately for the reference child and other household members.²⁰

Analysis. Bivariate associations between HVS™ screening result and sample characteristics were assessed using chi-square analyses or t-tests, as appropriate. The negative predictive value (NPV) of a screening tool for a condition is the probability that participants with a negative screening result truly do not have the condition. The NPV of the HVS™, along with sensitivity and specificity, was calculated separately for each hardship. Table 1 describes how the measures used to calculate NPV, sensitivity, and specificity were determined.

Table 1. Determination of True/False Positive/Negative Rates

The NPV of a screening tool for a condition is the probability that participants with a negative screening result truly do not have the condition. The NPV of the HVS™, along with sensitivity and specificity, was calculated separately for each hardship.

		Hardship	
		Positive	Negative
Hunger Vital Sign Screener	Positive	True Positive (TP)	False Positive (FP)
	Negative	False Negative (FN)	True Negative (TN)

RESULTS

Descriptive statistics. Of the 28,611 caregivers interviewed, the HVS™ identified 10,352 (36.2%) as at risk of household food insecurity and 18,259 (63.8%) as household food secure. Children's mean age was 15 months (SD=12). Caregivers' mean age was 26.4 years (SD=5.9); 75.8% were born in the United States; 51.4% were Black, non-Hispanic, 31.0% were Hispanic, and 14.0% were White, non-Hispanic; 37.7% were married or partnered; and 72.5% had a high school degree or higher educational attainment. Enrollment in the Supplemental Nutrition Assistance Program (SNAP) was reported by 62.1% of participants, and enrollment in the Special Supplemental Nutrition Program for Women, Infants, and Children

(WIC) was reported by 79.4%. Table 2 provides study sample descriptive statistics.

Table 2. Descriptive Statistics: Child and Caregiver Characteristics

	Total	Positive HVS™ Screen	Negative HVS™ Screen
Total Category n (%)	28611 (100.0%)	10352 (36.2%)	18259 (63.8%)
Interview Characteristics			
Language of interview**			
English	24096 (84.2)	8112 (78.4)	15984 (87.5)
Spanish	4386 (15.3)	2229 (21.5)	2157 (11.8)
Somali	129 (0.5)	11 (0.1)	118 (0.6)
Setting*			
Primary care clinic	6948 (24.3)	2607 (25.2)	4341 (23.8)
ED	21644 (75.7)	7735 (74.8)	13909 (76.2)
Child Characteristics			
Age, mean (SD) months**	14.9 (12.3)	15.5 (12.4)	14.5 (12.2)
Caregiver Characteristics			
Place of birth**			
US-born	21624 (75.8)	7219 (69.9)	14405 (79.2)
Immigrant	6905 (24.2)	3112 (30.1)	3793 (20.8)
Race/ethnicity, # (%)**			
Hispanic	8796 (31.0)	3813 (37.2)	4983 (27.6)
Black, NH	14571 (51.4)	4810 (46.9)	9761 (54.0)
White, NH	3976 (14.0)	1265 (12.3)	2711 (15.0)
Other/multiple races	992 (3.5)	364 (3.6)	628 (3.5)
Married, # (%) †	10762 (37.7)	3964 (38.3)	6798 (37.3)
Education, # (%)**			
Some school	7844 (27.5)	3210 (31.1)	4634 (25.5)
High school graduate	11348 (39.8)	3987 (38.6)	7361 (40.4)
Post-high school	9331 (32.7)	3124 (30.3)	6207 (34.1)
Age, mean (SD) year**	26.4 (5.9)	27.1 (6.1)	26.1 (5.8)
Enrolled in SNAP*	17635 (62.1)	6545 (63.5)	11090 (61.3)
Enrolled in WIC*	22579 (79.4)	8271 (80.3)	14308 (78.9)

*Significant at $p \leq 0.05$; **significant at $p < 0.001$; † not significant. ED=emergency department. SD=standard deviation. NH=non-Hispanic. SNAP=Supplemental Nutrition Assistance Program. WIC=Supplemental Nutrition Assistance Program for Women, Infants, and Children.

Quantitative evaluation results. The NPV of the HVS™ is the probability that a negative HVS™ screen correctly identified the absence of other unmet social needs (i.e., if a patient screens negative with the HVS, how likely they are to also screen negative for other social needs). The NPV of the HVS™ was highest for forgone health care at the child level at approximately 97.5% (95% CI 97.3, 97.7). The NPV of the HVS™ for

forgone health care at the household level was also high at 87.2% (95% CI 86.7, 87.7). The HVS™ had a lower NPV for energy insecurity and housing instability – 82.4% (95% CI 81.9, 83.0) and 77.4% (95% CI 76.7, 78.2) respectively (Table 3).

Table 3. Sensitivity, Specificity, and Negative Predictive Value Between the HVS™ and Other Household Hardships

Hardship	Overall Hardship Prevalence	HVS™ Sensitivity	HVS™ Specificity	HVS™ Negative Predictive Value	95% Confidence Interval
Housing instability	33.6%	58.1%	72.7%	77.4%	(76.7, 78.2)
Energy insecurity	24.2%	53.7%	69.5%	82.4%	(81.9, 83.0)
Forgone care (household)	18.8%	56.4%	68.4%	87.2%	(86.7, 87.7)
Forgone care (child)	4.1%	61.7%	64.8%	97.5%	(97.3, 97.7)

DISCUSSION

As providers and payers continue to move upstream to invest in screening for and addressing multiple unmet social needs, the need remains for systematic and standardized approaches to this burgeoning field of work.⁷ The HVS™ is a quick, widely recommended and implemented screener for risk for food insecurity and thus offers an opportunity to serve as a prescreen for other social needs. Results demonstrate, at varying levels, high NPV of the HVS™ to correctly identify other hardships' absence, suggesting that families who do not endorse the HVS™ may not be the highest priority for screening for other hardships. This is particularly true for forgone care at the child level (97.5%). However, clinicians should be aware that roughly 20% of families who do not endorse the HVS™ do, in fact, experience other hardships and would not be identified as warranting further hardship-specific screening by this method. For example, 22.6% of families who screen negative via the HVS™ are indeed housing unstable.

While a standardized or one-size-fits-all multidomain screening tool may or may not one day be realized, providers and health systems remain

in a state of screening tool heterogeneity, and real concerns about the time burden of screening across multiple SDOH domains add to the complexities of social needs screening at scale. The results of this study demonstrate that even the most common screening tool (HVS™) used to identify risk for the most common social need (food insecurity) is not necessarily an ideal option, without tradeoffs, as a prescreen for other social needs.

Drawing from the lessons of Wilson and Jungner's principles of screening, providers and institutions seeking to screen for and address health-related social needs should first and foremost achieve clarity of purpose – by identifying the social needs of concern, the institution's ability to suitably identify those needs, and what targeted actions will be taken – to best inform screening tool selection.²¹ This study demonstrates one option for providers, while highlighting the care and intentionality required to avoid the unintended consequences of screening for SDOH.²²

Strengths and limitations. This study's strengths include its focus on a large, sentinel, multistate, racially diverse population, and use of a validated and widely used and implemented screening tool. This study's limitations include its potential for selection and reporting bias. We used self-report to assess food security and other outcome measures, which may be subject to reporting bias. Given the stigma often associated with unmet social needs, caregivers may have been hesitant to disclose this information during interviews. Further, they may have felt comfortable revealing their experience with some social needs, but not others. For example, caregivers may have been more hesitant to disclose having to forgo health care for their child than for themselves or other household members. Another limitation of this study is that there are many other SDOH domains and social needs not included in the analysis, such as transportation – a common coexisting social need –¹³ employment, stress/mental health needs, and interpersonal violence. Future research should include other SDOH domains of which food security may also be predictive.

Potential for selection bias exists, as participants were caregivers of young children seeking health care in EDs or primary care clinics, which could limit our findings' generalizability. While interview setting (ED versus primary care clinic) was tracked among the overall study population, the main analysis does not control for setting. This is a limitation, as the setting in which a family seeks medical care may be associated with prevalence of hardship (for example, patients seeking care in the ED may be more likely to have forgone health care compared to those seen in a primary care clinic). The prevalence of social needs among the study

population is higher than among the national population. NPV increases as prevalence of the outcome decreases, indicating that the NPV of the HVS™ may be greater in the general population. Further research is needed to replicate and expand these findings in diverse samples of children of varying ages in other geographies.

This study did not disaggregate results by demographic characteristics or control for receipt of public assistance. Future research should further explore these dimensions to better understand how the NPV of the HVS™ or other screening tools may be affected by these characteristics.

Policy implications. As health care delivery continues to shift toward a value-based system, this study also demonstrates that more research is needed to identify screening best practices in a variety of clinical settings to accurately assess presence and absence of social needs among children. In doing so, providers can better address drivers of patients' health and thus drive down long-term health care costs.²³ The CMS Innovation Center and its 5-year AHC Model, while still under way, is the only federal health care delivery system model testing whether identifying and addressing social needs among Medicare and Medicaid beneficiaries through screening, referral, and community navigation services will impact health care costs and reduce health care utilization.²⁴

Beyond adopting a SDOH framework in alignment with the AHC Model, providers and the health care sector can advocate for strong evidence-based policies that enable them to better address health inequities and improve health outcomes. For example, the Improving Social Determinants of Health Act of 2021 – a legislative opportunity supported by hundreds of professional health organizations and networks, health insurers, and community-based organizations – would enable health providers and systems to better coordinate, support, and align SDOH best practices and capacity-building activities. In coordination with the Centers for Disease Control and Prevention and federal agencies such as CMS and others, the Act would support these activities through increased funding opportunities, technical, training, and evaluation assistance, scaled data collection and analysis, and identification and coordination of best practices.²⁵ Efforts like these are important to ensure that health systems are not only supporting their patients in achieving holistic health, but that providers also have the systems and resources to do so in ways that are evidence-based and avoid harm to patients.

CONCLUSION

In an ideal scenario, clinicians could utilize an in-depth, validated, multidomain screening tool to obtain a clear picture of the role multiple social needs play in patients' lives. Given time constraints in clinical visits – which are increasingly performed via telehealth and are further limited by the current COVID-19 crisis – short, directed screening tools are a promising way to determine which patients are unlikely to need more extensive social needs screening. Quick stepwise screening could allow for a more efficient workflow and more provider buy-in.

This is the first paper, to our knowledge, that examines the NPV of a screening tool for other social needs. While acknowledging the limited amount of time during a clinical visit, we recommend that clinicians choose a multidomain screener to obtain a nuanced and whole-person understanding of their patients' unique challenges and strengths. Further research to replicate and expand these findings in diverse samples of children of varying ages and more economically diverse circumstances, as well as in other geographic regions, is needed to develop a maximally efficient approach for clinical screening for SDOH.

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