Assessing food insecurity among hospitalized patients at an NCI-designated comprehensive cancer center

Marium Husain (marium.husain@osumc.edu)
Ohio State University Wexner Medical Center https://orcid.org/0000-0003-2649-1154
Electra Paskett
The Ohio State University College of Medicine
Alice Hinton
The Ohio State University College of Public Health
Emmanuel Boateng
Virginia Commonwealth University Medical Center
Nicole Leonard
The Ohio State University College of Medicine
Naima Hashi
Mayo Clinic College of Medicine and Science
Selamawit Addissie
The Ohio State University College of Medicine
Mubarak Mohamed
The Ohio State University College of Medicine
Darrell Gray
The Ohio State University College of Medicine

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Abstract

PURPOSE: To evaluate the prevalence of food insecurity among patients with cancer and to validate the Hunger Vital Sign (HVS) instrument compared to the standard-of-care USDA 18-item Household Food Security Scale (HFSS). The secondary objective was to assess disparities in food access based on race, zip code and insurance status.

PATIENTS AND METHODS: Patients with cancer who were hospitalized at The Ohio State University James Comprehensive Cancer Center (OSU-CCC) were identified to participate by the Department of Social Work. Each patient completed the HVS and the 18-item HFSS. The prevalence of food insecurity was estimated and 95% Wilson score confidence intervals were calculated. The agreement between the prevalence of food insecurity as measured by the two different instruments were compared through the use of McNemar's test. Disparities in food access based on race, zip code and insurance status were further assessed with Fisher exact tests.

RESULTS: One hundred and twelve patients participated. We found that the HVS identified food insecurity in 14.3% (95% Confidence Interval (CI): 9.1, 21.7) of participants, whereas the 18-item HFSS identified 8.6% (95% CI: 4.8, 15.1) of participants. However, there was no significant difference between food insecurity as measured by the HVS and the 18-item HFSS ($p = 0.289$). There were also no significant differences in food insecurity based on race, insurance status or geographical location of patients.

CONCLUSION: The HVS is an alternative to the 18-item HFSS as a valid tool to assess food security amongst hospitalized patients with cancer.

Declarations

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Availability of data and material: Data available within the article or its supplementary materials

Code availability: not applicable

Authors' contributions:

1) Made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work: all authors

2) Drafted the work or revised it critically for important intellectual content: Marium Husain, Electra Paskett, Alice Hinton, Darrell Gray

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4) Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: Marium Husain, Darrell Gray

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Background

Although the phenomenon of food insecurity is not immediately associated with developed countries like the U.S., it is a grave reality for many Americans, particularly in low-income urban and rural communities and in certain racial and ethnic populations [1-3]. The accepted definition of food insecurity is "household-level economic and social condition of limited or uncertain access to adequate food [4]." In 2015, the USDA reported that 12.7% of all US households (or 15.8 million households) were food insecure at some time during the year, and 5% of these households experienced "very low" food security, often associated with poverty and low income, and with important implications for the health and nutrition of individuals [4]. Food insecurity has only increased with the COVID-19 pandemic; as of April 2020, 38% of US households reported food insecurity [5]. This was prominently witnessed in lower-income households, with a prevalence of 44% food insecurity, as well as minority populations: 48% of black households, 52% of Hispanic households [6]. Some of this is attributed to financial instability from unemployment and school closures, where children are particularly susceptible to food insecurity as they cannot access the national school breakfast/lunch programs (which are free or at a reduced-price) [2].

Food insecurity is of particular importance for patients with cancer as it can have significant implications for their health [7-15]. There are limited studies focusing on food insecurity in patients with cancer. Due to a range of causes including lost income from a cancer diagnosis affecting employment, out-of-pocket medical costs, and transportation costs, one study found 46% of cancer survivors decreased spending on basic items, like food and clothing [16]. McDougall et al recently studied new and persistent-food insecurity amongst a diverse group of patients with cancer. They found that 36% of their population was food insecure in the first year after cancer diagnosis [3]. Newly food-insecure patients were more likely to be younger, Hispanic and have lower incomes. This is consistent with Trejo et al's study comparing food insecurity amongst cancer survivors and non-cancer survivors [17]. They found that food insecurity was more prevalent amongst cancer survivors who were younger and with lower income. There are particular nuances to cancer care, including cancer type, time since diagnosis, income, and access to resources that

impact the ability to adequately assess food insecurity and require greater attention that may not be captured by standard assessments [17-18].

The standard of care assessment for food insecurity is the 18-item Household Food Security Scale (18-item HFSS), also referred to as the US Household Food Security Survey Module. There are other shorter tools, but this module has more reliability and is able to assess food security of children in the household [4]. It has been validated and utilized since 1995 [19]. Children's HealthWatch, a non-partisan network of pediatricians, public health researchers and children's health and policy experts, worked with pediatricians to create a more easily-delivered measurement tool that can identify food insecurity with similar accuracy. They created the Hunger Vital Sign (HVS). The HVS was studied in a pediatric population and was found to have 97% sensitivity and 83% specificity in identifying children who live in food insecure families [20]. The screening tool was able to quickly identify food insecure families and identified families that had an increased risk of negative health outcomes. Therefore, it has potential to be a quick screening tool that providers can use to identify food insecure patients and then target services and resources for these patients [20]. This tool was utilized in a pediatric population, and has not been studied amongst patients with cancer, pediatric or adult.

Thus, the purpose of this study was to evaluate the prevalence of food insecurity among patients hospitalized at The Ohio State University James Comprehensive Cancer Center (OSU-CCC), using the HVS instrument [20] and compare this to the standardized 18-item HFSS [19]. Our hypothesis is that the HVS is non-inferior to the 18-item HFSS in identifying food insecurity in hospitalized cancer patients. To our knowledge there are no prior studies evaluating food insecurity amongst patients with cancer who are hospitalized, particularly at a tertiary cancer center.

Methods

This was an IRB-approved, single-institutional prospective review of patients at OSU-CCC. Only inpatient data was used in this study.

The primary objectives of this study were to evaluate the prevalence of food insecurity among patients hospitalized at OSU-CCC utilizing the HVS and to validate it in our adult patients with cancer population with the standardized 18-item HFSS. The secondary objective was to assess disparities in food access based on race, zip code and insurance status.

The two HVS questions are: " Within the past 12 months we were worried whether our food would run out before we got money to buy more," and "Within the past 12 months the food we bought just didn't last and we didn't have money to get more." The possible answers were: "often true," "sometimes true," or "never true."

The 18-item HFSS is divided into different subsections: 10 questions that elicit the experiences of adults and the household in general and 8 questions that elicit experiences of providing food to any children in the household. Not all questions are answered if the patient does not meet criteria for food security.

Patients included were 18 years of age or older who were hospitalized at OSU-CCC. Patients were enrolled from September 2019 through February 2020. Patients were excluded if they were non-English speaking.

Data Collection Process

Every patient that is hospitalized at OSU-CCC is evaluated by a social worker on admission as part of standard of care. Standardized basic assessments are performed and if a patient is found to have a social need, further investigations are performed by the social worker. Through collaboration with the Department of Social Work, patients were asked if they were interested in participating in a food security study. The social workers asked patients for their permission to be contacted by a member of the study team. Once that permission was obtained, the social worker contacted the primary investigator. Then members of the research team discussed the study with the patient and if they agreed to participate, written consent was obtained. The patients were then asked the 2-question HVS screening tool along with the 18-item HFSS. Further data were then obtained via electronic medical record queries: race, zip code and insurance status. Given that patients came from several different geographical locations, zip codes were categorized as following: within the city of Columbus, within the greater Columbus area, within Ohio and out of state.

Statistical Analysis

The study was originally powered to achieve a 5% margin of error for a 95% confidence interval (CI) when estimating the prevalence of food insecurity where the prevalence of food insecurity was assumed to be 17% based on Franklin County Ohio data.[21] To achieve this goal it was estimated that a minimum of 217 patients were needed. However, during the middle of data collection, the novel coronavirus, SARS-CoV-2 pandemic developed. This led to the temporary halting of clinical trials and all non-essential patient encounters. Therefore, the study was forced to halt recruitment after 112 patients had been enrolled into the study.

An interim analysis was performed on the data that was collected prior to recruitment being halted. Characteristics of the population were summarized with frequencies and percentages or means and standard deviations, as appropriate. For food insecurity measures which grouped patients into high/moderate/low/very low food security, patients with low or very low food security were considered to be food insecure. The prevalence of food insecurity as measured by the HVS as well as the standard 18-item HFSS, was estimated and 95% Wilson score confidence intervals (CI) were calculated. Further, the agreement between the prevalence of food insecurity as measured by the two different methods was compared through the use of McNemar's test. Disparities in food access based on race/ethnicity, insurance status and zip code were assessed with Fisher exact tests. SAS 9.4 was used for all analyses and a p-value < 0.05 was considered to be statistically significant.

Results

Demographics

A total of 112 patients were enrolled in the study. The average age was 61.8 years. Fifty-one percent identified as female and 91.8% identified as White while no one identified as Hispanic. Thus, we will use the terms non-Hispanic White (NHW) and non-Hispanic Black (NHB) to describe the racial composition of our sample. The majority of patients had some form of insurance and less than 1% were uninsured. The majority of patients were from Ohio but outside of Columbus and the surrounding cities (58%). Approximately 15% of patients were from the Columbus area. A summary of demographics is shown in Table 1.

Prevalence of Food Insecurity and HVS Validity

We found that the HVS identified food insecurity in 14.3% (95% CI: 9.1, 21.7) of participants, whereas the 18-item HFSS identified 8.6% (95% CI: 4.8, 15.1) of participants (Table 2). There was no significant difference between food insecurity as measured by the HVS and the 18-item HFSS (p = 0.289). Table 3 shows the agreement of HVS with the 18-item HFSS.

Secondary analyses

Further analyses were conducted to assess for disparities in food insecurity based on race, insurance status and geography.

Regarding race, the HVS identified food insecurity in 33.3% of non-white participants and 12.9% of white participants; no significant association between food insecurity and race was identified (p = 0.123). Similarly, there was no significant association found between race and the 18-item HFSS which identified food insecurity in 28.6% of non-white participants and 7% of white participants (p = 0.106). Although there were higher numbers of non-white participants found to be food insecure, there were no significant associations identified between race and food insecurity (Table 4).

Similarly, there were no significant associations found with insurance status. The HVS identified food insecurity in 9.5% of participants with private insurance and 17.1% of participants with other forms of insurance (including public programs) (p = 0.412). The 18-item HFSS identified 11.9% of privately-insured participants and 6.9% of participants with other insurance as food insecure (p = 0.493). (Table 4).

The HVS identified food insecurity in 10.3% of participants living in Columbus or the greater Columbus area, and 16.4% of participants living in Ohio or out of state (p = 0.565). The 18-item HFSS identified food insecurity in 7.9% of participants living in or near Columbus, while identifying 9.1% of participants in the state of Ohio or out of state (p = 1.000) (Table 4).

Discussion

Our objective was to compare the HVS to the 18-item HFSS in assessing food insecurity amongst adult patients with cancer hospitalized at an NCI-designated cancer center. The ultimate goal was to find a shorter tool that would identify food insecurity in patients with cancer and that could be streamlined as part of basic assessments for social determinants of health. We found that there was no significant difference in food insecurity determination between the HVS and the 18-item HFSS.

The HVS identified food insecurity in more patients as compared to the standard 18-item HFSS; however, this difference was not significant. The HVS identified food insecurity in 14.29% of participants. This is consistent with the 12.7% of food insecurity identified in the U.S. (by the USDA) and 17% identified in Franklin County, Ohio (by the city health department) where OSU-CCC is located. The 18-item HFSS identified food insecurity in 8.62% of patients, lower than both national and local rates. There were also no significant differences in food insecurity based on race, insurance status or geographical location of patients; this held true regardless of which measure of food insecurity was employed. These results suggest that the HVS could be a realistic alternative to the 18-item HFSS as a valid tool to assess food security amongst patients with cancer. We suggest that the HVS can be utilized in a hospitalized setting for patients with cancer.

Social determinants of the health of hospitalized patients are already evaluated by social work in our tertiary cancer center. To streamline the process of food insecurity assessment, we worked with our social work department to assess the practicality of each of the food insecurity measurement tools. The shorter form appears to be a strength of the HVS in our study. Our social work team noted that the HVS was easier to use and was easier to implement in the electronic medical record, as part of the standard social work assessment.

To our knowledge, this is the first prospective study to assess the prevalence of food insecurity amongst patients with cancer hospitalized at an NCI-designated comprehensive cancer center. It is also the first to evaluate the validity of the HVS as a measurement tool compared to the standard 18-item HFSS within this adult population. Food insecurity has been identified in patients with cancer previously, but this area is still limited in terms of study [3.16-17]. Assessing food insecurity is important in a population of patients with cancer as response to treatment is dependent upon nutritional status [9-10]. If food insecurity can be more readily identified in patients with cancer, particularly as part of standardized social determinants of health assessments, then patients can be connected with food and nutrition resources to help with decreasing food insecurity [22-23]. During the time of the COVID-19 pandemic, food insecurity has dramatically increased, particularly amongst lower-income and minority populations [2, 5-6]. This is undoubtedly affecting patients with cancer who are younger, lower-income and of minority populations. The need to address food insecurity becomes a more necessary tool in the treatment of cancer, and tools that are easily implemented can assist medical staff with food insecurity evaluation.

There are limitations to this study. The goal for patient accrual was unable to be achieved due to restrictions in patient interactions for research purposes due to the COVID-19 pandemic (restrictions

started in March 2020 and our last patient interviewed was in February 2020). Therefore, there is a larger confidence interval margin of error than was initially desired when estimating food insecurity. Further, potentially due to the small sample size, statistical significance was not reached when comparing the proportion classified as food insecure between race, insurance status, or geographical location. However, this preliminary data shows the potential for the HVS and we recommend further study of the HVS as a tool to more easily evaluate food insecurity in patients with cancer.

Conclusions

The HVS is an alternative to the 18-item HFSS as a valid tool to assess food security amongst hospitalized patients with cancer. We recommend implementation of the HVS in standard of care in cancer care assessment of food security for hospitalized patients with cancer.

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Tables

Table 1. Summary of demographic characteristics of study participants, N=112.

	n	%
Sex		
Male	55	49.11
Female	57	50.89
Ethnicity		
Not Hispanic or Latino	112	100.00
Hispanic or Latino	0	0.00
Race		
Black or African American	7	6.36
White	101	91.82
More than One Race	2	1.82
Insurance		
Uninsured	1	0.85
Medicare	55	46.61
Medicaid	13	11.02
Private	42	35.59
Other	7	5.93
Zip Code Area		
Columbus	16	15.09
Greater Columbus Area	23	21.70
Ohio	61	57.55
Out of State	6	5.66

Table 2. Estimates of food insecurity prevalence among the patients in the study for each of the measures.

Measure	Prevalence		95% CI
Hunger Vital Sign	(17/119)	14.29%	(9.11, 21.69)
18-item HFSS	(10/116)	8.62%	(4.75, 15.14)

Table 3. Comparison of the hunger vital sign questionnaire with the standardized 18-item HFSS questionnaire

	Hunger Vital Sign		
	Food Secure	Food Insecure	p-value
18-item HFSS			0.289
Food Secure	100	6	
Food Insecure	2	8	

Table 4. Associations between social determinants of health and food insecurity as measured by the HVS and 18-item HFSS.

	Race			Insurance			Zip Code Area		
	Non-White	White		Private	Other		Greater Columbus	Ohio / Out of State	
	n (%)	*n (%)*	*p-value*	*n (%)*	*n (%)*	*p-value*	*n (%)*	*n (%)*	*p-value*
Hunger Vital Sign			0.123			0.412			0.565
Food Secure	6 (66.67)	88 (87.13)		38 (90.48)	63 (82.89)		35 (89.74)	56 (83.85)	
Food Insecure	3 (33.33)	13 (12.87)		4 (9.52)	13 (17.11)		4 (10.26)	11 (16.42)	
18-item HFSS			0.106			0.493			1.000
Food Secure	5 (71.43)	93 (93.00)		37 (88.10)	68 (93.15)		35 (92.11)	60 (90.91)	
Food Insecure	2 (28.57)	7 (7.00)		5 (11.90)	5 (6.85)		3 (7.89)	6 (9.09)	