

Hunger vs. Heart Failure: Can Food Insecurity Screening Prevent CHF Exacerbations?

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Abstract

Food insecurity, defined by the United States Department of Agriculture as “access by all people at all times to enough food for an active, healthy life,” is experienced by 14.5% of American households. Food insecurity can depend on multiple factors, including transportation, financial stability, and geographic location — some areas termed “food deserts” have limited access to affordable and nutritious food. These factors can lead to higher cardiovascular health risks in addition to creating health disparities within many populations with chronic illness. With respect to patients with congestive heart failure (CHF), food security is increasingly relevant, as low-salt diets are one of the most important recommendations for management of heart failure. The purpose of this study was to examine the relationship between food insecurity with management outcomes, including readmissions and mortalities, in congestive heart failure patients within the Guthrie Clinic in Sayre, Pennsylvania. This quality improvement prospective study used retrospective review of records. Subjects were identified by an Epic report with baseline data from 2019. Identified adult patients with CHF were screened using the Household Food Insecurity Access Scale (HFIAS), and if identified as food insecure, were provided appropriate nutritional counseling. This study increased food insecurity screening rates from 86.6% to 94% over a 6-month span. Within the population of admitted CHF patients, readmission rates for a CHF exacerbation dropped from 27.6% to 21.2% of CHF patients after food insecurity screening and education was implemented. Mortality rates dropped from 24.1% to 19.8% after food insecurity screening and education was implemented. Although the differences between readmission and mortality rates before and after implementing food insecurity screenings in patients with CHF were not statistically significant, these differences are still important to note.

Introduction

Food insecurity is a growing problem within the United States. With 14.9% of households experiencing food insecurity overall, and rates approaching 25% in black and Hispanic households, this is an issue that will affect communities with a variety of chronic illnesses that must be considered. The United States Department of Agriculture defines food insecurity as “access by all people at all times to enough food for an active, healthy life.” A variety of factors influence and are influenced by food insecurity and have been termed “social determinants of health” (1).

Last year, Healthy People 2020 created a “place-based” organizing framework to display how five key areas of social determinants of health (SDOH) can interact to influence a person’s well-being (1). These five key areas are education, social and community context, health and health care, neighborhood and built environment, and economic stability. Each of these five determinants interacts with the other four, giving a better idea of the social factors that determine a person’s well-being in addition to their psychological and physical health. Several important factors are covered in each of the five categories. A person’s education takes into account their early childhood education and development, enrollment in higher education, if they graduated high school, and their language and literacy level. A person’s social and community context considers their civic participation, any discrimination they experience, any experiences they have had being incarcerated, and their level of social cohesion. A person’s health and health care give information about their access to health care and primary care as well as their own health literacy. A person’s neighborhood and built environment gives us information about their quality of housing, the conditions of the environment that they inhabit, what kind of crime and violence occurs in their environment, and their access to foods that will help support their healthy eating patterns. A person’s economic stability includes their employment status, if they are living in poverty or are considered below the poverty line, any housing instability they experience, and if they are experiencing food insecurity. Thus, it is important to recognize how food insecurity fits into a larger picture of interweaving social determinants that can greatly influence a person’s health (1).

Food insecurity can be influenced by multiple factors as well, including financial stability, transportation, and geographic location. For example, a patient living within a food desert may not have reliable access to nutritious food. A food desert is defined as an area with limited access to affordable and nutritious food — these areas can include urban areas as well as rural areas (2). In an area like Sayre, Pennsylvania, with a population of 5,500 as of 2019, the rural nature of the location is a large contributing factor. People living in a rural area without reliable transportation can have issues obtaining fresh produce if they live far from supermarkets or grocery stores.

Unfortunately, food insecurity affects a person’s physical health. A study conducted by Morris et al. found that congestive heart failure-specific patients living in food deserts had higher rates of hospitalization when compared to those who did not live in food deserts (3). This could be partly due to the low-salt diet recommendation for managing heart failure.

Occurrence Question	
1.	In the past four weeks, did you worry that your household would not have enough food?
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5.	In the past four weeks, did you or any other household member have to eat a smaller meal than you felt like you needed because there was not enough food?
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

Table 1. Questions asked by the Household Food Insecurity Access Scale, HFIAS.

Diet is crucial to the management of this chronic condition. Currently at the Guthrie Clinic, food insecurity is assessed using the Household Food Insecurity Access Scale (HFIAS), which has been embedded within the Epic electronic health record system (Table 1). This was developed by Jean Miner, MD, and asks questions including if they have had difficulty paying for or obtaining food within the past 12 months (Table 1). Given the high aging American population and high prevalence of congestive heart failure (CHF) in the United States, this project sought to utilize the HFIAS to identify CHF patients with food insecurity. This identification could help health care professionals facilitate appropriate enrollment into food assistance programs or to disseminate information about local food banks and other resources. This project aimed to examine the relationship between food insecurity and management outcomes, including CHF-specific readmissions and mortalities, in congestive heart failure patients within the Guthrie Clinic.

Methods

Participants and procedures

Participants were 243 adult CHF patients admitted to Robert Packer Hospital of Sayre, Pennsylvania, between June 2020 and March 2021. Patients were identified via Epic report and included baseline data from 2019. Identified patients were screened using the HFIAS, and if identified as food insecure, were provided with appropriate nutritional counseling. Inclusion criteria included being 18 years or older, having a prior diagnosis of CHF upon admission to Robert Packer Hospital documented in the electronic medical record, and proficiency in English. Subjects under 18 years of age and pregnant patients were excluded from this study. Patients who were willing and eligible provided verbal consent and completed the HFIAS. There was no payment or cost to subjects to participate. Participants were placed at minimal risk in this study, as there is always a small chance of data becoming unsecured. To minimize this possibility, all protected health information was de-identified before results were shared. Any identifiable data was accessed using only Guthrie-approved applications. This project was IRB approved.

Total Encounters	212
Gender (M/F)	136 / 76
Mean Age	75.4
Food Insecure	15
% Food Insecure	7%

Table 2. Overview of sample characteristics.

Study interventions

The quality improvement intervention was to identify CHF patients using the electronic health records, followed by screening of these patients for food insecurity with the HFIAS, then providing those who screened positive with appropriate nutritional counseling. Data collected

from the electronic medical record included gender, race, age, comorbidities, patients' answers to the HFIAS, and whether they were considered food insecure.

Assessment of food insecurity

Participants completed the HFIAS, with sample questions included in Table 1. Sample questions included rating how often they felt that they had enough money to cover food costs, and how often they felt unsure where their next meal was coming from (Table 1). Answer options provided a range of frequencies for the participant to choose from. Participants who answered the questionnaire indicating any frequency of food insecurity within the last 12 months were considered food insecure and given nutritional counseling on food resources available to them.

Assessment of management outcomes

Electronic medical records were analyzed to determine management outcomes for participants. Readmissions at any time between the participant's food insecurity counseling and the end date of the study were recorded. If the readmission was documented in the medical record as being due to an exacerbation of the patient's congestive heart failure, it was counted as a readmission in this study. Readmissions for causes other than CHF-exacerbations were not included as a management outcome in this study. Mortalities of the participants were also recorded as a management outcome for this study.

These management outcomes were analyzed among two groups of participants. One group consisted of 31 patients admitted to and discharged from Robert Packer Hospital for CHF exacerbations in June to September of 2020, before this project began screening patients for food insecurity. These patients were considered the baseline group to compare the intervention outcomes to. The second group included 212 patients admitted to and discharged from Robert Packer Hospital from September 2020 to March 2020, for which the HFIAS was administered, and management outcomes could be considered after the screening and food insecurity counseling.

These groups were compared by the percent change for CHF-specific readmissions, mortalities, and number of patients screened for food insecurity. Microsoft Excel and GraphPad Prism were used for data analysis.

Results

Sample characteristics demonstrated that among patients with congestive heart failure at Robert Packer Hospital, the majority are males with a mean age of 75.4 years (Table 2). Age was distributed across several decades, ranging from 40–49 to 80–89 (Figure 1). This study did not encounter any admitted CHF patients that were younger than 40 years or over 90 years. Among the CHF patients admitted, 7% were found to be food insecure (Table 2).

Analysis of electronic medical records from both the control and screened groups revealed that when the HFIAS was used for

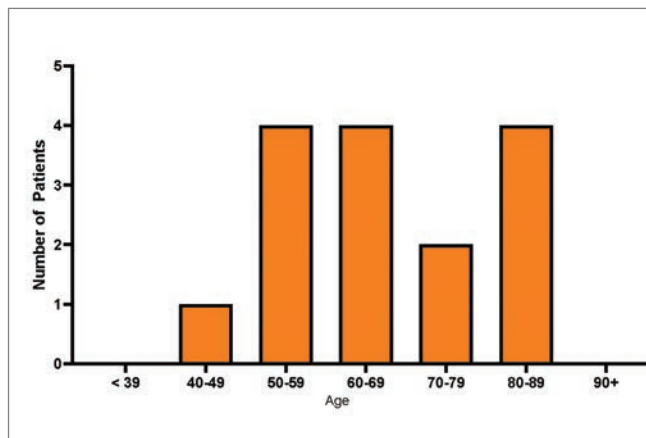


Figure 1. Age distribution among CHF patients with identified food insecurity.

food insecurity screening, food insecurity screening rates rose from 86.6% to 94% among patients with CHF, an 8.5% increase in screening (Figure 2A). Between the two groups, CHF readmissions were found to drop by 6.4% from 27.6% to 21.2% after the HFIAS was utilized (Figure 2B). CHF mortality rates also had a drop of 4.3%, from 24.1% to 19.8% after the HFIAS was utilized (Figure 2C). A paired t-test was performed to determine that each of these changes was statistically nonsignificant.

Discussion

Utilizing the HFIAS tool when screening CHF patients for food insecurity resulted in modest, nonsignificant readmission and mortality rate reductions within the Robert Packer Hospital. Although the differences between readmission rates and mortality rates before and after implementing food insecurity screenings were not statistically significant, these differences are still important to note. Noting that there was a slight increase in readmission rates and mortalities among CHF patients with food insecurity could help health care providers keep food insecurity in mind as an issue to address to help keep their patients healthier.

Patients with CHF that screened positively for food insecurity fell evenly across a large age range. This could be due in part to food insecurity affecting people of all ages. It is one of many social determinants of health that influences other aspects of psychological and physical health. Since employment and socioeconomic status can vary among all age ranges, it is no surprise that food insecurity would follow.

Although this study did reveal nonsignificant readmission and mortality decreases when the HFIAS was implemented, there are several limitations to note. This study took place during the COVID-19 pandemic, and as such, could have been influenced by the pandemic as well as by people's perceptions of the

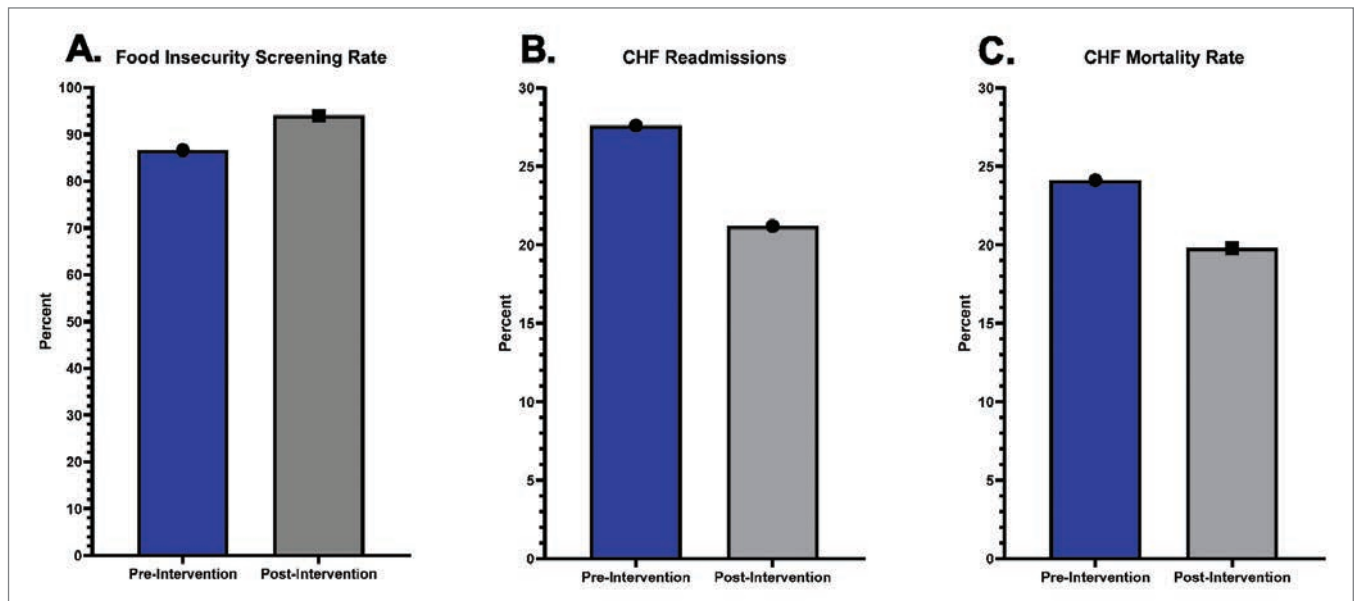


Figure 2. (A) Food insecurity screening rate in CHF patient groups observed prior to and after HFIAS implementation. (B) CHF readmission rates among CHF patient groups observed prior to and after HFIAS implementation. (C) CHF mortality rates among CHF patient groups observed prior to and after HFIAS implementation.

pandemic. Surges in Sayre, Pennsylvania, could have impacted the patients' willingness to leave their homes to seek treatment for CHF exacerbations, thus influencing data collection. These results could potentially be skewed toward people with more severe complications or exacerbations of CHF, thus leading them to become hospitalized regardless of the pandemic status. It could also affect a patient's transportation to the hospital. Another determinant of health — transportation — could have been affected by COVID-19, especially in the rural area of Sayre, Pennsylvania. If a patient was unable to reach the hospital due to both the pandemic and being too far from the hospital to arrive here on their own, this could also have skewed our data toward encountering only CHF patients who lived within a reasonable distance of Robert Packer Hospital.

Other confounding variables potentially include the weather conditions in Sayre, Pennsylvania. Due to poor road conditions for many months over the time period that the study took place, CHF patients too afraid to drive to the hospital or feeling unsure about driving too far in winter conditions may not have been included in this study. This could have skewed the results again toward patients with more severe complications or exacerbations of CHF, such as any exacerbation requiring an ambulance to take them to the hospital, thus negating the patient's own fear of transportation during the winter months limiting their arrival.

In addition to the limitations imposed by difficulties with transporting patients to the Robert Packer Hospital, there is a more insidious limitation to consider — the delicacy of the topic that this study addresses. Food insecurity is a sensitive topic for many people. Patients are wary to admit that they are having difficulty making ends meet in any context; these topics are rife with shame and guilt, making patients less likely to admit to them, let alone seek help or educational counseling. The patients that were able to admit to experiencing food insecurity in this study may not realize that they are far from alone in this struggle, but due to the stigma surrounding it, it is hard to know for certain whether the data presented here is fully accurate. Some CHF patients may have denied experiencing food insecurity when the HFIAS was administered.

It is clear that in many ways, this study further emphasizes the interrelated nature of the five social determinants of health organized by Healthy People 2020. Food insecurity is one factor among many, but potentially a more significant factor among members of the community with chronic health conditions such as congestive heart failure.

Disclosures

We have nothing to disclose.

References

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