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To cite this article: Anna Vaudin & Nadine R. Sahyoun (2015) Food Anxiety Is Associated with Poor Health Status Among Recently Hospital-Discharged Older Adults, Journal of Nutrition in Gerontology and Geriatrics, 34:2, 245-262, DOI: [10.1080/21551197.2015.1035825](https://doi.org/10.1080/21551197.2015.1035825)

To link to this article: <https://doi.org/10.1080/21551197.2015.1035825>



Published online: 24 Jun 2015.



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Food Anxiety Is Associated with Poor Health Status Among Recently Hospital-Discharged Older Adults

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Older adults returning home from the hospital may encounter health issues that cause anxiety about their ability to obtain enough food. Home-delivered meal (HDM) programs support nutritional needs and improve food security of those who cannot provide for themselves. A study conducted in six states examined feelings of anxiety about getting enough food in older adults (aged 60 years and older), comparing three time points: prior to hospitalization, at hospitalization (n = 566) and after receiving HDMs for two months posthospitalization (n = 377). Food anxiety during hospitalization was significantly higher among Hispanic ethnicity, current and former smokers, diabetics, and those who eat alone or have difficulty shopping. Food anxiety was significantly lower from baseline to two months follow-up ($P < 0.0001$), and participants showed improvements in certain coping strategies they used to get their meals. Indicators of food anxiety can help the health care system and community nutrition programs target those at highest risk of negative health outcomes.

KEYWORDS *food anxiety, food insecurity, home-delivered meals, Meals on Wheels, older adults, Older Americans Act Nutrition Program, transitional care*

INTRODUCTION

The older population of the United States is expanding as the “baby boom” generation ages and life expectancy of Americans continues to increase.

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In the 2013 Census, 14.1% of United States residents were older than 65 years (1). There is also an increasing trend of older adults preferring to “age in place,” remaining in their communities and homes rather than depending on nursing care. This combination of factors has resulted in a greater need for programs that provide support to older adults living in the community. The Older Americans Act Nutrition Program provides funding to such programs, including home-delivered meals (HDM), a service that delivers a healthy meal to older adults who are unable to leave their homes without assistance.

Recently, HDM programs—such as Meals on Wheels—throughout the country have seen an increase in waiting list numbers, due to both an increase in need and a decrease or maintenance in funding. With more people in need of the program, it becomes more important that it is well-targeted: that those who need HDM services most know about them and are made a priority for receiving them. The HDM program is effective in helping older adults remain in their homes (2–4), and so provides an economic advantage, as the alternative is often institutionalized care and a possible necessity for Medicaid funding (5, 6).

Older adults who have recently been hospitalized are an especially vulnerable segment of the population (7–10). Undernutrition is common among hospitalized older adults, and increases the risk of negative outcomes, such as mortality, morbidity, and health care utilization and costs (10, 11). Additionally, hospitalization is associated with functional decline in older adults (12, 13), which puts them at increased risk of food insecurity after returning to their homes (14). According to the U.S. Department of Agriculture (USDA), food insecurity means that a person or household’s access to adequate food is limited by a lack of money and other resources (15). In older adults, “other resources” often include the person’s own physical abilities; an older person may have limited access to food due to an inability to leave the house to shop for groceries, or a difficulty using the food they do have due to an inability to cook. The USDA measures the prevalence of food insecurity within the United States using a series of questions that are added as a supplement to the Current Population Survey (CPS) (15). In 2013, the CPS showed that 8.7% of households with older members (aged 65 and older) were food insecure (15). Food insecurity (or food insufficiency, a measure used by researchers to estimate food insecurity without using the official questionnaire included in the CPS) in older adults has been associated with low nutrient intakes (16–18), unhealthy body weight and body size (19), poor self-related health status (17), anemia (20), multimorbidity and disability (18, 21), lower cognitive function (22), anxiety and depression (19, 20), and decreased quality of life (20, 23). Research has shown that HDMs can improve food security status of older adults (24–26). If we are able to identify those who go into the hospital with the highest risk, we can target programs toward these individuals in an attempt to prevent food insecurity, malnutrition, and related rehospitalization and health declines.

In our study we used “food anxiety” as an indicator of potential food insecurity. Through in-depth interviews with older adults, Wolfe characterized the progression of food insecurity in the following increasingly severe stages: (1) compromised diet quality and variety and a limited ability to obtain foods recommended for health problems; (2) anxiety or uncertainty of food resources and food management strategies; (3) having to eat meals that are not socially acceptable or eating less; and (4) having to use emergency food management strategies, such as borrowing money. They found that this feeling of anxiety was especially prevalent in those who had physical disabilities and were dependent on others for food acquisition and preparation (27). By asking participants if they were worried about getting enough food, we intended to capture this feeling of anxiety as an early warning signal for the possibility of progression to food insecurity.

In this study, we examined the prevalence of food anxiety experienced by older adults at prehospitalization, while hospitalized, and at posthospital discharge, and the demographic, health, and lifestyle factors that may be associated with food anxiety. This information can inform how to best identify at-risk individuals, and target programs to prevent poor health outcomes posthospitalization.

METHODS

Data collected from the Community Connections (CC) Demonstration Project conducted in 2005–2006 was used in this study. This project was described in detail elsewhere (28). Briefly, this project was designed primarily to study the feasibility and effort required to enhance collaboration between HDM program sites, the health care system, and community organizations. Funding and technical assistance was provided to HDM program sites in six states based on competitive grant applications to initiate or strengthen these collaborations. The project also examined the health status and nutrition profile of individuals discharged from acute care hospitals and recruited as participants. Health assessment was collected at three time points: initially upon enrollment into the study within two weeks posthospital discharge, at two months postenrollment or upon withdrawal from the project, and at five months postenrollment into the study. In this article, only the data obtained at the initial and two-month follow-up interview were analyzed.

Participants

Participants were recruited from hospitals within communities served by the HDM programs. Hospital administrators signed a memorandum of understanding and discharge planners and social workers at local hospitals were instructed on identifying and referring individuals for our study. Participants

were also recruited from the community through self- or family-based referrals and from community organizations, if they had been discharged from the hospital within the previous two weeks.

Inclusion criteria included being at least 60 years of age, discharged from a hospital back to their place of preadmission residence, hospitalized for at least three days for an acute short-term illness or diagnoses, with no terminal disease or severe dementia, able to consume solid foods, not homebound before recent hospitalization, and must not have received HDMs within the year prior to hospitalization. Individuals had to understand the survey questions, administered in English or Spanish, understand the study protocol, and sign the informed consent form. The study was approved by the University of Maryland Institutional Review Board.

Individual Assessment

Upon admission into the study, a trained assessor visited individuals at home and administered an assessment tool. This assessment included questions on sociodemographic, health, functional status, and nutrition risk characteristics. The questionnaire was cognitively tested and then pilot tested (29). All assessment tools were administered via computer assisted personal interview.

Age, gender, race/ethnicity, education, income, living arrangement, and geographical location were collected. Several of these variables were coded dichotomously: age (>75 vs. <75 years), educational attainment (<12th vs. >12th grade), and gender. Race-ethnicity was categorized as non-Hispanic Whites, non-Hispanic Blacks, and Hispanic. Living arrangements was coded as live alone versus live with spouse or others.

Self-reported health status, physical and cognitive functioning, depression status, and social support were also collected. Participants were asked if their health, in general, was excellent, very good, good, fair, or poor. This variable was dichotomized as excellent, very good, or good vs. fair or poor. Physical function was assessed by asking if participants had difficulty performing seven Activities of Daily Living and 8 Instrumental Activities of Daily Living (30). Cognitive status was assessed using the 22-item Adult Lifestyles and Function Interview-Mini-Mental State Examination (ALFI-MMSE; range 0–30 points) questionnaire (31). Cognitive functioning was categorized as impaired if the ALFI-MMSE score was below 17 (31). The presence of depression was measured using the five-item Geriatric Depression Scale (GDS-5; range 0–5 points) (32). GDS-5 scores of two or more were indicative of the presence of depressive symptoms (32). Social support from family and friends was evaluated using the revised 12-item Lubben Social Scale (LSNS-R), which inquires about the frequency of contact, the number of family and friends seen monthly, and the number of family or friends the respondent felt close enough to call for help or speak to privately (29, 33, 34). A score of 0–15 is considered as socially isolated; 16–30 at high risk of social isolation, and scores of 31–46 moderate

risk of social isolation. Individuals receiving scores of 47 or greater were categorized as being at the lowest risk of social isolation (35).

Nutrition Risk Assessment

Questions on nutritional risk included frequency of eating meals alone (*all or most of the time* versus *sometimes* or *never*), self-reported appetite (*excellent, very good, or good* versus *fair* or *poor*), weight loss of more than 10 pounds over the past six months (yes/no), and difficulty in eating, shopping, and cooking (*no difficulty* versus *a little difficulty, some difficulty, or a lot of difficulty*). If participants had difficulty with cooking we inquired about whether they had help preparing meals (yes/no). If participants did not have help, they were asked if they needed help (yes/no), and if they answered “yes,” they were then asked if they were worried that they would not eat right because of lack of help preparing meals (yes/no). Difficulty in cooking was also assessed with a question asking, “If you had groceries available to you in the home now, would you be able to use them to cook a meal?” (yes/no). Participants were asked if they (or any member of their household) had ever applied for Supplemental Nutrition Assistance Program (SNAP, previously known as food stamps) (yes/no) and whether they were currently receiving SNAP benefits (yes/no).

Food-related anxiety for three different time periods was evaluated based on a yes/no response to questions asking how worried the participant was about getting enough food. The initial needs assessment questionnaire asked both “During the six months BEFORE you were hospitalized, were you ever worried about getting enough food?” and “WHILE AT THE hospital, were you worried about getting enough foods when you returned home?” At two-months follow-up, the participant was asked, “Since we last saw you have you been worried about getting enough food?” (yes/no). The worry about getting enough food that these questions identify will be referred to as “food anxiety” in this article.

To determine participants’ perception of whether they had enough to eat at follow-up, they were asked, “In general, would you say you have enough to eat always, most of the time, sometimes, or never?” Participants were also asked about their methods of obtaining food both at baseline and at follow-up. At baseline, participants were asked, “How do you get your meals right now? Do you . . .,” and were asked to select any combination of the following answers that applied to them: “Cook for yourself,” “Get food from family and friends,” “Eat foods that are easy to fix, i.e., soups, sandwiches or microwaveable meals,” “Eat foods that require no cooking,” “Skip meals or eat less food,” or “Save food from other meals.” After two months of HDMs, participants were asked how they get their meals other than HDMs, with the same answer options as were available at baseline, plus “Home delivered meals are enough.”

At follow-up, questions were asked to gather information about number of meals received per week (“How many home delivered meals per week have you been receiving from the Meals on Wheels program?”), and the portion of daily intake represented by a meal (“On the days that you eat a home-delivered meal, what portion of your daily intake does this meal represent?”).

Statistical Analysis

The analyses were conducted using SAS software (version 9.2; SAS Institute Inc., Cary, NC). Data were available from 566 individuals at baseline and 377 at follow-up. A sensitivity analysis was conducted to compared gender, age, race, education, income, how often they ate alone, SNAP benefits, and smoking status of those who remained in the study for two months with those who left the study before the two-months follow-up. No significant differences between these groups were found except for percentage of smokers (with more current/past smokers remaining in the study; $P < 0.05$). Missing values were imputed for income and depressive symptoms. We used descriptive statistics to obtain mean and frequency distributions for all variables at baseline. To examine differences in selected characteristics by food anxiety at baseline, *t* tests and chi-squares were used for continuous and dichotomous variables, respectively. Some questions were not answered by all participants (income [$n = 7$], depressive symptoms [$n = 7$], and self-reported health [$n = 4$]), and these observations were deleted from analyses. Chi-squares were used to compare the proportion of participants reporting food anxiety six months prior to hospitalization and at hospitalization (baseline) and two months posthospitalization.

We ran a logistic regression model to predict the odds of food anxiety compared to no food anxiety while hospitalized. To check for multicollinearity, we computed variance inflation factors (VIFs) for the variables and examined the correlation coefficients between each variable. None of the VIF values were >10 and the highest correlation coefficient was 0.285, so collinearity was determined not to be a problem in this model.

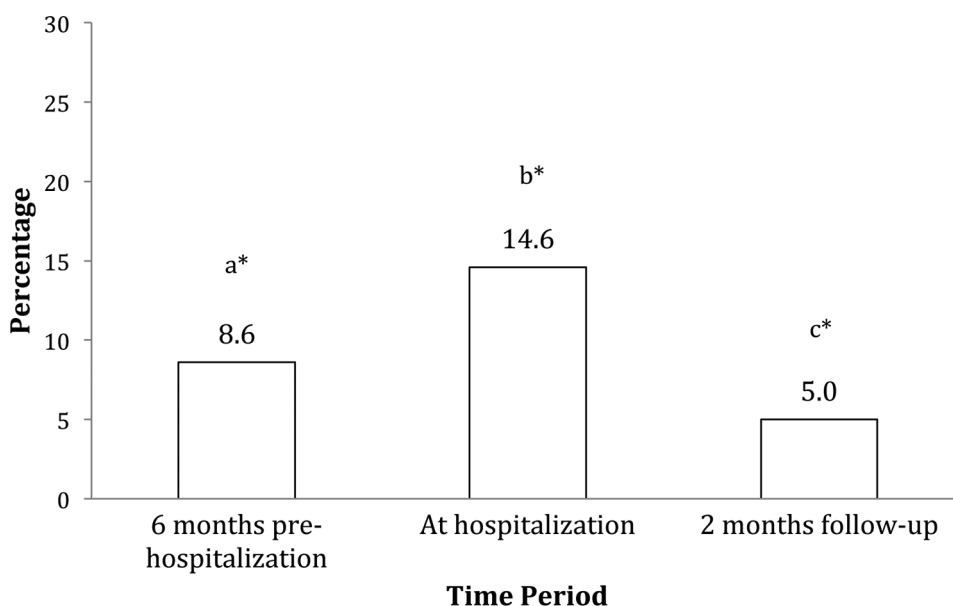
RESULTS

The majority of the sample was female (72.6%) and the average age was 76.8 years (range: 60–96 years). Non-Hispanic Whites comprised 73.7% of the sample; 10.6% were non-Hispanic Black and 15.7% were Hispanic. The average household income of the sample was low, with 72.5% receiving less than \$20,000 per year. Almost one-third (30.7%) had less than a high school education. More than two-thirds (70.1%) were single (widowed/life partner deceased, divorced, separated, or never married/single).

More than half of the participants received five meals per week (53.7%), 41.4% received more than seven meals per week, and the remaining participants had fewer than five meals per week. Two-thirds of recipients said that the meals contributed to half of their daily nutrient intake or more and only seven participants (1.9%) said the meal represented less than one-third of their daily intake.

FOOD ANXIETY OF STUDY PARTICIPANTS DURING THREE TIME PERIODS

When participants were asked, at baseline, to recall if they were worried about getting enough food during the six months preceding hospitalization, 8.6% of participants responded affirmatively. This number increased to 14.6% who said they felt worried while they were hospitalized, then decreased to 5.0% after participants had been home and receiving HDMs for at least two months (Figure 1). The percentage reporting anxiety was significantly higher while hospitalized than before hospitalization ($P < 0.0001$). It was also significantly lower after being home and receiving meals for two



*a is significantly lower than b at $p < 0.0001$ ($n = 566$)

b is significantly higher than c at $p < 0.0001$ ($n = 377$)

a is significantly higher than c at $p < 0.0001$ ($n = 377$)

FIGURE 1 Prevalence of food anxiety among Community Connections Demonstration Project participants, before hospitalization, while hospitalized ($n = 566$), and at two months post-hospital discharge ($n = 377$).

months, compared to the percentage reporting anxiety during hospitalization and to those reporting anxiety pre-hospitalization ($P < 0.0001$).

There were some individuals who reported at baseline that they did not have anxiety about getting enough food when they returned home, but yet at follow-up they only had enough to eat most of the time, sometimes, or never (18.5%).

CHARACTERISTICS BY FOOD ANXIETY

Individuals older than 75 years, Hispanics, non-Hispanic Blacks, with less than a high school education, or with a household income \leq \$20,000 were more likely to report food anxiety at baseline (Table 1). Other characteristics significantly associated with a higher risk of food anxiety were poor self-reported health, self-reported physician-diagnosed diabetes, impaired cognitive health, presence of depressive symptoms, being a current or past smoker, always or mostly eating alone, or having applied for SNAP benefits (whether the participant had actually received SNAP). Significantly more participants who said they would not be able to use groceries to cook a meal reported food anxiety. Other factors such as reported weight loss, difficulty shopping, and low social support were not significantly associated with food anxiety; however, these factors were highly prevalent among this population group.

Logistic regression analysis showed that when adjusted for the effect of the other characteristics in the model, the factors that were still significant predictors for increased likelihood of food anxiety at baseline were Hispanic ethnicity, being a current or past smoker, always or mostly eating alone, being unable to cook a meal, and having self-reported physician-diagnosed diabetes. Impaired cognition approached significance ($P = 0.06$) (Table 2).

COPING STRATEGIES FOR GETTING MEALS

At baseline, only 13 individuals (2.3%) reported that they got their meals exclusively by cooking while 277 (40.8%) said they cook for themselves in combination with some alternative approach. Three-quarters (74.7%) stated that they “Get food from family and friends,” in addition to other means of getting food, and 15.1% reported this as their only response. This means that almost 90% of participants were getting at least some, if not all, of their food from family and friends. Only one person answered “Skip meals or eat less food” exclusively, but 19.6% of participants included “Skip meals or eat less food” with at least one other strategy.

At two-month follow-up, 30 participants (8.0%) said they cook for themselves exclusively, while 46.2% said they cook for themselves and also employ some sort of coping strategy to get their meals. The number who included “Get food from family and friends” decreased to 49.9% and the number whose sole coping strategy was to get food from family and friends

TABLE 1 Demographic, Nutrition Risk Characteristics, and Health Status of the Community Connections Demonstration Project Participants by Food Anxiety While Hospitalized ($n = 566$)

Characteristics	<i>n</i>	Presence of anxiety		<i>P</i> -value
		No (%)	Yes (%)	
Demographics				
<i>Gender</i>				
Male	155	83.2	16.8	0.38
Female	411	86.1	13.9	
<i>Age</i>				
75 + years	206	79.1	20.9	0.0016
<75 years	360	88.9	11.1	
<i>Race/Ethnicity</i>				
Non-Hispanic White	417	88.5	11.5	0.0001
Non-Hispanic Black	60	85.0	15.0	
Hispanic	89	70.8	29.2	
<i>Marital status</i>				
Married/life partner	169	86.4	13.6	0.64
Currently unmarried (widowed/life partner deceased, divorced, separated, or never married/single)	397	84.9	15.1	
<i>Educational status</i>				
Less than high school	174	78.7	21.3	0.003
High school graduate	392	88.3	11.7	
<i>Household income</i>				
< \$20,000	405	82.7	17.3	0.009
> \$20,000	154	91.6	8.4	
Lifestyle and health status				
<i>Self-reported health</i>				
Poor	213	89.2	10.8	0.04
Excellent/very good/good/fair	349	82.8	17.2	
<i>Self-reported physician-diagnosed diabetes</i>	191	78.5	21.5	0.001
Has diabetes				
Does not have diabetes	375	88.8	11.2	
<i>Depression*</i>				
Has symptoms	227	79.7	20.3	0.003
Has no symptoms	332	88.9	11.1	
<i>Cognitive health*</i>				
Impaired	117	77.8	22.2	0.01
Intact	449	87.3	12.7	
<i>Smoking status</i>				
Current smoker	37	70.3	29.7	0.002
Past smoker	196	81.6	18.4	
Nonsmoker	333	89.2	10.8	
Nutrition risk status				
<i>Eats alone</i>				
Always/mostly	329	82.1	17.9	0.01
Sometimes/never	237	89.9	10.1	
<i>Self-reported weight loss</i>				
Yes	235	82.1	17.9	0.07
No	331	87.6	12.4	
<i>Difficulty shopping</i>				
Difficulty shopping	477	84.3	15.7	0.1
No difficulty shopping	89	91.0	9.0	

(Continued)

TABLE 1 Continued

Characteristics	<i>n</i>	Presence of anxiety		<i>P</i> -value
		No (%)	Yes (%)	
<i>Ability to cook</i>				
Unable to cook	257	79.0	21.0	<0.0001
Able to cook	309	90.6	9.4	
<i>Social support status*</i>				
High risk/socially isolated	264	83.7	16.3	0.31
Low/moderate risk of isolation	302	86.8	13.2	
<i>Food stamp use</i>				
Applied (received or did not receive)	116	88.4	11.6	<0.0001
Didn't apply	450	73.3	26.7	

*Depression was measured using the 5-item Geriatric Depression Scale (GDS-5; range 0–5 points) (30). GDS-5 scores of 2 or more were indicative of the presence of depressive symptoms (30). Cognitive health was assessed using the 22-item Adult Lifestyles and Function Interview-Mini-Mental State Examination (ALFI-MMSE) questionnaire (29). Cognitive functioning was categorized as impaired if the ALFI-MMSE score was less than 17 (29). Social support status was assessed using the revised 12-item Lubben Social Scale (LSNS-R). A score on the LSNS-R of 0–30 was considered high risk/socially isolated, a score of 31 or greater was moderate/low risk.

was halved to 7.2%. The proportion who included “Skip meals or eat less food” as one of their methods for getting food decreased from almost 20% to 7.7%, and no one said they “Skip meals or eat less food” exclusively at

TABLE 2 Adjusted* Odds Ratio (OR) and 95% Confidence Interval (CI) for Characteristics Associated with Self-Reported Food Anxiety While Hospitalized, Among Community Connections Demonstration Project Participants (*n* = 566)

Variables (reference group)	OR [95% CI]	<i>P</i> -value
Age (<75 years)		
75 + years	1.51 [0.88, 2.59]	0.13
Gender (Men)		
Women	0.83 [0.47, 1.49]	0.54
Race/ethnicity (Non-Hispanic White)		
Non-Hispanic Black	0.90 [0.39, 2.07]	0.80
Hispanic	2.53 [1.31, 4.87]	0.005
Cognitive function (Intact)		
Impaired	1.75 [0.97, 3.16]	0.06
Eat alone (Always/mostly)		
Sometimes/never	2.60 [1.47, 4.57]	0.001
Self-reported physician-diagnosed diabetes (No)		
Yes	1.87 [1.11, 3.14]	0.02
Smoking (Nonsmoker)		
Current smoker	3.14 [1.29, 7.63]	0.01
Past smoker	2.05 [1.17, 3.60]	0.01
Ability to cook (Able)		
Unable	2.11 [1.22, 3.66]	0.008

*Adjusted for other covariates in model.

follow-up. Eight participants (2.1%) selected “Home-delivered meals are enough” as their only answer, and 29 (7.7%) chose this answer in combination with another method of getting food.

DIFFICULTIES SHOPPING AND COOKING

At baseline, more than half (56.4%) of participants reported that they had a lot of difficulty shopping or were unable to shop. Those who reported anxiety about food while hospitalized were significantly more likely to have difficulty shopping ($P < 0.05$).

Almost half of all participants reported at baseline that if they had groceries available, they would be unable to cook a meal or did not know if they would be able (45.1%). However, among those who were food anxious while hospitalized, only 34.9% said they would be able to cook a meal, which was significantly lower than the proportion of participants who were not food anxious who said they could cook (58.3%) ($P < 0.0001$).

Additionally, 87.1% reported at least some difficulty with preparing meals. A larger proportion of those who were food anxious while hospitalized reported at least some difficulty cooking (88.0%, compared with 79.0% of those who were not food anxious), and this difference approached significance ($P = 0.0572$).

DISCUSSION

In the USDA 2013 report on food security in the United States, 8.7% of households that included an adult older than 65 years were food insecure, as were 9.0% of older adults living alone (15). Food insecurity is a known risk factor for compromised nutrition (16–18, 36), and is an important concern in older adults who have recently been discharged from the hospital. Malnutrition in this population is associated with rehospitalization, increased risk of mortality, and other negative health outcomes (37–40). If older adult patients go home malnourished, health issues may be compounded if they do not have support or assistance in acquiring and preparing food.

Food anxiety can serve as an indicator for the presence or risk of food insecurity. The presence of food anxiety can be a warning signal that indicates a need for intervention, and addressing the causes of this anxiety may be useful in preventing further health deterioration. By characterizing those who are food anxious while hospitalized and identifying the nutrition-related issues these individuals have that may contribute to their anxiety, we can determine what type of assistance may benefit them as they recover.

In our study, participants recalled significantly more food anxiety while hospitalized than before hospitalization. This is consistent with the idea that among older adults, hospitalization may provoke anxiety about acquiring

food. Decreased physical functioning can make it more difficult for an older adult to acquire sufficient food (14, 17). Additionally, after returning from the hospital and receiving HDMs for two weeks, the prevalence of food anxiety decreased significantly. This decrease suggests that the HDM program may alleviate anxiety and is an effective form of nutritional support for older adults during recovery. Of course, anxiety may also decrease as individuals' conditions improve and they become more confident in their ability to care for themselves.

In general, lower socioeconomic status and poorer health were more likely to be associated with food anxiety during hospitalization. These characteristics are consistent with those found throughout the literature to be associated with food insecurity among older adults (17, 36, 41, 42). Impaired cognitive function approached significance; however, the true impact of cognition on food anxiety may not be reflected in our results because we excluded individuals with cognitive dysfunction from the study; those who were included were able to understand the study and signed consent forms. Health care providers and caretakers should look out for these characteristics in the older population, as they suggest susceptibility to food anxiety. Additionally, those who have food anxiety while hospitalized often do not in fact have enough food when they return home. We found that almost 40% of those who were anxious about having enough food answered that they had enough to eat at two months follow-up only "most of the time," "sometimes," or "never."

For older adults returning to their homes, the HDM program can be a valuable support. In fact, many participants in this study relied heavily on the food provided through the program. At follow-up, three quarters of the respondents reported that the HDM represented half or more of their daily intake. This is a concern, because HDMs are only required to provide one-third of an older adult's daily recommended allowances. Participants who use these meals for more than half of their daily nutrients and only receive five meals or less per week may not be getting enough daily nutrition. In the 2013 National Survey of Older Americans Act participants, 34.0% said that a HDM represented about one-half of their food for the day and 25.6% said it represented more than one-half (2). Although our sample is not representative of this population, the heavier reliance of our study participants on HDMs suggests that the recently hospitalized population is a very needy portion of those eligible to receive meals.

At two-months follow-up, 21% of respondents indicated that they did not always have enough to eat, despite receiving HDMs. A greater proportion of respondents with food anxiety at baseline did not always have enough to eat at follow-up compared to those without food anxiety; however there were still 60 participants (18.5%) who did not report any anxiety at baseline, but did not always feel they had enough to eat at follow-up. This result has two implications: (1) anxiety about food while hospitalized was often consistent with a perceived lack of food upon returning home, and (2) some

individuals who did not report anxiety about getting enough to eat when they returned home from the hospital felt a lack of food when they did return home. The latter suggests that older adults may not consider the difficulty they will encounter in getting enough food when they return home from hospitalization, and thus may not seek assistance from HDM programs. It also is consistent with the findings of Quandt (42) and Wolfe (41), whose research showed that the mindset of many of today's older adults is likely to temper their impressions of their situation. For example, some individuals are likely to reflect back on how much they ate during past, worse experiences, and to consider having less than they need to be an acceptable situation (41). Wolfe's interviews with older adults implied that "going without" might not be seen as a symptom of food insecurity by the older generation (41). This outlook may be an explanation for some participants.

Having the means to acquire food is important for getting proper nutrition; however in the older adult population there is an increased risk of functional disabilities that may further affect an individual's ability to shop for food or prepare a nutritious meal (21, 43, 44). This is an especially relevant concern for those who have recently been hospitalized. Over half of the participants in this study reported that they had more than "some" difficulty shopping. Those who were food anxious at baseline were significantly more likely to have difficulty shopping, indicating an association between ability to shop and feeling secure about one's food situation.

Just under half of all participants said that if they had groceries available they would be able to cook a meal. However, among those who were food anxious at baseline, only 34.9% said they would be able to cook a meal. These results are consistent with previous research showing an association between ability to cook and risk of food insecurity (21). In 2003, Wolfe and colleagues published first-hand qualitative data from study participants saying that they were unable to eat enough because they were too sick or physically compromised to get up and prepare a meal (44). The authors suggested augmenting the current Household Food Security Survey Module to more accurately assess the food security status of older adults by adding questions about the respondent's ability not only to afford food but to acquire and prepare it.

Older adults who have problems acquiring enough food employ various coping strategies to get by, such as skipping meals, eating less, and getting food from family and friends. These coping strategies are characteristic of older adults who are struggling to get enough to eat. In-depth interviews with older adults showed that individuals employed strategies to manage their food supply, such as stretching food (41) or making do with the food left in the house, and relying on family and friends (42). The proportion of respondents in our study who reported that they skipped meals or ate less food, or got food from family or friends decreased from baseline to two-months follow-up. The proportion whose sole method of getting meals was to get food from family and friends decreased by half after two months of HDMs. This decrease

implies that the HDM program may be an effective nutritional support for older adults. The decrease may also, at least partially, reflect an improvement in the condition of participants and improvement in their ability for self-care.

There was also an increase in the proportion who said they cook for themselves; however, this relatively small increase suggests that two months may not be a long enough period for recently hospitalized adults to recover completely. For those who will recover the ability to cook after a period of healing, HDMs are a good source of nutritious food in the interim.

This study is based on secondary analysis of data and despite the large set of questions included, it was not specifically targeted to understanding all the reasons behind participants' feelings of anxiety about getting enough food. Additionally, all information was gathered by self-report, and is a reflection of the participant's perception of his or her own condition at the time. Another limitation is that the participants were a convenience sample and thus the results are not representative of all recently hospitalized older adults. However, the sample is large compared with similar studies and includes participants from a variety of geographical locations throughout the United States.

CONCLUSIONS

Food anxiety is an advance warning for compromised nutrition. The factors that are associated with food anxiety may cause food anxiety, or they may in fact be the cause of food anxiety. Some factors may be both; for example, research has shown that those with disabilities are more likely to be at nutritional risk (14, 45), and conversely that maintaining a healthy nutritional status is important in preventing further functional disabilities (46). Factors such as these can cause a spiral of downward health as the person's condition worsens due to poor nutrition, perpetuating the condition that is causing poor nutrition. Whether they are contributors or consequences of food insecurity, these factors are important indicators that an individual may benefit from nutritional assistance programs such as HDMs.

Our study shows that older adults returning from the hospital are at high nutritional risk and have a need for community nutrition services. Although the participants were receiving meals throughout the study, and did show improvement in food anxiety, there were some who still reported not having enough to eat. These individuals would have even less to eat, and be at higher nutritional risk, if they were not receiving food from a HDM program.

In this study, we identified characteristics that may predict risk for food anxiety in this population—such as Hispanic ethnicity, eating alone, inability to cook, having diabetes, impaired cognitive function, and smoking—and thus may be indicators of a predisposition towards food insecurity. We also gathered information on coping strategies for those who have trouble getting enough food. This information can help us understand how older adults deal

with food insecurity, and recognize when they are having to fall back on these coping strategies so that community programs can fill in the gaps.

More research is needed to narrow in on the determinants of food insecurity in the recently hospitalized older population so that the health care system can collaborate with community nutrition programs to target those at the highest risk.

TAKE AWAY POINTS

- Older adults returning home from hospital have many nutritional risk factors and are often in need of nutritional assistance. The risk of food anxiety in our sample was increased by Hispanic ethnicity, inability to cook, being a current/former smoker, diabetic, and eating alone. These characteristics are consistent within the literature as predictors of food insecurity, and may serve as indicators for detecting an at-risk population.
- Home-delivered meal programs may reduce feelings of anxiety about having enough food posthospital discharge. Significantly fewer participants in this study reported food anxiety after two months receiving meals, compared with the anxiety they felt at baseline.
- Older adults may employ coping strategies to get enough food to eat, or do without. Some individuals may not seek help and there may be undetected unmet need in this population. Therefore, health care providers and community programs must make efforts to reach out and identify those who need assistance programs the most.

FUNDING

This article was supported, in part, by a grant from the Administration on Aging, Department of Health and Human Services (DHHS). Grantees undertaking projects under government sponsorship are encouraged to express freely their findings and conclusions. Points of view or opinions do not, therefore, reflect official DHHS policy.

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