

ABSTRACT

Title of Document: SHORT-TERM HOME-DELIVERED MEAL INTERVENTION AND THE HEALTH, NUTRITION AND FUNCTIONAL STATUS OF HOSPITAL-DISCHARGED OLDER ADULTS

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Background: Following discharge from the hospital, homebound older adults remain at risk of poor dietary intake and adverse outcomes due to declines in health experienced during hospitalization. However, once home, timely receipt of in-home nutrition services by older adults is challenged by gaps in the continuum of care. Greater insight into the nutrition and wellness service needs of this population is needed to improve service coordination.

Methods: Staff at six home-delivered meal (HDM) programs in six US states enrolled 566 hospital-discharged, homebound older adults into a five-month HDM intervention project. Sociodemographic, nutrition and health risk data were collected at baseline, at 2 months after the initial assessment or at termination of home delivered meal services, and at 5 months after the initial assessment.

Statistical Analyses: Bivariate and multivariate analyses were used to examine relationships between sociodemographic, social, nutritional, and health risk factors, and participant food shopping/meal preparation ability. In addition, associations between these risk factors, adverse changes in living arrangement and short-term HDM program participation were evaluated. An assessment of the food items and cooking appliances available in the home was also performed.

Results: This dissertation suggests that among the hospital-discharged older adults studied: (a) many had a variety of foods available but reported being unable to prepare meals, (b) those who experienced adverse changes in living arrangement over the course of the intervention were more likely to report poor health and nutrition status, functional impairment, and social isolation following hospital discharge, and finally, (c) those who maintained or restored their ability to accomplish food-related instrumental activities of daily living such as shopping and preparing meals were shorter-term users of HDM compared to longer-term users.

Conclusion: Homebound older adults can benefit from timely enrollment to community-based programs nutrition and wellness services like HDM, especially those who are unable to shop and prepare meals. There is also a need at discharge to identify social, functional and nutritional risk factors for adverse outcomes in older adult patients in order to provide appropriate referrals to nutrition and wellness services that can facilitate successful transitions from hospital to home.

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DISCHARGED OLDER ADULTS

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Dedication

I dedicate this dissertation to my husband, parents and siblings
whose unwavering love, encouragement and support
have made my doctoral education possible.

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I would first like to thank God, through whom *all* things are possible – for the opportunity and means to emigrate to the United States to pursue my undergraduate- and graduate studies, and for the many wonderful people who have helped me along the way. I am eternally grateful to my husband and my family who have always set the bar high for themselves and for me, and encouraged me from the start to the finish of my doctoral education.

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Chapter 1: Introduction

Introduction

Studies of community-dwelling older adults estimate that inadequate dietary intake is prevalent among 40% of community-dwelling older adults and 50% of hospitalized older persons (1). Malnutrition in both populations can be attributed to a myriad of factors including age-related physiological changes, declining health status, polypharmacy, poverty, and changing living arrangements (2-6). These changes diminish food intake, and cause secondary pathologies such as sarcopenia (loss of lean body mass), impaired immunity, physical frailty and losses in quality of life (7,8). The consequences of declining dietary intake with age also include a greater risk of weight loss and falls, an inability to maintain good health and ward off chronic diseases – all of which increase the risk of hospitalization and institutionalization (9,10).

National Hospital Discharge Survey data suggest an increased incidence of acute and chronic diseases, and a greater rate of institutionalization, with age (11). Between 1970 and 2000, the rate of hospitalization for older adults (65 years and older) increased by 25 percent, in contrast to declining rates seen among younger population groups (11). Despite this, the duration of short-stay hospital visits has declined during the past twenty years in older persons, from 10.7 days in 1980 to 5.5 days in 2005 (12). Taken together these findings suggest that older adults are currently discharged from the hospital more quickly than in past years. Declining lengths of hospitalization for an older person leaves little time for effective discharge

planning and adequate patient education on disease management strategies for recovery (13). Following hospitalization, most older adult patients return to the community (14) thus these patients increasingly spend time in recovery outside the acute care setting.

The smooth transition from hospital to home can be complicated by losses in functional capability (15). Functional declines experienced during hospitalization can be attributed to bed rest and immobility (16). Increases in periods of bed rest have been shown to accelerate muscle loss and aerobic capacity, leading to falls in the hospital, and increased dependency upon discharge. These changes initiate a cascade of events that thrust older persons into declining health status and dependency upon discharge. Physical function post-discharge is a key determinant of patient outcomes and discharge destination (17), thus, older adults may be at increased risk for hospital readmission following discharge.

Hospital readmission accounts for half of all hospital admissions (18,19), and has long been an indicator of poor quality in-patient healthcare. Currently, readmission rates among older adults range between 31 to 50 percent (2,20). This is higher than necessary considering recent research that suggests 25 to 33 percent of such readmissions are preventable. Payne (19) estimates that eliminating 4.7 percent of hospitalizations would reduce the number of patients admitted by 1.8 million and save the healthcare system \$5.1 billion. Thus, a tangible economic incentive exists to limit the rate of rehospitalizations seen among older adult patients. Effective discharge planning is essential to ensure that older patients receive referrals to health

and social services that can enable them to successfully re-enter community residence and mitigate the ‘revolving door’ nature of hospital readmissions (18).

The timely receipt of nutrition and healthcare services for elders recently discharged from hospital may be important to maintaining health and facilitating recuperation (13). The weeks that follow an older person’s discharge from hospital have been identified as a critical period in the recovery process (21,22). Hospital-discharged older adults can rely on community-based nutrition programs, such as those provided by the Older Americans Act Nutrition Program (OAANP) to meet their health service needs (23). National evaluations of the OAANP, the largest home and community-based service provider for older adults, indicate that it is a well-targeted, effective, and efficient program and framework for preventative nutrition intervention (23,24). Often these services are provided by two parallel delivery systems that are inefficient in meeting the health and wellness needs of older adults. Currently only older adults at risk of nursing home placement due to physical impairment, or those who are socially or economically vulnerable, are targeted to participate in the OAANP (25). The decentralized nature of the program, while successful in delivering services to needy elders, has not allowed for the development of a clearly defined targeting strategy (26). As a result, older adults who may benefit from the nutrition and wellness services provided by the OAANP, such as hospital-discharged older adults, are not targeted. These older adults who return to the community at risk of poor nutrition, often experience subsequent declines in health and reinstitutionalization. There is a need for improved coordination between

healthcare delivery systems and senior nutrition services to mitigate this gap in the continuum of nutrition care for older adults.

The United States is at the cusp of a boom in the older adult population (27). The proportion of Americans 65 years of age and older is expected to grow from 12% to 20% of the U.S population by 2030. These demographic changes, coupled with the rising costs of healthcare and the need for alternatives to currently available long-term care, are increasingly exerting pressure on existing home- and community-based services (28). The current long-term care model prioritizes institutional care over community-based care (29). Consequently, providing timely access to older adults seeking community-based care is difficult. Efforts to rebalance the long-term care model must prioritize a shift away from expensive institutional care to consumer-directed, flexible, community-based care (29). These efforts include the establishment of the ‘Choices for Independence’ initiative by the US Administration on Aging (AoA) in 2006. ‘Choices for Independence’ was established to guide aging service providers in changing the long-term care paradigm (30). This initiative represents a novel approach to addressing both current and future long-term care challenges. In addition, a philosophical and operational shift among aging service providers which have traditionally focused on solely providing services and not played an active role in the continuum of healthcare services for older adults, is also needed.

Much is known about the health and nutrition status of older adults participating in home and community-based nutrition programs (31). However, the use and impact of these services on recently-discharged older adults is unknown. Expanding nutrition programs to meet the needs of this currently underserved group

of older adults poses a great challenge. Many programs have limited human resources and funding, and a large number of older adults are currently waiting to receive nutrition and meal services (32,33). As noted above, aging services do not consider themselves part of the long-term care system in their communities. Thus, bridging the existing divide between the medical and social service communities presents an additional challenge to ensuring continuity in the nutrition care received by hospital-discharged older adults.

In 2005, the Meals on Wheels Association of America (MOWAA) recognized an opportunity to transform home-delivered meal programs from their current role as primarily nutrition services providers to core programs within the long-term care system (34). To study the feasibility and effort required to enhance collaboration between home-delivered meal programs, the healthcare system and community organizations, MOWAA developed the Community Connections (CC) demonstration project. This project provided funding and technical assistance to these programs to increase collaboration, and examine the health status of recently discharged, acutely-ill program participants. Using this dataset, this dissertation intends to examine the health and nutrition status of hospital-discharged older adults.

Objectives and research questions

Using data from the Community Connections (CC) project, the objectives of this dissertation are to describe the environmental and physical constraints faced by older adults upon discharge, identify risk factors for adverse changes in living arrangement over the course of a 5-month nutrition intervention, and examine characteristics of short-term users of the home-delivered meal program (HDM). The results of this dissertation analysis are presented in the form of three manuscripts that address the following research questions:

1. What environmental and physical constraints do hospital-discharged older adults face in maintaining adequate dietary intake?
 - 1.1. What types of foods are available in the homes of hospital-discharged older adults?
 - 1.2. What health, functional, nutritional and social risk factors are associated with difficulty performing food-related activities of daily living? Do these factors differ by gender?

2. What functional (cognitive, physical and depression status), nutritional (eating alone, appetite, weight loss, self-reported health status) and social isolation risk factors are associated with adverse changes in community-based living arrangement?

3. What health, physical and nutrition risk factors are associated with early withdrawal (due to improved health) from a HDM program?
 - 3.1. Do health, physical and nutrition status differ at baseline by early withdrawal status?
 - 3.2. Are short-term improvements in functional status associated with early discontinuation of HDM participation due to improved health?

Chapter 2: Literature Review

Impact of hospitalization on the nutrition status of older adults

Hazards of hospitalization for older adult patients

Hospitalization is a challenging experience for many older adults, characterized by declines in physical function and nutrition status (16). Older persons admitted to hospital often experience varying levels of functional transition during their stay and unfortunately, many become dependent functionally upon discharge. Functional declines experienced during hospitalization can be attributed to bed rest and complications of underlying health conditions under treatment (16,35). Periods of bed rest have been shown to accelerate muscle loss and declines in aerobic capacity, leading to falls in the hospital, and increased dependency upon discharge.

Although many older adults are malnourished at the time of admission (13), several factors such as multimorbidity, poor appetite and oral health, declining sensory and functional status, medication effects and the hospital eating environment, contribute to additional declines in nutrition status experienced by older adults during hospitalization (36-39). Medical procedures that prevent older adult patients from receiving food orally for several hours and the poor palatability of hospital food may also negatively impact dietary intake during hospitalization (4). Given the prevalence of malnutrition in hospitalized older adults, its impact on recuperation (40-42), length of hospitalization (3), associated healthcare costs (3) and adverse outcomes following hospital discharge (43-45), it is essential to address malnutrition in hospitalized older adults. Interventions to mitigate or halt the progression of malnourishment in older

adult patients have been developed and implemented since this condition was first recognized as important to the health of older adult patients (46). Despite these advances, malnutrition remains widely reported. This review of the literature will summarize available research on the prevalence of malnutrition in older adult patients, challenges of nutrition assessment and screening in this population, and opportunities for intervention along the continuum of nutrition care for older adults.

Prevalence of malnutrition in older adult patients

Improving the nutrition status of hospitalized older adults is critical to prevent the debilitating effects and consequences of malnutrition (36). Malnutrition in institutionalized older adults can have negative consequences both to the individual and healthcare institution. For the patient, undernutrition can be accompanied by the loss of lean tissue (10), decreased intestinal absorption (47), declines in psychological response (48), impaired immunity and wound healing (49), increased risks of mortality following hospital discharge (44,50) and poor quality of life (7,51). At the institutional level, malnourished older adult patients often have longer lengths of hospital stay (3,48,52), increased healthcare expenditure (3,52), and increased likelihood of hospital readmission (42,45) following discharge than their better nourished counterparts.

Malnutrition in older adults occurs as a result of an excess or deficiency in nutrient intake, absorption or utilization (37,38,53). Alarming rates of malnutrition in hospitalized older adult patients have been recognized since the 1970s (54-56). Current estimates of the prevalence of protein-energy malnutrition in this population

have remained largely unchanged for the last decade and range between 10-80% of hospitalized older adults (36,42,50). Reasons for this include challenges faced by healthcare workers in the assessment and recognition of malnutrition in older adult patients (36).

Nutrition assessment and screening in older adult patients

The assessment of nutrition status in older patients is a complex task (37). Nutrition assessment includes a thorough evaluation of the nutrition status of the older adult patient and includes an assessment of medical and dietary history, physical status, anthropometric measures, and biochemical and clinical data (57,58). Many of the anthropometric, biochemical and hematological measures used in nutrition assessment can be altered by the physiological processes in normal aging and by the acute illnesses presented by the patient (4,36,37,59). Accurate assessment of nutritional status is also challenged by the many hazards of hospitalization such as depression, acute confusion and declining physical function, experienced by older patients. Consequently, healthcare providers and older adults patients themselves, may confuse symptoms of undernutrition with these outcomes of hospitalization, leading to the under-reporting and under-diagnosis of malnutrition (37).

Nutrition screening is defined as a 'focused activity designed to identify people who need a particular nutrition service or program' (60), and can provide a more expedient means to identify older adults at risk of undernutrition. Despite the fact that older adults are a heterogeneous population, there are specific characteristics unique to older adults that place them at risk for poor dietary intake (61). These

characteristics include unplanned changes in weight, declining appetite status, and the presence of eating or digestive problems (62). Using these and other factors, several nutrition screening tools have been developed to assist healthcare workers in identifying older adults at risk of poor dietary intake (53,63). The most widely published of these tools include the Nutrition Screening Initiative tools, the Mini Nutritional Assessment, and the Subjective Global Assessment (13,64-66). Nutrition screening guidelines established by the Joint Commission on Health Accreditation of Healthcare Organizations (JCHAO) mandate that screening be performed for each patient within 24 hours of admission (67). However, this policy has been described as ‘labor-intensive’ and ‘unrealistic’ given the demands on available human resources in many institutions (13). Hospital workers are frequently unable to ensure that all older patients received appropriate nutrition screening and intervention within this timeframe (13). Organizational reasons for this deficiency include shortages of registered dietitians in hospitals (13), inadequate training of medical and nursing staff to identify and address patient nutrition risk (57), variations in nutrition knowledge and practice among nursing and medical staff (68-70), institutional nursing staff shortages (71), insufficient assistance available to patients during mealtimes (39), patient dislike of hospital food (72) and poor subsequent dietary intake by patients (73). Given the increasingly reduced lengths of hospital stay among older adult patients (12,74), it is possible that they may be discharged before nutrition services are provided.

Timely nutrition assessments and reassessments of nutrition status are essential for older adults patients as they can become malnourished in shorter time

than do younger adults (2-3 days versus 10 days) (40). This is of concern as patients may not be reassessed over the course of the hospital stay (37). Considering the negative impact of hospitalization on health, older patients may be at increased risk of morbidity and mortality in the weeks following discharge. The implementation of nutrition screening procedures to identify the needs of older patients at discharge can facilitate the care planning process and reduce negative health outcomes experienced by these patients once they return home. There is also a need to elevate the importance of nutrition assessment and monitoring, as well as the awareness of community-based programs available to older patients following discharge (36,75).

Transition from hospital to home: gaps along the continuum of nutrition care

Discharge planning for older adults

Transitioning from hospital to home can be an additional source of stress on the older adult patient and his/her caregivers. Effective discharge planning and patient education are important in facilitating a patient's transition between the hospital and the community. Discharge planning has been defined as "an interdisciplinary process that assesses the need for follow-up care and arranges for that care, whether self-care, care provided by family members, health professionals or a combination of these options" (76) - the ultimate goal being to improve patient outcomes and facilitate the achievement of independence (77-79). Ideally, discharge planning spans from the point of admission, prior to the receipt of services to well after the patient has been discharged (77). The discharge planning process involves patient screening and assessment, documentation and follow-up procedures, and program evaluation

measures (80). To be effective, information must be collected on the patient's physical, mental, emotional, nutritional, social and financial status. Using this information, decisions are made regarding patient placement, health and social service needs (81).

Researchers have noted that discharge planning efforts for many older adult patients have been ineffective (82). Older adults find the discharge plans and patient education they receive are inadequate to meet their health service needs following hospital discharge. As many as 20% to 40% of discharge plans are inadequate to meet the patients needs (83). A review of the literature reveals that discharged older adult patients often need information on the recovery process, and need assistance emotionally dealing with their physical limitations, and maintaining health at home (21,49,84-86). As a result, older adults discharged from hospital are often left to navigate the transition alone and locate community-based health and nutrition services to meet health service needs (87). To combat this, the Administration on Aging established Aging and Disability Resource Centers in 2003 throughout the country to assist older adults in seeking out needed services (88). At this time, their impact on the health status of older adults has yet to be established. However, the timely identification and enrollment of older adult patients into appropriate health services is key help them mitigate downward spiral of declining health and nutrition status precipitated by hospitalization.

Nutrition-related care planning at discharge

Malnutrition is prevalent among hospitalized and community-dwelling older adults despite the policies and practices in place to combat this problem. Several barriers to addressing malnutrition across the continuum of care have been documented (89). These include the lack of communication and confusion among hospital staff regarding designating responsibility for patient nutrition care (62) and challenges faced by discharge planners to ensure that patients receive adequate education at discharge (90). Traditionally, it was the role of the nursing staff to provide meals to patients (70), however with time, that task has been delegated to auxiliary staff (70,91). Although this change has effectively uncoupled 'high priority' nursing activities from foodservice activities, it has led to the lack of awareness of patient dietary intake and nutrition needs (70,92). These changes, coupled with deficits in nutrition knowledge reported by nursing staff (68-70) and the belief that dietitians are solely responsible for patient nutrition care, may reduce the awareness and assessment of patient nutrition status at discharge (89). At this time, few published studies are available that document the involvement of nutrition professionals in the discharge planning process. Recently, Baker and Wellman (75) found in a survey of hospital case managers, that more than 70% of them perceived registered dietitians as not important to discharge planning (75). Given the declines in health experienced during hospitalization, older patients may be at risk of poor health outcomes once discharged. This may be mitigated in part, by recognizing the need for, and ensuring that, nutrition professionals are involved early in the discharge

planning process to make certain that no lapse in nutrition support occurs as older adults transition from hospital to home (93,94).

Nutrition-related patient education at discharge

In the past when hospital stays for older adult patients were of longer durations that at present, most hospitals provided education to patients to facilitate their maintenance of health maintenance practices when they return home. Standard discharge planning also included linking patients with an outpatient dietitian to assist the patients in making positive, long-term behavioral changes (95). Unfortunately, increasingly shortened lengths of hospital stay may not allow healthcare providers sufficient time to prepare patients for their return to the home (13,96). Consequently, some patients return home before they receive the appropriate nutrition counseling (13). In addition, deficiencies in nutrition-related patient education at discharge may be related to the fact that patients are often unaware of their nutrition status and level of need, thus do not ask appropriate questions of their healthcare providers. Patient education will also be insufficient if healthcare providers focus on providing basic information on how patients can address medical needs (86) and spend less time on assisting patients with the diet-related requirements of the recovery process.

Once older adults are home, they and their caregivers are responsible for interpreting and adhering to the care plans provided at discharge. Some older adults have reported having difficulty with the transition back to community residence in terms of managing their health and securing needed healthcare services (21,85,86,97,98). Although home visits by a dietitian have been shown to be

beneficial and result in improved health outcomes among older adults (99), little is known about the nutrition education needs of older adults following hospital discharge.

Nutrition needs assessment and service coordination at discharge

Discharge planning assessment tools are frequently used to facilitate planning for patient care following hospitalization. A review of commonly used tools for older adult patients suggests that many of these tools lack specific questions that evaluate the presence of nutrition risk factors or nutrition-related diagnoses. Given the limited awareness among nurses, case managers and physicians of community-based nutrition services (75,100), questions on nutrition status that are asked during discharge planning may facilitate referrals to appropriate community services. Improved communication between nutrition professionals in hospital and community-healthcare settings and effective coordination of community-based nutrition services for the patient once home, are also required to ensure continuity of care. In one study, Wacker, Kudrat and Keith found that nutrition and such social support services as home-delivered meals and friendly-visiting for post-hospital care, were less frequently coordinated for older adults by discharge planners than other medical services (i.e., home healthcare and visiting nurse services) (77). There is a need for nutrition professionals to become more actively involved in the discharge planning process (101). Raising awareness of community nutrition resources for older adults and the role of nutrition professionals in the discharge planning process may lead to improved coordination and continuity of care for older adult patients (102,103).

Community-based in-home nutrition-related services for home-bound older adults

Following hospital-discharge, homebound older adults can remain at risk of poor dietary intake due to declines in health and physical function experienced during hospitalization. These older adults are faced with the challenge of recuperating from ill-health, restoring good dietary practices and re-entering into community living while also contending with physical limitations (22). These limitations can negatively impact the ability to perform basic (ADL) and food-related activities of daily living (FADL), i.e., walking, preparing meals, and grocery shopping (104,105).

Consequently, the foods present in the home following hospital discharge may have a significant impact on nutrition and health status, particularly for homebound older adults (106). The variety and quantity of these foods can be affected by household income and available food assistance (61). For older adults with limited incomes and mobility, and for those without alternative food sources, in-home nutrition and nutrition-related services available in the community can mitigate the risk of inadequate food intake. These services include skilled services, personal care, homemaker and home-delivered meal (HDM) services (107-109). Skilled services include those ordered by a physician or provided under the supervision of nurse (108) or home care dietitian, including parenteral and enteral nutrition support (95).

Personal care services are available for older adults who are medically stable but need assistance with basic ADLs (i.e., eating, toileting, transferring, dressing, bathing and continence), performing prescribed exercises and taking medication (110).

Homemaker services include light housework, meal preparation, food shopping and assistance with laundry (108). These service are typically provided by social service

departments, private non-profit agencies, and proprietary agencies, through funds from Medicare, Medicaid, and out-of-pocket expenses by older adults (108).

Other services such as HDM services are provided through funds made available via Title III of the Older American Act (Appendix A). The OAA authorizes many services to meet the health and social needs of older adults, however the majority of the funds appropriated are directed to support the operation of the OAA Nutrition Program (OAANP) (111). The OAANP offers an array of home and community-based wellness services for older adults. It is comprised of the congregate meal (CM) and HDM nutrition programs (23,108). The CM program caters to ambulatory older adults, providing meals and opportunities for social interaction among peers at accessible locations within the community. The HDM program provides meals and nutrition education to older adults who are frail and/or homebound due to illness, physical inability or social isolation (111,112). Information on, and referrals to, community-based health and wellness services such as homemaker services are also available through HDM programs.

Growth in the older adult population and the increasingly shortened lengths of hospitalization experienced by older adults (113,114), are expected to increase demand for in-home nutrition services (24,115). Older adults also prefer to remain resident in the community and delay institutionalization for as long as possible (116). Some OAANP participants have reported that use of the HDM program have enabled them to remain resident in their homes (117). However, in-home nutrition services remain largely underutilized by many older adults (113). Thus, there is a pressing need to bridge the communication and service coordination gap between the

institutional and community-based healthcare systems to ensure that older adult patients, at discharge, become aware of and receive available home and community-based services (90).

Bridging gaps in the continuum of nutrition care for hospital-discharged older adults: challenges and opportunities

Challenges to expanding community nutrition services

Currently, home-delivered meal service programs face significant constraints in expanding services to accommodate the influx of new program participants, such as hospital-discharged older adults. These include the limited availability of staff and funding (118), as well as the ethical challenges related to accommodating the needs of both recently discharged elders and those on the waiting lists to receive meals (119). National evaluations of the OAANP services indicate that they are well-received, well-targeted and highly rated by participants (23,115,120). In a survey of HDM participants, 91% reported that participating in the HDM program enable them to remain in their homes (117). Unfortunately, funding for community-based nutrition programs has not kept pace with the growing demand for these services (13,109). Relative to other federal programs that provide health and wellness services to older adults, the OAANP is generally under-funded (121). For example, in 1999, 883,942 home-delivered meals were served and the program comprised 29.7% of the Title III funding available. By 2006, the number of meals service had increased to 921,475 but a similar proportion of funds (28.8%) was allocated to this program (122,123). Based on findings from the 1993-1995 evaluation of the OAANP, almost half (41%) of

home-delivered meal programs offering meal services reported having waiting lists of older adults seeking meal services that were unable to get enrolled (124). More recent estimates are not available, however it is likely that many more programs have waiting lists in light of growing interest among older adults for community-based long-term care (23), and concerns with rising food and transportation costs for senior nutrition programs (28,118).

Improving the coordination of services implemented by professionals in both the medical and social service systems is also needed to ensure that older adults can access available community-based nutrition services. However, it is challenged by the nature of the discharge planning process (125). Discharge planning is frequently one of many duties performed by the hospital nurse or social worker (81). The fast pace of the hospital setting, coupled with high caseloads and limited human resources, make providing adequate patient education at discharge and follow-up difficult (75,126). However, it has been well-established that participation in community-based nutrition programs can positively impact the health and nutrition status of older adults, delay institutionalization, and attenuate the contribution of poor nutrition status as an antecedent of hospital admissions (23,127-129). Thus, to contend with these challenges to program expansion, there is a need to re-examine the barriers to accessing community-based nutrition programs that older adults experience, and the priority system established to assess their need for health and wellness services at the hospital- and community-levels (130,131).

Opportunities for improvement

Recent reviews of the literature (132-134) suggest that home-based care programs for older adults can result in reduced mortality and hospital readmission, increasing the likelihood that older adult patients remain at home in the months following discharge. To accomplish this, systems-level changes to how health and wellness services for older adult patients are coordinated between the social service and medical systems need to be improved (49,80,101,135). Continued efforts to improve how older adults are targeted to receive needed community-based nutrition services should be examined and improved (25). Meeting the health and wellness needs of older adult patients will enhance their ability to successfully transition back to community residence (81,136).

Limitations of available research

This review of literature suggests that greater insight into the experiences of older adults transitioning from hospital to home along the continuum of nutrition care is needed. Little is known about the nutrition education and meal service needs of older adult patients at hospital discharge and once they return home to the community. Clarity in these areas, together with a better understanding of the involvement of nutrition professionals in the discharge planning process, can elucidate areas where greater research and intervention are needed. In addition, there is little published research that examines determinants of successful community re-entry (i.e., the maintenance of community residence).

Several studies support the value of nutrition intervention and the impact on health and well-being among older adult home-delivered meal users (132,134,137,138). Home-delivered meal services are often cited as important in allowing older adults to maintain community residence and avoid negative health outcomes however, until recently, few published prospective studies evaluating the impact of HDM on the health of program participants were available (139,140). Keller et al. (139) examined the association between meal program participation on nutrition risk in a cohort (18-month follow-up) of vulnerable community-dwelling older adults. The results of this study revealed that senior nutrition program participation was associated with declining self-reported need for help with meals and shopping assistance, as well as an overall decline in nutrition risk. Specifically, home-delivered meal program participation was found to be an independent predictor of lower nutrition risk ($p=0.04$). Similarly, Kretser et al. (140) also investigated the impact of HDM service on participant nutrition and functional status. From this prospective study with a 6-month follow-up, these researchers found that participation in the HDM program overall was associated with significant weight gain and reductions in nutrition risk. Improvements in physical function were also observed for up to half of program participants. Taken together, these findings suggest that long-term participation in home-delivered meal programs can indeed be beneficial. However, there is limited published literature on the impact of such interventions on those with short-term, nutrition needs such as hospital-discharged older adults.

Rationale for the ‘Community Connections: Moving Seniors towards Wellness’ Demonstration Project’

A well-coordinated delivery system of medical and social services for older adults does not currently exist (141), although significant efforts by the Administration on Aging have been made to improve awareness of and access to, these services. Despite this, these services are often provided by two parallel delivery systems resulting in the inefficient use of resources to provide duplicated and often fragmented services that do not meet the health and wellness needs of older adults (142). Consequently, older adults may return to the community following hospital discharge at risk of poor nutrition, subsequent declines in health and reinstitutionalization. In the past, only socially or economically vulnerable older adults are targeted to participate in the OAANP (13,75,142,143). Recent changes to the Older Americans Act have expanded the targeting framework to include those that are at risk for nursing home placement, specifically those who are homebound due to physical impairments. However, other groups of older adults that may also benefit from the nutrition and wellness services provided by the OAANP, such as those with short-term nutrition needs as a result of a hospital stay, are not typically targeted (25). Improving coordination between the medical and social service systems has always been the goal of aging services (144) but there is a need to bridge the divide between these two systems. This improvement requires establishing and enhancing collaboration between community-based nutrition sites, the healthcare system and community organizations.

In 2004, the Meals on Wheels Association of America (MOWAA) recognized the need to transform their member home-delivered meal programs into active partners within the continuum of nutrition care for older adults. To embark on this effort, they developed the Community Connections: Moving Seniors Toward Wellness study to examine the feasibility of improved coordination between healthcare and community-based organizations, in order to provide a continuum of care to older adults during transition from hospital to home. As a result, the Community Connections study provides a unique opportunity to examine the efficacy of these collaborations, as well as the nutrition status and nutrition service needs of hospital-discharged older adults.

Chapter 3: Research Design and Methods

Community Connections Project Overview

A Request for Proposal announcement was made throughout the Meals-On-Wheels Association of America (MOWAA) provider network. Six programs out of 18 applicants were selected to participate. The Community Connections (CC) project provided funding and technical assistance to each program to initiate or strengthen collaborations with community organizations and the healthcare system. Each program provided meals, and related nutrition, health, and supportive services to participants discharged from acute care hospitals. In addition, their health and nutrition risk status and home care service needs were examined.

The CC project was overseen by the Project Design Team, a group of individuals comprised of Meals on Wheels Association of America (MOWAA) program administrators, researchers at University of Maryland, as well as web-based communications and community development experts. This team was responsible for designing and implementing the CC project from the start, and it also provided the guidance, monitoring, and tracking of progress of project tasks and objectives. Researchers at the University of Maryland were co-investigators and provided expertise in the areas of geriatric assessment, research methods, experimental design, and statistical analysis. This project was approved by the University of Maryland's Institutional Review Board (145, Appendix B).

Study Design

The CC study was a prospective (5-month) cohort field study, examining the impact of meal service participation on functional and health outcomes of hospital-discharged older adults. Each project site had a dietitian or a health paraprofessional who was trained to collect data from participants using computer-assisted personal interviewing (CAPI) software. Information on physical and cognitive function, depression status, and nutrition and social isolation risk, were collected. Three waves of data were collected: 1) initial assessment, 2) 2 months later or at termination of program participation, and 3) 5 months after the initial assessment. At baseline and at the 2-month follow-up assessment, all study participants were evaluated using a face-to-face, in-home survey to determine their physical and functional status, state of general health, and available social support. The last assessment was a brief telephone call to determine participant vital and health status, and rehospitalization status (Figure 3.1).

Study Site Selection

Six programs in six states representing a diversity of service areas and large monthly enrollment were selected and funded out of 18 applicants. These six programs were Central Louisiana (Cenla) Area Agency on Aging, Inc. (Alexandria, LA), Christian Senior Services Meals on Wheels (San Antonio, TX), Hawkeye Valley Area Agency on Aging, Inc. (Waterloo, IA), the Lutheran Service Society of Western Pennsylvania (Pittsburg, PA), Meals on Wheels of Stark and Wayne Counties (Massillon, OH), and Onondaga County Department of Aging and Youth, Senior

Nutrition Program (Syracuse, NY). Each program worked to develop a model approach for providing meals, related nutrition services and linkages to other social and supportive services.

Participants

Adults were eligible for participation if they were: 60 years of age or older, hospitalized for acute short-term illnesses, without terminal illness, had not received home-delivered meal services within the past year, able to consume solid foods, and able to understand survey questions in English or Spanish. Participation was voluntary and refusal to participate did not affect meal services received.

Recruitment

The CC project has been described at length elsewhere (34). Briefly, from May 2005 to February 2006, project staff at the participating nutrition programs recruited hospital-discharged participants from local hospitals and the surrounding communities. Discharge planners, hospital administrators and social workers at participating hospitals were encouraged to identify and recruit participants. Written informed consent was obtained. A total of 566 participants were recruited, and assigned randomly to an early (≤ 2 days) post-hospital discharged ($n=234$) or a delayed (14 days) post-hospital discharged ($n=332$) enrollment group. Enrollment was conducted in this way to examine the impact of the timeliness of meals and health service receipt on health status.

Questionnaire Development

Questionnaires used were adapted from valid measures (34) and selected based on their appropriateness for a vulnerable older adult population. All questionnaires were developed in English for use at the Iowa, Ohio, Pennsylvania, Louisiana and New York project sites. A Spanish-language version was developed by project staff at the Texas site to collect data from Hispanic CC project participants more accurately.

Questionnaire Testing and Validation

The survey instrument was first assessed by an expert panel of researchers in the fields of nutrition, gerontology, and public health. These experts reviewed the instruments developed for face validity and offered suggestions for improvement. These instruments were then pilot- and cognitive- tested among older adults comparable to the study population (64,146-153). Cognitive tests were performed to examine whether the questions gathered information as intended and whether the questions were relevant to the individual's life and experience.

Measures

Cognitive function

Cognitive status was assessed using the 15-item, Adult Lifestyles and Function Interview Mini Mental State Examination (ALFI-MMSE)) (154). The ALFI-MMSE is a shorter, telephone version of the widely used Mini Mental State Examination (MMSE) screening tool (155). The MMSE and ALFI-MMSE were designed to identify patients with cognitive disturbances and track changes in cognitive function in a hospital setting. Both have been validated and found useful in assessing several domains of cognitive function, including orientation, attention, immediate and short-term recall, language, and the ability to follow simple verbal and written commands (148). For the Community Connections questionnaire, the wording of several questions assessing orientation and language were modified to better suit community-dwelling older adults. For example, the MMSE question asking respondents to name the hospital or the floor of the interview location was reworded to elicit information related to the respondent's home address.

Depression status

Depression status was measured using an abbreviated version of the Geriatric Depression Scale, the GDS-5 (156,157). This 5-item measure is comprised of a series of yes/no statements related to an individual's feelings about his or her life. The GDS-5 was created using questions derived from the original 30-item Geriatric Depression Scale, correlated with clinical diagnoses of depression (149). The GDS-5

was specifically developed for use with older adults and is an effective tool to screen depression status (158). A single question on perceived emotional well-being, adapted from the Administration on Aging's Performance Outcomes Measurement Project Emotional Well-being Survey (159,160), also was included. This question read: 'Think about how you feel about your life, the way things are going for you now - would you say that your life is...'. Available response options were: excellent, very good, good, fair or poor.

Physical function

Physical function was assessed using questions on Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL) and questions adapted from the Nagi classification for functional decline and disability. The ADL scale was developed by Katz et al. (161) to assess the ability of older adults to perform basic activities such as bathing, dressing, eating, using the toilet, transferring in and out of bed, and bladder control. The Katz ADL scale was modified for use in this study by omitting the question on incontinence to avoid making respondents uncomfortable. Two questions by Branch and colleagues (146) that assessed the respondent's ability to walk across a room and ability to take care of their appearance, were added to the ADL questions.

The IADL scales developed by Lawton and Brody (162), describe less basic, more complex self-care functions including shopping, doing laundry, traveling, managing money, preparing meals, cleaning, using the telephone, and taking medication. The onset of functional limitations and disability was evaluated using the

classification scheme developed by Nagi (147) to assess an older adult's ability to perform lower and upper extremity functions. These functions consist of stooping, crouching or kneeling, light household cleaning activities (i.e., vacuuming, sweeping, and dusting), handling small objects (i.e., buttons) or grasping larger objects (i.e., door knobs), raising arms above the head, and extending arms forward.

For all respondents, three questions were used to assess perceived difficulty with each physical activity and unmet needs for personal assistance. Similar to the Longitudinal Survey on Aging (163), questions that assessed perceived difficulty began with the phrase "Because of a health or physical impairment, how much difficulty do you have with...". Available answer categories for this question were: none, a little difficulty, some difficulty, a lot of difficulty, and unable to do activity.

Food-related anxiety and nutrition risk

Questions on food-related anxiety were adapted from the work of Wolfe and colleagues (150), as well as the Cornell-Radimer Food Insecurity Scale (164). Statements on the food insecurity experience of older adult focus group participants that demonstrated a high degree of agreement with the Cornell-Radimer Food Insecurity Scale were adapted to assess the food-related anxiety experienced by Community Connections participants 6 months prior to, during, and following hospitalization. In addition, participants were asked if they had eaten less than desired following their hospitalization and why, if they were able to use fresh or frozen foods to prepare a meal, and how they got their food.

Participants were also asked questions adapted from the DETERMINE Your Nutritional Health Checklist to evaluate their level of nutrition risk (165). Survey questions assessed the frequency of eating meals alone, self-reported general health, oral health, appetite, and weight loss over the past 6-months. Finally, participants were asked to select from a list of food acquisition and meal preparation activities indicative of food insufficiency in older adults, adapted from research by Wolfe et al. (150). These activities included cooking for self, obtaining food from family/friends, and rationing food (i.e., saving foods from meal to meal).

General health status

A single question was used to evaluate self-reported health among participants (“How would you describe your overall health now?). Available answer categories for this question were: excellent, very good, good, fair or poor.

Social support

Available social support was assessed using the Revised Lubben Social Network Scale (LSNS-R) (151). This scale was adapted from the Berkman-Syme Social Network Index (153) and it was designed to evaluate social networks and support from family and friends, as well as the nature of interdependent social support (166). Family and friend networks are evaluated based on the frequency of contact, the number of relations seen monthly, and the number of relations the respondent ‘feels close to’. Interdependent social supports are evaluated based on whether the

respondent has a confidant, or on roles the respondent plays in the relationship (i.e., role as a confidant and being reliant on others. Each of 12 items in LSNS-R are equally weighted (value ranges from 0 to 5) with an overall score ranging from 0 to 60 (167,168).

Health and wellness service awareness and utilization

Participant awareness and use of community-based health and wellness services was also assessed. The services evaluated were adapted from a list of services provided at the project site in New York. Staff from all project sites also reviewed the list generated to ensure that the services listed also included those offered at their site or were available via referral to other community-based agencies. These services included in-home (i.e., nutrition counseling, home healthcare, homemaker services and caregiver respite services), information and access (i.e., telephone reassurance, friendly visiting and senior transportation), home repair and renovation (i.e., home safety evaluation and home repair), and community-based (i.e., legal assistance, dental care, grocery-delivery, mental health, podiatry, vision, adult daycare, immunization and physical therapy) services. For each service, respondents were asked if they had used it since discharge and if not, whether they felt that they needed the service.

In-home food and kitchen assessment

An assessment of the foods and cooking appliances available in the home was performed during initial in-home interviews. Foods available in the homes were

assessed by using a predefined food inventory checklist within specific food groups (breads and cereals, fruits, vegetables, dairy products, and meat (i.e., meat, poultry, fish) or meat alternatives (i.e., dried legumes and peanut butter)). Foods included in this checklist were drawn from foods identified to be top sources of energy among older adults (85,86,169,170). Within each food group, individual food types were counted and scored on a 4-item Likert-scale (none, 1-2 items, 3-5 items, or 5+ items). These foods were also classified by type (fresh, canned or frozen) and location (pantry/kitchen shelf/counter, refrigerator or freezer). In addition, the condition of each food was rated by the project assessors on a 5-item Likert scale (excellent, very good, good, fair or poor). Finally, assessors evaluated homes for the presence of selected appliances (microwave, oven, stove, refrigerator, and freezer) and checked for functionality.

Composition survey instruments and sequence of data collection

The questionnaire designed for the baseline assessment included questions on all the measures described above. However, for the follow-up interview, a questionnaire containing fewer measures than the baseline questionnaire was developed. Specifically, only questions that elicited data on physical and cognitive function, general health status and depression status, food-related anxiety, health service utilization and sociodemographic information were included in this assessment (Table 3.1). Questions to determine changes in living arrangement since baseline were also incorporated.

A final telephone interview was administered to participants inquiring about their self-reported health, changes in self-reported general health, ability to walk across a room, prepare meals, and shop for food. Frequency of visits to doctors and other health professionals, hospital visits as well as reasons for these visits, were also determined. In addition, participants were asked if the reason for their rehospitalization was a result of a complication of their recent hospitalization. Finally, if the participant was found to be deceased, a proxy was asked about the date and main cause of death.

Data Collection and Management

Data collection

Each project site had a dietitian or other health paraprofessional who was trained to collect the data using computer assisted personal interviewing (CAPI) software. All participants, at initial admission into the study, were evaluated during an hour-long, in-home survey to determine their physical and cognitive functioning, state of health, available social support, and were questioned about their health service needs (Figure 3.1). All participants were required to participate in a second 45-minute, in-home interview administered 8 weeks following the first. During the second interview, the questionnaire was administered to participants to evaluate their physical and functional health status, social support, and health service usage. Lastly, all participants or their proxy were contacted three months following the second in-home assessment for a 10-minute telephone interview to determine vital and health status, program participation, and potential reinstitutionalization. Participants that

terminated their enrollment in the study at any time after the baseline assessment were also administered the telephone assessment. Informed consent was obtained from all participants prior to enrollment in the study (Appendix C).

Data transmission and processing

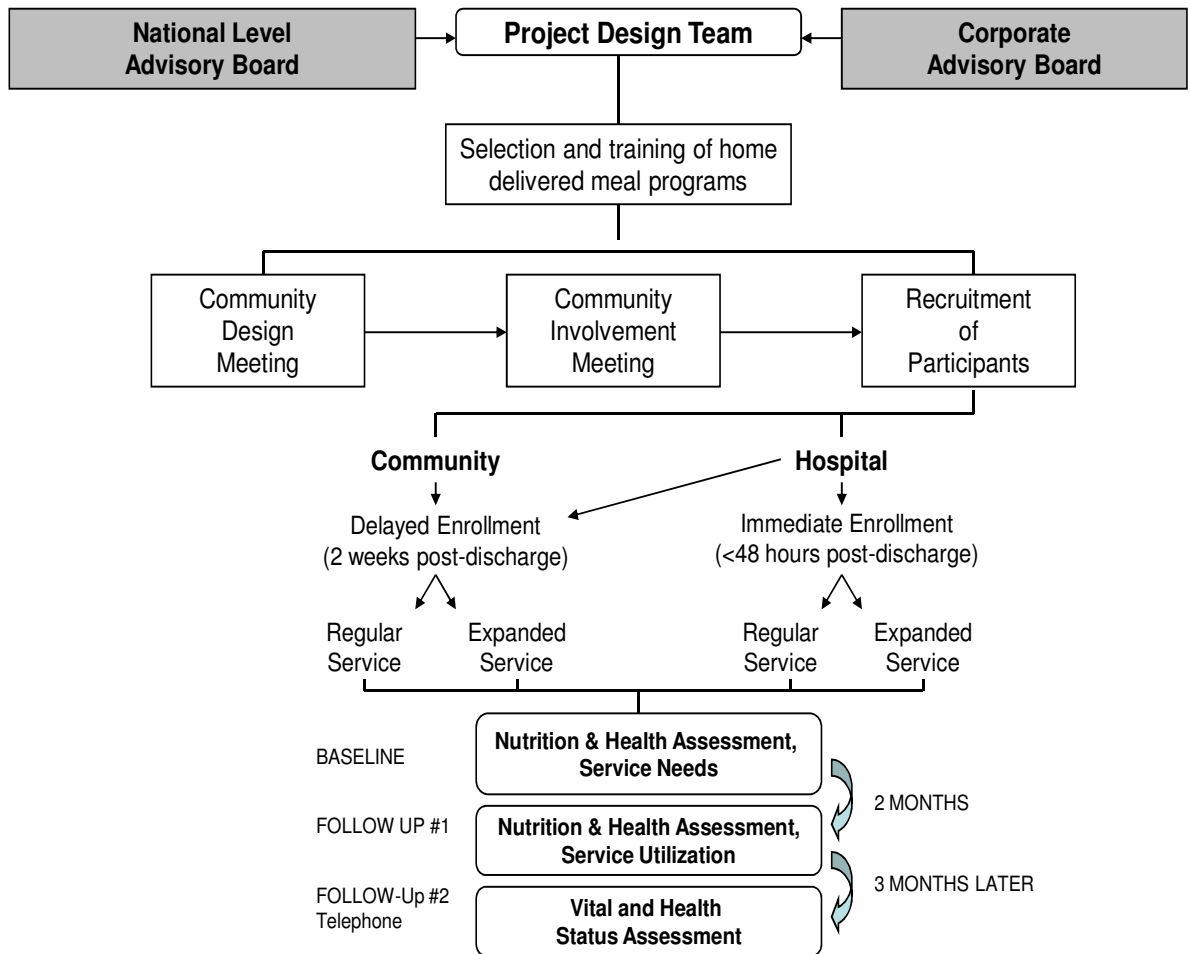
Project assessors at each site uploaded data following interviews in an encrypted format onto the secure, password-protected, limited-access Community Connections website (available at: www.communityconnections.org). Researchers at the University of Maryland downloaded the data files weekly in an ASCII file format and aggregated them by survey type (initial assessment, follow-up assessment, in-home food inventory or final telephone interview). Downloaded and aggregated data were evaluated using descriptive statistics to detect the presence of information that deviated from anticipated values.

All interview files were cleaned for data processing. Cleaning included the merging of partially completed data files, the deletion of incomplete records, and the creation of a new participant identification variable. Data cleaning procedures differed by the type of variable (numerical and text) within the data files. Numerical variables such as weight and height, were examined to detect any non-numerical characters or out of range values. These issues were resolved by recoding the out-of-range values as missing or by contacting the appropriate project assessor to clarify the data collected. A similar procedure was used in the evaluation of non-numerical data. A coding manual was developed to guide recoding data into numerical or character-based data as deemed appropriate for the analysis.

Table 3.1. Comparison of Components of Community Connections Survey Instruments

Survey Components	Initial Needs Assessment	In-Home Checklist	Follow-up Needs Assessment	Final Telephone Interview
General health	X		X	X
Physical function	X		X	X
Living arrangement	X		X	X
Cognitive function	X		X	
Depression status	X		X	
Food-related anxiety	X		X	
Nutrition risk factors	X		X	
Health service use	X		X	
Demographics	X			
Social support	X			
Health service awareness and need	X			
Food inventory appraisal		X		
Appliance appraisal		X		
Vital status				X
Hospitalization history				X

Figure 3.1. Community Connections project study design



Chapter 4: Results

4.1 - Manuscript #1: Home food environment and nutrition-related activities of daily living in hospital-discharged, homebound older adults

Abstract

Background: Little is known of foods available to hospital-discharged older adults, their ability to prepare and to shop for food. The purpose of this investigation was to (1) describe the home food environment of hospital-discharged older adults and (2) examine associations between health/nutrition risk factors and food-related activities of daily living (ability to shop and prepare meals).

Methods: Staff at 6 meal programs in 6 US states enrolled hospital-discharged, homebound older adults into a 5-month, home-delivered meal intervention study. In-home interviews were conducted to capture participant sociodemographic, nutrition and health risk data. An assessment of the foods and kitchen appliances available was also performed.

Statistical Analysis: Descriptive and bivariate analyses were used to examine relationships between sociodemographic, social, nutritional risk/health status characteristics, and participant food shopping/meal preparation ability.

Results: Most participants (>75%) returned to homes with functional kitchen appliances and a variety of nutritious foods, however, 18% of households lacked fresh fruit, 12% lacked fresh vegetables, and 35% had no fresh meat or meat alternatives. It

is also of interest that 35% of participants reported an inability to both prepare meals and shop. Among those unable to do both activities, the prevalence of depressive symptoms, food-related anxiety, and poor self-rated health was significantly ($p < 0.01$) higher compared to those able to both shop and/or prepare meals.

Conclusion: This study suggests that older adults may face additional challenges to recuperation from illness based on the inability to prepare meals regardless of the home food environment that awaits them following hospital discharge.

Introduction

Hospitalization is a challenging experience for many older adults as they may face declines in nutrition status and physical functionality (3,16,171,172). Functional declines experienced during hospitalization can be attributed to bed rest or immobility and complications of underlying health conditions under treatment (15). Periods of bed rest of any duration have been shown to accelerate muscle loss, increasing the likelihood of falls and increased dependency upon discharge (10). Multiple factors contribute to the declining nutrition status of older adult patients during hospitalization, including poor dietary intake due to illness, the eating environment in the hospital, and the lack of assistance with meals (39). Thus, the post-hospital discharge period is critical to recuperation from illness, restoration of good dietary practices, and re-entry into community living for these patients (22).

However, once home, older adults often remain at continued risk of poor dietary intake (173,174). Many return to solitary living arrangements, have limited access to in-home nutrition services, and see little improvement in physical functionality (33,175,176). In addition to these barriers to recuperation, limited finances may also restrict access to nutrient-dense foods such as fruits and vegetables (177). Given the importance of these foods in the primary and secondary prevention of chronic diseases (178,179), a greater understanding of the availability of fruits, vegetables and other food groups to this population is warranted.

Community-based nutrition services such as those provided by the Older Americans Act Nutrition Program are well-positioned to assist older adults in transitioning from hospital to home (23). According to the Administration on Aging,

home-delivered meal services are important in allowing older adults to maintain community residence and avoid negative health outcomes such as premature death and reinstitutionalization (117). Unfortunately, persons seeking home-delivered meal services may wait several months to begin receiving meals (33). While few published reports exist on the waiting period for meal services, past research estimates this period to range between 3 to 5 months (33,128), far exceeding the critical 2-week-period of recovery following discharge (22). Thus, vulnerable, homebound, hospital-discharged older adults interested in receiving meal services may have to rely on self and on others for nourishment. Little is known about the type and amount of food available in people's homes following discharge and the ability of these older adults to use these foods or to acquire additional foods.

Home food availability is typically assessed using household food inventory measures (180). These measures can provide a more reliable alternative to traditional dietary assessment methods which rely on the potentially impaired or declining cognitive and physical abilities of older adult respondents (181). While household food inventories cannot assess individual dietary intakes, they do provide information on the environmental context within which food choices are made (182). Prior research suggests that the home environment can be a significant determinant of nutrition and health status (106) and the availability of foods in the home may be especially relevant to the health and nutrition status of homebound older adults.

The purpose of this investigation was to (1) describe the home food availability for hospital-discharged older adults and (2) examine associations of health and nutrition risk characteristics with food-related activities of daily living

(ability to shop and prepare meals) among these older adults. Data for this study were obtained from the “Community Connections: Moving Seniors Toward Wellness” demonstration project, which investigated the effort needed to develop partnerships between nutrition service providers, community organizations and the medical care system to provide a smooth transition from hospital to home (34).

Methods

Overview of the Community Connections Project

The Community Connections (CC) project provided funding and technical assistance to home-delivered meal programs in six states to initiate or strengthen collaborations between community organizations and the healthcare system. In addition, the health and nutrition status and home care service needs of individuals discharged from acute care hospitals were also examined. With study approval by the University of Maryland’s Institutional Review Board, a Request for Proposal was published throughout the Meals-On-Wheels Association of America (MOWAA) provider network, inviting nutrition programs to submit proposals. Six programs out of 18 applicants were selected to participate (34). Each program provided meals, and related nutrition, health, and supportive services to participants. This was accomplished through their efforts to strengthen coordination and communication with medical care providers and community organizations in their communities. The CC project has been described at length elsewhere (34).

Study subjects and participant recruitment

From May 2005 to February 2006, project staff at the participating nutrition programs recruited hospital-discharged participants from local hospitals and the surrounding community. Adults were eligible for participation if they were: 60 years of age or older, hospitalized for acute short-term illnesses, without terminal disease, non-users of home-delivered meal services within the past year, able to consume solid foods, and able to understand survey questions in English or Spanish. Discharge planners, hospital administrators and social workers at participating hospitals were encouraged to identify and recruit potential project participants. Written informed consent was obtained from all participants. A total of 566 participants were recruited, and assigned to an early (≤ 2 days; $n=234$) or delayed (14 days; $n=332$) post-hospital discharged enrollment groups. Enrollment was conducted in this way to examine the impact of the timeliness of meals and health service receipt on health status.

Data collection and measurements

Each project site had a dietitian or other health paraprofessional who was trained to collect the data using computer assisted personal interviewing (CAPI) software. Questionnaires used were based on valid measures (148,149,153,165,168,183,184) and evaluated through cognitive- and pilot-testing of older adults similar to those in the target population (154). Three waves of data were collected: first at baseline, at 2 months after the initial assessment or at termination of home delivered meal services, and finally at 5 months after the initial assessment. At initial admission into the study and at follow-up, all participants were evaluated in a

face-to-face, in-home survey to determine their physical and cognitive functioning, state of health, and available social support. The final assessment was a brief telephone interview to determine participant's vital and health status, and potential rehospitalization. For this study, only data obtained in the initial interview were used.

Individual assessment

The in-home assessment captured demographic data of participants such as age, gender, education, marital status, living arrangement, annual household income, and race/ethnicity. Cognitive status was assessed using the 22-item Adult Lifestyles and Function Interview-Mini-Mental State Examination (ALFI-MMSE; range 0-30 points) questionnaire (148). The presence of depression was measured using the 5-item Geriatric Depression Scale (GDS-5; range 0-5 points) (26). Physical function was assessed by asking participants if they have difficulty performing 7 Activities of Daily Living (ADL), 8 Instrumental Activities of Daily Living (IADL), and 4 activities related to upper and lower-extremity functioning (183,184). Finally, self-reported general health status was also obtained.

Participants were also asked questions adapted from the DETERMINE Your Nutritional Health Checklist to evaluate their level of nutrition risk (165). These included the frequency of eating meals alone, the ability to prepare food using fresh or frozen ingredients, and self-reported oral health, general health, and appetite. Food-related anxiety was evaluated based on the question: "While at the hospital, were you worried about getting enough food?". Available social support from family and friends was evaluated using the Lubben Social Scale (LSNS-R) which inquires

about the frequency of contact with family and friends (153,168). The strength of social support was assessed separately for family and friend networks.

Household food availability and appliance assessment

An assessment of food items and cooking appliances available in the home was performed during initial in-home interviews. Almost all participants (88%, n=512) allowed project assessors to conduct the in-home food assessments. Foods available in the homes were assessed by the assessors using a predefined food inventory checklist within specific food groups (breads and cereals, fruits, vegetables, dairy products, and meat foods (such as meat, poultry and fish)). Foods included in this checklist were drawn from foods identified to be top sources of energy among older adults (169). Within each food group, individual food types were counted and scored on a 4-item Likert-scale (none, 1-2 items, 3-5 items, or 5+ items). These foods were also classified by type (fresh, canned or frozen) and location (pantry/kitchen shelf/counter, refrigerator or freezer). Summary scores were created to enumerate the number of foods present within each group (Breads and Cereals, Fruits, Vegetables, Milk and milk products, and Meat and meat alternatives), regardless of food type or location. The condition of each food was rated by the project assessors on a 5-item Likert scale (excellent, very good, good, fair or poor) and dichotomized good (excellent/very good/good) or fair/poor (not suitable for consumption). In addition, assessors evaluated homes for the presence of selected appliances (microwave, oven, stove, refrigerator, and freezer) and checked for functionality.

Statistical analyses

The goal of this investigation was to characterize home food availability of all (n=512) CC project participants who allowed an assessment of home food availability. Subgroup analyses were also performed using an analytical sample of 498 participants to characterize the impact of physical impairments on the ability to shop and prepare meals among participants with fresh fruits and vegetables available. Of this subgroup, 211 (42%) participants were in the delayed enrollment group and 287 (58%) participants were in the early enrollment group. As no significant differences were observed in participant sociodemographic, health, functional, and nutritional risk characteristics by enrollment status, these groups were combined for this analysis. Many sociodemographic variables were coded dichotomously: age (≥ 75 vs. < 75), educational attainment ($< 12^{\text{th}}$ grade vs. $\geq 12^{\text{th}}$ grade education), living arrangement (living alone vs. lives with a spouse or lives with others), and gender. Race-ethnicity was categorized into 3 groups (Non-Hispanic Whites, Non-Hispanic Blacks and Hispanics. Two individuals of American Indian/Alaska Native heritage were combined with the Non-Hispanic Black group. Living arrangements were also coded dichotomously (lives alone vs. lives with spouse or others).

Cognitive functioning was categorized as impaired if the ALFI-MMSE score was below 17 (148); otherwise, the individual was considered to be without impairment. GDS-5 scores of 2 or more were indicative of the presence of depressive symptoms while participants with scores of 0 or 1 were categorized as not having depressive symptoms (149). Self-reported physical function was examined using self-reported ability to perform each set of basic ADL and instrumental activities of daily

living (IADL), as well as activities related to lower- and upper-extremity functional limitation (183,184). For each activity, participants were asked if they had any difficulty doing that activity due to a health or physical impairment. Measures of physical functioning for the ADLs, IADLs and Nagi activities were dichotomized to describe participants who had no difficulty with any activity versus those who had any amount of difficulty with one or more activities. All nutrition risk variables were also dichotomized as eating meals alone (all or most of the time vs. some of the time or never); self-assessed oral health, general health, and appetite status were coded as excellent, very good or good versus fair or poor. The ability of participants to prepare food using fresh or frozen ingredients and the presence of anxiety at the hospital related to acquiring food post-hospital discharge were also dichotomously coded (yes vs. no).

CC participants were also categorized by severity of the risk of social isolation based on the Lubben Social Network Scale score using the following cutpoints: 0-15 (socially isolated), 16-30 (high risk of social isolation), 31-46 (moderate risk of social isolation), and ≥ 47 (low risk of social isolation). Scoring of the family or friends subscales used the following cutpoints: 0-7 (socially isolated), 8-15 (at high risk of isolation), 16-22 (at moderate risk of social isolation) and 21-30 (at low risk of social isolation (185).

Finally, each household was assigned one point for each food item reported as present. A total score for each food group was determined and used in the analysis.

Availability of fresh produce and ability to shop and prepare meals

Participants were grouped according to the availability of fresh fruit and vegetables in the home (households that had one or more items of fresh produce and households that had no fresh fruit and vegetables available). A matrix was developed to examine characteristics of individuals with varying abilities to shop and prepare meals. Individuals that had some or no difficulty with shopping and had some or no difficulty preparing meals were designated as ‘able to both shop and prepare meals’ (n=111). Participants who reported being unable or having a lot of difficulty shopping and preparing meals, were classified as ‘unable to shop and prepare meals’ (n=172). The remaining participants were categorized as ‘either not able to shop or not able to prepare meals’ (n=215). Of these, 14 participants were found to lack fresh fruits and vegetables of any kind and these participants were excluded from the subgroup analysis.

Descriptive statistics (means and frequencies) and Student’s t-tests for continuous variables and chi-square (χ^2) analyses for categorical variables were used to examine individual characteristics by gender. Bivariate analyses were also used to make pairwise comparisons of participant sociodemographic and health risk characteristics between each category of the matrix and the referent category, by gender. All statistical analyses were performed using SAS (v. 9.1, SAS Institute, Cary, NC).

Results

Participant characteristics

Most CC participants were Non-Hispanic White (75%), 15% were Hispanic and 10% were Non-Hispanic Black (Table 4.1.1.). Participants ranged in age from 60 to 96, with a mean age of 76.8. Most participants were high school graduates (70%) and lived alone (60%), although significantly more women than men lived alone. Women were more likely than men to have household incomes below \$20,000 (78% vs. 55%, $p<0.05$). No gender differences were observed in CC participant perceptions of food-related anxiety during hospitalization.

Over 60% of CC participants self-reported fair or poor general health. About 78% of CC participants reported physical limitations in basic activities and almost all reported limitations in instrumental activities of daily living. The majority of men and women CC participants also reported difficulty preparing meals (77% and 83%, respectively). Almost half (46%) of the participants indicated that they were unable to prepare meals with fresh ingredients but few reported difficulties preparing meals with frozen ingredients (<10%). Less than half of CC participants reported the presence of depressive symptoms (43%).

Significantly more women than men reported eating meals alone (64% vs. 45%, $p<0.01$), had poor appetite (42% vs. 31%, $p<0.05$), and had difficulty shopping (88% vs. 77%, $p<0.01$), respectively. Men were significantly more likely to be determined to have cognitive impairment (24% vs. 17%, $p<0.05$) and fair or poor oral health (38% vs. 28%, $p<0.05$) than women, respectively. Finally, women had significantly higher mean scores for social isolation risk scores than men (mean score

31.4 vs. 27.9, $p < 0.01$) and social support from families (mean score 18.2 vs. 15.7, $p < 0.01$).

Assessment of home food environment assessment

The availability of specific food items is shown in Figure 4.1.1. Participants had canned (91%) or frozen vegetables (67%) and fewer had canned (69%) or frozen (21%) fruit. However, up to half the participants lacked fresh fruits and vegetables available in refrigerators or kitchen pantries, and up to 20% lacked fresh fruits or fresh vegetables of any kind. Up to five percent of households lacked dairy, meat/meat alternatives and breads/cereal products of any kind.

Generally, the foods available in participant homes tended to be in good condition. About 5% of CC participants had grain and bread products in poor condition and <4% had dairy, meat/poultry/fish foods, canned produce, and fresh vegetable foods in poor condition. Less than 10% of households had fresh fruit and refrigerated vegetables in poor condition (data not shown). Finally, almost all participants owned functional kitchen appliances such as refrigerators (100%), freezers (98%), stoves (99%), ovens (97%), and microwaves (96%).

Fourteen (14) participants completely lacked fresh produce. More than half reported living alone (57%), being socially isolated or at high risk of social isolation (64%), having fair or poor oral health (64%), and one or more limitations in basic or instrumental activities of daily living (93%). Almost half (43%) reported being anxious about the foods available at home during hospitalization (data not shown). Characteristics of participants who refused to grant permission to conduct in-home

food assessments were also examined (n=54). Those who lived with others (59%) were more likely to not allow the in-home food assessment compared to those who lived alone (41% (p<0.01)). The most common reasons cited were related to the dynamics of family living, i.e., discomfort with granting access to the kitchen when family members were not at home, unwillingness of family members to allow assessors access to the kitchen and participant perceptions that foods stores did not represent typically available foods.

Characteristics of participants in relation to their ability to shop and prepare meals

As compared to participants who have no difficulty shopping or preparing meals, those who can do neither had significantly higher reported depressive symptoms (55% vs. 22% (among men), and 59% vs. 24% (among women), respectively) and fair or poor general health (80% vs. 42% (among men), and 74% vs. 49% (among women), respectively) (Table 4.1.2). Similarly, as compared to participants who have no difficulty shopping or preparing meals, those with difficulty reported significantly difficulty eating (22% vs. 3% (among men), and 21% vs. 5% (among women), respectively), and one or more limitations in basic ADLs (91% vs. 29% (among men), and 95% vs. 41% (among women), respectively). Finally, mean availability scores for fresh fruit and vegetable did not differ significantly by gender or by ability to shop for food or prepare meals.

Discussion

The primary purpose of this investigation was to describe the home food environment of hospital-discharged older adults. Our findings show that the majority of project participants had functional kitchen appliances and a variety of foods available following at least three days of hospitalization. However, of importance is that more than a third of participants reported being unable to both shop and prepare meals. Our analysis focused on these two nutrition-related activities of daily living because of their importance to nutritional intake and functional ability in community-dwelling older adults (104). Coupled with reports by participants of limited ability to prepare meals using fresh ingredients (including fresh fruits and vegetables), these findings suggest that the availability of these foods within the home may not be sufficient to ensure adequate dietary intake. Older adults unable to either shop or prepare meals may be at risk of poor dietary intake and dependence on formal and informal support (186,187). Thus, having access to ready-made home-delivered meals once home from hospital, may reduce the potential impact of physical impairment on dietary intake and recovery from illness in an acute health episode. In addition, hospital-discharged older adults and their caregivers may also benefit from referrals to homemaker services that can facilitate food shopping and meal preparation.

Participants who were unable to shop or prepare meals were also more likely to report having depressive symptoms, poor self-rated health, difficulty eating and at least one impairment in basic activities of daily living. Depression in older adults is of great concern given its relationship to declines in physical and cognitive status, nutrition risk, social interaction, quality of life and health resource utilization (188-

191). Individuals experiencing depression may be less motivated to strive toward wellness through compliance with the medical care regimen prescribed at discharge (189) and may be less inclined to consume sufficient calories to meet energy and nutrient needs (174). Also, while most participants had a variety of food available in the home, difficulties reported with eating could further limit dietary intake. Thus, specific questions that elicit information on nutrition-related physical functioning during discharge planning may be useful in identifying older adults who would benefit from timely enrollment in home and community-based services to address their nutrition and health needs. Formal services for nutrition support such as the home-delivered meal program may be difficult to secure immediately following hospitalization due to the popularity of the program and resulting waiting lists (23). CC participants reported moderate levels of social support (average LSNS score = 28.7), therefore participation in a home-delivered meal program soon after hospital discharge may also be important to overcome limitations in available social support for some older adults.

Low educational attainment (among women), cognitive impairment, perceived food insufficiency, poor oral health and poor self-rated health were more frequently reported among those unable to both shop and prepare meals. Studies have shown that declines in cognitive status is common (up to 50%) among hospitalized older adult patients for a myriad of medical and environmental reasons (190,191). Since both shopping and preparing meals are cognitively-tasking activities (192), cognition must be evaluated at the hospital level in relationship to these activities of daily living. Older adults returning home to solitary living arrangements can also be at particular

risk for functional decline, increased dependence, and loneliness (176). In this study, women more frequently reported living alone and eating meals alone than men. Our findings suggest that individuals who had difficulty both shopping and preparing meals were generally more physically and functionally impaired but had as much or more fresh produce in the home as those with fewer limitations. Thus, hospital-discharged older adults may benefit from timely enrollment in community-based nutrition programs providing home-delivered meal services. In addition, nutrition counseling services available from these programs may also assist these older adults in managing declines in oral health while maintaining adequate dietary intake. Providing information and referral to available nutrition counseling services as well as community-based dental services, at the point of discharge may also be warranted for older adult patients. Hospital-discharged older adults may also gain from friendly-visiting or homemaker programs that can provide companionship during mealtimes to improve caloric intake and dietary quality (193,194).

This study has several limitations. Information for this analysis was collected from a convenience sample, and thus is not representative of all older adults. Nutrition risk, health and functionality measures obtained were based on self- or proxy-report. It is also possible the true number of participants lacking fresh produce was underreported since about 10% of the population did not allow the home food assessment. The demographic characteristics of participants and non-participants of the home food availability assessment were compared and revealed no significant differences in living arrangement and household income. However, social desirability was cited as a concern among those participants who refused to allow the in-home

assessment, its effects among those that did consent to the assessment is unclear (180). The issue of social desirability is a particularly relevant to this study as project assessors represented the community agencies which provided meals to respondents. Past research has suggested that reliable information can be obtained using this data collection strategy if project assessors receive appropriate training (195). Since CC assessors did receive intensive training on standardized survey administration, we are confident that the impact of social desirability was minimized.

The use of household inventories as an estimate of dietary intake in the absence of traditional assessments (i.e., 24 hour recalls or 3-day food records), has been questioned (180,181). Traditional dietary assessment tools are widely used in older adult populations but, given the vulnerable health status of recently hospitalized older adults and the changes in dietary intake experienced by many older adult patients during hospitalization, these assessments were unlikely to have yielded reliable information. Information on the home food availability is presented here as a proxy for potential food intake in this homebound older adult population.

Despite these limitations, this study has many strengths. We are not aware of any other study that has fully evaluated the home food environment of hospital-discharged older adults. Extensive information was collected on the health, physical and psychological status of the population using validated and cognitively tested survey instruments, and the size of the sample assessed was larger than those obtained in past research in similar populations (140,174,193,196). In addition, computer-assisted personal interviewing software was used to facilitate accurate data collection for this multi-site, multi-state project and an examination of the home food

environment of this older adult population was performed. This study extends the work of past researchers who have assessed the foods available in specific storage areas of the home (i.e., refrigerator content) (197) or the total home food environment of older adults (198,199).

Conclusion

Older adults are at risk of declines in nutrition and health status following hospital discharge. This study suggests that older adults may face additional challenges to recuperation from illness based on the inability to prepare meals regardless of the home food environment that awaits them following discharge from the hospital. Most Community Connections program participants had home food environments with a variety of nutritious foods available and functional appliances upon returning home but more than a third of the participants were either unable to prepare meals or shop. Hospital discharge planners are often unaware of the risk factors for poor nutrition faced by older adult patients once home in the community. Increasing awareness of hospital case managers and discharge planners is important to ensure that comprehensive discharge plans that include interventions to reduce nutrition risk are created and implemented. Including specific questions on nutrition-related physical functioning during discharge planning to identify older adults who would benefit from timely enrollment in home and community-based services to address their nutrition and health needs.

All older adults should be targeted for timely enrollment into community-based wellness and nutrition programs such as mental health and home-delivered meal services following hospital discharge to facilitate their successful transition from

hospital to home (200,201). Currently, only community-dwelling older adults at risk for nursing home placement due to physical impairment or those who are socially or economically vulnerable are targeted to participate in the OAANP. However, hospital-discharged with older adults are often not targeted to receive these services (23,25). Increased awareness of the prevalence and impact of depression on the health and functioning of older adult patients can inform decisions made by medical and nutrition professionals during the discharge planning process. Declines in health and functional status that occur in hospital-discharged older adults place them at risk for poor dietary intake and reinstitutionalization may be mitigated by currently available community-based nutrition and wellness services, such as those offered through the OAANP (i.e., home-delivered meal and congregate dining programs).

The homes of older adults are growing in importance as venues for long-term care services and research (202). Prior research suggests that the home environment can be a significant determinant of nutrition and health status (106), and the availability of foods in the home may be especially relevant to homebound older adults. This study also highlights the need for continued research to better understand the home food environment of homebound older adults, its relationship to dietary intake, and its impact on functional and nutritional status. The findings from this investigation are consistent with past research that suggests older adults can benefit from the meal and nutrition services provided by home-delivered meal programs to supplement available food stores, reduce the risk of poor dietary intake and facilitate successful re-entry into community living (23,174).

Table 4.1.1. Sociodemographic and health characteristics of CC project participants

Characteristics	Overall (n=512)	Men (n=136)	Women (n=376)
Demographic profile			
(Percentages, unless stated otherwise)			
Age (mean±sd)	76.8±8.2	76.4±8.0	76.9±8.3
60-64	10.7	10.3	10.9
65-74	25.8	27.2	25.3
75-84	45.1	44.1	45.5
85+	18.4	18.4	18.4
Race-ethnicity			
Non-Hispanic White	75.0	77.2	74.2
Hispanic	14.7	16.9	13.8
Non-Hispanic Black	10.4	5.9	12.0
Educational attainment			
Less than a high school education	30.5	30.9	30.3
High school graduate	69.5	69.1	69.7
Living arrangement			
Live alone	59.6	51.5	62.5*
Live with spouse or others	40.4	48.5	37.5
Poverty status			
Annual household income < \$20,000	71.6	54.7	77.7*
Annual household income ≥ \$20,000	28.5	45.3	22.3
Health and functional status			
Cognitively impaired	18.8	24.3*	16.8
Presence of depressive symptoms	43.0	41.5	43.6
Limitation in 1 or more ADLs†	77.8	74.1	79.2
Limitation in 1 or more IADLs†	95.7	93.9	96.4
Limitation in 1 or more Nagis	52.6	48.8	54.0
Unable to cook meals with fresh ingredients	45.7	41.9	47.1
Unable to cook meals with frozen ingredients	8.4	9.6	8.0
Fair/poor self-assessed health	62.5	61.0	62.2
Nutrition risk			
Eat alone frequently	59.2	44.9	64.4**
Fair/poor self-reported appetite	39.1	30.9	42.0*
Difficulty shopping for food or clothes	84.8	76.5	87.8**
Difficulty preparing meals	81.1	77.2	82.5
Difficulty eating	11.1	11.0	11.2
Fair/poor self-reported oral health	30.5	37.5*	27.9
Perceived food-related anxiety during hospitalization	14.8	16.9	14.1
Social support			
Social isolation risk score (mean±sd)	30.5±10.5	27.9±10.2	31.4±10.5**
Social support - family subscale (mean±sd)	17.5±6.2	15.7±6.8	18.2±5.9**
Social support - friends subscale (mean±sd)	13.0±7.0	12.2±6.6	13.3±7.1

* Significant at p<0.05

** Significant at p<0.01

† ADL – Activities of Daily Living, IADL – Instrumental Activities of Daily Living

Figure 4.1.1. Percentage of households with no available food items within food groups

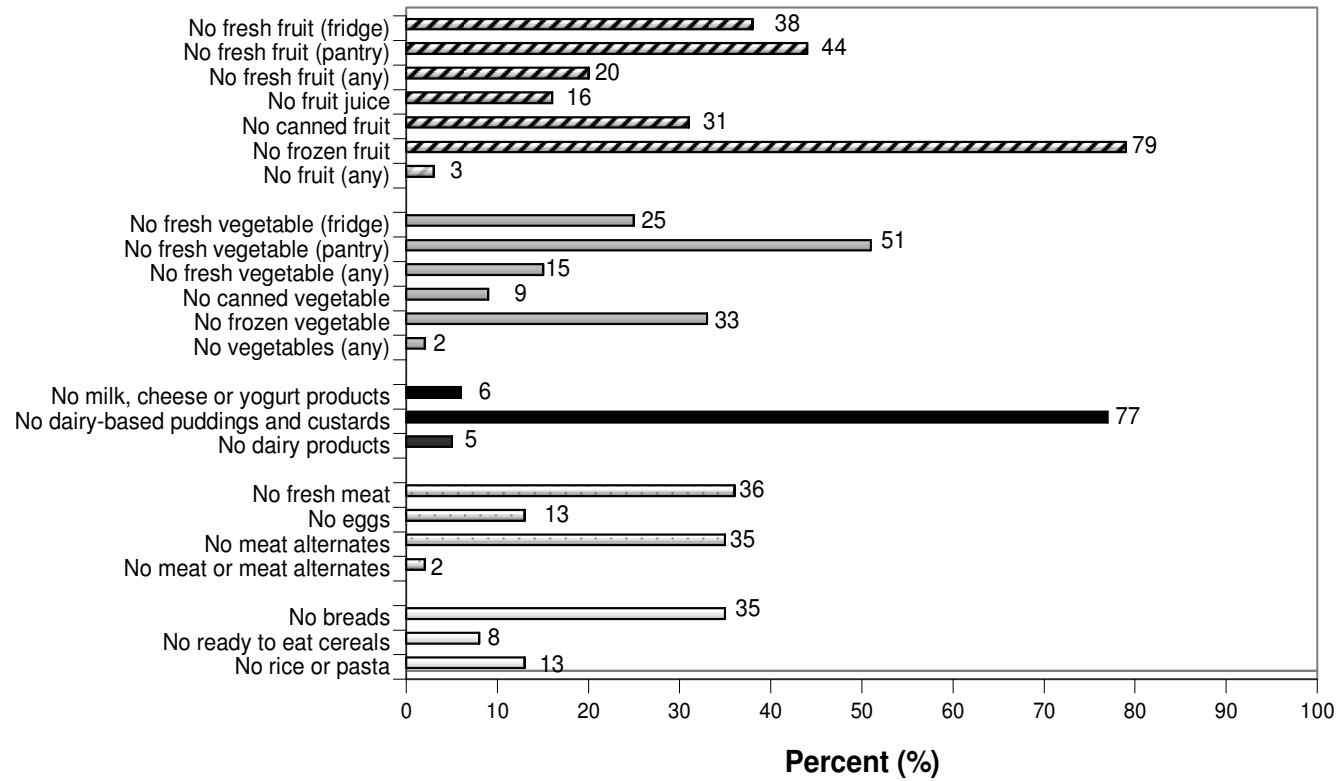


Table 4.1.2. Sociodemographic and health risk correlates of nutrition-related activities of daily living (n=498)

Characteristic	Men			Women		
	Have NO difficulty shopping AND preparing meals (n=31) ^a	Have difficulty shopping OR preparing meals (n=56)	Have difficulty shopping AND preparing meals (n=46)	Have NO difficulty shopping AND preparing meals (n=80) ^a	Have difficulty shopping OR preparing meals (n=159)	Have difficulty shopping AND preparing meals (n=126)
Sociodemographics (Percentages, unless stated otherwise)						
Age						
≥ 75	67.7	58.9	63.0	57.5	70.4*	61.1
Race-Ethnicity						
Non-Hispanic White	83.9	85.7	60.9	73.8	78.0	69.9
Hispanics	6.5	8.9	34.8	10.0	10.1	21.4
Non-Hispanic Black/Others	9.7	5.4	4.4	16.3	12.0	8.7
Educational attainment						
Less than high school	25.8	25.0	41.3	22.5	28.9	35.7*
Living arrangement						
Live alone	61.3	55.4	37.0*	67.5	65.4	57.1
Annual household income <\$20,000	46.7	57.7	53.5	79.0	78.8	74.3
Health and functional status						
Cognitive function ^b						
Impaired	12.9	33.9*	21.7	11.3	13.2	23.8*
Depression status ^c						
Have symptoms	22.2	38.8	54.6**	24.1	38.6*	58.5**
ADL Limitations						
One or more	28.6	77.8*	90.9**	41.1	82.8*	94.6**
Nagi Limitations						
One or more	20.0	52.8*	79.0**	30.8	45.3	80.3**
Self-reported health						
Fair or poor	41.9	55.4	80.4**	48.8	59.8	73.8**
Nutrition risk status						
Food-related anxiety						
Present	3.2	19.6*	17.4	6.3	11.3	21.4**
Oral health status						
Fair or poor	22.5	37.5	43.5	17.5	28.3**	31.8*
Eat meals alone						
All or most of the time	54.8	48.2	30.4*	66.3	66.7	61.9
Self-reported appetite status						
Fair or poor	16.1	37.5*	32.6	33.8	40.9	50.0*
Difficulty eating						
Yes	3.2	7.1	21.7*	5.0	6.3	20.6**

Table 4.1.2. Sociodemographic and health risk correlates of nutrition-related activities of daily living - continued

Characteristic	Men			Women		
	Can both shop and prepare meals (n=31) ^a	Can either not shop or prepare meals (n=56)	Cannot shop and cannot prepare meals (n=46)	Can both shop and prepare meals (n=80) ^a	Can either not shop or prepare meals (n=159)	Cannot shop and cannot prepare meals (n=126)
Fruit & vegetable availability						
Fresh fruit (mean±SD)	2.9±1.5	3.5±1.6	3.1±1.7	3.8±1.5	3.4±1.5	3.5±1.4
Fresh vegetable (mean±SD)	2.6±1.0	2.6±1.1	3.0±1.0	3.1±0.7	2.8±0.9	3.0±0.8
Social support						
Risk of social isolation ^d - overall (mean±SD)	28.5±9.6	30.5±9.9	25.1±10.2	32.2±10.3	32.5±10.1	30.0±10.7

^a Reference group for pairwise bivariate comparisons by ability to shop and prepare meals.

^b Cognitive function was measured using the AFLI-MMSE tool; participant scores below 17 were indicative of cognitive impairment.

^c Depression status was assessed using the Geriatric Depression Scale (GDS-5); participant scores of 2 or more signified the presence of depressive symptoms.

^d Social isolation risk was determined using the Lubben Social Network Scale (range: 0-60).

* Significant at $P<0.05$.

** Significant at $P<0.01$.

4.2. Manuscript #2 - Development of a screening tool for identifying hospital-discharged older adults at risk of losing independent community residence

Abstract

Background: Recurrent hospitalizations are common among older adult patients. Ineffective discharge planning may contribute to it as discharge planning assessments often do not assess the presence of social, functional and nutritional risk factors - factors that have been positively associated with institutionalization, loss of community residence and mortality in older adults. Thus, the purpose of this investigation was to (a) identify functional, nutritional and social isolation risk factors for adverse outcomes among community-dwelling, hospital-discharged older adults during a 5-month nutrition intervention and (b) recommend components for a screening tool to identify high-risk older adult patients.

Methods: Staff at six meal programs in six US states enrolled 566 hospital-discharged, homebound older adults into a 5-month, home-delivered meal intervention study. In-home and telephone interviews were conducted to capture participant sociodemographic, nutrition and health risk data. Among participants with complete data, 91 experienced adverse changes in living arrangement (i.e., death, institutionalization, relocation to a relative's home or having someone move in) and 385 experienced no such changes.

Statistical Analysis: Bivariate and multivariate logistic regression analyses were used to examine relationships between each functional, nutritional and social isolation risk factor and risk of adverse changes in living arrangement, controlling for age, gender, race-ethnic background and CC project site.

Results: The CC participants who reported risks of poor health and nutrition status, depressive symptoms, impaired cognition, and social isolation following hospital discharge, were significantly ($p < 0.01$) more likely to experience adverse changes in living arrangement by the end of the intervention than those who did not report these risk factors. Specifically, participants who reported fair or poor general health ($p = 0.01$) and limited social support from friends ($p = 0.032$) were more likely to experience adverse changes in living arrangement over the 5-month intervention, controlling for all age, gender, race/ethnicity, and project site.

Conclusion: There is a need at hospital discharge for assessment tools that identify high-risk older adult patients. A tool that assesses the functional, nutritional and social status of older adult patients, used together with existing assessments may assist hospital staff in developing comprehensive care plans to better address patient needs post-hospital discharge.

Introduction

Adults 65 years of age and older in the United States currently comprise 12% of the total population (27) but account for a third of hospital admissions and half of all healthcare-related expenditure (14). By one estimate, every hospital visit costs \$17,300 (14) and thus even small reductions in these costs in the older adult population alone could result in savings of billions of dollars (18,19). To date, several healthcare cost reduction efforts have already been implemented – these include prospective payment systems, the creation of health maintenance organizations, and the institutionalization of managed care (203). In addition to these, there is growing interest in curbing hospital readmissions, another common and costly aspect of healthcare expenditure (18). Hospital readmission is estimated to account for half of all hospital admissions, and thus reductions in this aspect of healthcare utilization could also have a sizable impact on healthcare costs (18,19). In addition to cost savings, reducing rehospitalization will lessen the emotional and physical distress experienced by patients and their families during and following hospitalizations. For families of patients, many of whom shoulder the physical, emotional and financial costs of caregiving (204), hospitalization of a loved one is an unwelcome event. For the older adult patient, hospitalization can lead to declines in health and functionality (3,16,171,172), which may increase the risk of subsequent hospital readmission or institutionalization.

Hospital readmission is common in older adult patients and has long been considered an indicator of poor quality in-patient healthcare (18,135,205). Recurrent hospitalizations may be attributed to the declining lengths of hospital stay

experienced by older adult patients (206) and ineffective discharge planning (207). Assessment tools such as the Blaylock Risk Assessment Screening Score (BRASS) (208), the Nursing Needs Assessment Instrument (NNAI) (209), and the Discharge Planning Questionnaire (DPQ) (210), are frequently used to facilitate planning for patient care following hospitalization. Common to these assessments are questions eliciting information on a patient's functional and health status, and the emotional and social support available to them upon discharge. However, the extent to which adverse health outcomes, such as hospital readmission, are avoided when these assessments are made is unknown (76,211). The development of screening tools and prediction models to identify community-dwelling older adults at risk for hospital admission and hospital readmission has been a fertile area of research for the last two decades (212-215). Despite the utility of these screening tools in identifying high-risk older adults, their predictive accuracy is limited (18,135,216). This may be attributed to the exclusion of validated questions that assess the presence of social, functional (i.e., cognitive impairment and depression) and nutritional risk factors in older adult patients from these tools. Cognitive impairment, depression and nutrition risk have all been positively associated with institutionalization, loss of community residence and mortality in this population (141,207,212-214,216-221). To date, few studies have examined relations between these risks and adverse health outcomes in older adults (212). The purpose of this investigation was therefore to (a) identify functional, nutritional and social isolation risk factors for adverse outcomes among community-dwelling, hospital-discharged older adults during a 5-month nutrition intervention and (b) recommend components for a screening tool to identify high-risk older adult

patients. This research analyzed data from the “Community Connections: Moving Seniors Toward Wellness” demonstration project.

Methods

Overview of the Community Connections Project

The Community Connections (CC) project investigated the efficacy of a systemic approach to providing services to homebound, older adults through partnerships between nutrition service providers, community organizations and the medical care system. A Request for Proposal announcement was made throughout the Meals-On-Wheels Association of America (MOWAA) provider network, inviting home-delivered meal programs to submit proposals; six meal programs out of 18 applicants were selected to participate. The CC project provided funding and technical assistance to each program to initiate or strengthen collaborations with community organizations and the healthcare system. Each program provided meals, and related nutrition, health, and supportive services to participants discharged from acute care hospitals. In addition, their health and nutrition risk status and home care service needs were also examined. This project was approved by the University of Maryland’s Institutional Review Board (34).

Study subjects and participant recruitment

The CC project has been described at length elsewhere (34). Briefly, from May 2005 – February 2006, project staff at the participating nutrition programs recruited hospital-discharged participants from local hospitals and the surrounding

community. Adults were eligible for participation if they were: 60 years of age or older, hospitalized for acute short-term illnesses, without terminal illness, had not received home-delivered meal services within the past year, able to consume solid foods, and able to understand survey questions in English or Spanish. Discharge planners, hospital administrators and social workers at participating hospitals were encouraged to identify and recruit potential project participants. Written informed consent was obtained from all participants. A total of 566 participants were recruited, and randomly assigned to an early (≤ 2 days) post-hospital discharged (n=234) or delayed (14 days) post-hospital discharged (n=332) enrollment group. Enrollment was conducted in this way to examine the impact of the timeliness of meals and health service receipt on health status.

Data collection and measurements

Each project site had a dietitian or a health paraprofessional who was trained to collect data from participants using computer assisted personal interviewing (CAPI) software. Information on physical and cognitive function, depression status, and nutrition and social isolation risk, was collected using previously validated questionnaires (148,149,153,165,168,183,184,222) and evaluated through cognitive- and pilot-testing with older adults similar to those in the target population (154). Three waves of data were collected: at baseline, 2 months later or at termination of program participation, and at 5 months after the initial assessment. At baseline and at the 2-month follow-up assessment, all study participants were evaluated using a face-to-face, in-home survey to determine their physical, depression and cognitive status,

state of general health, and available social support. The last assessment was a brief telephone call to determine participant vital and health status, and rehospitalization status. For this study, a subset of data obtained at initial, follow-up and final assessments were used.

Baseline individual assessment

The baseline in-home assessment captured such demographic data on participants as age, gender, education, marital status, living arrangement, annual household income, and race/ethnicity. Cognitive status was assessed using the 22-item Adult Lifestyles and Function Interview-Mini-Mental State Examination (ALFI-MMSE; range 0-30 points) questionnaire (148). The presence of depression was measured using the 5-item Geriatric Depression Scale (GDS-5; range 0-5 points) (149). Physical function was assessed by asking if participants had difficulty performing 7 Activities of Daily Living (ADL), 8 Instrumental Activities of Daily Living (IADL), and 5 activities related to upper and lower-extremity functioning (Nagi) (183,184). For each activity, participants were asked if they had no difficulty, a little difficulty, some difficulty, or a lot of difficulty with the activity, or were unable to perform the activity at all due to a health or physical impairment. Participants who had no difficulty were assigned a score of 0 and those who reported any difficulty with the activity received a score of 1.

Participants were also asked questions adapted from the DETERMINE Your Nutritional Health Checklist to evaluate their level of nutrition risk (165). Survey questions assessed the frequency of eating meals alone and the ability to prepare food

using fresh ingredients, self-reported oral health, general health, appetite and weight loss over the past 6-months. Food-related anxiety was evaluated based on the question: “While at the hospital, were you worried about getting enough food?”. Available 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 (153,168). The strength of social support was also evaluated separately for family and friend networks.

Two-month follow-up assessment

During the Follow-Up assessment, data on changes in living arrangement since the baseline assessment were collected. For participants who indicated that a change had occurred, they were asked to specify if: they now lived alone, they had moved in with family members, someone had moved in with them (such as a friend, family, or neighbor) or they now had paid help.

Final telephone individual assessment

At the final telephone assessment, participants were asked about their general health, changes in participant self-reported general health, and ability to walk across a room, prepare meals and shop for food. The frequency of visits to a doctor or other health professional, hospital visits as well as reasons for these visits, were also determined. In addition, participants were asked if the reason for their

rehospitalization was a result of a complication of their recent hospitalization. Finally, if the participant was found to be deceased, a proxy was asked about the date and main cause of death. This assessment was administered to those who terminated their participation in the study early but agreed to be contacted at 5 months. The assessment was also administered to participants 3 months after the follow-up in-home assessment.

Statistical analysis

Excluded from the analysis were data of 43 participants whose baseline assessment was not administered within the time-frame specified by the study design, data of 47 participants who participated in the study for less than 7 days or for greater than 5.5 months. Thus, the analytic sample for this investigation consisted of 476 project participants, 205 (43%) in the delayed enrollment group and 271 (57%) in the early enrollment group. As no significant differences were observed in participant sociodemographic, health, functional, and nutritional risk characteristics, and in adverse outcomes by enrollment group, these groups were combined for this analysis.

Information on changes in living arrangement (such as rehospitalization, institutionalization (i.e., admission to a nursing facility), relocation to a relative's home or having someone move into the home of the respondent) was collected at both of the follow-up interviews. Participants reporting any of these changes over the course of the 5-month intervention were considered to have had an adverse outcome (n=91). Participants who remained in living situations where they lived alone or with a spouse over the course of the intervention, were deemed as having had no adverse

outcomes (n=385). For participants that ended their participation in the CC project before the in-home follow-up, only data on change in living arrangement obtained from the final telephone assessment was used. For the remaining participants, data from the in-home follow-up and telephone follow-up assessments were used to obtain changes in living arrangement.

Several sociodemographic variables were coded dichotomously: age (≥ 75 vs. < 75), educational attainment ($< 12^{\text{th}}$ vs. $\geq 12^{\text{th}}$ grade); and gender. Race-ethnicity was categorized into 3 groups: Non-Hispanic Whites, Hispanics and Non-Hispanic Blacks. The latter group included 2 individuals of American Indian/Alaska Native heritage. Living arrangements were also coded dichotomously (lives alone vs. lives with spouse or others).

Cognitive functioning was categorized as impaired if the ALFI-MMSE score was below 17 (148). Scores on the GDS-5 assessment of 2 or more were indicative of the presence of depressive symptoms (149). Each set of measures of physical functioning (183,184) were summed so possible scores ranged from 0-7 for ADLs, 0-8 for IADLs, and 0-5 for Nagi activities. All nutrition risk variables were dichotomized: eating meals alone (all or most of the time vs. sometimes or never), self-reported oral health, general health, and appetite status (excellent, very good, or good vs. fair or poor), the ability to prepare food using fresh or frozen ingredients (yes vs. no) and presence at the hospital of anxiety related to acquiring food post-discharge (yes vs. no).

The CC participants were also categorized by risk of social isolation based on the Lubben Social Network Scale score: a score of 0-15 is considered as socially

isolated; 16-30 at high risk of social isolation, 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. In this study, scoring of the family or friends subscales used the following cutpoints: 0-7 (socially isolated), 8-15 (at high risk of social isolation), 16-22 (at moderate risk of social isolation) and 23-30 (at low risk of social isolation) (185).

Bivariate analyses were performed to identify differences in all health, social and nutrition risk characteristics between those who remained resident in the community and those with adverse outcomes, using *t*-test for continuous variables and chi-squared test for categorical variables. Cognitive function, risk of social isolation and depression status were evaluated using several sets of questions – each question within each set examined a facet of the overall construct. As the goal of this analysis was to identify possible components of a screening tool, these individual questions were also examined using chi-squared analysis. Variables significant at the $p < 0.1$ level, were retained for subsequent multivariable analysis.

For this investigation, multivariable logistic analyses were carried out in two stages to examine relationships between each variable and risk of adverse changes in living arrangement. *Stage 1*: Univariate logistic regression analyses, controlling for age, gender, race-ethnic background and CC project site, were conducted. *Stage 2*: A hierarchical forward stepwise multiple logistic regression model was used to identify independent predictors of adverse changes in living arrangement, controlling for covariates. Multicollinearity was explored using the PROC REG procedure in SAS

(v. 9.1). A value of $p < 0.05$ was used to determine statistical significance. All statistical analyses were performed using SAS (v. 9.1, SAS Institute, Cary, NC).

Results

Participant characteristics

Participants in the sample population were mostly women (72%), Non-Hispanic White (72%), and about half were 75 years of age or older (53%) (Table 4.2.1). About 68% were high school graduates and 58% lived alone; almost three-quarters of the population (73%) reported incomes of less than \$20,000. More than half the participants reported having fair or poor general health (62%) and frequently eating alone (60%). A majority reported having difficulty shopping for food or clothes (86%), and having difficulty preparing meals (81%). Other negative health indicators included the presence of cognitive impairment (20%), presence of depressive symptoms (42%), poor self-reported appetite (38%), inability to prepare meals with fresh ingredients (47%) and poor self-reported oral health (33%). The CC participants reported several IADL impairments (mean number = 4.17), and ADL impairments (mean number = 2.6). Also, a third of the participants received support from a caregiver following hospital discharge but almost half were at high risk of social isolation or were socially isolated (46%) (Table 4.2.1).

Significantly more ($p < 0.01$) CC participants who experienced adverse changes in living arrangement reported at baseline fair or poor general and oral health, cognitive impairment, presence of depressive symptoms, greater number of ADL and IADL impairments, and an inability to prepare meals from fresh foods than

participants who maintained community residence during this time (Table 4.2.1). The CC participants who were socially isolated or at high risk of social isolation at baseline, were also significantly ($p < 0.1$) more likely to experience a negative outcome than participants who were at less risk of social isolation ($p = 0.06$).

Healthcare utilization post-hospital interview

Eighteen percent (18%) of CC participants reported one or more hospitalizations requiring an overnight stay post-hospital discharge. The most commonly cited reasons for hospitalization were heart disease (27%) and respiratory illnesses including emphysema, pneumonia, or asthma (15%). About half of those rehospitalized stated that the reason for their hospital visit was due to a complication from their previous hospitalization (data not shown).

Health assessment at final telephone assessment

Only a third (33%) of CC participants considered themselves to be in fair or poor health at the final telephone assessment. More than half of the participants reported improvements in their ability to walk (52%), while fewer reported improvement in shopping for food or clothes (35%) and in preparing meals (39%). Fewer than 12% reported increased difficulty in their ability to walk, shop and prepare meals (Table 4.2.2).

Variables associated with adverse outcomes in living arrangement

In the univariate analyses controlling for age, gender, race/ethnicity and project site, several variables were identified as significantly ($p < 0.05$) associated with adverse changes in living arrangement over the course of the 5-month intervention. Participants who self-reported fair or poor general health at baseline were more than twice as likely as those who self-reported good health to experience negative outcomes ($p = 0.0044$, Odds Ratio (OR) = 2.24, 95% Confidence Interval (CI) = 1.29-3.89). Those who reported the presence of depressive symptoms ($p = 0.0079$, OR = 1.96, 95% CI = 1.19-3.21) and an inability to prepare meals using fresh ingredients ($p = 0.0382$, OR = 1.95, 95% CI = 1.03-3.23) were almost twice as likely to experience adverse changes in living arrangement. Participants with poor self-reported emotional health and cognitive impairment were significantly associated with adverse outcomes. However, self-reported poor appetite and oral health, and recent weight loss, were borderline significantly associated with adverse outcomes (Table 4.2.3). These analyses also revealed that CC participants who infrequently confided in friends or family members were at least 70% more likely to experience a negative outcome than participants who were more actively engaged in social interactions with family and friends (Table 4.2.3).

The results of the multivariate logistic regression model shown in Table 4.2.4, indicate that only fair or poor self-reported health ($p = 0.01$, OR = 2.09, 95% CI = 1.19-3.66) and increasing Lubben Social Network Score (friends subscale) ($p = 0.032$, OR = 0.96, CI = 0.93-0.99) remained significantly associated with adverse

changes in living arrangement over the 5-month intervention, controlling for all variables.

Discussion

CC participants who reported risks of poor health and nutrition status, depressive symptoms, impaired cognition, and social isolation following hospital discharge, were significantly more likely to experience adverse changes in living arrangement by the intervention's end. Although having one or more physical impairments and an inability to prepare foods with fresh ingredients were associated with adverse outcomes in bivariate analyses, these relationships did not persist in subsequent analyses. Only self-reported fair or poor general health and social support received from friends, remained significantly associated with adverse outcomes in multivariable analyses.

As in other studies, poor self-reported health was identified as a risk factor of rehospitalization (141,220). This finding may be attributed to established predictive associations between self-reports of poor general health, underlying ill-health and subsequent mortality (223). Although specific questions on self-reported health were included in only three of the screening tools and prediction models reviewed (213,215,220), all included questions associated with overall general health such as functional status assessments and the number of or presence of specific comorbidities (208-210,212-215,217,219,220,224-226).

Our findings suggest that cognitive impairment and the presence of depressive symptoms are associated with adverse outcomes in hospital-discharged older adults.

This finding is consistent with the work of other researchers who have identified impaired cognitive function as a risk factor for hospitalization (218), institutionalization (227,228) and death (228). Questions that evaluate cognitive function, in varied formats, were included in two out of three discharge planning assessments (208,209) and in only one of the screening tools / prediction models reviewed (229). In the Blaylock Risk Assessment Screening Score (BRASS), cognitive function was evaluated using a single question about the patient's level of orientation or disorientation to person, place and time (208). Three criteria were used in the Nursing Needs Assessment Instrument (NNAI) to assess cognitive function – (1) anticipated level function at discharge, (2) presence of impairments in memory, judgment and orientation, and (3) problems with methods of communication (209). However, Caplan et al. (229) used a well-established screening tool in older adult populations, the Short Portable Mental Status Questionnaire (MSQ), to assess cognitive function in a prospective cohort study of discharged older adult patients (230). In this analysis, an increased risk of readmission was found among patients with low MSQ scores (indicative of cognitive impairment).

In our study, 42% of the CC participants had depressive symptoms and there was an increased risk of adverse outcomes among them compared to those without depressive symptoms. The presence of depression in hospitalized older adult patients has been estimated to range from 5-45% (231) and has also been shown to be predictive of institutionalization (232) and rehospitalization (216). However, only one discharge planning assessment tool (NNAI) and one screening tool (developed by Mercantonio et al.) included an assessment of depression (233). In the NNAI,

depression status is listed within a checklist of current health problems evaluated at discharge. However, in a matched case-control study among hospitalized patients in a Medicare managed care plan, Mercantonio et al. (233) included a history of depression in the prediction model used. These authors reported that a 3-fold higher risk of hospital readmission among patients with histories of depression than patients hospitalized for the first time. Overall, based on the relationship between self-reported health, cognitive function, depression status and adverse outcomes, it is of note that assessment of these areas of health and wellbeing are not common in tools developed to facilitate discharge planning or to identify older adults at risk for hospital readmission.

The presence of nutrition risk factors in older adults increases the likelihood of poor dietary intake, subsequent declines in functional status and possible rehospitalization or reinstitutionalization, as well (172,216,165). Our findings identified several nutrition risk factors that approached significance or were significantly associated with increased risk of adverse changes in living arrangement such as oral health, appetite, ability to prepare meals and involuntary weight loss. Furthermore, reported weight loss was identified as risk factor associated with adverse outcomes among CC participants (Table 4.2.4). Sahyoun et al. (234) found that certain nutrition risk factors such as eating meals alone, difficulty preparing meals and oral health problems were positively associated with mortality. These were also identified by Jensen et al. (220), Freedman et al. (224), and Caplan et al. (225) as predictors of hospitalization. Similarly, Brunt (141) found that poor appetite, and involuntary weight change had a negative impact on continued community residence.

Taken together, these findings suggest that the presence of risk factors for poor dietary intake at hospital discharge may be important determinants of an older adult's ability to remain resident in the community. Currently, the Joint Commission on Health Accreditation of Healthcare Organizations (JCHAO) directive (13,67) states that nutrition risk must be assessed within 24 hours of a patient's hospital admission. Several screening tools such as the Subjective Global Assessment, the Malnutrition Screening Tool, the Nutrition Risk Classification, the Determine Checklist, the Mini Nutritional Assessment are typically used to assess the nutrition status of older adults in the hospital setting (165,65,66,235,236). Common to these tools is the assessment of self-reported weight status or history of weight change, changes in dietary intake, perceived appetite, eating and drinking habits, oral health problems, and the ability to shop for food, prepare meals, and eat. However, despite the availability and utility of these tools, re-evaluations of nutrition status for older adult patients may not occur before they are discharged (37). This deficiency may be attributed to the ever-declining lengths of hospitalization experienced by older adult patients (206), and the limited nutrition training received, and increased workload experienced, by nursing and medical staff (36,62). Of the three discharge planning assessment tools reviewed only the NNAI included a specific question to evaluate the presence of malnutrition and dehydration. The Discharge Planning Questionnaire (DPQ) and the BRASS assessment tool did not include questions on nutrition status. However, among the remaining hospital admission risk screening tools and prediction models reviewed, questions evaluating the presence of nutrition risk factors (i.e., the need for assistance preparing meals or the presence of eating problems) or nutrition-related diagnoses

(i.e., diabetes (212,213,224) and coronary heart disease (213,224)) were present. Thus, given the limited awareness among hospital staff of community-based nutrition services (75,100), including questions that assess nutrition status at discharge may facilitate nutrition risk assessment at discharge and improve referrals to appropriate community services. Hospital-discharged older adults who are at nutrition risk can benefit from referrals to community-based nutrition programs where they can receive nutrient-dense meals, and nutrition education and counseling services. These programs also provide referrals (23) to other community-based wellness services (i.e., mental health programs) that can help older adults manage the cognitive decline and negative affect experienced during the weeks following hospital discharge.

As in past research, our study suggests that the lack of social support was inversely associated with adverse outcomes. Following hospital discharge, prior to the receipt of formal homecare services, many older adults depend on assistance from relatives and friends (237,238) and these have been shown to differ in frequency and extent following hospitalization (239). Relatives provide more tangible forms of assistance (i.e., helping with meal preparation, self-care) while friends provide intangible assistance (i.e., emotional) to the older adult. Antonocci and Akiyama (240) have suggested that social support received from both sources is essential in facilitating recuperation and the maintenance of good health by the older adult. Past research by Mistry et al. (219) revealed a positive relationship between risk of social isolation and rehospitalization in a group of older adult veterans. Similarly, findings from our study showed that the risk of social isolation was positively associated with risk of adverse changes in living arrangement. In particular, our study identified the

importance of the availability of relatives or friends as confidants, and the important of being a confidant to friends in relation to risk of adverse outcomes, while Mistry and colleagues (219) showed the importance of having close relatives and being a confidant in relation to rehospitalization risk. These findings may be partly explained by recent work by Gruenewald et al. on how older adults perceive the utility of interactions with members of their social network (241). These authors suggested that older adults who infrequently felt useful to family and friends were at least twice as likely to experience functional declines or death during a 7-year follow-up period, controlling for sociodemographic, health, behavioral and psychosocial status factors. Thus, playing an active role in one's social network may have health-promoting effects. It is of note that despite the fact that all CC participants received meals and other services, a relationship between social isolation/high risk of isolation and adverse outcomes remained. Although this association did not remain significant, it did approach significance, indicating its potential role. Nonetheless, the association between social supports received from friends remained significant as it may not be an area typically addressed by social services. This may be attributed to the fact that social support received from friends may have more of a positive effect on the wellbeing of an older adult more than support received from relatives (207,242). This may be because friendships are considered relationships that are chosen by the individual, free from the potentially demanding social expectations present in relationships with relatives (243).

Overall, these results suggest that evaluating the social support available to older adults at discharge can assist in identifying those with limited support and with

subsequent risk of negative health and residential outcomes. The assessment of available social support in discharge planning has traditionally focused only on the availability of a caregiver for the older adult (212), however a more detailed set of questions may be warranted. Alternatively, for older adults with limited social support, referrals to friendly visiting / senior companionship programs often available through home-delivered meal programs may be necessary. While older adults do benefit from social contact with drivers who deliver meals daily (244), past work by MacIntyre et al. (245) and Keller et al. (246) suggests that friendly-visiting services targeted at homebound older adults can improve perceptions of social support and knowledge of community-based health services.

In summary, several candidate functional, nutritional and social risk factors were identified as independent risk factors for negative health and residential outcomes among community-dwelling older adults, including poor self-reported general health and limited social interaction with friends. Other health and nutrition risk factors such as the presence of cognitive impairment and depressive symptoms, poor self-reported appetite and oral health, should also be considered when developing discharge planning and screening tools to target older adults at risk for rehospitalization. Few of the available screening / prediction models included questions that addressed all these areas of health and wellbeing.

The challenge of translating our findings into a practical and user-friendly instrument for busy health professionals remains. For example, cognitive impairment, presence of depressive symptoms, and social isolation risk scores were derived from responses to several questions. Most of these individual questions were not

significantly associated with adverse changes in living arrangement. Although collinearity was not found to be problematic among the variables assessed, it is still probable that these variables are closely associated. Including all the questions necessary to assess these risk factors in a screening tool will result in an instrument that is too long to administer and unlikely to be useful to health professionals. Future research using similar, valid but shorter assessment instruments (247-249) can be used to confirm our findings and identify a more parsimonious set of variables for inclusion in a screening tool.

This study has several limitations. Information for this analysis was collected from a convenience sample, and is thus not representative of all older adults. For this study, nutrition, health and social risk factors were identified by proxy- or self-report. Thus, it is possible that for some CC participants, adverse outcomes were underestimated as this ascertainment was based on self-report or by proxy respondents. Future research is needed in a larger more representative sample of hospital-discharged older adults, over a longer period of time, to evaluate the ability of the candidate risk factors to correctly identify older adults at risk of adverse changes in living arrangement. Finally, past cross-sectional studies of home-delivered meal program participants have shown this population to be at risk of poor dietary intake (173,174,250). Consequently, we anticipated our analysis to reveal strong associations between nutrition risk factors and adverse outcomes. This result may be attributed to the fact that all CC project participants received a daily meal thus attenuating associations between nutrition risk and adverse outcomes.

Despite these limitations, this study has many strengths. This is the only study we are aware of that has examined associations between functional, nutritional and social isolation risk factors and adverse changes in living arrangement (or loss of community residence) in hospital-discharged older adults. Extensive information was collected on the nutrition, functional and social support status of the population investigated using validated and cognitively-tested survey instruments. In addition, computer-assisted personal interviewing software was used to facilitate accurate data collection for this multi-site, multi-state project.

Conclusion

Hospital readmission is a common and costly event in older adult patients (18). There is a need at discharge for screening tools to identify high-risk older adult patients (76,130). Consistent with past research (172,176,219), this study suggests that functional, nutritional and social risk factors are prevalent in hospital-discharged older adults. The CC program participants who reported the presence of these risk factors were more likely to experience adverse changes in living arrangement over the course of a 5-month intervention. Professionals in the medical and community-based healthcare systems need to be aware of the risk of poor health and loss of independence faced by hospital-discharged older adults. Screening tools to identify older adult patients in danger of hospital admission / readmission are limited in scope. A screening tool that assesses the functional, nutritional and social status of older adult patients at discharge, used together with existing discharge planning

assessments may assist hospital staff in developing comprehensive care plans to better address patient health and wellness needs post-hospital discharge.

Community-based senior nutrition programs are well-positioned to provide support to older adults at risk for functional decline, poor dietary intake and social isolation (23). Services including nutrition counseling, mental health services and friendly-visiting/senior companionship programs are available from home-delivered meal programs or via referrals to other community-based providers. Timely enrollment into these programs will also ensure that vulnerable older adult patients experience no lapse in care as they transition from hospital to home.

Table 4.2.1. Baseline characteristics by disposition at 5-months

Characteristic	Overall n=476	Remained resident in community n=385	Adverse change in living situation n=91	<i>P</i>
Sociodemographics	% (Unless indicated otherwise)			
Age				
60-64	10.9	9.2	14.3	0.35
65-74	25.9	26.4	24.9	
75-84	46.2	46.4	46.0	
85+	17.0	18.1	14.9	
Women	72.3	73.0	69.2	0.47
Race/Ethnicity				
Non-Hispanic White	71.6	73.0	65.9	0.06
Non-Hispanic Black	11.3	12.0	8.8	
Hispanic	17.0	15.1	25.3	
Married	70.6	71.4	67.0	0.41
High school graduate	67.7	68.8	62.6	0.26
Live alone	58.0	59.5	51.7	0.17
Household income <\$20,000	72.7	71.6	77.3	0.28
Health and functional status				
Self-reported health (fair or poor)	62.0	59.0	74.7	0.01
Cognitively impaired	19.8	17.4	29.7	0.01
Depressive symptoms present	42.2	39.0	55.8	<0.01
ADL Impairment (mean+SD)	2.6 (2.08)	2.5 (2.0)	3.2 (2.4)	0.01
IADL Impairment (mean+SD)	4.3 (1.8)	4.2 (1.7)	4.8 (1.9)	<0.01
Nagi Impairment (mean+SD)	1.4 (1.3)	1.4 (1.3)	1.5 (1.4)	0.45
Nutrition risk				
Eat alone frequently	59.9	60.0	59.3	0.91
Oral health (fair or poor)	32.8	30.4	42.9	0.02
Appetite status (fair or poor)	38.2	36.1	47.3	0.05
Has difficulty shopping	85.5	84.2	91.2	0.09
Has difficulty preparing meals	80.9	80.5	82.4	0.68
Has difficulty eating meals	11.3	10.4	15.4	0.18
Lost 10 pounds in 6 months	43.1	41.3	51.1	0.09
Unable to prepare meals with fresh ingredients	47.1	43.4	62.6	<0.01
Perceived food-related anxiety during hospitalization	14.7	14.6	15.4	0.84
Social support				
Social isolation risk (High risk /Isolated)	46.0	43.9	55.0	0.06
Has a caregiver	31.1	31.4	29.7	0.74

Table 4.2.2. Frequency of self-reported changes in health status at final telephone assessment in Community Connections project participants (n=476)

Characteristic	Walking across a room	Shopping for food	Ability to prepare meals
Easier than at last assessment	52.0	34.8	39.3
About the same as at last assessment	33.0	46.7	44.9
More difficult than at last assessment	11.9	10.6	10.3

Table 4.2.3. Univariate logistic regression model predicting adverse changes in living arrangement among Community Connections project participants (n=476)

Characteristic	OR*†	95% CI†	P
Self-reported general health			
Excellent, very good or good	1.0	Referent	
Fair or poor	2.24	1.29-3.89	0.0044
Self-reported emotional health			
Excellent, very good or good	1.0	Referent	
Fair or poor	1.65	1.01-2.71	0.0468
Depressive symptoms			
Absent	1.0	Referent	
Present	1.96	1.19-3.21	0.0079
Cognitive function			
Not impaired	1.0	Referent	
Impaired	1.83	1.03-3.23	0.0382
Self-reported appetite			
Excellent, very good or good	1.0	Referent	
Fair or poor	1.60	0.99-2.59	0.0545
Self-reported oral health			
Excellent, very good or good	1.0	Referent	
Fair or poor	1.58	0.96-2.59	0.0720
Self-reported weight loss in past 6 months			
No weight lost	1.0	Referent	
Weight lost	1.53	0.99-2.36	0.0560
Self-reported ability to prepare meals using fresh ingredients			
Able	1.0	Referent	
Unable	1.95	1.11-3.43	0.0198
Social isolation risk (overall) score (per point)	0.98	0.96-1.00	0.0814
Social isolation risk (friends subscale) score (per point)	0.96	0.93-0.99	0.0126
Infrequent service as confidant to friends			
Always, very often, often	1.0	Referent	
Sometimes, not often, never	1.71	0.95-3.06	0.0744
Infrequent availability of relatives as confidants			
Always, very often, often	1.0	Referent	
Sometimes, not often, never	1.87	1.01-3.46	0.0462

Table 4.2.3. Univariate logistic regression model predicting adverse changes in living arrangement among Community Connections project participants - continued

Characteristic	OR*†	95% CI†	P
Infrequent availability of friends as confidants			
Always, very often, often	1.0	Referent	
Sometimes, not often, never	1.74	1.04-2.92	0.0339

*Adjusted for age, gender, race/ethnicity, and project site

†OR, odds ratio; CI, confidence interval

Table 4.2.4. Logistic regression model identifying significant baseline variables predictive of adverse changes in living situation in Community Connections project participants (n=476)

Characteristic	OR*	95% CI	P
Self-reported general health			
Excellent, very good or good	1.0	Referent	
Fair or poor	2.09	1.19-3.66	0.0099
Social isolation risk (friends subscale) score (per point)	0.96	0.93-0.99	0.0320

*Adjusted for age, gender, race/ethnicity, and project site

†OR, odds ratio; CI, confidence interval

4.3. Manuscript #3 - Improvements in functional and health status, and short-term use of home-delivered meals among hospital-discharged older adults

Abstract

Background: The months that follow hospital discharge represent a critical period in the recovery process for older adult patients. Community-based nutrition services such as the home-delivered meal program (HDM) can support recuperation. Although HDM services are well-received by participants, some do terminate meal services soon after enrollment. Past research suggests that short-term HDM users, especially hospital-discharged older adults, may have temporary nutrition needs during recovery that can be addressed by this program however, little research is available to support this claim. The goal of this investigation was to identify functional and nutritional characteristics of individuals who prematurely withdrew from the HDM program due to health improvements.

Methods: Staff at six meal programs in six US states enrolled 566 hospital-discharged, homebound older adults into a 5-month, home-delivered meal intervention study. In-home interviews were conducted at baseline and at 2-months follow-up to capture participant sociodemographic, nutrition and health risk data. Of participants with complete data, 164 participants remained on the Community

Connections (CC) project at follow-up and 69 terminated meal services because they were feeling better.

Statistical Analysis: Descriptive and bivariate analyses were used to examine relationships between baseline sociodemographic, social, nutritional risk, health status characteristics between participants who remained on the program and those who terminated meal services due to feeling better at follow-up. Changes in health and functional status between baseline and follow-up questions were also examined and compared for the two population groups.

Results: Although improvements in self-reported general health, functional status and physical status were observed between baseline and follow-up for many CC participants, improvements in specific activities such as the ability to prepare meals, shop and manage money were significantly more ($p < 0.05$) prevalent among those who withdrew early compared to those who remained on the program at follow-up.

Conclusion: Older adults may benefit from a functional status assessment at hospital discharge and referrals to in-home nutrition and wellness services to facilitate successful transitions from hospital to home. Improvements in instrumental activities of daily living such as preparing meals, may result in short-term use of community-based nutrition programs in this population.

Introduction

Little is known about the nutrition needs of homebound, hospital-discharged older adults. Understanding home-delivered meal program use by these older adults is of interest because they are likely to be at risk of declining nutrition and health status at discharge and may benefit from nutrition intervention (25,89). The months that follow hospital discharge for the older adult patient represent a critical period with potential difficulty transitioning back to community residence and managing the recovery process (21,22,176,251). In-home nutrition and wellness services such as those provided through the Older Americans Act Nutrition Program (OAANP) or via referral to other community-based agencies can assist older adult patients in transitioning from hospital to home (23). Home-delivered meal (HDM) services are among those provided by through OAANP and can enable older adults to maintain community residence and avoid negative health outcomes such as premature death and reinstitutionalization (117). However, several factors impact how long older adults participate in the HDM program. Although HDM services are largely well-received by participants (24), some do terminate meal services. Reasons for termination can be classified as involuntary (i.e., death, declines in health and functionality) and voluntary (i.e., feeling better, improved food security) (252,253). To date, only a handful of published studies have examined HDM program utilization and documented voluntary and/or involuntary reasons for, and predictors of, withdrawal from community-based nutrition programs among older adult participants (112,140,254-256). As a result little is known about the utilization patterns of HDM program participants.

Although many older adults tend to be long-term HDM program users, there are those with short-term needs. Thus far, only two researchers have described characteristics of short-term meal program users (112,255). Both Choi (112) and Frongillo et al. (255) conducted prospective studies to examine the utilization patterns of HDM program participants and reported that older adults who voluntarily withdraw from HDM programs shortly after enrollment frequently are recently discharged from the hospital. These findings suggest that short-term HDM users, especially hospital-discharged older adults, may have temporary nutrition needs during recovery that can be addressed by this program however, little research is available to support this claim. Considering voluntary withdrawal, particularly where participants cite improved health, as an outcome measure when evaluating HDM program use is important because it may be indicative of the alleviation of risks for poor health and nutrition status (254), especially among hospital-discharged older adults. To our knowledge, there is no published study that examines changes in nutrition and health status in relation to voluntary participant withdrawal (due to improved health) in this population. Thus, the goal of this investigation was to identify characteristics of individuals who prematurely withdrew from the HDM program due to health improvements using data from the “Community Connections: Moving Seniors Toward Wellness” demonstration project (34).

Methods

Overview of the Community Connections Project

The Community Connections (CC) project investigated the efficacy of a systemic approach to providing services to homebound, older adults through partnerships between nutrition service providers, community organizations and the medical care system. A Request for Proposal announcement was made throughout the Meals-On-Wheels Association of America (MOWAA) provider network, inviting OAANPs to submit proposals; six programs out of 18 applicants were selected to participate. The CC project provided funding and technical assistance to each program to initiate or strengthen collaborations with community organizations and the healthcare system. Each program provided meals, and related nutrition, health, and supportive services to participants discharged from acute care hospitals. In addition, participant health and nutrition risk status and home care service needs were also examined. This project was approved by the University of Maryland's Institutional Review Board.

Participant recruitment

The CC project has been described at length elsewhere (34). Briefly, from May 2005 – February 2006, project staff at the participating nutrition programs recruited hospital-discharged participants from local hospitals and the surrounding community. Adults were eligible for participation if they were: 60 years of age or older, hospitalized for acute short-term illnesses, without terminal illness, had not received home-delivered meal services within the past year, able to consume solid

foods, and able to understand survey questions in English or Spanish. Discharge planners, hospital administrators and social workers at participating hospitals were encouraged to identify and recruit participants. Written informed consent was obtained. A total of 566 participants were recruited, and assigned to an early (≤ 2 days) post-hospital discharged (n=234) or delayed (14 days) post-hospital discharged (n=332) enrollment group. Enrollment was conducted in this way to examine the impact of the timeliness of meals and health services on health status.

Data collection and measurements

Each project site had a dietitian or a health paraprofessional who was trained to collect data from participants using computer assisted personal interviewing (CAPI) software. Information on physical and cognitive function, emotional health status, and nutrition status and level of social support, was collected using previously validated questionnaires (148,149,153,165,168,183,184,222) and evaluated through cognitive- and pilot-testing among older adults with characteristics similar to those in the target population (154). Three waves of data were collected: initial assessment, 2 months later or at termination of program participation, and at 5 months after the baseline assessment. At baseline and at the 2-month follow-up, all study participants were assessed using a face-to-face, in-home survey. The last assessment was a brief telephone call to determine participant vital and health status, and living arrangement. For this study, a subset of data obtained at baseline and follow-up assessments were used.

Baseline individual assessment

The baseline in-home assessment captured demographic data on participants such as age, gender, education, marital status, living arrangement, annual household income, and race/ethnicity. Cognitive status was assessed using the 22-item Adult Lifestyles and Function Interview-Mini-Mental State Examination (ALFI-MMSE; range 0-30 points) questionnaire (148). The presence of depression was measured using the 5-item Geriatric Depression Scale (GDS-5; range 0-5 points) (149).

Physical function was assessed by asking if participants had difficulty performing 7 Activities of Daily Living (ADL), 8 Instrumental Activities of Daily Living (IADL), and 5 activities related to upper and lower-extremity functioning (Nagi) (183,184).

Participants were also asked questions adapted from the DETERMINE Your Nutritional Health Checklist to evaluate their level of nutrition risk (165). Survey questions assessed the frequency of eating meals alone and self-reported oral health, general health, appetite and weight loss over the past 6-months. Food-related anxiety was evaluated based on the question: “While at the hospital, were you worried about getting enough food once you return home?”. Available 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 (153,168). Participants were also asked if they obtained food from family or friends.

Finally, participants were also asked to review a list of home and community-based healthcare services offered through the CC project sites or available via

referrals to other community-based agencies, and indicate the services they used. Possible services included in-home (i.e., nutrition counseling, home healthcare, homemaker services and caregiver respite services), information and access (i.e., telephone reassurance, friendly visiting and senior transportation), home repair and renovation (i.e., home safety evaluation and home repair), and community-based services (i.e., legal assistance, dental care, grocery-delivery, mental health, podiatry, vision, adult daycare, immunization and physical therapy).

Two-month follow-up assessment

Similar to the baseline assessment, data on cognition, depression, physical function and nutrition risk were also collected using the same instruments as described above. Participants were also asked if they had been worried about getting enough food since the baseline assessment. Finally, participants were asked if they needed or received health services offered through CC project sites or via referral from other community-based agencies since baseline.

Statistical analysis

Following mid-course revisions to the follow-up questionnaire, a question was added to determine if participants were voluntarily terminating meal services. Participants were also asked if they were withdrawing 'because they were feeling better'. This information was only available for 253 participants. Of these, 172 remained on the CC project at the time of the follow-up assessment, 71 terminated participation in the study early because they felt better, and 10 terminated

participation in the program but were not feeling better. Data of the 10 participants who terminated meal services but did not feel better were excluded. In addition, data of 28 participants whose baseline assessment was not administered within the time-frame specified by the study design were also excluded. Thus, the analytic sample for this investigation consisted of 215 project participants, 84 (39%) in the delayed enrollment group and 131 (61%) in the early enrollment group. Household income (below \$20,000) was the only characteristic that differed significantly by enrollment group (63% vs. 77% in the early and late groups, respectively ($p=0.0381$)). As no other significant differences were seen between the two groups in sociodemographic, health, functional, and nutritional risk characteristics, and in withdrawal status, these groups were combined for this analysis. The final sample was comprised of 164 participants who remained on the CC project at follow-up and 69 participants who terminated meal services because they were feeling better.

Measures of baseline health, nutrition and social support characteristics

Several sociodemographic variables were coded dichotomously: age (≥ 75 vs. < 75), educational attainment ($< 12^{\text{th}}$ vs. $\geq 12^{\text{th}}$ grade); and gender. Race-ethnicity was categorized into 3 groups: Non-Hispanic Whites, Hispanics and Non-Hispanic Blacks. The latter group included 2 individuals of American Indian/Alaska Native heritage. Living arrangements were coded as lives alone vs. lives with spouse or others. Cognitive functioning was categorized as impaired if the ALFI-MMSE score was below 17 (148). GDS-5 scores of 2 or more were indicative of the presence of depressive symptoms (149). Each set of measures of physical functioning were

summed so possible scores ranged from 0-7 for ADLs, 0-8 for IADLs, and 0-5 for Nagi activities. Measures of physical functioning for the ADLs, IADLs and Nagi activities were also dichotomized to describe participants who had none or some difficulty with any activity versus those who were unable to or had a lot of difficulty with one or more activities (183,184). All nutrition risk variables were dichotomized: eating meals alone (all or most of the time vs. sometimes or never), self-reported oral health, general health, and appetite status (excellent, very good, or good vs. fair or poor), and presence of anxiety related to acquiring food when at the hospital (yes vs. no). Food acquisition from family and friends was dichotomized (yes vs. no). The CC participants were categorized by risk of social isolation based on the Lubben Social Network Scale score: a score of 0-15 is considered as socially isolated; 16-30 at high risk of social isolation, 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 (185).

Measures of change in health and functional status between baseline and follow-up

Change in health and functional status was assessed based on responses to the baseline and follow-up questions. A matrix was created to describe participants who improved or maintained good self-reported health and function, versus those who experienced decline or showed no improvement to fair or poor self-reported health and function (Figure 4.3.1). This included cognitive and depressive status, and all ADL, IADL, and Nagi variables. To assess changes in cognitive function, a comparable dichotomous variable was created to characterize changes in the AFLI-

MMSE score (score of <17) between baseline and follow-up (Figure 4.3.2). In the same way, changes in depression status (GDS-5 score <2) between baseline and follow-up were also evaluated, and a dichotomous score created.

Data analysis

Descriptive statistics (means and frequencies) and Student's t-tests for continuous variables and chi-square analyses for categorical variables were used to examine differences in health, nutrition and functional risk factors between participants who remained on the program or terminated meal services due to feeling better at follow-up. Chi-squared analyses were used to compare changes in health, nutrition risk and physical function by program participation status. All statistical analyses were performed using SAS (v. 9.1, SAS Institute, Cary, NC). A value of $p < 0.05$ was used to determine statistical significance.

Results

Participant characteristics at baseline by level of participation status after 2 months

As compared to individuals who remained in the CC program, those who reported feeling better included significantly more women (80% vs. 66%), fewer Hispanics (7% vs. 23%), and more high school graduates (83% vs. 69%) (Table 4.3.1). No other significant differences were observed between the two groups.

Changes in participant characteristics between baseline and follow-up

There were significantly fewer participants who reported risk factors of poor health at follow-up among both groups (Table 4.3.2). Specifically, significant ($p < 0.01$) declines in the number of participants who reported fair or poor self-reported health were seen among those who remained in the program and those who withdrew early (-31.0% and -30.5%, respectively), Nagi impairments (-34.3% and -43.5%, respectively), and nutrition risk factors such as self-reported appetite (-9.6% and -17.4%, respectively), weight loss (-28.9% and -21.5%, respectively), and reports of being unable or having difficulty with shopping for food or clothes (-24.7% and -27.7%, respectively) and with preparing meals (-27.4% and -37.7%, respectively). In addition, significantly fewer individuals ($p < 0.01$) who withdrew early from the study reported 1 or more IADL limitations.

Comparison of participant characteristics at baseline and at follow-up

Table 4.3.3 indicates the percentage of participants who self-reported poor indicators of health status and nutrition risk variables by group, at baseline and at follow-up. At baseline there were significantly fewer individuals who reported three or more ADL impairments among the early withdrawals compared to the other group but there were no other significant differences between the groups. However, at follow-up, significantly fewer individuals who withdrew early reported depressive symptoms, 1 or more IADL and Nagi impairments, and difficulty with/inability to shop and to prepare meals. Reports of cognitive impairment were also less frequent

among participants who withdrew early, however, these differences only approached statistical significance ($p=0.07$).

Health service utilization at baseline and at follow-up

The most commonly used health services at baseline and at follow-up were home healthcare, homemaker, nutrition education, and physical therapy (Figure 4.3.3). Use of the remaining services ranged from 0% (caregiver respite services) to friendly-visiting (7%), and adult daycare (1%) to adult immunization services (19%), at baseline and follow-up, respectively (data not shown). No significant differences in utilization of services were seen between those who withdrew and those who remained in the study.

Associations between changes in self-reported health, functional status and early withdrawal status

Based on the matrix that was developed to examine positive change or maintenance of adequate status versus no improvement or decline, the results indicated that older adults who maintained or experienced improvements in the ability to prepare meals (90% vs. 69%), manage money (94% vs. 84%), shop for food or clothes (87% vs. 60%), and do domestic tasks like laundry (87% vs. 64%) and housework (87% vs. 55%), were significantly more likely to withdraw early from the CC project (Table 4.3.4).

Discussion

Overall, improvements in self-reported general health, functional status and physical status were observed between baseline and follow-up for many CC participants. However, significantly more participants who withdrew early from the project reported improvements in health and nutrition risk variables. Specifically, significantly fewer CC participants who withdrew early from the study at baseline were nursing-home eligible (reporting 3 or more physical limitations) than those who continued to receive meals. These results are in line with past work by McAuley et al. who found that participants who frequently left their homes (15 days or more monthly) at baseline were more likely (Odds Ratio: 3.24, 95% CI: 1.16-5.77) to withdraw prematurely from a home-delivered meal/case management program (254). Although many participants reported maintaining or improving physical and functional status and declining nutrition risk factors, only improvements in the ability to shop for food or clothes, prepare meals, manage money and do housework were more prevalent among those who withdrew early. Improvements in these cognitively-tasking activities may also be associated with greater improvements in cognitive function reported in participants who withdrew early from the study compared to those who remained. These findings suggest that overall, those hospital-discharged older adults were not necessary frail and could take care of very basic needs. However, these older adults may have required some assistance with IADLs and one-third (69 out of 215)) could use this program as a gap measure to until they can become independent in shopping, preparing meals, and general upkeep of the home.

Currently, hospital-discharged older adults are not targeted to receive HDM (25), however, they represent a traditionally underserved but vulnerable population (257), often eligible for this service. Our findings are supported by Choi (112) and Frongillo et al. (255) who found that recently-discharged older adults were more likely to use HDM services for a shorter duration than older adults who were not recently discharged. At this time, the OAANP only serves a percentage of eligible older adults due to funding constraints (23). However, interest in the program remains high and many programs have waiting lists of older adults interested in receiving meals (33). Unfortunately, limited resources constrain the ability of HDM programs to expand through outreach or to meet the needs of older adults interested in receiving meals (32). These challenges, coupled with data from national-level evaluations that suggest participants are choosing to receive meal services much longer than in the past (33), may further limit efforts by these programs to target hospital-discharged older adults, even those with short-term meal service needs (255). It is possible that those currently served by the HDM have chronic illnesses and require long-term use (255), however by providing services to individuals with short-term needs, the HDM programs may be able to serve more needy individuals and potentially decrease the cost of healthcare for older adults through declines in reinstitutionalization.

It is of note that few participants took advantage of homemaker services available via referral through the CC project sites. Homemaker services provide older adults with limited mobility, assistance with general housekeeping, running errands, buying groceries, preparing meals, escorts to medical appointments, and assistance bathing or dressing (107). Among CC participants who did not receive homemaker

services at follow-up (n=165), 85% did not perceive a need for the service and 10% indicated that they needed it but did not get it (data not shown). Other researchers have also found utilization of homemaker services to be limited among older adults (84,113,258), ranging <20% (84) to as many as >50% (113). Reasons for non-use identified included lack of perceived need, availability of informal assistance, and lack of awareness of the service (113,114,258). Older adults interested in obtaining homemaker services typically pay out-of-pocket, thus cost may also be a barrier to utilization. However, national-level program evaluation data from the Administration on Aging suggests that homemaker services are well-received by older adults and can play a significant role in enabling them to maintain community residence (117). Thus, efforts are needed to mitigate barriers to these services faced by older adults.

Participants who remained on the study at follow-up were more functionally impaired, particularly in food-related activities of daily living, than those who withdrew early. However, significant improvements were also observed among those who remained on the study therefore it may be possible that with assistance from homemaker and transportation services, more individuals will be able to get meals from congregate dining program allowing other older adults to receive HDM. Thus, more timely reassessments of eligibility may be required for hospital-discharged older adults to enable HDM programs to more effectively use available resources to serve additional older adults.

Discharge planning assessments for older adult patients in the hospital should include questions that determine their ability to perform food-related activities of daily living (i.e., the ability to prepare meals and shop for food and clothes). These

questions are often not included in commonly-used discharge planning assessments (208-210) nor do these issues arise when hospital workers are asked to describe appropriate discharge planning considerations for older adults (259). Our results support recommendations by Grimmer et al. (251) for the inclusion of such questions in discharge planning assessments.

Finally, older adults who remained on the CC study at follow-up were more likely to report the presence of depressive symptoms than those who withdrew early. Depression is common (8%-20%) in community-dwelling older adults and is frequently underdiagnosed (260,261). In our study about 40% reported the presence of depressive symptoms. An interdependent relationship between physical function and depression status has been established (262). Physical limitations can restrict the ability of older adults to maintain contact with friends and family, heightening perceptions of social isolation and negative affect (263,264) and conversely, these limitations are often a source of anxiety and sadness, especially during recovery among hospital-discharged older adults (86). The presence of depressive symptoms can also negatively affect dietary intake, adherence to prescribed treatment regimen, social skills, mood and immunologic function (187,216,231,265,266). Despite these relationships, mental health utilization among community-dwelling older adults is very low. A recent study of HDM program participants revealed that 12% had clinically significant diagnoses of depression however, only one-third were receiving treatment (260). Older adults are unlikely to seek treatment for depressive symptoms due to the social stigma (265) however, HDM programs are well-positioned to provide participants with information on, and referrals to, professional in-home

mental health services (264). During the reauthorization of the Older Americans Act in 2006, this legislation was amended to prioritize efforts by aging service providers to raise public awareness of mental health disorders, remove barriers to diagnosis and treatment, and coordinate mental health services. In addition to these efforts at the community-level, screening for depression status at discharge may be warranted as depression is common in hospitalized older adults and may not be routinely evaluated during hospitalization or at discharge (231).

This study has several limitations. Information for this analysis was collected from a convenience sample, and is thus not representative of all older adults. Akin to the study by McAuley et al. (254), evaluating reasons for voluntary early withdrawal was not the original goal of the CC study. Consequently, the sample size available for analysis, especially for the outcome, was limited. Also, data on nutrition, health, physical and social risk factors were identified by proxy- or self-report. As a result, it is possible that associations between these factors and early withdrawal status may have been underestimated. Future studies can use validated performance-based and clinical measures, with a larger, more representative sample of hospital-discharged older adults, over a longer period of time, to better investigate changes in health status and its relationship with premature voluntary withdrawal.

Despite these limitations, this study has many strengths. This is the only study we are aware of that has examined associations between changes in functional, nutritional and social isolation risk factors, and voluntary participant withdrawal (due to improved health) in hospital-discharged, home-delivered meal users. Extensive information was collected on the nutrition, functional and social support status of the

population investigated using validated and cognitively-tested survey instruments during a baseline and follow-up assessments. In addition, computer-assisted personal interviewing software was used to facilitate data collection and entry for this multi-site, multi-state project.

Conclusion

The months that follow hospital discharge represent a critical period for older adult patients (22) and community-based nutrition services such as the home-delivered meal program are well-positioned to aid in this process. Continued efforts to document utilization patterns of HDM participation, particularly instances of voluntary withdrawal due to improved health, can inform program planning and evaluation efforts. Our study suggests that improvements in instrumental activities of daily living, such as the ability to prepare meals, shop and manage money may result in short-term use of community-based nutrition programs among hospital-discharged older adults. For these patients, an assessment of impairments in these activities at hospital discharge, as well as timely receipt of HDM services and referrals to homemaker, transportation and mental health services following discharge, can ensure that older adults experience no lapse along the continuum of care as they transition from hospital to home.

Table 4.3.1. Participant characteristics at baseline by withdrawal status after 2 months

Characteristic	Remained on meal program n=146	Felt better & ended meals n=69
	Baseline	
Sociodemographics		
Age		
60-64	6.2	15.9
65-74	26.7	30.4
75-84	49.3	40.6
85+	17.8	13.0
Women	66.4	79.7*
Race/Ethnicity		
Non-Hispanic White	66.4	78.3
Non-Hispanic Black	10.3	14.5
Hispanic	23.3	7.3*
Married	34.3	26.1
High school graduate	68.5	82.6*
Household income <\$20,000	69.4	65.1
Social support		
Live alone	57.5	65.2
Social isolation risk -high risk /isolated	50.7	55.1
Has no caregiver	70.6	81.2

Significantly different at baseline: * p<0.05

Table 4.3.2. Changes in participant characteristics by program participation level at baseline & follow-up

Characteristic	Remained on meal program n=146		Felt better & ended meals n=69	
	Baseline	Follow-up	Baseline	Follow-up
Health and functional status				
Self-reported health (fair or poor)	70.6	39.0**	60.9	30.4**
Cognitively impaired	17.1	14.4	10.1	5.9
Depressive symptoms present	43.4	36.4	30.8	22.7
3 or more ADL impairments	52.7	28.1**	24.6	17.4
1 or more IADL impairments	98.0	95.9	94.2	59.4**
1 or more Nagi impairments	73.3	39.0**	68.1	24.6**
Nutrition risk				
Eat alone frequently	59.6	58.9	65.2	63.8
Oral health (fair or poor)	32.9	21.2**	26.1	18.8
Appetite status (fair or poor)	32.9	23.3**	42.0	24.6**
Lost 10 pounds	41.9	13.0**	41.8	20.3**
Has a lot of difficulty with/unable to shop	64.4	39.7**	50.7	13.0**
Has a lot of difficulty with/unable to prepare meals	58.2	30.8**	47.8	10.1**
Has a lot of difficulty with /unable to eating	3.4	1.4	2.9	2.9**
Perceived food-related anxiety	15.8 ^a	5.5 ^{b**}	7.3 ^a	2.9 ^b
Received food from family/friends	73.2	48.6**	72.5	42.7**
Saved food from previous meals	30.3	37.0**	39.1	17.7**

Significantly different between baseline and follow-up: * p<0.05, ** p<0.01
 Perceived food-related anxiety: ^aat hospital or ^bsince initial assessment

Table 4.3.3. Health and nutrition risk variables at baseline & at follow-up by withdrawal status

Characteristic	Baseline		Follow-Up	
	Remained on meal program n=146	Felt better & ended meals n=69	Remained on meal program n=146	Felt better & ended meals n=69
Health and functional status				
Self-reported health (fair or poor)	70.6	60.9	39.0	30.4
Cognitively impaired	17.1	10.1	14.4	5.9
Depressive symptoms present	43.4	30.8	36.4	22.7 [†]
3 or more ADL impairments	52.7	24.6 [*]	28.1	17.4
1 or more IADL impairments	98.0	94.2	95.9	59.4 [†]
1 or more Nagi impairments	73.3	68.1	39.0	24.6 ^{††}
Nutrition risk				
Eat alone frequently	59.6	65.2	58.9	63.8
Oral health (fair or poor)	32.9	26.1	21.2	18.8
Appetite status (fair or poor)	32.9	42.0	23.3	24.6
Lost 10 pounds	41.9	41.8	13.0	20.3
Has a lot of difficulty with/unable to shop	64.4	50.7	39.7	13.0 ^{††}
Has a lot of difficulty with/unable to prepare meals	58.2	47.8	30.8	10.1 ^{††}
Has a lot of difficulty with /unable to eating	3.4	2.9	1.4	2.9
Perceived food-related anxiety	15.8 ^a	7.3 ^a	5.5 ^b	2.9 ^b
Received food from family/friends	73.2	72.5	48.6	42.7

Significantly different at baseline: ^{*} p<0.05, ^{**} p<0.01

Significantly different at follow-up: [†] p<0.05, ^{††} p<0.01

Perceived food-related anxiety: ^aat hospital or ^bsince initial assessment

Figure 4.3.1. Determination of changes in physical function between baseline and follow-up assessments

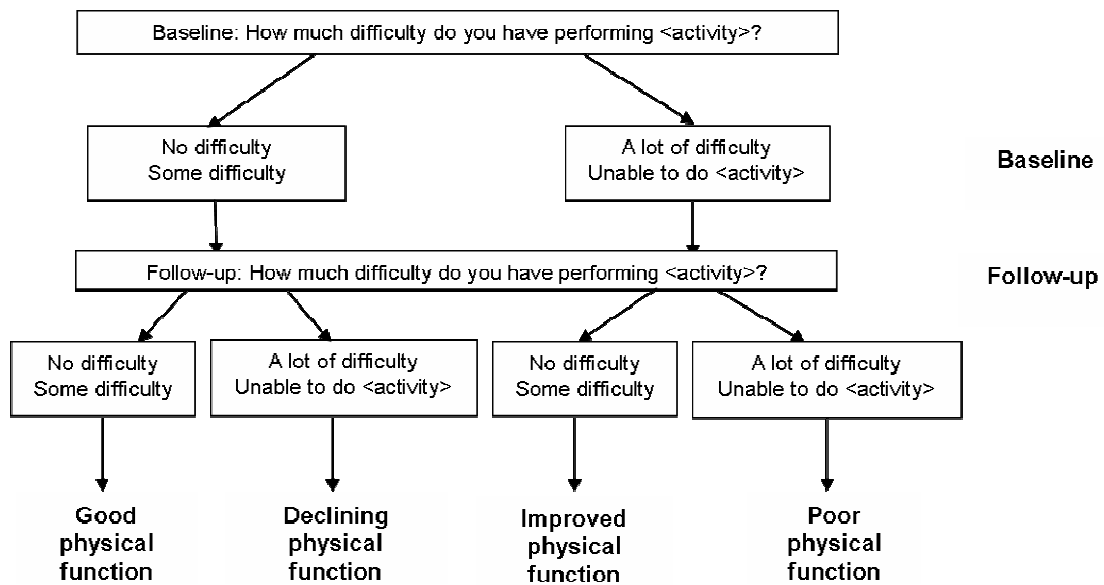


Figure 4.3.2. Determination of changes in cognitive status between baseline and follow-up assessments

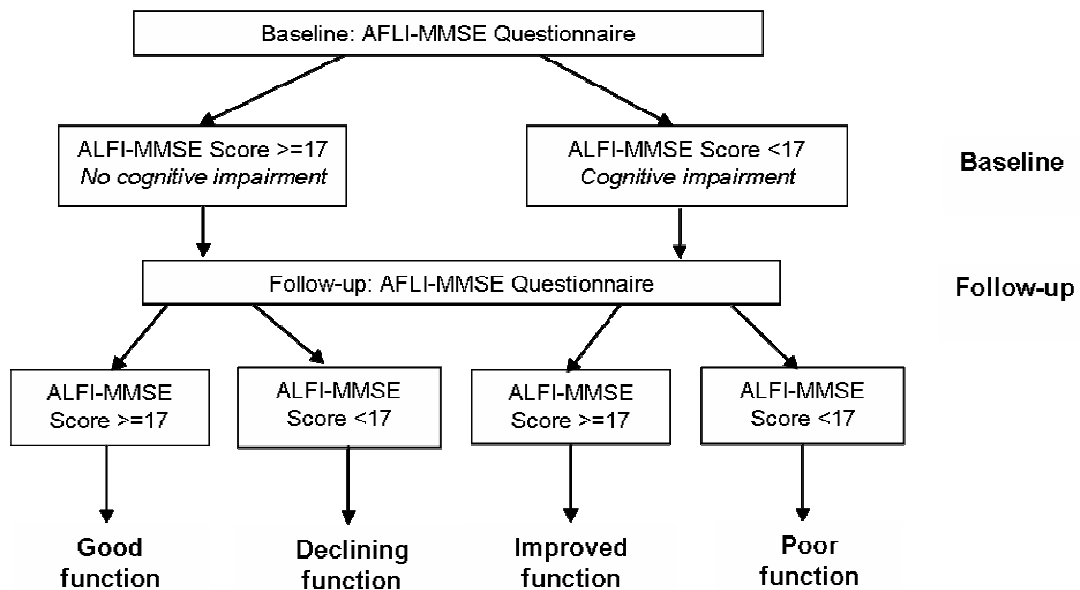


Figure 4.3.3. Commonly used health services by withdrawal status after 2 months

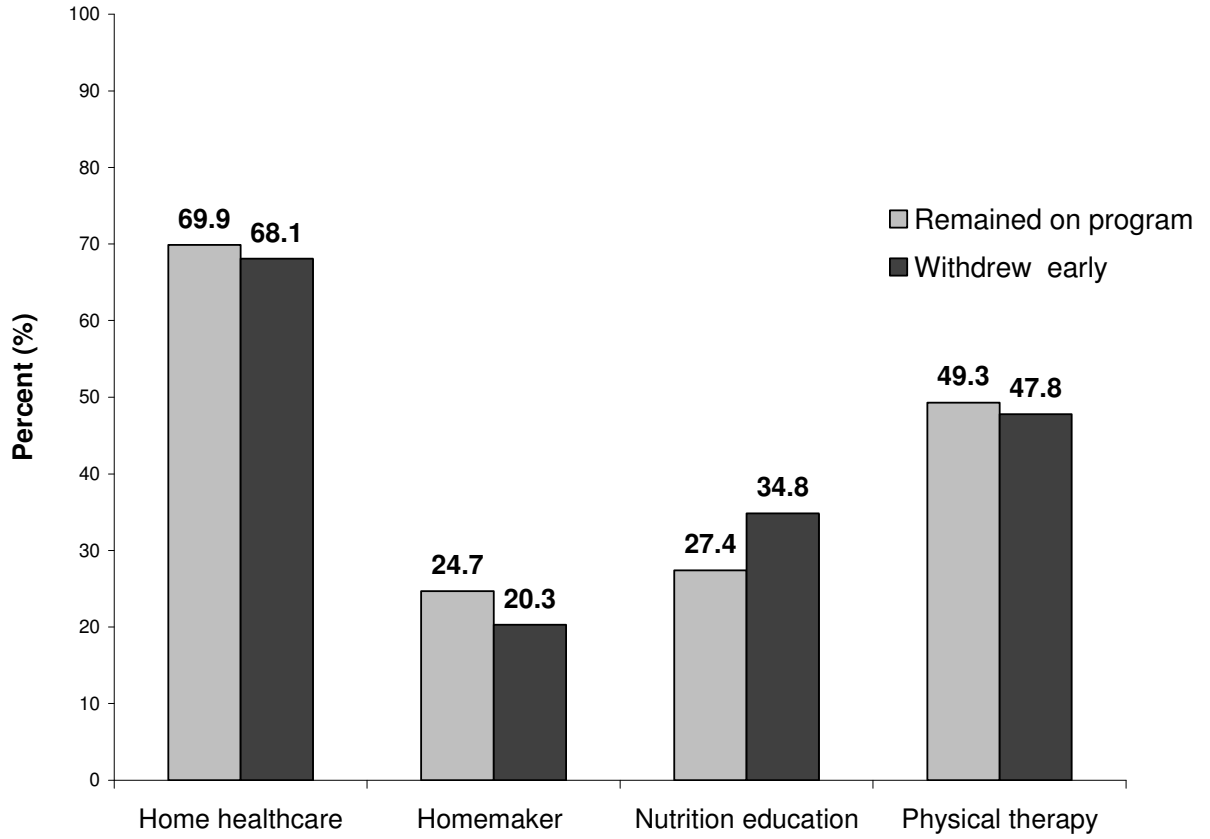


Table 4.3.4. Changes in health and functional status by program participation status at follow-up.

Characteristic	Remained on meal program n=146	Felt better & ended meals n=69	P
General/functional health status	%		
Self-reported health: improved at follow-up or remained good since baseline	61.0	69.6	NS
Cognitive status: improved at follow-up or remained unimpaired since baseline	85.6	92.8	NS
Depression status: improved at follow-up or remained asymptomatic since baseline	59.6	71.0	NS
Activities of daily living			
Bathing: improved at follow-up or remained functional since baseline	88.4	94.2	NS
Dressing/undressing: improved at follow-up or remained functional since baseline	98.0	100.0	NS
Caring for self: improved at follow-up or remained functional since baseline	98.6	100.0	NS
Toileting: improved at follow-up or remained functional since baseline	98.0	100.0	NS
Transferring: improved at follow-up or remained functional since baseline	96.0	100.0	NS
Walking: improved at follow-up or remained functional since baseline	93.2	97.1	NS
Eating: improved at follow-up or remained functional since baseline	98.6	97.1	NS
Instrumental activities of daily living			
Using the telephone: improved at follow-up or remained functional since baseline	98.6	100.0	NS
Preparing meals: improved at follow-up or remained functional since baseline	69.2	89.9	0.0009**
Taking medication: improved at follow-up or remained functional since baseline	96.6	100.0	NS
Managing money: improved at follow-up or remained functional since baseline	83.6	94.2	0.0304*
Shopping: improved at follow-up or remained functional since baseline	60.3	87.0	<0.0001**
Taking transportation: improved at follow-up or remained functional since baseline	93.8	100.0	NS
Doing laundry: improved at follow-up or remained functional since baseline	63.7	87.0	0.0004**
Doing housework: improved at follow-up or remained functional since baseline	54.8	87.0	<0.0001**

* p<0.05; ** p<0.01, NS (Not significant, p>0.05), for chi-squared test

Chapter 5: Summary and Implications

Summary

This dissertation used data from a demonstration project which studied the feasibility of improved coordination between healthcare and community-based organizations, to provide a continuum of care to older adults during transition from hospital to home. This dissertation examined: (1) the home food environment available to hospital discharged older adults, (2) the health and nutrition characteristics of hospital-discharged individuals with adverse changes in living arrangement and (3) characteristics of study participants who withdrew early from the home-delivered meal (HDM) program due to improved health and nutrition status.

The major findings of this dissertation suggest that among this sample of hospital-discharged older adults: (a) a great percentage had food available in the home but many were unable to use the food to prepare a meal; (b) those individuals who experienced adverse changes in living arrangement were more likely to report poor health and nutrition status, depressive symptoms, impaired cognition, and social isolation following hospital discharge; and (c) finally, those who maintained or restored their ability to accomplish food-related instrumental activities of daily living such as shopping and preparing meals were short-term users of home-delivered meals (HDM) and voluntarily withdrew from the program.

Older adults are at risk of declines in nutrition and health status following hospital discharge. The majority of Community Connections (CC) project participants had functional kitchen appliances and a variety of foods available following

hospitalization. However, a large percentage of older adults were unable to prepare meals or shop for food, if needed. Older adults unable to either shop or prepare meals may be at risk of poor dietary intake and dependence on formal and informal support (186,187). Thus, having access to ready-made home-delivered meals once home from the hospital, may reduce the potential impact of physical impairment on dietary intake and improve recovery from illness. For older adults with short-term nutrition needs, home-delivered meal services can bridge the gap until they become independent in shopping, preparing meals and housekeeping. In light of the limited awareness of community-based nutrition services among medical and nursing staff (75,100), including questions that assess nutrition status and the ability to obtain and prepare meals upon discharge may prompt referrals to appropriate community services.

A review of the literature suggests that screening tools to identify older adult patients in danger of hospital admission / readmission are limited in scope. The addition of questions that assess the functional, nutritional and social status of older adult patients at discharge, used together with existing discharge planning assessments, may assist hospital staff in developing comprehensive care plans that better address patient health and wellness needs post-hospital discharge. Homebound, hospital-discharged older adults and their caregivers may also benefit from referrals to in-home nutrition and nutrition-related services available in the community (i.e., HDM programs and homemaker services). These programs can provide much needed meals and assistance with food-related activities of daily living and domestic chores, respectively. Referrals to other community-based health and wellness programs such as mental health and senior transportation services, are also available through home-

delivered meal programs thereby establishing the HDM program as a central component of community-based long-term care services.

The current trend in shifting care from institutional- to community-based care will increase the demand for community-based nutrition services. Consequently, HDM programs will need to expand to serve more eligible older adults. Targeting hospital-discharged older adults can be beneficial to both individuals, community-based nutrition programs and the healthcare system as a whole because the timely receipt of meal services following hospital discharge may improve recovery and transition to community residence. Also, many older adults may need meal services only for a short time until they can become independent in food-related activities of daily living, thereby allowing more older adults to be served by the HDM program. Finally, receiving HDM may reduce experiences of malnutrition among older adults along the continuum of nutrition care and decreasing healthcare costs through reduced reinstitutionalization in this population.

Limitations and strengths

This study had several limitations, including the use of a convenience sample, the use of self-report in obtaining participant health data, and the reliance on home-delivered meal program staff for data collection. A convenience sample of hospital-discharged older adults was drawn from six HDM programs in six US states. In addition, criteria for selection of study participants included hospitalization due to an acute care problem, and return to a home residence immediately following hospital

discharge. As a result, our findings may not be generalized to all hospital-discharged older adults.

In addition, measures of physical function were based on self-report instead of using performance-based measures, which are considered superior to questionnaire-based, subjective measures (267). Performance-based measures have also been shown to elucidate more information than questionnaire-based methods and be predictive of negative health outcomes such as mortality, falls, and health service utilization (268). However, to minimize participant burden, questionnaires were used instead of performance-based measures.

For this study, 77 out of 566 (14%) respondents had a proxy provide health status information on their behalf. Older participants, those who had less than a high school education and those that lived with others were significantly ($p < 0.05$) more likely to use a proxy. Mixed results have been reported on the accuracy of information by proxy respondents. Past research has shown that responses to questions by proxy and primary respondents are not always in agreement (269,270) but a recent review of literature on survey research in older adults, Neumann et al. (271) suggests that proxy reports do show relatively good agreement with primary respondents regarding assessments of physical and functional status.

Another limitation to the results is social desirability - the tendency for respondents to answer questions in ways that present themselves in the best light to an interviewer (272). The impact of social desirability on the validity of responses increases with the age of the respondent and the sensitivity or emotiveness of the questions posed (273,274) thus it can be a salient issue when conducting survey

research among older adults. For this dissertation, several questions within the survey instruments administered may have been perceived as emotive by respondents. For example, two questions within the five-item Geriatric Depression Scale required respondents to evaluate if they feel 'worthless' and 'helpless'. Despite this, cognitive tests of these questions revealed that older adults were not offended (154), thus it is probable that accurate answers to these questions were obtained. Social desirability can also be a factor if respondents perceive the assessor as being a gate-keeper to resources or services they are interested in receiving (275). This is a particularly relevant to this study as project assessors represented the community agencies which provided meals to respondents. Despite this, past research has suggested that reliable information can be obtained using this data collection strategy if project assessors receive appropriate training (195). Since CC assessors did receive intensive training on standardized survey administration, it is likely that the impact of social desirability was minimized.

Despite these limitations, this dissertation has several areas of strength. This is the only study we are aware of that has evaluated the total home food environment of hospital-discharged older adults. Past researchers, such as Boumendjel et al. (197), have only examined a component of the home food storage environment in hospital-discharged older patients. Although statistically significant differences in hospital admission were seen between older adults who had empty refrigerators compared to those that had a full refrigerator, no information was collected on kitchen appliances, types of food available in other parts of the home or the condition of these foods.

In addition, this research was the first to our knowledge that examined associations between functional, nutritional and social isolation risk factors and adverse changes in living arrangement (or loss of community residence) in hospital-discharged older adults. Mainly, other researchers have evaluated risk factors for readmission in this population (20,172,233,276), however only a few have conducted research similar to this dissertation. These include Brunt et al. (141) and Howell et al. (277) who evaluated risk factors associated with continued residence in community-dwelling, and nursing home-discharged older adult populations (respectively) have examined determinants of community re-entry in older adults.

Extensive information was collected on the health status of hospital discharged older adults using validated and cognitively-tested screening tools. The use of cognitively-tested screening tools in research involving older adults is important due to the negative impact of age-related memory loss, misinterpretation of questions and social desirability on the quality of data obtained (278). This particular population under study may differ significantly from those used to develop the screening tools, thus reducing the validity of the data collected. Consequently, cognitive testing provides greater confidence in our use of these tools.

The CC study was a multi-state, multi-site endeavor. Data quality may have been adversely affected if data collection efforts were implemented differently in different sites. To ensure uniform administration of the data collection tools, all project assessors received training on standardized interviewing techniques specific to older adult respondents. To further ensure accurate data entry, all survey instruments were administered using computer-assisted personal interviewing software.

Implications

An outcome of this research is to raise awareness among policy-makers, nutrition and healthcare professionals about the challenges to recuperation faced by hospital-discharged older adults. There is much interest in rebalancing the long-term care model such that greater emphases are placed on the delivery of home- and community-based care instead of institutional care. However, providing timely access to older adults seeking community-based nutrition services following hospital discharge is challenged by gaps in the continuum of care. Little is known about the nutrition needs of hospital-discharged older adults. A review of commonly used discharge planning tools for older adult patients suggests that many lack specific questions for evaluating the presence of nutrition risk factors or nutrition-related diagnoses. In addition, hospital staff are often unaware of community-based nutrition services available for older adults. Other organizational issues typical in healthcare settings such as high caseloads and limited human resources limit the capacity for effective discharge planning consequently, referrals to appropriate community-based nutrition and wellness services are often not done. As a result, older adult patients and their caregivers are often left to seek out services on their own. To combat this, the Administration on Aging established Aging and Disability Resource Centers in 2003 throughout the country to assist older adults in seeking out needed services (88). These centers have made progress in establishing partnerships within the community to streamline access to long-term care information, and empower consumers to make informed healthcare choices. However their impact on rebalancing the long-term care system has yet to be established.

These gaps in the continuum of nutrition care provide ample opportunities for further research. For example, research is needed to evaluate the impact of nutrition screening and education for patients during discharge on the successful transition from hospital to home. Results of this dissertation have also identified functional, nutritional and social risk factors associated with negative health outcomes and adverse changes in living arrangement among community-dwelling older adults. It may be of interest to include these risk factors in a screening tool and evaluate the ability of the screening tool to predict program needs of hospital -discharged older adult.

An additional area for policy development includes the decision-making criteria used to identify older adults in need of community-based nutrition services. At this time, services are targeted to those older adults who are at risk of nursing home placement or those who are socially or economically vulnerable (144), however, medical disability is currently not a program priority or determinant of eligibility (25,279). This targeting framework limits the ability for recently hospitalized older adults, including those with short-term needs to participate in these programs. A re-examination of the targeting framework for community-based nutrition programs, recommended by several researchers (25,26), is needed to ensure that as many vulnerable older adults as possible are served, particularly those also at risk of reinstitutionalization.

Finally, for hospital-discharged, homebound older adults, the type and quantity of foods present in the home may have a significant impact on their nutrition and health status. Past research has suggested an important link between home food

stores and hospital readmission (197), thus, additional research is needed to better understand the home food environment of homebound older adults and its relationship to dietary intake, as well as the impact of formal and informal in-home nutrition support services used by older adults.

Appendices

Appendix A: Titles of the Older Americans Act

Section	Purpose
Title I: Declaration of Objectives	To outline ten board policy objectives that summarize the legislative intent of the Older Americans Act – to provide services that support the physical, mental and nutritional health of older adults, and their need for housing, employment, and community service.
Title II: Establishment of the Administration on Aging	To establish the Administration on Aging as the lead agency for planning and coordinating programs for older Americans offered through the aging network.
Title III: Grants for State and Community programs on Aging	To authorize long-range planning by State Units on Aging for the development of local programs that address the access, in-home, caregiver and community service needs of older adults. To establish the Disease Prevention and Health Promotion programs, the National Caregivers Support Program and Older Americans Act Nutrition program (previously named the Elderly Nutrition Program).
Title IV: Activities for Health, Independence, and Longevity (Research, Training and Demonstration Programs)	To authorize training, research, and demonstration projects to expand knowledge about aging and test program innovations for services and programs.
Title V: Community Service Senior Opportunities Act	To provide part-time employment for unemployed, low-income older adults 55 years of age or older.
Title VI: Grants for Services for Native Americans	To authorize funds for supportive and nutrition services for older Native Americans.
Title VII: Vulnerable Elder Rights Protection Activities	To authorize programs to prevent elder abuse, neglect and exploitation as well as a long-term care ombudsman program that investigates complaints by institutionalized older adults.

Adapted from: O’Shaughnessey, C.V. Older Americans Act of 1965 (The Basics). National Health Policy Form. George Washington University, Washington DC.

Appendix B: Institutional Review Board Approval Notification



UNIVERSITY OF
MARYLAND

INSTITUTIONAL REVIEW BOARD

2100 Lee Building
College Park, Maryland 20742-5121
301.405.4212 TEL 301.314.1475 FAX

October 1, 2004

INSTITUTIONAL REVIEW BOARD APPROVAL NOTIFICATION

TO: Dr. Nadine Sahyoun
Ucheoma Akobundu
Department of Nutrition and Food Science

PROJECT TITLE:
"Community Connections: Moving Seniors toward Wellness"

IRB/HSR PROTOCOL IDENTIFICATION NUMBER: 04-0432

EXEMPTION STATUS AND APPROVAL EXPIRATION DATE:
Non-Exempt; September 30, 2005

The Institutional Review Board (IRB) Co-Chairpersons concur with the departmental Human Subjects Review (HSR) Committee's recommendation to approve the application to conduct the above referenced project. The IRB has approved the application and the research involving human subjects described therein, subject to any requests which may have been made by the IRB to revise the application. We ask that any future communications with our office regarding this research reference the protocol identification number indicated above.

We also ask that you not make any changes to the approved protocol without first notifying and obtaining the approval of the IRB. Also, please report any deviations from the approved protocol to the Chairperson of your departmental HSRC. If you have any questions or concerns, please do not hesitate to contact either of us at irb@deans.umd.edu. Thank you.

ADDITIONAL INFORMATION REGARDING IRB/HSRC APPROVALS

EXPIRATION OF IRB APPROVAL—Approval of non-exempt projects expires one year after the official date of IRB approval; approval of exempt projects expires three years after that date. If you expect to be collecting or analyzing data after the expiration of IRB approval, please contact the HSRC Chairperson in your department about submitting a renewal application. **(PLEASE NOTE: If you are not collecting data from human subjects and any on-going data analysis does not increase the risk to subjects, a renewal application would not be necessary.)**

STUDENT RESEARCHERS—Unless otherwise requested, the IRB will send copies of approval paperwork to the supervising faculty researcher (or advisor) of a project. We ask that such persons pass on that paperwork or a copy to any student researchers working on that project. That paperwork may be needed by students in order to apply for graduation. **PLEASE BE ADVISED THAT THE IRB MAY NOT BE ABLE TO PROVIDE COPIES OF THAT PAPERWORK, particularly if several years have passed since the date of the original approval.**

Enclosures (where appropriate), will include stamped copy of informed consent forms included in application and any copies of the application not needed by the IRB; copies of this memorandum and any consent forms to be sent to the Chairperson of the Human Subjects Review Committee

Appendix C: Informed Consent Form

INITIALS: _____ DATE: _____

INFORMED CONSENT FORM

Identification of Project/Title	Community Connections: Moving Seniors toward Wellness
Statement of Age by Participant	I state that I am over 18 years of age and wish to participate in a research study conducted by the Meals on Wheels Association of America and the University of Maryland.
Purpose	The purpose of this study is to improve the timeliness of meal services received by hospital discharged older adults, and to include these meals as part of standard eldercare health services.
Procedures	I am required to participate in two in-home interviews (1-hour and 45-minutes long, respectively) and a short (10-minute) telephone interview. For the first two interviews, a trained interviewer will come to my home to ask me questions about my state of health, and questions about what personal or healthcare services I may need. I will be asked to follow instructions to perform simple tasks such as counting backwards, identifying objects and drawing. I am also required to allow the interviewer to assess the type, amount and nature of foods available in my kitchen and pantry, and assess the condition of the appliances in my home. The first interview will occur within a week after I agree to participate in the study and the second will occur 8 weeks later. During the second interview, I will be asked questions about my satisfaction with the services I received and my opinion of how appropriate and timely these services were. After 3 months I, or a person I designate as my proxy (i.e., a spouse or family member), will be asked a few questions by telephone about my state of health, living arrangements and about the nutrition and healthcare services that I have received.
Confidentiality	All the information collected in this study will remain confidential. The information collected may be used for publication and presentation purposes but my name or contact information will not link me to the answers I provide. My interviewer and local meal program director will be the only individuals that will have access to all the information given.
Risks	I am aware that the only personal risks of participating in this study are possible fatigue or tiredness that may occur from answering questions.
Benefits, Freedom to Withdraw & Ability to Ask Questions	I understand that by participating in this study, the information I provide will be used in the future to improve the meal and healthcare services offered to recently hospitalized older adults. I understand that I am free to ask questions and to withdraw from the study at any time without penalty.
Medical Care	The University of Maryland does not provide hospitalization or medical insurance for participants of this research study nor will the University of Maryland provide any compensation for any injury sustained as a result of participating in this research, except as required by law.

INITIALS: _____ DATE: _____

INFORMED CONSENT FORM

If I have any questions about the study, I am aware that I can contact the Principal Investigators:

Contact Information of Investigator(s)
Nadine Sahyoun, PhD, RD
Department of Nutrition and Food Science
0112 Skinner Hall
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Telephone: (301) 405-0775

For any questions about my rights as a research subject or reports of research-related injury, I am able to contact the:

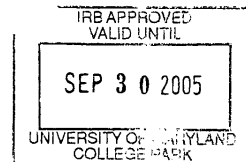
Contact Information of Institutional Review Board (IRB)
Institutional Review Board Office
University of Maryland
College Park, MD 20740
Email: irb@deans.umd.edu
Telephone: (301) 405-4212

I have read and understand this consent form, and I volunteer to participate in this research study. I understand that I will receive a copy of this form.

Name of Participant (please print): _____

Signature of Participant: _____

Date: _____



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