Research Proposal: A Quasi Experimental Study to Determine the Effects

of a Volunteer-Led Home-Based Nutrition, Physical Activity and

Social Support Program for Community Residing Older Adults

by

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Abstract

As the older adult population continues to grow, so do their health care needs. Yet, there is a lack of evidence to determine if a trained volunteer-led home nutrition intervention program can result in positive outcomes that influence the health of the geriatric population and reduce hospital readmissions. The purpose of this proposal is to recommend a study that utilizes trained volunteers to provide nutrition education, physical activity, and social support to community-residing older adults discharged from the hospital and at risk for malnutrition or are malnourished. It is hypothesized that the program will increase calorie and protein intake, physical activity minutes, quality of life score, and reduce hospital readmissions. The 16-week quasi-experimental study will have 323 participants. Data will be collected from food diaries, exercise logs, a questionnaire, and a hospital database. Anticipated results indicate the intervention group (IG) will significantly increase their average daily calorie intake ($p<.001$) compared to the comparison group (CG). The IG will have a significantly better quality of life score compared to the CG ($p=0.01$). No significant differences will be found in average daily protein intake, physical activity minutes, and hospital readmissions. The proposed study promotes the value of a non-traditional home nutrition intervention program and its ability to provide solutions to improve the health of community-residing older adults, specifically among those discharged from the hospital. The program can coincide with care provided by healthcare professionals.

Keywords: age in place, older adult, quality of life, nutrition education, volunteers

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Chapter 1: Introduction to the Study

Life expectancy in the United States has increased from 47 years in 1900 to 78 years in 2017 (Centers for Disease Control and Prevention [CDC], 2019). According to the Academy of Nutrition and Dietetics (2019), the number of older adults aged 65 and older in the United States is expected to increase to 74 million by 2030, accounting for 21% to 24% of the population. As this population sector continues to grow more resources will be needed to address the challenging needs of the geriatric population.

As people age, they are prone to the many changes that commonly occur within the normal aging process. These changes include age-related disease, functional impairment, and lack of physical activity which can interfere with an individual's nutritional status (Amarya et al., 2015). Inactivity often leads to reduced muscle tone and mass which can impair mobility and the ability to participate in activities of daily living (Amarya et al., 2015). Another factor that commonly occurs with aging includes disease development which can affect dietary intake. Many older adults have multiple chronic diseases that require medications that can reduce appetite or alter the taste of certain foods or beverages (Mahan & Raymond, 2017). Poor oral health and swallowing difficulties can affect the types of food consumed (Mahan & Raymond, 2017).

Aside from the many changes that occur with the aging process, limited means of transportation can hinder food access. This can also contribute to reduced dietary intake (Mahan & Raymond, 2017). In addition to reduced mobility to areas outside of the home, older adults may find themselves living alone or they may have little to no social support. Psychosocial factors such as social isolation and loneliness are common among those who live alone. These

individuals are more likely to eat alone and typically have marginal dietary intake (Porter Starr et al., 2015).

A combined reduction in dietary intake, lack of physical activity, and social interaction can increase the risk of malnutrition (Amarya et al., 2015). Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients (World Health Organization, 2020). It can be classified into the following conditions: undernutrition, such as wasting (low weight-for-height) stunting (low-height-for-age) and underweight (low weight-for-age), micronutrient-related malnutrition (lack of vitamins and minerals or excess), and overweight/obesity along with disease-related non-communicable diseases (heart disease, stroke, diabetes, and some cancers) (World Health Organization, 2020). Malnutrition in older adults can lead to a variety of health problems such as a reduced immune system that increases the risk for infection, delayed wound healing, reduced appetite, and muscle weakness that may result in falls and fractures (Amarya et al., 2015). Malnutrition can affect an individual's ability to recover from an acute medical condition, and if hospitalized leads to longer recovery times and length of stay (Barrett et al., 2018; Kaiser et al., 2010; Norman et al., 2008; Philipson et al., 2013; Porter Starr et al., 2015; Snider et al., 2014).

As many as 1 out of 2 older adults are at risk for malnutrition (Barrett et al., 2018; Kaiser et al., 2010; Norman et al., 2008; Philipson et al., 2013; Snider et al., 2014). Heersink et al. (2010) found that up to 20%-70% of older adults who are hospitalized are malnourished, while 49% of those recently discharged from the hospital are malnourished. Furthermore, those who are malnourished upon hospital discharge have a higher risk of mortality one year after hospitalization (Liu et al., 2002). Once discharged from the hospital back to the community, older adults are slow to return to their baseline nutritional status because they often experience

low nutritional intake, weight loss and limited dietetic follow up (Chen et al., 2009; Keller et al., 2018; Locher et al., 2008; Marshall et al., 2015; Rasheed & Woods, 2013). Therefore, it is important to focus on the type of home care provided to older adults once discharged from the hospital. This includes care in the form of nutrition, physical activity, and social support. A focus on these factors may improve dietary intake, activities of daily living, and quality of life, which may ultimately reduce hospital readmissions within this population group.

Background

Older adults tend to be hospitalized more often and have a longer length of stay when compared to younger adults. In 2017, the Administration for Community Living Profile of Older Americans (2018), reported that more than 7 million people aged 65 years or older stayed in the hospital overnight at least one night. Within this group, 11% stayed overnight one time, 3% stayed overnight twice, and 2 % stayed overnight three or more times within the year (Administration for Community Living, 2018). This is double the number of overnight stays for those aged 45-64 years old, with 6% who stayed overnight at least once, 1% stayed overnight on two occasions and 1% stayed overnight at least three or more times (Administration for Community Living, 2018). Goodman et al. (2013) found hospital readmissions affect one in six older adults on Medicare who are released from medical services and one in eight released after surgical procedures. The estimated cost of readmissions is more than 17 billion dollars (Rau, 2012). The high cost associated with readmissions prompted the passing of the Hospital Readmissions Reduction Program, a 2012 mandate of the Patient Protection and Affordable Care Act, to begin reducing payments to hospitals that have excess readmissions (Patient Protection and Affordable Care Act, 2010). The Academy of Nutrition and Dietetics partnered with national groups to form The Alliance to Advance Patient Nutrition. This organization focuses on

eliminating hospital malnutrition and advocates for proper nutritional interventions at discharge (Buys et al., 2017). National efforts are working toward both improving nutritional care provided to older adults while hospitalized and at discharge and decreasing the cost of readmissions.

Still, more work is needed to address the type of care provided to older adults post-discharge especially since many older adults are choosing to remain in the home. The term "aging in place" is often used to describe older adults who choose to remain in their home instead of retreating to a retirement community, assisted living facility, or nursing home (Porter Starr et al., 2015) According to the Federal Interagency Forum on Aging Related Statistics (2016), up to 96% percent of the geriatric population live in their own home or community-based housing and wish to remain there for as long as they can. With many older adults choosing to age in place, health care professionals play a vital role in connecting their elderly patients with available community resources such as a home-based nutrition intervention program.

Problem Statement

Overall, with more adults choosing to "age in place" efforts should focus on improving the nutritional, mental, and physical health of older adults who are discharged from the hospital and returned to home. Older adults are especially at risk for the consequences of malnutrition because once a malnourished older adult is discharged from the hospital their risk of subsequent hospitalization increases if adequate nutrition support is not provided post-discharge. Measures to improve nutritional status in the form of improved dietary intake, physical activity, and the quality of life can assist in allowing the older adult to remain in the home and potentially reduce the costs associated with institutional care and hospital readmissions. Yet, questions remain as to how to provide the best nutritional care to address needs. Luger et al. (2016) acknowledged the limited amount of healthcare professionals available in the community health care system that

can provide services to homebound older adults. Therefore, they've suggested the idea of a program that utilizes a "buddy" system. The buddy system uses trained volunteers to provide nutrition education, physical activity recommendations, and social support to malnourished older adults or those at risk of becoming malnourished (Luger et al., 2016). Unfortunately, since there has been little exploration of such a program, there is limited evidence to show that this type of program could be effective in reducing hospital readmissions as well as increasing calorie and protein intake, physical activity and quality of life improvements.

Purpose of the Study

The purpose of this quasi-experimental study is to determine if a program that utilizes a buddy system to provide nutrition education, physical activity recommendations, and social support to community-residing older adults who are at risk for malnutrition or are considered malnourished can result in outcomes pertinent to three specific areas of health. These areas include an increase in protein and calorie intake, physical activity, and quality of life. The study will also determine if the program can reduce hospital readmissions among older adults who have recently been discharged from the hospital.

Research Question 1

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average calorie intake between individuals who receive the program and those who do not?

Hypotheses

H_o: After four months there will be no significant difference in average calorie intake between individuals who receive a home-delivered volunteer-led nutrition education, physical

activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

H_a: After four months there will be a significant difference in average calorie intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home delivered volunteer-led nutrition education and social support program.

Research Question 2

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average protein intake between individuals who receive the program and those who do not.

Hypotheses

H_o: After four months there will be no significant difference in average protein intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

H_a: After four months there will a significant difference in average protein intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

Research Question 3

In older adults who are at risk for malnutrition, or are malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a greater number of minutes spent in physical activity between individuals who receive the program and those who do not?

Hypothesis

H_o: After four months there will be no significant difference in the number of physical activity minutes between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

H_a: After four months there will be a significant difference in the number of physical activity minutes between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

Research Question 4

In older adults who are at risk for malnutrition, or are malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a greater quality of life score between individuals who receive the program and those who do not?

Hypothesis

H_o: After four months there will be no significant difference in the quality of life score between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

H_a: After four months there will be a significant difference in the quality of life score between those who receive home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

Research Question 5

In older adults who are at risk for malnutrition, or are malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program reduce hospital readmissions between individuals who receive the program and those who do not?

Hypothesis

H_o: After four months there will be no significant difference in the number of hospital readmissions between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

H_a: After four months there will be a significant difference in the number of hospital readmissions between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program, and those who do not.

Nature of the Study

The proposed study will utilize a four-month quasi-experimental study design. It will compare the effects of a nutrition education, physical activity, and social support program provided by trained volunteers to the intervention group versus no formal nutrition education, physical activity, and social support provided to the comparison group. The study will determine if the program can result in several outcomes. These outcomes include determining if the average calorie and protein intake will be increased, a greater number of minutes spent being physically active will be achieved, a greater quality of life score will be attained and if hospital

readmissions will be reduced among the study participants specifically among those in the intervention group. Participants will be recruited at a local area hospital within a 6-12-month period, through an open enrollment process. If an insufficient number of participants is recruited within the 6-12-month time frame, then an additional six-month recruitment period will be added in hopes of generating a sufficient number of recruits. Upon recruitment the participants will be randomized to either the intervention or comparison group.

The primary outcomes of this study participants increasing their average calorie and protein intake along with physical activity participation as measured by the amount of time spent being physically active. Another primary outcome will be to determine if social interaction combined with dietary intake and physical activity can result in a greater quality of life score. The dietary, physical activity recommendations, and social support will be provided by the buddies. A secondary outcome will be the number of hospital readmissions. This study will have 1 independent and 5 dependent variables. For the continuous variables, a parametric t-test will be used to compare the results and determine if any significant differences exist between both groups as it relates to the daily average protein intake, calorie intake, the average number of physical activity minutes completed, and quality of life score. Hospital readmissions will be evaluated at 16 weeks, followed by a parametric t-test to determine if any significant difference exists between the groups.

Definitions

Body Mass Index (BMI): as measured by weight in kilograms divided by height in meters squared.

Buddy System: trained non-professional volunteers who deliver nutrition education, physical training and social support to prevent malnutrition, frailty, isolation and loneliness for older adults at home or who find it difficult to leave the house (Luger et al., 2016).

Comorbidity: the condition of having two or more diseases at the same time (National Institutes of Health [NIH] National Cancer Institute, n.d.).

Elderly: considered to be a person who is 65 years of age and older (Institute of Medicine, 1990).

Frailty*:* a clinical syndrome often used as an umbrella term to describe general health decline in the older adult. It can be categorized into four areas; impaired physical functioning, malnutrition, depression and cognitive impairment (Mahan & Raymond, 2017).

Frailty Instrument for Primary Care of the Survey of Health Aging and Retirement (SHARE-FI): an instrument used to assess frailty. It consists of the five items of exhaustion, loss of appetite, weakness, slowness and low physical activity (Luger et al., 2016).

Food Security: access to readily available supply of nutritionally adequate and safe foods programs (Mahan & Raymond)

Functional Status/Functionality: the ability to perform self-care, self-maintenance, and physical activities, correlates with independence and quality of life (Mahan & Raymond, 2017).

Geriatrics: the study of the chronic diseases frequently associated with aging, including diagnosis and treatment (Mahan & Raymond, 2017).

Health Related Quality of Life (HRQOL): an individual's or groups perceived physical and mental health over time (Centers for Disease Control and Prevention [CDC], 2018).

Home Care Taker: educated professionals that provide home care to the elderly (Lindegaard, et al., 2013)

Hospital readmissions: patient admission to a hospital within 30 days after being discharged from an earlier hospital stay (Mayo Clinic, n.d.).

Income: a gain or recurrent benefit usually measured in money that derives from capital or labor (Merriam-Webster, 2020).

Institutional: refers to services and specific benefits authorized in the Social Security Act. One of those services includes Nursing Facility (NF), which refers to skilled nursing, rehabilitation and long-term care facilities (Centers for Medicare & Medicaid Services, n.d.).

Living Arrangement: an older adult who lives alone or lives with others (Luger et al., 2016).

Malnutrition: deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. It can be classified into the following conditions: undernutrition, such as wasting, (low weight-for-height) stunting, (low-height-for-age) and underweight (low weight-for-age), micronutrient-related malnutrition (lack of vitamins and minerals or excess), and overweight/obesity along with disease-related non-communicable diseases (heart disease, stroke, diabetes, and some cancers) (World Health Organization, 2020)

Mini Nutritional Assessment Long Form *(MNA-LF)***:** a validated nutrition screening and assessment tool that can identify geriatric patients age 65 years and older who are malnourished or at risk of malnutrition (Nestle Nutrition Institute, n.d.).

Mini Nutritional Assessment Short Form (MNA-SF): a quick and validated nutrition screening tool used to identify elderly patients who are malnourished or at risk of malnutrition (Nestle Nutrition Institute, n.d.)

Nutrition Intervention: provided by the trained volunteers to the intervention group and will include recommendations to increase calorie and protein intake.

Nutritional Status: The state of a person's health in terms of the nutrients in his or her diet (National Institutes of Health [NIH]National Cancer Center, n.d.).

Nutrition Vulnerability: Predisposing factors (multiple medical conditions, physical inactivity, reduced dietary intake) that affect an individual's ability to respond to a stressor or illness (Porter Starr et al.,2015).

Older Adult: age 65, based on traditional retirement age (Mahan & Raymond, 2017).

Osteoporosis: a disease in which the density and quality of bone are reduced (International Osteoporosis Foundation, 2017).

Physical Therapist: a movement expert who improves the quality of life through prescribed exercise, hands-on care, and patient education (American Physical Therapy Association, 2020)

Physical Activity Intervention: provided by trained volunteers to the intervention group that includes physical activity on at least 2 days of the week. This includes walking (indoor or outdoor), outdoor yard work, indoor housework. Activities can include balance, shoulder, leg and arm exercises (National Institute on Aging, 2015).

Polypharmacy: Taking five or more medications or over-the-counter drugs daily (Mahan & Raymond, 2017).

Quality of Life: a general sense of happiness and satisfaction with one's life and environment (Mahan & Raymond, 2017).

Sarcopenia: the loss of muscle mass, strength and function (Mahan & Raymond, 2017).

Social Support: provided by the trained volunteers and will center around different topics of discussion. Potential topics include sports, current events, past and present accomplishments, favorite activities and favorite memories.

Undernutrition: a classification of malnutrition that includes wasting (low weight for height), stunting (low height for age) and underweight (low weight for age) age (World Health Organization, 2018).

Assumptions

The volunteer-led program will result in participants increasing their calorie and protein intake. The program will result in participants actively engaging in physical activity that ends in a greater quality of life score for the community-dwelling older adult. The number of hospital readmissions will be reduced in the intervention group and hospital readmissions will not be reduced in the comparison group. Another assumption is that there will be enough people willing to participate in the study. It's also assumed that the participants will provide honest answers to the questionnaires, physical activity log, and food record. Another assumption is the feasibility of the interventions and compliance with dietary and physical activity recommendations. A final assumption is that the study will be valuable in the field of dietetics and geriatrics as well as national hospital to home programs.

Limitations

There are several limitations to address. First, the proposed study design, quasi-experimental, will not be able to show causation in study outcomes, but rather, will only provide evidence of an association. Therefore, the study will not determine if the proposed intervention causes the outcome. Another limitation is the study sample is not entirely representative of the older adult population because of age limit constraints. The study will take place in Wisconsin and may not apply to older adults who live in areas of the United States outside the Midwest. Dietary, physical activity and social support data will be collected though self-report and is, therefore, subject to bias and reporting inaccuracies. The study will last four months and will not

be able to show long-term effects. To encourage social interaction the volunteers will be given a variety of topic ideas to generate discussion with study participants. This can create variations in social support outcomes because of the lack of a uniformed curriculum. Due to this variation, it will be difficult to determine which social support topics, if any, are associated with the quality of life score. If the study participant is hospitalized and a nutrition intervention is implemented, there will be no way to determine if the intervention had any influence on calorie and protein intake as well as hospital readmissions. Hospital intervention can be a potential confounder. Other confounding variables include socioeconomic status, food insecurity and access to healthcare or community resources. These components can affect the nutritional, physical, and mental health of the older adult. They may also affect hospital readmission and influence study outcomes. It's important to keep these confounding variables in mind because they not be measured and controlled for.

Delimitations

There are several delimitations to address in this research proposal. The first delimitation is the inclusion of older adults who are considered malnourished or at risk of malnourishment. The study will not pertain to otherwise healthy adults. A second delimitation is the inclusion of community-residing older adults and the exclusion of those who live in skilled nursing or long-term care facilities. A third delimitation includes age, as the proposed study only pertains to older adults between 65 and 75 years of age. Study results may not apply to individuals outside this age range. A fourth delimitation is the inclusion of only home-delivered, physical activity, and social interaction interventions. Interventions will not include those provided in the hospital. The possible effect of hospital interventions will be addressed in the discussion portion of the study. Finally, the HRQOL questionnaire is designed to be read to each participant. While the

volunteers will be instructed on how to administer the survey, they will not be trained professionals proficient in administering questionnaires.

Significance

Results from this study can fill an existing research gap by providing evidence-based support for a program that utilizes trained volunteers to reduce hospital readmissions while also reducing the costs associated with readmissions. First, this study can serve as a baseline for future studies that include a non-traditional approach to providing nutritional care to homebound older adults. Secondly, the proposed study can provide a potential and feasible healthcare program that can complement medical services provided by health care professionals. The study will promote the value of nutrition intervention and the registered dietitian's ability to teach nutrition to non-health care professionals and to proactively address nutritional deficiencies and improve dietary intake. Most importantly, study outcomes may illustrate how improved nutrition and mobility can result in improved quality of life for older adults, especially by decreasing hospital readmissions. The older adult may be able to remain in the home and avoid costs associated with provision of skilled nursing or long-term care facility.

Summary

Just as life expectancy has increased over the span of nearly 50 years, so has the number of older adults who chose to age in place. As this population sector continues to grow, more resources will be needed to address the challenging needs of this population group. Such needs include care provided to older adult's post hospital discharge, especially to those who are at risk for malnutrition or to those already considered malnourished. This proposed study aims to include trained volunteers as a resource to provide home health services and to determine

whether this method can positively affect the number of hospital readmissions among older adults.

The results from the proposed study can guide the development of future hospital-to-home care programs. The study can also promote the value of nutrition and services provided by registered dietitians by finding solutions to address malnutrition in older adults who are unable to easily leave home to access community resources. The next chapter will review the literature and evidence on home-based nutrition intervention programs provided to older adults considered malnourished or at risk for malnourishment and discharged from the hospital.

Chapter 2 Review of the Literature

Life expectancy in the United States has increased from 47 years in 1900 to 78 years in 2017 (Centers for Disease Control and Prevention [CDC], 2019). According to the Academy of Nutrition and Dietetics (2019), in 2014 older adults aged 65 and older accounted for 15 %, or 46 million of the total US population. This number is expected to increase to 74 million by 2030, accounting for 21% to 24% of the population. As this population sector continues to grow, more resources will be needed to address the challenging needs of the geriatric population.

As people age, they are prone to the many changes that commonly occur within the normal aging process. These include age-related disease, functional impairment, and lack of physical activity which can interfere with an individual's nutritional status (Amarya et al., 2015). Another factor that commonly occurs with aging includes disease development which can affect dietary intake. Many older adults have multiple medical conditions and require medications that can reduce appetite or alter the taste of certain foods and beverages (Mahan & Raymond, 2017). This can lead to reduced quality and quantity of dietary intake (Porter Starr et al., 2015). Medications can also alter the absorption and utilization of nutrients. Older adults may also have limited means of transportation which can hinder food access and contribute to low dietary intake (Mahan & Raymond, 2017). Other factors such as poor oral health, swallowing difficulties, and the emotional and financial burden of managing multiple chronic diseases all affect the nutritional status of the older adult (Mahan & Raymond, 2017).

Furthermore, a lack of physical activity is also a common age-related change within the elderly. Studies have shown that 70% of those aged 60-69 years often experience a lack of outdoor physical activity and this percentage increases with age (Amarya et al., 2015). Unfortunately, physical activity may be limited as a result of degenerative and chronic diseases

such as chronic obstructive airway disease and arthritis. A reduction in exercise often leads to reduced muscle tone and mass. This can negatively affect mobility and the ability to participate in activities of daily living (Amarya et al., 2015).

Ultimately these health factors can contribute to the development of malnutrition. As many as 1 out of 2 older adults is at risk for malnutrition (Barrett et al., 2018; Kaiser et al., 2010; Norman et al., 2008; Philipson et al., 2013; Snider et al., 2014). Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients (World Health Organization, 2020). It can be classified into the following conditions: undernutrition, such as wasting, (low weight-for-height) stunting, (low-height-for-age) and underweight (low weight-for-age), micronutrient-related malnutrition (lack of vitamins and minerals or excess), and overweight/obesity along with disease-related non-communicable diseases (heart disease, stroke, diabetes, and some cancers) (World Health Organization, 2020). Malnutrition in older adults can lead to a variety of health problems such as a reduced immune system that increases the risk for infection, delayed wound healing, reduced appetite, muscle weakness that may result in falls and fractures (Amarya et al., 2015). Additionally, malnutrition can affect an individual's ability to recover from an acute medical condition and, if hospitalized, leads to longer recovery times and length of stay.

Older adults, compared to younger adults, tend to be hospitalized more often and have a longer length of stay. According to the Administration for Community Living Profile of Older Americans report (2018), in 2017 more than 7 million people aged 65 years or older stayed in the hospital overnight at least one night. Among this group, 11% stayed overnight one time, 3% stayed overnight twice, and 2 % stayed overnight three or more times within the year. This is double the number of overnight stays for those aged 45-64 years old. More specifically, 6%

stayed overnight at least once, 1% stayed overnight on two occasions, and 1% stayed overnight

at least three or more times (Administration for Community Living, 2018). Goodman et al.

(2013) found hospital readmissions affect one in six older adults on Medicare who have been

released from medical services and one in eight released after surgical procedures. The estimated

cost of readmissions is more than 17 billion dollars (Rau, 2012). The high cost associated with

readmissions has prompted the passage of the Hospital Readmissions Reduction Program, a 2012

mandate of the Patient Protection and Affordable Care Act, to begin reducing payments to

hospitals that have excess readmissions (Patient Protection and Affordable Care Act, 2010). The

Academy of Nutrition and Dietetics partnered with national groups to form The Alliance to

Advance Patient Nutrition. This organization focuses on eliminating hospital malnutrition as well

as advocating for proper nutritional interventions at discharge (Buys et al., 2017). National

efforts are working toward improving nutritional care provided to older adults both while

hospitalized and upon discharge, as well as decreasing costs associated with readmissions.

Still, more work is needed to address the care provided to the geriatric population post-

discharge. Factors such as inadequate discharge planning, poor communication between hospital

healthcare personnel and community clinicians, and lack of effective long-term community-

based care are often common practices often experienced by older adults (Goodman et al., 2013).

Such behaviors increase hospital readmission risk. Once discharged from the hospital to the

community, older adults are slow to return to their baseline nutritional status because they often

experience low nutritional intake, weight loss and limited dietetic follow up (Chen et al., 2009;

Keller et al., 2018; Lochler et al., 2008; Marshall et al., 2015; Rasheed & Woods, 2013;).

A growing amount of research has focused on the type of nutritional care provided to

older adults once they are home. The US Department of Health and Human Services and the

United States Department of Agriculture (USDA) Food and Nutrition programs have proposed

specific outcomes designed to improve the nutritional care provided to older adults. One of those

outcomes involves decreasing the number of avoidable admissions to hospitals and re-

admissions through integrated services and identification of malnutrition risk during transitions

of care (Saffel-Shrier et al., 2019). Heersink et al. (2010) found that up to 20%-70% of older

adults who are hospitalized are malnourished, while 49% of those recently discharged from the

hospital are malnourished. Furthermore, those who are malnourished upon hospital discharge

have a higher risk of mortality one year after hospitalization (Liu et al., 2002).

Concerns about malnutrition and nutritional care provided after discharge have prompted

some hospitals in the United States to include hospital-to-home transition programs that may

include home-delivered meals, but a systemic review found no effect of home-delivered meals

on hospital readmissions (Campbell et al., 2015; Oria et al.,2016). Therefore, questions remain as

to how to provide nutritional care that would effectively reduce readmission risk. Other questions

that remain include how to provide older adults with home nutritional care that address factors

that affect their nutritional status. These factors include a lack of physical activity, reduced

dietary intake, and social isolation. Winzer et al. (2019) has focused on interventions that include

increased protein intake, physical activity, and social support as a means to drive behavior

change. These interventions could be delivered in either a group or a face-to-face setting (Wizner

et al., 2019). "Buddy style" interventions, however, have also been studied to determine their

effect on inducing behavior change within the community-residing healthy, older adult

population that is considered malnourished or at risk for malnutrition (Winzer et al., 2019). The

term "buddy style" interventions refers to use of trained volunteers who provide individuals who

live alone, or with others, social support as well as basic education on health topics such as nutrition and exercise (Luger et al., 2016).

Unfortunately, there's no consensus on the current evidence that targets a specific nutrition intervention, physical activity, or social support program for homebound malnourished older adults. Part of the reason for this is because older adults are a heterogeneous group. Some individuals live alone or have a caregiver who helps them participate and manage activities of daily living. Others reside with relatives, and some may live alone with no form of social support or contact. Additionally, multiple diseases such as congestive heart failure (CHF), Chronic Obstructive Pulmonary Disease (COPD), diabetes, and renal disease can affect this population group; therefore, specific interventions that target these conditions can be tricky. The trend for nutrition interventions and its effects on hospital readmissions include a focus on home-delivered meals, nutrition counseling that emphasizes goal setting, and increased energy/protein intake either in the form of whole food or oral nutrition supplements (ONS) (Beck et al., 2013; Campbell et al., 2015; Lindegaard et al., 2017; Terp et al., 2018; Young et al., 2018). Interventions are typically provided by the Registered Dietitian (RD) or Registered Nurse (RN) and are directed toward the older adult, or the caregiver, with communication done by phone or home visit (Beck et al., 2013; Lindegaard et al., 2017; Terp et al., 2018; Young et al., 2018).

While the trend for nutrition interventions focuses on care provided by health care professionals, Luger et al. (2016) acknowledged the limited number of healthcare professionals available in the community health care system that can provide services to homebound older adults. As a result, the focus has shifted to a trained buddy style intervention program that could provide basic healthcare services, with professional health care support, to older adults who reside at home. However, a lack of evidence exists to determine if a "buddy style" program that

focuses on nutrition education, physical activity, and social support could be effective in reducing hospital readmissions.

The objectives of this literature review include the following: Analyze existing evidence on the effectiveness of home-based nutritional interventions provided to malnourished older adults post-discharge, as measured by hospital readmission, nutrition, and functional status; evaluate existing evidence that utilizes a "buddy system" that works to provide nutrition education, physical activity, and social support to homebound older adults at risk for malnutrition or who are malnourished; and review the motivation and barriers that influence food choice among homebound older adults in relation to nutrition education curriculum design.

Literature Research Strategy

Initially, at the start of this research process, key search topics included "older adults", "post-acute care", "home-based nutrition", "protein intake" and "malnutrition". These terms were entered into the EBSCO host (Academic Search Premier and CINAHL) and PubMed research databases. This search generated many articles that included research on home-delivered meals, malnutrition in older adults, and protein intake in older adults who reside in long-term care facilities. An article on nutritional care provided to older adults once discharged from an acute rehab center was also included. For a short time, this shifted the focus to research topics related to home nutritional care provided to older adults once discharged from an acute rehab facility. Unfortunately, there was limited research available on this topic.

After reading multiple articles from the initial search, and through personal work experience the research topic shifted towards the type of nutritional care provided to older adults once discharged from the hospital. New search terms included "malnutrition and hospitalized older adults 65 years and older and readmissions," "home-based nutrition and hospital

readmissions," "frailty and older adults 65 years and older and readmissions." Finally, as the

research topic was narrowed down, key search terms included "physical activity and older adults

65 years and older," "social support/quality of life and older adults 65 years and older," and

"malnutrition and home-based care and older adults 65+ years and older." As research continued,

more articles were found from literature reviews, meta-analysis, and research studies.

Eventually, PubMed and EBSCO host (Academic Search Premier) served as the primary

databases.

Background

According to the Federal Interagency Forum on Aging Related Statistics (2016), up to

96% percent of the geriatric population live in their own home or community-based housing and

wish to remain there for as long as they can. The phrase to describe older adults who chose to

remain in the home instead of living in a retirement community, assisted living or nursing home

is often referred to as "aging in place" (Porter Star et al., 2015). The decision to remain in the

home can provide emotional stability and cost-saving benefits. By remaining in the home, the

adult can maintain a sense of independence. Additionally, less money is spent on institutional

care, which can benefit the family as well as government and health systems (Office of Public

Policy Development and Research, 2013) According to the Office of Public Policy Development

and Research (2013), from 2004 to 2007 the median monthly cost of institutional care, such as

care provided in a nursing home was $5,243, compared to $928 spent in non-institutional care as

the cost of institutionalized care continues to rise. In 2016, the national average cost of a semi-

private room in a nursing home was more $6,000 per month and a private room cost more than

$7,000 a month (U.S. Department of Health and Human Services, 2020). Approximately one-

fifth of nursing home expenses are paid out of pocket, the remainder of the costs is either paid

through Medicaid, Medicare, or private insurance (Office of Public Policy Development and Research, 2013).

Measures to improve nutritional status in the form of improved dietary intake, physical activity, and quality of life can assist in allowing older adults to remain in the home and potentially reduce the costs associated with institutionalized care and hospital readmissions. Healthcare professionals play a vital role in connecting their elderly patients with available community resources, such as a home-based nutrition intervention program.

Nutritional Vulnerability and Social Support

Individuals who choose to remain in the home are prone to "nutritional vulnerability" which can be described as predisposing factors (multiple medical conditions, physical inactivity, reduced dietary intake) that affect an individual's ability to respond to a stressor or illness (Porter Starr et al., 2015). For example, if an individual becomes sick with the flu it may take longer to recover from the illness or the individual may not be able to fully recover to the health status they were in before they became sick. Psychosocial factors such as depression, social isolation, and loneliness are common among older adults especially in those who live alone and can contribute to nutritional vulnerability. Individuals with limited social interaction tend to eat alone and typically have marginal dietary intake (Porter Starr et al., 2015). This is most prevalent in single or widowed older men. They often lack the cooking skills to prepare food and tend to have minimal close social relationships outside of their spouse (Porter Starr et al., 2015).

The value of social support in the form of relationships with others has been extensively studied by Harvard researchers for more than 80 years (Waldinger, 2015). The Harvard Study of Adult Development began in 1938 and has tracked the lives of more than 700 men from inner-city Boston and Harvard University (Waldinger, 2015). The study was designed to examine the

lives of the participants by collecting information related to work, home life, and health (Waldinger, 2015). Waldinger et al. (2015) continues to collect information from the original cohort, especially those who are still living today as well as their offspring. Key findings suggest that individuals with strong social connections through family, friends, and community tend to be happier, healthier, and live longer (Waldinger, 2015). In contrast, those with less social connections who find themselves isolated often experience loneliness, are less happy, and live shorter lives (Waldinger, 2015). The findings from this study emphasize the value of relationships and how social connections with others can lead to a happier and healthier life. A lack of, or limited, social support can not only lead to reduced dietary intake but can negatively affect mental health and overall quality of life. Future nutrition programs that provide nutrition education to homebound older adults, especially those who live alone should consider the social aspect as a valuable asset to any education or nutrition program because of its effects on health and wellbeing.

Physical Activity

Body composition changes occur with aging. Older adults tend to experience a decrease in muscle mass and an increase in body fat. Among the elderly, a lack of physical activity can exacerbate the loss of muscle mass and lead to a decrease in energy intake (Amarya et al., 2015). This loss can also lead to the development of sarcopenia and can significantly affect an older adult's quality of life by limiting mobility. It can also increase the risk of falls, which further limits mobility (Mahan & Raymond, 2017). Older adults are also prone to loss of bone density, which can lead to the development of osteoporosis. Regular physical activity and weight-bearing exercises can work to delay and prevent the development of osteoporosis and sarcopenia (Mahan & Raymond, 2017). Malnourished older adults, and even those at risk for malnutrition increase

their chances of developing osteoporosis and sarcopenia especially as their quality and quantity of dietary intake decrease.

Since living at home continues to be a desirable option for most older adults, nutrition education programs should focus on including a physical activity component that incorporates easy strength training exercises that can be done at home. An increase in physical function can support an older adult's independence by improving mobility that allows the individual to manage activities of daily living without assistance while enhancing the quality of life and delay the need for care provided in a nursing home (Niemela et al., 2011).

Nutrition Interventions and Hospital Readmission

As malnutrition becomes prevalent within the hospitalized elderly population, more studies have begun to evaluate the effects of post-discharge care provided to older adults who are found to be malnourished or at risk for malnutrition upon hospital discharge. Specifically, if these programs are effective at reducing hospital readmissions as well as improving nutritional and functional status.

In addition to readmissions, Beck et al. (2013) and Young et al. (2018) acknowledged the importance of weight gain, weight maintenance, and functional status and how these can affect hospital readmissions because of their influence on overall health and wellbeing. While Lindegaard et al. (2017) acknowledged the importance of nutrition and meal behavior to improve appetite and food intake, weight change nor functional status was a measured outcome and instead, hospital readmissions remained a primary focus.

Beck et al. (2013), Lindegaard et al. (2017), and Young et al. (2018) utilized RDs to provide discharge follow up care either through telephone or home visits. The majority of nutritional care consisted of estimated protein and energy needs, nutrition counseling, and goal

setting, along with individualized diet plans, referral to meals on wheels, and prescription orders for oral nutrition supplements (Beck et al., 2013; Lindegaard et al., 2017; Young et al., 2018).

Each intervention was implemented post-hospital discharge and lasted anywhere between 4 to 9 weeks with readmission status evaluated at 9, 12, and 26 weeks (Beck et al., 2013; Lindegaard et al., 2017; Young et al., 2018). Beck et al. (2013) implemented nutrition interventions to study participants with and without the assistance of General Practitioners (GPs). Lindegaard et al. (2017) and Young et al. (2018) provided nutrition intervention to study participants, family members, and caretakers.

Beck et al. (2013) found that even though the intervention group had fewer readmissions as 26 weeks post-discharge, it was not statistically significant when compared with the control group. A significantly greater improvement in mobility was seen in the intervention group versus control. A significant increase in nutritional status concerning weight change, mean energy, and protein intake was seen in the intervention group. In contrast, nutritional status remained unchanged in the control group. The intervention group also had a higher significant intake of oral nutrition supplements (ONS) compared to the control group. It is important to note that there was a higher participation rate in the intervention group than in the control group.

Young et al. (2018) found no significant differences in nutritional status (weight gain and MNA score) between the control and intervention groups. However, the intervention group was able to maintain weight; the control group lost 1 kg of weight (Young et al., 2018). The intervention group had a significant improvement in walk speed compared to the control group. Additionally, no significant differences were found between both groups regarding unplanned hospital readmissions.

On the other hand, Lindegaard et al. (2017) found that after 30- and 90-days post-discharge, the home visit (HV) group had a lower percentage of readmissions and readmission risk when comparing those who received RD follow-up over the phone and those in the control group who did not receive any RD follow-up. This study resulted in low participation rates among home care staff as well.

The research on whether post-discharge nutrition programs can reduce hospital readmissions remains inconclusive, with two studies indicating no effect and the other indicating a reduction in readmissions and risk. However, results suggest that individualized nutrition counseling provided by the RD may result in improved weight gain, weight maintenance, energy, protein intake, and mobility. These effects could also be attributed to the use of ONS, with a higher percentage of intake in the intervention group compared to the control group (Beck et al., 2013; Young et al., 2017). Still, improvement in nutritional health may ultimately reduce the risk of malnutrition. Older adults are especially at risk for the consequences of malnutrition because once a malnourished older adult is discharged from the hospital their risk of subsequent hospitalization will increase if not provided with adequate nutrition support post-discharge. Hospital discharge programs that provide dietetic follow up to fill in the need to provide more home support to individuals who chose to remain in the home, even if such programs are implemented by other important health care professionals such as RNs.

RD Designed and Registered Nurse (RN) Implemented Nutrition Intervention

Registered Dietitians play a valuable role in improving the nutritional status of their patients or clients. They can create dietary interventions that can be implemented by other health care professionals like RNs, but still provide support if needed. Collaboration between both health care professions is key to improving the health of an individual because many factors

affect the health and wellness of older adults that extend beyond what nutritional expertise and services can provide.

Terp et al. (2018) conducted a 12-week randomized controlled trial on older adults identified as at nutritional risk to determine if a nutrition intervention program could result in improved nutritional, functional status, and self-rated health; reduced hospital readmission rates; and mortality. During hospitalization, the RD provided dietary advice and a dietary plan for both the control and intervention groups (Terp et al., 2018). Additionally, for those in the intervention group the dietary plan was individualized and based on food choices and preferences for each participant to be utilized upon arrival home (Terp et al., 2018). The control group received no follow-up care. After one day of nutrition education training provided in the hospital, the nursing staff implemented the dietary plans in the intervention group (Terp et al., 2018). A referral to hospital clinical dietitians was made if a decline in nutritional status (declined dietary intake) was evident (Terp et al., 2018).

The intervention group had significant weight gain compared to the control group. A significant improvement was also seen in the intervention group concerning self-rated health when compared to the control group. The intervention group, however, was prescribed more anti-depressants compared to the control group which could explain their improvement in self-rated health (Terp et al., 2018). The use of more anti-depressants could also explain their improvement in weight gain because certain anti-depressants are associated with weight gain. Almost 100% of participants consumed such medications (Terp et al., 2018). No significant differences were found between each group in functional status, mortality, and readmission rates (Terp et al., 2018).

Terp et al. (2018) found a hospital-to-home nutrition program that utilizes RDs to develop nutrition interventions that could be implemented from the hospital to home but implemented by other members of the health care team such as RNs. RDs can provide support by way of referrals and adjustments to individualized dietary plans. It is important to control for medications, though, because they can cause the investigator to overestimate results and make it difficult to determine whether or not outcomes are a result of the intervention. Registered Nurses were only provided one day's worth of nutrition education training and Terp et al. (2018) did not provide any details as to what constituted dietary counseling.

Still, the transition from hospital to home is often associated with limited dietetic follow up; this exacerbates the nutritional health of the individual especially if the patient is at nutritional risk. While RNs can implement individualized dietary plans with RD support, perhaps the RD's value and support can be utilized in other ways such as through training of basic nutrition education topics provided to non-healthcare professionals.

Application of a "Buddy System"

Lugar et al. (2016) acknowledged the limited amount of healthcare professionals available in the community health care system that can provide services to homebound older adults. Therefore, they've suggested the idea of a program that utilizes a "buddy" system that utilizes trained individuals to provide basic health care services, but with professional health care support.

Luger et al. (2016) conducted a 12-week randomized controlled trial where volunteers were trained by a nutritionist and physiotherapist in basic knowledge regarding frailty and malnutrition, nutrition-related topics, strength training, and psychological issues. If needed, the buddies had an opportunity to call the nutritionist and physiotherapist for advice. For those in the

intervention group, the buddies discussed ideas on how to enrich foods with protein along with high calorie and protein recipes. They also provided strength training exercises and implemented individual goal setting. Participants in the control group only received social support from the buddies in the form of companionship (Luger et al., 2016).

A significant increase in the Mini Nutrition Assessment Long Form (MNA-LF) score was seen in the intervention group and indicated an improvement in nutritional status compared to the control group. Both groups saw improvement in frailty status as measured by the Frailty Instrument for Primary Care of the Survey of Health, Ageing, and Retirement in Europe (SHARE-FI DFS) score, but no significant differences were found between both groups. Luger et al. (2016) found a home-health physical activity, nutrition and social support program conducted by non-healthcare professionals can improve nutritional and frailty status among older adults who live at home.

An important aspect of this study is the use of social support because older adults may suffer from social isolation and become depressed. This can affect their appetite and reduce oral intake, therefore increasing their risk for malnutrition or frailty. Luger et al. (2016), however, acknowledged that while the buddies were advised to not discuss nutrition or physical activity with individuals in the control group topics, they couldn't exclude the possibility that nutrition topics and physical activity may have been performed during home visits (Luger et al., 2016).

Any nutrition education program that models the use of a buddy system should include a way to measure adherence to program requirements; however, results indicate a nutrition education, physical activity, and social support program could be implemented and used as a model for future nutrition intervention programs to older adults discharged from hospital services. The program could be also utilized in conjunction with care provided by health care

professionals.

Application of a "Buddy System" and Behavior Change

It is one thing to provide basic health education to interested patients or clients, but it is another to induce behavior change. As an expansion from the previous study, Winzer et al. (2019) sought to determine if buddy style interventions, compared to social support alone, could produce behavior change in physical activity and dietary intake. The interventions followed the same format as the previous study except this time, Winzer et al. (2019) assessed dietary and physical activity adherence behavior through a self-reported food frequency and physical activity questionnaire. Furthermore, participant program adherence was measured via documentation forms completed by the buddies (Winzer et al., 2019).

The intervention group showed a significant increase in walking time outside, muscle strength exercise, light sports, and moderate sports when compared to the intervention group. A significant improvement in the amount of time spent, at least 10 minutes, in these activities was also seen (Winzer et al., 2019). The intervention group significantly increased their portion of legumes and nuts consumed per day as well as their fluid intake when compared with the control group (Winzer, et al., 2019). For both groups, there were no significant improvements in adherence to daily intake recommendations (Winzer, et al., 2019). Finally, the intervention group had a higher overall mean adherence rate compared to the control group (Winzer et al., 2019).

Overall, most improvements were seen in the intervention group as opposed to the control, which should not be surprising since the control group only received social support. Even though more significant improvements were seen in physical activity recommendations, the same could not be said for adherence to dietary recommendations. Winzer et al. (2019) acknowledged this could be due to poor oral health because the emphasis was placed on protein

sources such as meat, fish, and dairy products which may have been difficult for the participants to chew. Other factors that may have affected meal intake include affordability, altered taste of foods, decreased appetite, and early satiety. These are all common factors that influence dietary intake in this population group (Winzer et al., 2019). These factors should be considered when designing nutrition interventions because they can help estimate the acceptability and likelihood that the interventions will be effective in improving the individual's nutritional health. It is also important to understand what other factors influence food choices among the geriatric population. This can help guide and develop future nutrition education programs or interventions by targeting specific motivations and barriers that are commonly experienced within the older adult population.

Motivation and Barriers of Dietary Intake

Knowledge of the factors that either motivate or inhibit food choice can assist with designing nutrition interventions. Such factors can address and provide solutions to common barriers that influence dietary intake among older adults. The additional knowledge can also tailor interventions that are based upon the individual's food choices, social demographic characteristics, and other important factors that affect that particular individual or group. Locher et al. (2009) conducted an observational study that evaluated motivations and perceived barriers that influence dietary intake and the quality of dietary intake in homebound older adults. Social demographic characteristics, food security, and diet quality were also assessed to determine their influence, if any, on food choice.

There were no significant differences between the groups with regard to motivations and barriers that influenced food choice, regardless of social-demographic characteristics (age, gender, ethnicity, marital status, and living arrangement) (Locher et al., 2009). The top and most

important factors that motivated food choices, however, included sensory appeal, convenience, and price (Locher et al., 2009). The least important factors were ethical concerns, mood, and food's natural content (Locher et al., 2009). The most common barriers to consuming desired food and meals were health, special diet restrictions, and the inability to shop for oneself (Locher et al., 2009). The least common barriers were not having the right cooking equipment or facilities, inability to physically feed oneself, and others eating with them (Locher et al., 2009). Locher et al. (2009) also found that older people, were less likely to perceive health, special diet, people eating with them, feeling sad or blue, tired, or weak as a barrier to food choices (Locher et al., 2009).

From personal experience, most older adults especially those in their 80s-90s, tend to eat what they want regardless of the health or non-health benefits. Sahyoun et al. (2004) found the most effective nutrition interventions for older adults are those that include the individual in making food choices based upon personal preferences. Any potential dietary changes should be communicated to the older adult with encouragement, and the older adult should be invited to participate by providing input about favorite foods and what he/she is willing to do or try (Sahyoun et al., 2004). This can also help ensure compliance with dietary recommendations. The value of individualized nutrition interventions is evident in the study findings because social demographic factors were not a significant influence on motivations and barriers that influenced food choice. Locher et al. (2009) emphasized the importance of focusing on the individual rather than making assumptions about factors that motivate or inhibit food choice based on an individual's socio-demographic characteristics.

Even though the value of individualized nutrition interventions should be acknowledged and recognized, it is important to understand other factors that affect dietary intake among the

homebound older adult population. For example, the price of a food item was a top motivator for food choice, while the inability to shop for oneself was a common barrier. Future interventions that target easy and affordable foods, and perhaps include caregivers, should be considered. Interventions, however, should be tailored to meet an individual's needs and based upon the individual's food preference along with continuous input from the individual.

Summary of Evidence

Based on the studies that evaluated hospital readmissions the evidence remains inconclusive as to whether or not nutrition interventions designed to improve energy and protein, intake, along with weight gain, and functional status can reduce hospital readmissions. Beck et al. (2013) found eight weeks of follow up home visits provided by the RD, in collaboration with the GP (in some cases), can improve weight gain, protein, and energy intake, despite the inability to reduce hospital readmissions. Young et al. (2018) found a six-week home dietetic follow up program, either through home visits or by telephone resulted in weight maintenance as well as improvement in walk speed. Perhaps better improvements may have been seen if the study duration had been longer.

Lindegaard et al. (2017) demonstrated the value of nutrition intervention to reduce hospital readmissions at 60 and 90 days, but with favorable results when interventions were conducted in person instead of over the phone. Lindegaard et al. (2017) measured home care staff adherence to dietary interventions and found poor overall adherence to nutrition recommendations. This is discouraging because home health aides are considered caregivers for older adults and their cooperation is key to improving the health of the individual they care for. The role of the home health aide remains to be seen and questions remain on how his role affects the nutritional health of the older adult

Terp et al. (2018) found nutrition interventions created by an RD and implemented by RNs could result in weight gain along with improvement in self-rated health in individuals identified as at nutritional risk, but it had no significant effect on hospital readmissions or functional status. The weight increase may also be related to anti-depressant medications that are known to cause weight gain because more than 90% of antidepressant treatments in the study used such medications (Terp et al., 2018). The use of anti-depressants may have affected the increase in self-rated health and results from this study should be considered with caution.

It should also be noted that Lindegaard et al. (2017) and Terp et al. (2018) did not include much data on nutritional intake. No individual dietary or protein intake was reported so it is difficult to determine how or if nutrition interventions affected study outcomes. Beck et al. (2013) evaluated dietary intake through use of a four-day dietary record.

The use of ONS could account for the demonstrated weight maintenance and gain results in the Beck et al. (2013) and Young et al. (2018) studies. Since Terp et al. (2018) did not provide statistics on the number or percentage of individuals who were prescribed oral nutrition supplements, it is difficult to determine if ONS had any effect at all on weight gain. This raises the question if improved weight status could be achieved without the reliance on ONS.

While Terp et al. (2018) found RD-created dietary plans can be implemented by RNs with continuous RD support, Luger et al. (2016) proved that basic nutrition curriculum created by RDs and implemented by non-healthcare professionals can impact the nutritional health of frail and malnourished older adults. Additionally, Winzer et al. (2019) found such a program could improve physical activity, and to a lesser extent, nutritional behavior changes. Knowledge of factors that influence food and meal choice should be considered when developing nutrition education or interventions. Locher et al. (2009) illustrated that food choice among older adults

includes health and non-health (cost, mood, and convenience) reasons. Regardless of social-demographic characteristics, factors regarding food and meal choice can vary for each individual. Therefore, nutrition interventions or education provided to older adults should be tailored to an individual's needs and include continuous input from the individual.

The studies published by Luger et al. (2016) and Winzer et al. (2019) were different from the other studies reviewed here because trained non-healthcare professionals provided the nutritional, physical activities, and social support interventions. Older adults may feel more comfortable discussing their health with peers and who may have underlying health conditions. Luger et al. (2016) and Wizner et al. (2019) found that such a program is feasible and could be implemented in conjunction with care provided by health care professionals.

Conclusion

As the population ages, so can the number of older adults who live with multiple comorbidities (Porter Starr et al., 2015). They will experience the normal physiological changes that often accompany aging. These changes typically include a decrease in physical activity, functional ability, and dietary intake. They may also experience loneliness and social isolation as they grieve the loss of a spouse, friend, or close relative. All of these factors can affect their nutritional health and can increase their risk of malnutrition. If malnourished and hospitalized, these conditions can delay recovery times and increase the length of stay. Once a malnourished or frail older adult has been discharged from the hospital, their risk of subsequent hospitalization increases if not provided with adequate nutrition support post-discharge. Recovery from hospitalization and any post-acute rehabilitation efforts will be delayed, which can result in a subsequent hospital stay.

RDs can provide nutritional counseling and interventions that work to improve dietary

intake, weight, and mobility. Improvements in these areas can serve as a preventative measure to

improve malnutrition status and ultimately reduce hospital readmission risk. It is important to

note, that health care provided to older adults is a team effort that relies heavily on collaboration

between different health care providers (physicians, nurses, occupational and physical

therapists). RDs play an important role in the multidisciplinary team.

Registered Dietitians can work to provide training for non-healthcare professionals so

that they can provide nutrition education and improved dietary intake to older adults who live at

home. Home intervention programs must also include physical activity and social support

segments because each is essential to an older adult's overall health and wellbeing. These

programs should extend past 12 weeks to elicit a lasting effect. If dietetic services are extended

weeks and months post-hospital discharge, more training in geriatric nutrition for RDs is integral

to the success of nutrition interventions. The Academy of Nutrition and Dietetics allows RDs to

become board certified as a Specialist in Geriatric Nutrition (Saffel-Shrier et al., 2019). Future

employment opportunities for RDs will continue to grow as the geriatric population continues to

grow in tandem.

This literature review discusses the evidence for a variety of methods to provide

nutritional care to older adults who choose to remain in the home, as well as common motivation

and barriers that affect food choice. As the evidence suggests a nutrition program conducted by

healthcare professionals and non-healthcare professionals can affect and to some extent, improve

nutritional status, functionality, physical activity, and mental health of community-residing older

adults. Future studies should continue to focus on a volunteer trained program to improve dietary

intake, physical activity, and social support. This program should also be evaluated to determine

if it can reduce hospital readmissions. If a program is developed it must be feasible, low cost,

long enough in duration, and be used in addition to the care provided by health care

professionals.

Chapter 3: Methodology

Introduction

Older adults may have certain challenges that can affect their dietary intake. Some may find themselves trying to manage multiple comorbidities that may require them to take medications, which can alter their appetite or sense of taste (Mahan & Raymond, 2017). They may also have limited means of transportation that can limit food access (Mahan & Raymond, 2017). Age-related changes including lack of physical activity, functional impairment, and loneliness can interfere with their ability to maintain good health and nutritional status (Amarya et al., 2015). The elderly is at a higher risk of malnutrition compared with other adult populations (Amarya et al., 2015). De Maria-Ghalili et al. (2013) found that in a sample of 3,209 community-dwelling older adults living in Southeastern Pennsylvania, 38% were well nourished, while more than 50% were at risk for malnutrition and close to 6 % were considered malnourished. If hospitalized and malnourished, older adults may face more complications and are at increased risk for readmission to the hospital within 30 days (Barrett et al., 2018; Kaiser et al., 2010; Norman et al., 2008; Philipson et al., 2013; Snider et al., 2014). To reduce the risk for hospitalization and malnutrition it is important to address the type of home care provided to older adults once discharged from the hospital because many older adults are choosing to age in place (Federal Interagency Forum on Aging Related Statistics, 2016). This chapter will address the methodology of the proposed study. Topics include research design, data analysis plan, threats to validity, ethical procedures followed by a summary of the reviewed topics.

Research Design

Research Question 1

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average calorie intake between individuals who receive the program and those who do not?

Hypotheses

H_o: After four months there will be no significant difference in average calorie intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

H_a: After four months there will be a significant difference in average calorie intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home delivered volunteer-led nutrition education and social support program.

Research Question 2

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average protein intake between individuals who receive the program and those who do not?

Hypotheses

H_o: After four months there will be no significant difference in average protein intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

H_a: After four months there will a significant difference in average protein intake between individuals who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program compared to those who do not receive a home-delivered volunteer-led nutrition education and social support program.

Research Question 3

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a greater number of minutes spent in physical activity between individuals who receive the program and those who do not?

Hypothesis

H_o: After four months there will be no significant differences in the number of minutes spent in physical activity between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

H_a: After four months there will be a significant difference in the number of minutes spent in physical activity between those receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

Research Question 4

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a greater quality of life score between individuals who receive the program and those who do not?

Hypothesis

H$_o$: After four months there will be no significant difference in the quality of life score between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

 H$_a$: After four months there will be a significant difference in the quality of life score between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

Research Question 5

In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program reduce hospital readmissions between individuals who receive the program and those who do not?

Hypothesis

H$_o$: After four months there will be no significant difference in the number of hospital readmissions between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

H$_a$: After four months there will be a significant difference in the number of hospital readmissions between those who receive a home-delivered volunteer-led nutrition education, physical activity, and social support program and those who do not.

Table 1

Research questions and variables

Research Question	Independent	Dependent	Confounding
In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average calorie intake between individuals who receive the program and those who do not?	Nutrition intervention Physical activity intervention Social support intervention	Average calorie intake	Baseline weight/BMI Living arrangement Number of comorbidities Socioeconomic status Food insecurity Polypharmacy Hospital Interventions
In older adults who are at risk for malnutrition or malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a higher average protein intake between individuals who receive the program and those who do not?	Nutrition intervention Physical activity intervention Social support intervention	Average protein intake	Baseline weight/BMI Living arrangement Number of comorbidities Socioeconomic status Food insecurity Polypharmacy Hospital Interventions
In older adults who are at risk for malnutrition, or are malnourished can a home-delivered volunteer-led nutrition education,	Nutrition intervention Physical activity intervention Social support intervention	A greater number of minutes spent in physical activity	Baseline weight/BMI Living arrangement Number of comorbidities Socioeconomic status Food insecurity Polypharmacy

physical activity, and social support program result in a greater number of minutes spent in physical activity between individuals who receive the program and those who do not?			
In older adults who are at risk for malnutrition, or are malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program result in a greater quality of life score between individuals who receive the program and those who do not?	Nutrition intervention Physical activity intervention Social support intervention	Quality of life score	Baseline weight/BMI Living arrangement Number of comorbidities Socioeconomic status Food insecurity Polypharmacy Access to healthcare
In older adults who are at risk for malnutrition, or are malnourished, can a home-delivered volunteer-led nutrition education, physical activity, and social support program reduce hospital readmissions in individuals who receive the program and those who do not?	Nutrition intervention Physical activity intervention Social support intervention	Hospital readmissions number	Baseline weight/BMI Living arrangement Number of comorbidities Socioeconomic status Food insecurity Polypharmacy Access to healthcare Malnutrition Social Support

Setting and Sample Size

Sample size

A sample size of 323 participants must be obtained to maintain a 5% margin of error and a 95% confidence interval (Raosoft, 2004). The sample size was calculated through the use of the Raosoft sample size calculator and is based upon a population size of 20,000. It is important to note, that since the population size from which to choose the sample from remains unknown at this time. Raosoft sample size calculator suggests 20,000 (Raosoft, 2004). Since more than 300 participants must be recruited, a sample size of at least 387 participants is required to account for a 20% drop out rate. The 20% drop-out rate is based on previous research from Terp et al. (2018). Participants who enroll in the study, but who do not complete the interventions will still be included in the analysis. The decision to include these individuals is based on previous research by Terp et al. (2018).

To accommodate the large population size of 323 participants the goal will be to have at least 80 trained volunteers. This number was determined by dividing 323 by four which is the number of participants the volunteer will see each day. In total, there will be 8 visits each week (4 on Monday and 4 on Friday) for a period of 4 months. To accommodate a large number of volunteers there will be two registered dietitians (RDs) and two physical therapists who will provide training to the volunteers.

Recruitment

The method to recruit participants will be based upon probability and randomized sampling of hospitalized and discharged older adults. Study subjects will be recruited from the general medical floor at Froedtert Hospital in Wauwatosa, WI within a 6-12-month period. Upon discharge, patients who were identified as being at risk for malnutrition or were diagnosed with

malnutrition will be given discharge paperwork and a leaflet will also be provided with an invitation to participate in a research study that focuses on providing a comprehensive hospital-to-home program designed to improve the type of nutritional care provided to individuals like themselves. Additionally, the discharge planner will ask the patient about their interest in participating in a research study. The mention of the study will only be discussed right before discharge and not during the hospital stay. If interested, the patient's information will be forwarded to study personnel who will call the individual and explain the study in further detail. If an insufficient number of participants are not recruited within the 6-12-month time frame, then an additional six months will be added in hopes of generating more recruits.

Population

The study subjects will be adults between 65 and 75 years of age, at risk for malnutrition or already considered to be malnourished at discharge according to the Mini Nutrition Assessment Short-Form (MNA-SF) score (see Appendix F). The MNA-SF has been used in previous research studies to identify individuals who are at risk for malnutrition or are considered malnourished (Lindegaard et al., 2017; Lugar et al., 2016; Winzer et al., 2019). The participants must live in the free-living community; they can live by themselves or with others. Exclusion criteria include the following medical conditions; Chronic Obstructive Pulmonary Disease (COPD), renal disease, Alzheimer's, dementia, mental health issues, and cancer patients undergoing cancer treatments. Furthermore, the study will also exclude older adults who are wheelchair bound and live in a skilled rehab or long-term care facility. Such exclusion criteria were based upon previous research studies that investigated the effects of nutrition interventions provided to homebound older adults who were either malnourished or at risk of malnutrition.

These studies excluded either all or some of the conditions described above (Lindegaard et al.,

2017; Lugar et al., 2013; Terp et al., 2018; Winzer et al., 2019).

Study Protocol

Individuals will be recruited through an open enrollment process that will continue until a

sufficient number of participants have been recruited. Once the individual is discharged from the

hospital and agrees to participate in the study, they will be randomized (using an online research

randomizer tool), to either the intervention or comparison group. The participants will be further

categorized according to their nutrition status as determined by their MNA-SF score. The

decision to categorize the participants according to their nutritional status was based upon

previous research by Lindegaard et al. (2017). In total there will be two groups (comparison and

intervention) that will contain participants who are either malnourished or at risk for

malnutrition. Once the participants are assigned to a group the designated volunteer will begin

the program for the intervention group.

The RDs and physical therapists will also be recruited from the same floor and hospital as

the participants. They must have at least 6 months minimum experience working with the elderly

population. They should also have at least 6 months of clinical experience, whether gained

through a hospital, long term care, or rehabilitation center because many participants may have

underlying health conditions such as diabetes or heart disease. In addition, the RDs will be

responsible for calculating calories and protein amounts obtained from the food records. The

RDs and physical therapists will provide at least 4 weeks of 1-hour evening training to the

volunteers and the sessions will be held once a week. The professionals must be willing to

volunteer their time (20 weeks) for this study. The RDs and physical therapists must also be

easily accessible during the four months either by phone or email in case the trained volunteers

need to contact them for professional advice. The decision to use an RD and physical therapist to

provide training and support to the trained volunteers was based upon previous research by

Luger et al. (2016).

Study volunteers will be individuals who are retired and aged 60 years or older because

they may have more time to devote to the study. The volunteers will be recruited from senior

centers and retirement communities in hopes to recruit 80 volunteers. The volunteers will be

trained in nutrition topics and physical activity strength training exercises. The social interaction

portion of the study would not require formal training, but rather volunteers will be given topic

ideas to generate discussion with study participants. Each interested volunteer will undergo

background checks and interviews with study personnel to evaluate their interests and

motivations to participate in the study. The volunteers themselves may be diagnosed with a

disease as well (diabetes, high blood pressure), but otherwise, they may not be considered

malnourished or at risk of malnutrition. The volunteers will be required to visit the subjects twice

a week for one hour. The biweekly visits for one hour each were based upon previous research

by Luger et al. (2016) who conducted a similar study utilizing trained non-professional

volunteers. To establish rapport and build a sense of familiarity between the volunteer and

participant, the same volunteer will see the same participant each week. Also, there will be a 4-

hour drive time, to account for a 1-hour drive back and forth from each participant's home each

week. Overall, the volunteer will be committing to 12 hours for a period of 4 months or 16

weeks.

Instrumentation

The validated MNA-SF- will be used to screen participants to identify those at risk for

malnutrition or those who are considered malnourished. This form has been validated in more

than 400 studies and is easy to use (Nestle Nutrition Institute, n.d.). According to an Academy of Nutrition and Dietetics position paper (2019), the MNA-SF has received a moderate score for validity and reliability. The MNA-SF is not only suitable for the elderly but may be best used in community settings as well as sub-acute, or residential aged care (Queensland Government, 2017).

The RD will calculate energy and protein needs, which will be calculated based on the Academy of Nutrition and Dietetics Evidence Analysis Library (EAL). The EAL recommends energy needs for older adults (over 65 years of age) who are acutely or chronically ill, to be calculated based on 18-22 kcal/kg/day for females and 20-23 kcal/kg/day for males (Academy of Nutrition and Dietetics [AND], n.d.) The energy needs for those who are underweight as indicated by a Body Mass Index (BMI) <20 kg/m^2 may be as high as 27-28 kcal/kg/day; therefore, estimated needs will be calculated based on 27-28 kcal/kg/day (AND, n.d.) for underweight participants. The EAL goes on to report more research is showing a relationship between an increase in medication use and decreased energy needs, but more research is needed in this area (AND, n.d.).

On the first home visit and at the beginning of the study, each volunteer will carry a scale and measure the participant's weight. The weights will be measured with participants wearing light indoor clothing and no shoes (Beck et al., 2013). BMI will be calculated as actual weight in kilograms divided by meters squared. Beck et al. (2013) suggests height is often not a feasible measurement with the frail and diseased older adult population. Although Beck et al. (2013) makes this suggestion, height will still be estimated through arm span measurement. The RDs will train the volunteers on how to measure height using the arm span technique.

Protein requirements for older adults will be based upon information provided by the Academy of Nutrition and Dietetics Nutrition Care Manual that suggests 0.8 g/kg day for adults with or without unintentional weight loss (AND, n.d.). It is important to note that some studies have estimated protein requirements to be close to 1.0 g/kg/day recommendation for older adults, but this research has remained inconclusive (AND, n.d.).

To track dietary intake, the participants will be required to fill out a 4-day food diary (see Appendix C). The use of a 4-day food diary was based upon research by Beck et al. (2013). The food diary will include 2-week days and 2 weekend days in an attempt to capture usual dietary intake. In order to calculate the number of average calories and protein consumed at baseline, the volunteers will give the food record to the participants at the beginning of the study before the home visits begin. They will also provide instructions on how to fill out the food diary. The participants will be required to complete the food diary on the last week of each month (Four times total) and give the completed diary to their assigned volunteer, who will then give the diary to the RD. The United States Department of Agriculture FoodData Central database will be used to calculate calories and grams of protein from the list of foods provided in the food journal. FoodData Central is a national database that provides nutrient profiles on a wide variety of food and beverages. The database can be used by researchers, policymakers, product developers, educators as well as nutrition and health professionals (U.S. Department of Agriculture, n.d.)

Intervention

Dietary recommendations will be based upon Tufts University *My Plate for Older Adults.* (see Appendix G). The *My Plate for Older Adults* was created to include the updated 2015-2020 Dietary Guidelines for Americans (Tufts University, 2020). It recommends that older adults make half their plates fruit and vegetables, and a quarter whole grains, plus include multiple

servings of fat-free and low-fat dairy foods, protein-rich foods, healthy oils, herbs, and spices (to season foods instead of salt) (Tufts University, 2020). Participants will not be required to meet all of the dietary recommendations provided by *My Plate for Older Adults*, but the plate can be used as a guide to help them incorporate healthy eating into their diets.

Participants will be advised to meet their estimated calorie and protein needs. Emphasis will be placed on protein, nutrient- dense, and high calorie foods such as milk, yogurt, oatmeal, pudding, vegetables, fruits, nut butter, cheese, mashed potatoes, beans, and fish. For individuals who are lactose intolerant, lactose-free milk such as Lactaid or soymilk, and lactose-free products, will be discussed. Misselwitz et al. (2013) found that some individuals can tolerate foods containing lactose, but at very low amounts (such as up to 12 g/day) without having major symptoms. This is especially true when consuming lactose (small 4 oz glass of milk) with a meal or in the form of cheese (cheddar or Swiss) or fermented dairy products (kefir or yogurt) (Misselwitz, et al., 2013). The ability to consume and tolerate lactose will depend on the individual. Special consideration will be given for individuals on a dietary restriction, such as low sodium, with the buddies providing education on how to limit sodium in the diet. Volunteers will also encourage participants to increase fluid intake in the form of coffee, tea, milk, and soups because of the ability to detect thirst declines with age (Tufts University, 2020). Fluid intake, however, will not be measured.

Additionally, the volunteers will carry a guidebook prepared by the dietitian and physical therapist (see Appendix D). The use and development of a guidebook is based upon previous research by Luger et al. (2016). The book will include information provided by the Academy of Nutrition and Dietetics Nutrition Care Manual and the Institute of Aging's Exercise and Physical Activity Guide for older adults. The volunteers can take this book with them and use it to guide

their conversations with the participants. The book will be divided into three sections: nutrition,

physical activity, and discussion topics. The books will also contain worksheets that the

volunteers can leave with the participants at the end of sessions as a way to emphasize what was

taught. For example, on the first visit, the participants will receive a copy of the Tufts University

My Plate for Older Adults, a document which they can hang on their refrigerator. The

participants will also receive copies of exercises they can perform on their own or without the

supervision of the volunteer. To track compliance in providing nutrition education, physical

activity, and social support the guidebooks will contain a page that the trained volunteers must

complete after the first visit and each week thereafter. It will ask basic questions such as, "Did

you discuss the importance of consuming adequate protein today?" or "Did you perform physical

activity exercises today, if so which ones?"

Physical activity will also be tracked and monitored through the use of a weekly activity

log (see appendix H). The physical activity log is provided by the National Heart, Lung and

Blood Institute in collaboration with the Department of Health and Human Services and

Community Health Worker Disparities Initiative (National Heart, Lung, and Blood Institute,

2013). The study volunteers will give this log to the participants before the study begins and the

participants will be required to fill out the log for one week. The logs will be turned into the

physical therapist who will calculate the average amount of time spent in activity. The

participants will be required to record their minutes of physical activity on the last week of each

month (4 times total) throughout the duration of the study. Physical activity recommendations

will be based upon recommendations provided by the physical therapist and the National

Institute on Aging's Exercise and Physical Activity guide. Participants will be asked to do at

least 30 minutes of physical activity at least 2 days out of the week. Activity can include

walking, outdoor yard work, and even indoor housework. Other exercises will include balance, shoulder, leg, and arm exercises (National Institute on Aging, 2015), or anything that will allow the individual to get up and move around to encourage mobility and activities of daily living.

In addition to physical activity and nutrition education, the volunteers will provide social interaction with the participants by discussing a variety of topics. Topic ideas include sports, current events, past and present accomplishments, favorite activities, and favorite memories. The goal will be to provide a positive interaction between the volunteer and participant. The social aspect will be measured through the Centers for Disease Control (CDC) Health-Related Quality of Life (HRQOL) questionnaire also known as Healthy Day Measures (See Appendix E). The validated questionnaire consists of four core questions that inquire about perceived health status and activity limitation within the last 30 days (U.S. Department of Health and Human Services, 2000). The questionnaire has been used in numerous validation and reliability studies involving different population groups including the elderly (Centers for Disease Control [CDC], 2018). The HRQOL questionnaire will be administered at baseline and the end of the study. The questionnaire is designed to be read in-person or it can be read over the phone, however, the volunteers will read the survey questions to the participants. Hospital readmissions data will be collected through the hospital database. This data will be collected at the end of the study (16 weeks).

Data Analysis Plan

Descriptive Statistics

For the proposed study there will be two groups; one group that will receive the volunteer-led intervention and a comparison group that will receive educational handouts and no social support. Based on the MNA-SF score, the participants will be considered malnourished or

at risk for malnutrition. Participants will be divided into two groups based on their randomization and MNA-SF score. Both groups will be compared to determine if a significant difference exist among the groups. For the continuous variables, a paired parametric t-test will be used to compare the results and determine if any significant differences exist between both groups. To track calorie and protein intake at baseline and post-intervention, a table will present frequency distribution. It will display data (from both groups) in the form average grams of calorie and protein consumed daily at baseline and the end of the four months.

Physical activity will follow a similar format with a table presenting baseline and four-month data on the minutes spent participating in physical activity, as measured by the physical activity log. A parametric t-test will be used to compare the average minutes of physical activity and to determine if a significant difference exists between both groups. The HRQOL mean baseline and four months score for each group will also be provided on a separate table, followed by a parametric t-test to determine if any significant difference exists between the groups. Additionally, since the CDC (2018) recommends the use of the SAS, SPSS, or SUNDAN syntax software to score the outcome measures for the HRQOL. The SPSS software may also be used to determine the HRQOL scores.

Readmission data will be presented in a table that will illustrates frequency distribution in the form of the total and average number of hospital readmissions at 16 weeks. A parametric t-test will be used to compare the average number of hospital readmissions and to determine if a significant difference exists between both groups.

Inferential Statistics

As depicted in table 2, the proposed study will contain one independent and five dependent variables.

Table 2

Description of Variables

Variable Type	Variable Name	Variable Source	Potential Responses	Level of Measurement
Independent	Nutrition education, physical activity and social support program	Group placement	Intervention or comparison	Discrete/categorical
Dependent	Average daily amount of protein intake	Self-report/Food Record	Grams of protein	Continuous
Dependent	Average daily amount of calorie intake	Self-report/food record	Amount of calorie intake	Continuous
Dependent	Number of average daily minutes spent in physical activity	Physical activity log	0-60 minutes	Continuous
Dependent	Social support outcomes	HRQOL-4 questionnaire	01-30	Continuous
Dependent	Hospital readmissions	Hospital database	Number of hospital admissions	Continuous

Each group will be compared before and after the intervention to determine within and between subject variance. If the data is not normally distributed, the Wilcoxon-Signed Rank test (non-parametric equivalent to the parametric paired t-test) will be used to determine if a significant difference exists between both groups concerning dietary intake, physical activity, HRQOL score, and readmissions data (Harris et al., 2012). Study results will be considered statistically significant if the p-value is less than or equal to 0.05.

Threats to Validity

Since the proposed study is a quasi-experimental design it will not be able to show causation in study outcomes, but rather only association. Therefore, it cannot be determined if the proposed intervention caused the outcome and threatens the validity of the study results. Another threat to validity involves the food record method. This method is subject to reporting inaccuracies because people tend to under or over report their food and fluid consumption. The length of time it takes to record daily food and fluid intake could also lead to inaccurate reporting and threatens the validity of the study results.

Ethical Procedures

To keep data private, paper forms such as the food diaries, physical activity logs and guidebooks will be stored in a locked filing cabinet and only accessible to study personnel. Informed consent forms (see Appendix B), educational handouts, guidebooks, and questionnaires will also be kept in a locked filing cabinet. The filing cabinets will be located in an office at Mount Mary University. Any electronic data such as Excel worksheets that will be used to compile data sets and conduct statistical tests will be saved and stored on a flash drive. The flash drive will be placed in a manila envelope and stored in the same locked filing cabinet as the paper forms. Any laptop or computer utilized for study purposes will be password protected and will be programmed to time out after 10 minutes of inactivity. To further protect the identity of participants, volunteers, and health care professionals, names of each individual will not be provided on study documents, instead each individual will be identified through an identification number. A unique identification number will be placed on all documents completed by the same individual. To protect patient privacy the peer volunteers will receive training on the Health Insurance Portability and Accountability Act (HIPPA). Since this study will be recruiting human

subjects and will require informed consent an Institutional Review Board (IRB) application will
be submitted (see Appendix A).

Summary

In conclusion, the proposed four month-quasi experimental study will compare the effects
of a nutrition education, physical activity, and social support program administered by trained
volunteers. One group will receive the intervention and the other will not. The participants will
be recruited from Froedtert Hospital in Wisconsin with a goal to recruit 323 participants. The
registered dietitians and physical therapists will also be recruited from the same hospital with a
goal to recruit two individuals from each discipline. Finally, volunteers will be recruited from
senior centers and retirement communities in hopes to recruit 80 volunteers. Both descriptive and
inferential statistics will be used. Potential threats to validity exist for the proposed study due to
the study design and dietary collection methods. All subject data will be protected through the
use of a locked filing cabinet for storage of paper forms and locked storage of flash drives. All
computers or laptops will only be accessed through a password with a timed lockout. Finally, all
study participants must provide informed consent and are free to exit the study at any time. Since
the study will utilize human subjects an application to the IRB will be submitted for approval.
Chapter 4 will include narratives and tables of anticipated outcomes followed by chapter 5,
which entails a discussion of potential study results followed by recommendations for future
studies.

Chapter 4 Anticipated Results

Characterization of the Study Population

A total of 323 participants will be recruited from Froedtert Hospital in Wauwatosa, Wisconsin between January 2020 to September 2020. Of the 323 participants, 162 will be randomly assigned to the CG and the other 161 participants will be assigned to the IG. The IG will receive the volunteer-led intervention and the CG will receive educational handouts and no social support. It is estimated a total of 10 or more participants may drop out of the study for personal reasons or because they pass away. Their data will still be used to complete the study. Overall, if 5 participants in each group drop out of the study, then 313 study subjects will complete the study with 156 in the CG and 157 in the IG. Anticipated designations of study participants are shown in Figure 1.

Figure 1

Flowchart illustration for the study participants
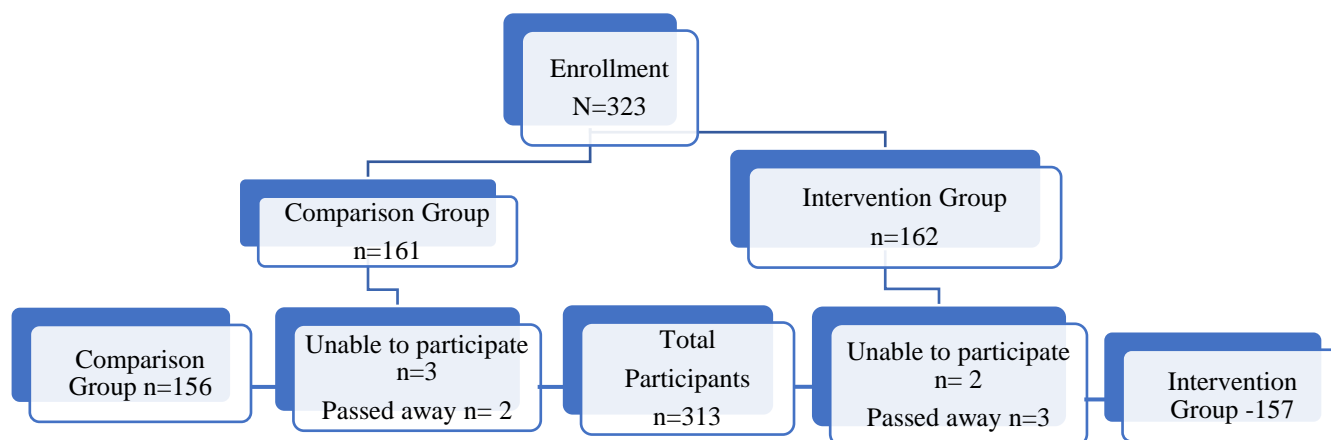
Baseline Characteristics

Anticipated baseline characteristics of both groups are presented in Table 1. It is anticipated that there will be no significant differences in baseline characteristics.

Table 3

Baseline characteristics of the study population

Characteristics	Total N=313	IG n=157	CG n=156	P-Value
Female, %	78	52	48	0.76
Age, y	70.1 (3.2)	69. 7 (3.5)	70.6 (2.9)	0.99
Living with others, %	58	52	48	0.53
Living alone, %	42	57	43	0.44
Polypharmacy $\geq$ 5 drugs, %	39	19	20	0.87
Heart failure, %	24	10	14	0.67
Diabetes, %	42	23	16	0.26
Hypertension, %	57	30	22	0.27
Dyslipidemia, %	45	25	21	0.56
Depression, %	11	08	12	0.37
Rheumatoid Arthritis, %	19	08	10	0.64
Osteoporosis, %	18	07	11	0.66
BMI, kg/m$^{2.}$	20.4 (1.96)	20.7 (2.33)	20.1(1.50)	0.45
Underweight, %	23	11	24	0.82
Normal weight, %	76	25	48	0.70
Overweight, %	17	09	16	0.81
Obese, %	10	04	12	0.53
At risk of malnutrition, %	65	31	34	0.57
Malnourished, %	34	18	06	0.55

*p $\leq$ 0.05 indicates statistical significance

Nutrition and Physical Activity Outcomes

Calorie and protein intake will be based on a four-day food diary that will be given to the participants a week before the study and on the last week of each month. It will include two weekdays and two weekend days in an attempt to capture normal daily intake. The registered dietitians will provide four weeks of one-hour training to the study volunteers. The volunteers will visit the participants in the IG twice a week for one hour. Table 4 summarizes the predicted changes for both categories between the groups at baseline and at 16 weeks.

Physical activity information will be collected through a seven-day exercise log and will be given to the participants the week before the study and on the last week of each month. The physical therapist will provide four weeks of one-hour training to the study volunteers. The volunteers will visit the participants in the IG twice a week for one hour. Table 5 summarizes the anticipated changes in the number minutes spent being physically active between both groups at baseline and 16 weeks.

Table 4

Nutrition outcomes

Outcome	Group	Baseline				16 weeks			
		Mean	SD	95% CI	P-Value	Mean	SD	95% CI	P-Value
Calories	IG	1,529	258.7	[1558, 1707]	0.12	1540	231.9	[1474,1607]	0.0008
	CG	1,699	188.8	[1646, 1750]		1,701	195.9	[1645, 1758]	
Protein (g)	IG	31	10.2	[28.6, 34.9]	0.37	32	11.1	[30.2-36.6]	0.32
	CG	29	12.6	[25.0, 32.3]		28.2	12.3	[24.7, 31.8]	

*p ≤ 0.05 indicates statistical significance

Table 5

Physical activity outcomes

Outcome	Group	Baseline				16 weeks			
		Mean	SD	95% CI	P-Value	Mean	SD	CI (95%)	P-Value
Physical activity	IG	11.5	8.1	[9.2, 13.9]	0.79	13.2	7.7	[11.0, 15.4]	0.88
(min)	CG	11.1	8.8	[8.6, 13.6]		12.9	8.2	[10.6, 15.3]	

*p ≤ 0.05 indicates statistical significance

Health Related Quality of Life Score

The volunteers will provide social interaction with the participants by discussing a variety of topics that interest the participant. The social aspect will be measured through the Centers for Disease Control (CDC) Health-Related Quality of Life (HRQOL). The questionnaire will be administered at baseline and the end of the study. The HRQOL is based on a 30-point scale and a lower number indicates a better score. By 16 weeks, it is anticipated the IG will have a better HRQOL score compared to the CG. Table 6 summarizes the anticipated results.

Table 6

Quality of life outcomes

Outcome	Group	Baseline				16 weeks			
		Mean	SD	95% CI	P-Value	Mean	SD	95% CI	P-Value
HRQOL Score	IG	8.1	6.0	[6.3, 9.8]	0.86	6.3	4.3	[5.1, 7.5]	0.01
	CG	7.9	4.1	[6.8, 9.1]		8.0	3.7	[6.9, 9.0]	

*p ≤ 0.05 indicates statistical significance

Hospital Readmissions

Hospital readmissions data will be collected through the hospital database at the end of the study (16 weeks). It is estimated that by 16 weeks the IG will have fewer readmissions compared to the CG. Anticipated results are shown in Table 7.

Table 7

Readmissions outcomes

Outcome	Group	16 weeks				
		Total	Mean	SD	CI 95%	P-Value
Number of	IG	21	0.4	0.8	[0.2, 0.6]	0.38
Readmissions	CG	27	0.6	0.6	[0.4, 0.7]	

*p ≤ 0.05 indicates statistical significance

Chapter 5: Discussion

As the older adult population continues to grow so does their desire to age in place. Yet, the elderly are at a higher risk of malnutrition compared with other adult populations (Amarya et al., 2015). The risk of malnutrition increases if an older adult is hospitalized and then discharged home. Once discharged from the hospital and into the community, older adults are slow to return to their baseline nutritional status because they often experience low nutritional intake, weight loss and limited dietetic follow up (Chen et al., 2009; Keller et al., 2018; Locher et al., 2008; Marshall et al., 2015; Rasheed & Woods, 2013). A lack of evidence exists to determine if a nutrition education, physical activity, and social support program provided by trained volunteers can result in improved nutritional status, a greater amount of time spent in physical activity, a greater quality of life score, and a reduction in hospital readmissions. This chapter will discuss the anticipated results of the proposed study, and compare those results from previous studies conducted by Beck et al. (2013), Luger et al. (2016), and Winzer et al. (2019). It will also discuss the proposed study's strengths and limitations followed by suggestions for future studies.

Interpretation of Results

This 16-week quasi-experimental study will evaluate the effects of a volunteer-led home-based nutrition education, physical activity, and social support program provided to older adults considered malnourished or at risk of malnutrition upon hospital discharge. It is anticipated that all null hypotheses will be rejected and that all alternative hypotheses will be accepted. It is predicted that the program will result in several outcomes; a greater intake of protein and calories, an increase in the number of minutes spent being physically active will be achieved, a greater quality of life score will be attained, and hospital readmissions will be reduced when

compared to the CG who will receive no volunteer-led intervention. Instead they will receive educational handouts.

Characterization of the Study Population

Unlike Beck et al. (2012), Luger et al., (2016), and Winzer et al. (2019), study participants will be between the ages of 65 and 75, with a mean age of 70. Similar to the studies conducted by Beck et al. (2012), Luger et al. (2016), and Winzer et al. (2019), the study population will be predominately female. Also similar to Luger et al. (2016) and Winzer et al. (2019), the participants will be considered malnourished or at risk of malnutrition, and the majority of participants will fall under the risk for malnutrition category. There will be no significant differences in baseline characteristics.

Nutrition and Physical Activity Outcomes

At baseline, no significant differences will be found in calorie intake between the groups; however, the IG will significantly consume a greater number of calories compared to the CG (p <.001). While the IG will increase their average daily protein intake, no significant differences will be found between the groups at baseline and 16 weeks. Both groups will increase their average number of physical activity minutes per day from baseline to 16-weeks; however, no significant differences will be found between the groups.

Health Related Quality of Life and Hospital Readmissions

The IG will receive home visits and continuous social interaction from the study volunteers, and those in the CG will not receive any visits nor study-supported social interaction. At baseline, no significant differences in HRQOL scores will be found between the groups; however, by 16 weeks, the IG will significantly lower their HRQOL score compared to the CG (p=0.01). It's important to note that a lower score indicates a better score. Regarding hospital

readmissions, the IG will have fewer total readmissions compared to the CG, but no significant differences will be found between groups.

Volunteer Adherence Rate

To track compliance in providing nutrition education, physical activity, and social support the volunteers will carry guidebooks during each visit with the participant. These guidebooks will contain copies of exercises and nutrition recommendations. They will contain a page that the trained volunteers must fill after the first visit and each week thereafter. It will ask basic questions such as, "Did you discuss the importance of consuming adequate protein today"? or "Did you perform physical activity exercises today, if so which ones?" It is anticipated that 95% of volunteers will attend their assigned home visits, as evidenced by completed documentation forms and the number of attended home visits, which will be tracked by the number of completed forms.

Comparison to Other Studies

The anticipated results of the proposed study are somewhat consistent with previous research by Beck et al. (2012), Luger et al. (2016), and Winzer et al. (2019). Beck et al. (2012) found that nutrition counseling provided by registered dietitians resulted in improved weight gain, protein intake, and mobility but had no effect on the number of hospital readmissions. Similar outcomes are made in the proposed study, with the IG consuming more average calories per day when compared to the CG. While the IG will increase their average protein intake and minutes of physical activity, there was no significant difference when compared to the control group. A possible reason for this may be due to family members or care takers who encourage the CG participants to engage in physical activity, or perhaps partake in the activity with them.

It's difficult to say what the reason is for the lack of significance because this was not an investigative part of the study, so possible reasons are based upon pure speculation.

While the number of readmissions between both groups decreases, they will not be statistically significant. Although no significant outcomes will be seen in readmissions, it's important to consider possible nutrition interventions implemented in the hospital that may inadvertently influence hospital readmissions outcomes. Such interventions may also affect the increase in energy and protein intake in both groups. However, hospital interventions will not be measured and evaluated in the proposed study so the effect of hospital nutrition interventions will remain unknown. Other possible reasons for non-significance in hospital readmissions may be related to less medical condition complications, adequate follow up with the participant's personal physician and successful connection to other community resources. Since these factors will not be controlled for or investigated, it cannot be said with certainty that these components will influence study outcomes. It is important to note, one of the main differences between Beck et al. (2012) and the proposed study, is that the nutrition interventions were performed by health care professionals, as opposed to volunteers in the Luger et al. (2016), and Winzer et al. (2019) studies. Beck et al. (2012) also utilized oral nutrition supplements (ONS), which may have influenced results. The proposed study will not use ONS and will instead work to ensure adequate calories and protein needs are met by foods based on each individual's food preference.

Although the MNA-SF score was not used as a measurable outcome in the proposed study, the increase in calorie and protein intake is similar to results by Luger et al. (2016) that found a nutrition education, physical activity, and social support program led by trained volunteers, could result in improved nutritional status as indicated by the MNA-LF score. Winzer et al. (2019) expanded on research by Luger et al. (2016) and found such a program

could to a lesser extent, improve adherence to nutrition recommendations through encouraging the consumption of plant and animal-based protein-rich foods and fluid intake. While in the present study an increase in protein intake will be seen in the IG, it will not be statistically significant when compared to the CG. Winzer et al. (2019) found significant increases for the intervention group in legumes, nuts and fluid consumption, but these increases were not seen in animal protein-based foods (meat, dairy, fish). Winzer et al. (2019) attributed the difference in these results to a decrease in oral health, such as the difficulty in chewing certain foods like meat, along with not enjoying the taste and issues of cost or affordability. The same rationale may be applied to the proposed study and could explain why no significant increases will be found in protein consumption between both groups.

Similar to the proposed study physical activity outcomes that found an increase in the amount of time spent in physical activity, Winzer et al. (2019) found significant improvements for the intervention group in physical activity behavior, such as light sport activity and muscle strength exercise when compared to the control group. In contrast, hospital readmissions were not measured outcomes in both the Luger et al. (2016) and Winzer et al. (2019) studies. Although the influence of social interaction was a component in both the Luger et al. (2016) and Winzer et al. (2019) studies, it wasn't a measured result. Still, such research paves the way for future studies, like the proposed study, that combines the framework of a peer-led intervention with social interaction and hospital readmission measured outcome.

Strengths and Limitations

There are several strengths to this study. First, the intervention will take place in the participant's home and will not require the study subjects to travel outside their home. This will make it easier for individuals with limited transportation options to participate. Second, the

interventions will be delivered by trained volunteers and the participant may be willing to share more information than they would with a health care professional. Third, the use of a buddy program may provide a low-cost solution to help improve the nutritional, physical, and mental health of the older adult while also reducing costs associated with hospital readmissions. Finally, the "buddy-style" program can be implemented in conjunction with care provided by healthcare professionals, while highlighting the importance of nutrition, exercise, and mental health on overall health and well-being for the community-residing older adult.

There are limitations to the proposed study that must be addressed. The first limitation is the study design, quasi-experimental, will not show causation in study outcomes, but rather, will only provide evidence of an association. Therefore, the study will not determine if the proposed intervention causes the outcome. The intervention will last four months and will not show long-term effects. Another limitation, the study sample is not entirely representative of the older adult population because of age limit constraints. The study will take place in the Midwest and would not apply to older adults living in other geographical areas outside the Midwest. Dietary, physical activity, and social support data will be collected through self-report; therefore, is subject to bias and reporting inaccuracies. Although the study participants will be given a guidebook with a variety of topic ideas to generate discussion with participants, there is no uniform curriculum. It will be difficult to determine which social support topics, if any, are associated with the quality of life score. Finally, if the study participant is hospitalized and a nutrition intervention is implemented, there will be no way to determine if the intervention had any influence on calorie and protein intake, and the number of hospital readmissions. Hospital intervention can be a potential confounder. Other confounding variables include social economic status, food insecurity and access to healthcare or community resources. These components can

affect the nutritional, physical, and mental health of the older adult. They may also affect

hospital readmission and influence study outcomes. It's important to keep these confounders in

mind because they not be measured and controlled for.

Suggestions for Future Studies

The rising prevalence of the older adult population and their desire to remain in the home

will continue to be a prominent topic for years to come. The challenge lies in how to provide a

continuum of care once the older adult is discharged from the hospital and sent home. A

hospital-to-home program that provides nutritional support is key to helping ensure the older

adult's nutritional needs are being addressed, especially if the older adult is malnourished or at

risk for malnutrition. The trained "buddy style" program framework can be implemented in

home health care programs and used in conjunction to care provided by professional health care

providers. The next step will be to improve on the suggested study design, quasi experimental,

and focus on a longer study duration such as 6 to 12 months, to determine long-term results. To

implement a long-term study, though, the challenge may be finding a reliable source of funding

to finance the study, finding individuals who are willing to participate as volunteers, and as study

participants. There must also be an incentive, such as continuing professional education credits,

to encourage the registered dietitians and physical therapists to devote extra time the study. Once

these challenges are addressed and the study show's an improvement in nutritional, physical, and

mental health combined with a reduction in hospital readmissions, a full-scale randomized

control trial can take place to further determine the value of a home-based peer-led program that

emphasizes nutritional support.

Conclusion

As the baby boomer generation continues to grow older, more healthcare professionals will be needed to provide care to this unique population group. This can also help decrease the burden placed on the healthcare system. Any program that allows older adults to remain in the home and maintain their sense of independence while improving their quality of life and health is worth the research effort. It is often family members and close friends that assume responsibility for the elderly as their healthcare needs and loss of independence increases. The proposed study is a step in the right direction towards meeting the needs of our elders. As they have done for us in the past, we can do for them in the future.

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Application for IRB

Mount Mary University
Institutional Review Board (IRB)
for the Protection of Human Subjects

Application for IRB Review

DATA COLLECTION CANNOT BEGIN
UNTIL THE IRB HAS APPROVED THIS PROJECT

I. Required Documentation - No action will be taken without these attachments.

Are the following attached to the IRB application?

Informed Consent Document	☒ Yes	Informed Consent Documents should include an explanation of procedures, risk, safeguards, freedom to withdraw, confidentiality, offer to answer inquiries, third party referral for concerns, signature and date. See Appendix.A and use the **MMU Informed Consent Template** to avoid delays in the process.
Questionnaire/Survey Instrument(s)	☒ Yes	If a survey is being administered in any written format (e.g., survey monkey, qualtrics), a copy of that survey must accompany this application. If a survey is being conducted verbally, a copy of the introductory comments and survey questions being asked must be attached to this application. If survey includes focus group questions, a complete list of the question must be attached. For research using a published/purchased instrument, a photocopy of the instrument will suffice.
Verification of Human Subjects Training	☐ Yes	Copy of transcript, certificate or other evidence that ALL members of the research team have completed the required training. .
Copy of cooperating institution's IRB approval.	N/A	Not required if there is no cooperating institution. .

II. Investigator(s):

Name: Serina Myers   Phone: 480-221-7041
Affiliation with Mount Mary University (e.g. faculty, student, etc.):   Student
Email: myerss@mtmary.edu

Signature: Serina Myers   Date: 10/20/20

Name: Phone:
Affiliation with Mount Mary University:
Email:

Signature: _____   Date:

If student, list Research Advisor and complete the application. Research Advisor must provide requested information and verify.

Department:

Research Advisor's Name: Dr. Dana Scheunemann
Email: scheuned@mtmary.edu   Phone:

Research Advisor: Have you completed Human Subject's Training?   ☐ Yes   ☐ No

Research advisor's signature indicates responsibility for student compliance with all IRB requirements.

Signature: _____   Date:
            Research Advisor

III. Project Description
Instructions: Briefly describe the proposed project including the sample and methodology (e.g. human subjects, data collection, data analysis and instruments).

1) Objectives (purpose of project):
The purpose of the project to determine whether a volunteer-led home-based nutrition education, physical activity, and social support program can result in participants increasing their calorie and protein intake. It will be determined if the program can result in increased physical activity among study subjects and if such interventions effect the quality of life. Finally, it will also be determined if the program is effective at reducing hospital readmissions among older adults who are considered malnourished or at risk of malnutrition.

2) Relevance to practice/body of knowledge:
A lack of evidence exists that explores the effect of a volunteer-led home-based nutrition education program and hospital readmissions. If successful, this program may reduce costs associated with hospital readmissions and can be used in conjunction with home care services provided by health care professionals. As the older population group continues to grow, many older adults are choosing to remain in the home, therefore more home-based care nutritional care programs must be developed to address the needs of this population group. The proposed study could provide a preliminary framework for hospital to home care programs that include nutritional care. It can also promote the value of nutrition and its abilities to address nutritional deficiencies, malnutrition and offer possible solutions to improve dietary intake in the home bound geriatric population. Any program that can improve dietary intake, physical activity, quality of life while reducing hospital readmissions has the potential to help the older adult maintain a sense of independence, mental stability and further enhance their desire to remain in the home.

3) Describe the research design (e.g. subject/participant selection and assignment, design, intervention, data analysis):

This is a 4-month quasi-experimental trial with a target recruitment of at least 323 subjects, 80 volunteers and 4 healthcare professionals. Study participants will be recruited through randomized sampling of hospitalized and discharged older adults. Study subjects will be recruited from the Froedtert Hospital general medicine floor in Wauwatosa, Wisconsin and must be between the ages of 65 and 75. Volunteers will be recruited from local senior community centers and retirement communities and must be at least 60 years of age or older. Registered dietitians and physical therapists will provide 4 weeks of training to the volunteers. There will be two groups; intervention and comparison. Participants will be randomly assigned to either the intervention or comparison group based on their MNA-SF score. Volunteers will visit the intervention group at least twice per week for 16 weeks. During these visits the volunteers will provide nutrition education, physical activity demonstrations and social support in the form of various discussion topics that best suit the individual. The volunteers will carry a guidebook that pertains nutrition topics such as how to increase protein and calories, exercises and discussion topic ideas. To ensure volunteer compliance to the study protocol, the guidebook will also contain a page that the volunteer must fill out each week. The page will ask general questions about what was discussed during each visit. It will be broken down into sections; nutrition, physical activity and social support. The intervention group will also be given an activity log to track their daily steps and activities. While those in the comparison group will not receive any intervention. Instead they will receive pamphlets that discuss the importance of consuming enough protein, calories and fluid. They will also receive pamphlets that provide examples of different exercises. The comparison group will also be given a physical activity log that must be filled out weekly. Finally, hospital readmissions data will be obtained from the hospital database at the end of the study.

Primary outcome measurements include dietary, physical activity and quality of life outcomes. Hospital readmissions will serve as the secondary outcome. Dietary, physical activity and quality of life will be measured at baseline and at the end of the study. All participants will be matched in the sense that they are considered either at risk for malnourishment or are malnourished. A parametric t-test will be used to compare dietary, physical activity adherence, HRQOL score and readmission data between both groups at baseline and at the end of the intervention. Study results will be considered statistically significant if the p-value is less than or equal to 0.05. Additionally, the Centers for Disease Control (2018) recommends the use of the SAS, SPSS and SUNDAN syntax software to score the outcome measures for the HRQOL. Therefore, the SPSS computer software may be used to determine the HRQOL scores. Each group will be compared before and after the intervention to determine within and between subject variance. To further explore the results and make inferences the Wilcoxon-Signed Rank test will be used.

4) What measurement/data collection tools are being used?
Food record, Physical activity log, MNA-SF, Health-Related Quality of Life (HRQOL) questionnaire, Froedtert Hospital patient registrar, Tufts University *My Plate for Older Adults* model, Guidebook

IV. Additional Project Information – Required by all applicants
1) What human subjects training has the researcher completed (e.g. course work, online certification)?

2) What process is used for obtaining informed consent (attach the informed consent application)? See Appendix for consent application.

3) Does the research include special populations?

Minors under 18 years of age?	☐ Yes	☒ No
Persons legally incompetent?	☐ Yes	☒ No
Prisoners?	☐ Yes	☒ No
Pregnant women, if affected by research?	☐ Yes	☒ No
Persons institutionalized?	☐ Yes	☒ No
Persons mentally incapacitated?	☐ Yes	☒ No

4) If **YES,** describe additional precautions included in the research procedures.

5) Does the research involve any of the following procedures?

False or misleading information to subjects?	☐ Yes	☒ No
Withholds information such that their informed consent might be questioned?	☐ Yes	☒ No
Uses procedures designed to modify the thinking, attitudes, feelings, or other aspects of the behavior of the subjects?	☐ Yes	☒ No

6) If **YES**, describe the rationale for using procedures, how the human subjects will be protected and what debriefing procedures are used.

7) Does the research involve measurement in any of the following areas?

Sexual behaviors?	☐ Yes	☒ No
Drug use?	☐ Yes	☒ No
Illegal conduct?	☐ Yes	☒ No
Use of alcohol?	☐ Yes	☒ No

8) If **YES**, describe additional precautions included in the research procedures.

9) Are any portions of the research being conducted online?

Survey posted on a website?	☐ Yes	☒ No	If yes, assure anonymity
URL for survey includes information that could identify participants?	☐ Yes	☒ No	If yes, assure anonymity
Invitation to participate sent by email?	☐ Yes	☒ No	If yes, assure anonymity
Items use drop-down box?	☐ Yes	☒ No	If yes, assure that items allow choice of "no response"

10) If **YES**, describe additional procedures.

11) Describe the methods used to ensure confidentiality of data obtained.
To keep data private, paper forms such as physical activity logs, food diaries, guidebooks, questionnaires will be stored in a locked filing cabinet and only accessible to study personnel. Any electronic data will be saved and stored on a flash drive and placed in the same locked filing cabinet as the paper forms. To further protect the identity of participants, volunteers, and health care professionals, names of each individual will not be provided on study documents, instead each individual will be identified through an identification number. This number will be placed on documents completed by the same individual. The volunteers will receive training on the Health Insurance Portability and Accountability Act (HIPPA).

Risks and Benefits
1) Describe risks to the subjects and the precautions that will be taken to minimize them. (Risk includes any potential or actual physical risk of discomfort, harassment, invasion of privacy, risk of physical activity, risk to dignity and self-respect, and psychological, emotional or behavioral risk.)
There will be some physical activity performed throughout the duration of the study. The participants may remove themselves from the study at any time. Multiple steps will be taken to ensure research ethics are followed. Study subjects will not be put at any risk or harm throughout the duration of the study.

2) Describe the benefits to subjects and/or society. (These will be balanced against risk.)
This proposed study will help determine if a home-based trained volunteer program can provide positive outcomes in the study population. These outcomes include increased calorie and protein intake, physical activity, quality of life and reduction in hospital readmissions. The study subjects may learn new exercises they can conduct at home along with new recipes. They may also welcome a new friendship through conversations with study participants. Another key benefit is the potential to reduce readmissions, which can help improve the quality of life, by reducing the amount of time and money spent in the hospital.

V. Is the proposed project "research" as defined by Institutional Review Board requirements? - Required by all applicants

- Research is defined as a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.
- A human subject is defined as a living individual about whom an investigator obtains either 1) data through intervention or interaction with the individual; or 2) identifiable private information.

Does the research involve human subjects or official records about human subjects?
☒ Yes
☐ No

If NO STOP here, and SUBMIT application.

If the results will be available in the library, presented at a professional conference (includes any presentation to group(s) outside of the classroom), or published, please check the Yes box:
☐ Yes
☒ No

Appendix B

Consent Form

Research Participant Information and Consent Form

Mount Mary University

Title of Study: A Quasi Experimental Study to Determine the Effects of a Volunteer Led Home Based Nutrition, Physical Activity, and Social Support Program for Community Residing Older Adults.

Invitation to Participate and Purpose of the Research You are invited to participate in a research study that seeks to evaluate a volunteer-led nutrition, physical activity, and social support program. The program will seek to determine if the intervention results in increased calorie and protein intake, physical activity and improved quality of life. It will also seek to evaluate if the program results in reduced hospital readmissions, specifically in those who receive the intervention. There will be two groups, one group will receive the intervention and the other will not receive the intervention and will be known as the comparison group. Participants will be asked to fill out a food and physical activity log. Individuals in the intervention group will receive home visits by the volunteers twice a week for four months. They will also engage in conversations with the volunteers that pertain to different social topics as well as a discussion on how to incorporate nutrient-dense, high protein caloric foods. They will also be encouraged to participate in some sort of physical activity at for least 30-minutes twice a week. They will also be encouraged to incorporate some of the foods described in their daily diet. Data will be de-identified and analyzed by researchers. Participants must be 18 years of age or older.

Benefits and Risks: This research is designed to benefit the dietetics profession, by providing a preliminary framework for a hospital to home care program that includes nutritional care. It can also promote the value of nutrition and its abilities to address nutritional deficiencies and offer possible solutions to improve dietary intake in the homebound geriatric population. Although participants may not benefit personally from being in this research study, findings generated by this research may add new knowledge to the geriatric dietetics field in general. There will be no monetary compensation. While there will be some light exercises performed during this study, the participants can decline to participate. There are no known potential risks associated with participating in this study. Please address any questions or issues of concern to the researchers using the contact information provided above.

Confidentiality: All information obtained will be kept confidential by the researchers who will be the only people with access to the data. Information obtained will be stored electronically and will be password protected. Per the U.S. Office of Human Research Protections (code §46.115), all data will be destroyed 3 years after the end of data collection. Paper files will be shredded, and electronic files will be deleted. Individual participants will not be identified in any report or publication about this study.

Contact Information If you have questions about this research study, your rights as a research subject, or would like to know the outcome of the research, please contact Dana Scheunemann, 414-930-3658, scheuned@mtmary.edu and Serina Myers, 480-221-7041, myerss@mtmary.edu. If you have any questions regarding your rights or privacy as a participant in this study, please contact Dr. Tammy Scheidegger, Mount Mary University Institutional Review Board Chair, 2900 North Menomonee River Parkway, Milwaukee, Wisconsin, 53222-4597, telephone (414) 930-3434 or email schediet@mtmary.edu.

Consent By signing below, you are indicating that you have read this consent form, have been given the opportunity to ask questions, and have agreed to voluntarily participate. You may withdraw from participation at any time, or refuse to answer any question herein, without penalty or loss of benefits to which other participants are entitled.

You may request a copy of this page for your records. Thank you for your participation.

Signature of participant_____ Date _____

Other Possible Elements Needed
A disclosure of appropriate alternative procedures or courses of treatment, if any, that might be advantageous to the participant. For research involving more than minimal risk, a statement describing any compensation for injuries and contact information. (Minimal risk is a risk of harm to the participant that is no greater than the risk encountered in normal, day-to-day activities or during routine physical or psychological examinations.) If the participant is a patient or client receiving medical, psychological, counseling, or other treatment services, there should be a statement that withdrawal from the study will not jeopardize or otherwise affect any treatment or services the participant is currently receiving or may receive in the future. Participants also should be told whether their data will be destroyed should they withdraw from the study. If a survey instrument or interview questions are used and some questions deal with sensitive issues, the participants should be told they may refuse to answer individual questions.

Appendix C

Food Diary

- Please write what you eat and drink daily
- Include portions (cups, tablespoon, ounces)

Week 4

Days	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Breakfast							
Snack							
Lunch							
Snack							
Dinner							

Appendix D

Guidebook developed especially for the Quasi- Experimental Study. Includes worksheets for the participants.

Please use this as a guide to help you make better food choices each day. If you have any questions please ask your study buddy. Dietary recommendations are based upon the Academy of Nutrition and Dietetics Nutrition Care Manuel (Academy of Nutrition and Dietetics, n.d.)

(Attention study volunteers: Worksheet copies of the information below can be given to the participants in both groups so they can practice on their own)
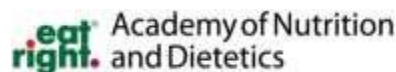
High-Calorie, High Protein Nutrition Therapy

A high-calorie, high-protein diet has been recommended for you either because you can't eat enough calories throughout the day, have lost weight, or need to add protein to your diet. Following the recommendations on this handout can help you:

- Gain weight and give your body energy
- Get more protein from foods that help your body heal and grow strong
- Recover from surgery or illness

   Tips

Try to eat at least 6 meals and snacks each day

- Extra meals and snacks can help you get enough calories and protein.
- You may want to try high-calorie supplement drinks (made at home or bought at a store) periodically between meals to get more calories each day.

o If you buy the drink at the store, read the label to look for products with 200-400 calories per serving.

o If you make the drink at home, you can increase calories by adding protein ingredients such as nonfat milk, low-fat yogurt, nonfat milk powder, or protein powder.

• Enjoy snacks such as milkshakes, smoothies, pudding, ice cream, or custard. **Eat More Fat**

- Fat provides a lot of calories in just a few bites. A tablespoon of oil, butter, or margarine has about 100 calories.
- Add butter, margarine, or oil to bread, potatoes, vegetables, and soups.
- Use mayonnaise, salad dressing, avocado, and peanut butter/nut butters freely.

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Choose High-Protein Foods

- Enjoy milk, eggs, cheese, meat, fish, poultry, and beans. Consider trying protein powders and meal replacement shakes and bars.
- Choose higher-fat meats. They have more calories than lean meats.
  Examples include chicken thighs, marbled meats, bacon, sausage, poultry with skin
- Choose whole milk instead of low-fat or skim milk.
- Eat high-fat cheeses instead of low-fat or nonfat cheeses.

Shopping Tips

- Avoid diet, low-calorie, or low-fat food items.
- Look for dairy products (milk, cheese, yogurt, cottage cheese) that are labeled "whole fat" or have at least 4% fat.
- Purchase nonfat dry milk powder or protein powder to use to make shakes or other blended recipes.

Cooking Tips

- Make a high-protein milk recipe like the one below. The recipe can be prepared in advance and stored in the refrigerator until you are ready to drink it. Use this high-protein milk in recipes that call for milk or drink it as a beverage.

  o 1 cup whole milk

  o 1⁄4 cup nonfat dry milk powder

- Add cheese sauce, butter, and sour cream to vegetable and potato dishes.
- Get extra calories by adding condensed milk, cream, butter, nut butters, and sweetener to hot cereals, mashed potato, pudding, and soups. Examples:

o Prepare oatmeal with condensed milk, butter/nut butter, and brown sugar

o Prepare mashed potatoes with cream, butter, and cheese

o Prepare soup with cream and extra butter, or puree the soup with cream to make a bisque

o Add cream to pudding mix or use pudding dry mix in cakes/baked goods • Serve items with extra sauces. These contain additional calories:

o Gravy on meats and potatoes
o Extra mayonnaise, BBQ sauce or ketchup
o Dipping sauces, hummus, and regular salad dressing

High Calorie, High Protein Nutrition Therapy—Page 2

High-Calorie, High Protein Sample 1-Day Menu

Meal	Menu
Breakfast	1 large egg, scrambled 1 medium biscuit 1 tablespoon jam 2 tablespoon butter 1 cup apple juice
Snack	1 cup instant pudding
Lunch	4 ounces tuna salad (with mayonnaise, oil, relish) 1 hard-boiled egg 6 crackers 2 canned peach halves 2 tablespoons cream cheese 4 walnut halves 1 cup grape juice
Snack	1/2 cup orange juice in smoothie 1/4 cup frozen strawberries in smoothie 1 banana in smoothie 1 ounce protein powder in smoothie
Dinner	3 ounces ground beef patty 2 tablespoons gravy 15 french-fried potatoes with ketchup 3 large stalks broccoli 2 tablespoons cheese sauce 2 slices bread 1 tablespoon butter
Snack	1 medium scoop ice cream 2 tablespoons chocolate syrup

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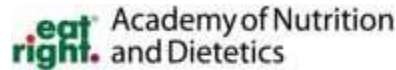
Lactose-Controlled Nutrition Therapy

- Lactose is the type of sugar in milk and dairy foods.

- To digest lactose, people need to have a specific enzyme in the small intestine. This enzyme is called lactase.

- If you have trouble digesting lactose, you may have diarrhea, bloating, stomach pain, and gas symptoms.

- Limiting or avoiding milk and dairy products can help ease these symptoms.
- Taking lactase supplements before having milk and dairy products may also help.

Note: Milk and dairy foods are a primary source of calcium, a mineral that is important to good health. When you avoid milk and dairy foods, you need to get calcium from other foods, such as the following:

- Sardines
- Canned salmon
- Tofu (calcium-fortified)
- Shellfish
- Turnip greens
- Collards
- Kale
- Dried beans
- Broccoli
- Calcium-fortified orange juice
- Calcium-fortified soy milk
- Blackstrap molasses
- Almonds

Tips

Label Reading Tips

- Check ingredients lists carefully.
- Avoid foods made with butter, cream, milk, milk solids, or whey.
- Avoid products when the ingredients list states, "May contain milk."

Copyright © Academy of Nutrition and Dietetics. This handout may be duplicated for client education. 1 Lactose Controlled Nutrition Therapy.

eat right. Academy of Nutrition and Dietetics

Heart Failure Nutrition Therapy

This nutrition therapy will help you feel better and support your heart.

This plan focuses on:

- Limiting sodium in your diet. Salt (sodium) makes your body hold water. When your body holds too much water, you can feel shortness of breath and swelling. You can prevent these symptoms by eating less salt.
- Limiting fluid in your diet. For some patients, drinking too much fluid can make heart failure worse. It can cause symptoms such as shortness of breath and swelling. Limiting fluids can help relieve some of your symptoms.
- Managing your weight. Your registered dietitian nutritionist (RDN) can help you choose a healthy weight for your body type.

You can achieve these goals by:

- Reading food labels to keep track of how much sodium is in the foods you eat.
- Limiting foods that are high in sodium.
- Checking your weight to make sure you're not retaining too much fluid.

Reading the Food Label: How Much Sodium Is Too Much?

The nutrition plan for heart failure usually limits the sodium you get from food and drinks to 2,000 milligrams per day. Salt is the main source of sodium. Read the nutrition label to find out how much sodium is in 1 serving of a food.

- Select foods with **140** milligrams of sodium or less per serving.
- Foods with more than **300** milligrams of sodium per serving may not fit into a reduced-sodium meal plan.
- Check serving sizes. If you eat more than 1 serving, you will get more sodium than the amount listed.

Nutrition Facts

8 servings per container
Serving size   2/3 cup (55g)

Amount per serving
Calories   **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Cutting Back on Sodium

- **Avoid processed foods. Eat more fresh foods**.
  Fresh and frozen fruits and vegetables without added juices or sauces are naturally low in sodium.
- Fresh meats are lower in sodium than processed meats, such as bacon, sausage, and hot dogs. Read the nutrition label or ask your butcher to help you find a fresh meat that is low in sodium.

Add flavors to your food without adding sodium
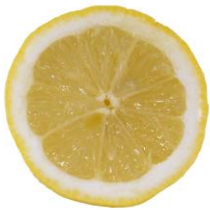
Try lemon juice, lime juice, fruit juice, or vinegar.
Dry or fresh herbs add flavor. Try basil, bay leaf, dill, rosemary, parsley, sage, dry mustard, nutmeg, thyme, and paprika.
Pepper, red pepper flakes, and cayenne pepper can add spice to your meals without adding sodium.
Hot sauce contains sodium, but if you use just a drop or two, it will not add up to much.
Buy a sodium-free seasoning blend or make your own at home.

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Heart Failure Sample 1-Day Menu

Breakfast	1 cup regular oatmeal made with water or milk 1 cup reduced-fat (2%) milk 1 medium banana 1 slice whole wheat bread 1 tablespoon salt-free peanut butter
Morning Snack	1/2 cup dried cranberries
Lunch	3 ounces grilled chicken breast 1 cup salad greens Olive oil and vinegar dressing (for greens) 5 unsalted or low-sodium crackers Fruit plate with 1/4 cup strawberries 1/2 sliced orange (for fruit plate) 1 peach half (for fruit plate)
Afternoon Snack	1/2 low-sodium turkey sandwich made with: 1 ounce low-sodium turkey 1 piece whole wheat bread
Evening Meal	3 ounces herb-baked fish 1 baked potato 2 teaspoons soft margarine (trans fat–free) (for potato) Sliced tomatoes 1/2 cup steamed spinach drizzled with lemon juice 3-inch square of angel food cake Fresh strawberries (2) (for cake)
Evening Snack	2 tablespoons salt-free peanut butter 5 low-sodium crackers

Physical Activity

Try to exercise at least 2 days or more each week. This can include walking, housework and even work outside the home. Being active can make it easier to pick up your grandchildren or bend down when working in the garden. Please use the exercises below as a way to add more exercise in your day. Exercise recommendations are based upon the National Institute on Aging Every Guide on Exercise and Physical Activity (National Institute on Aging, 2015).

(Attention volunteer: Worksheet copies of the exercises below can be given to the participants in both groups so they can practice on their own)

Wrist Curl

This exercise will strengthen your wrists. It also will help ensure good form and prevent injury when you do upper body strength exercises.

1. Rest your forearm on the arm of a sturdy chair with your hand over the edge.
2. Hold weight with palm facing upward.
3. Slowly bend your wrist up and down.
4. Repeat 10-15 times.
5. Repeat with other hand 10-15 times.
6. Repeat 10-15 more times with each hand.

This exercise will strengthen your shoulders and arms. It should make swimming and other activities such as lifting and carrying grandchildren easier.

Overhead Arm Raise

1. You can do this exercise while standing or sitting in a sturdy, armless chair.
2. Keep your feet flat on the floor, shoulder-width apart.
3. Hold weights at your sides at shoulder height with palms facing forward. Breathe in slowly.
4. Slowly breathe out as you raise both arms up over your head keeping your elbows slightly bent.
5. Hold the position for 1 second.
6. Breathe in as you slowly lower your arms.
7. Repeat 10-15 times.
8. Rest; then repeat 10-15 more times.

TIP As you progress, use a heavier weight and alternate arms until you can lift the weight comfortably with both arms.

This exercise will strengthen your shoulders and make lifting groceries easier.

Side Arm Raise

1. You can do this exercise while standing or sitting in a sturdy, armless chair.
2. Keep your feet flat on the floor, shoulder-width apart.
3. Hold hand weights straight down at your sides with palms facing inward. Breathe in slowly.
4. Slowly breathe out as you raise both arms to the side, shoulder height.
5. Hold the position for 1 second.
6. Breathe in as you slowly lower your arms.
7. Repeat 10-15 times.
8. Rest; then repeat 10-15 more times.

TIP As you progress, use a heavier weight and alternate arms until you can lift the weight comfortably with both arms.

These push-ups will strengthen your arms, shoulders, and chest. Try this exercise during a TV commercial break.

Wall Push-Up

1. Face a wall, standing a little farther than arm's length away, feet shoulder-width apart.
2. Lean your body forward and put your palms flat against the wall at shoulder height and shoulder-width apart.
3. Slowly breathe in as you bend your elbows and lower your upper body toward the wall in a slow, controlled motion. Keep your feet flat on the floor.
4. Hold the position for 1 second.
5. Breathe out and slowly push yourself back until your arms are straight.
6. Repeat 10-15 times.
7. Rest; then repeat 10-15 more times.

Elbow Extension

This exercise will strengthen your upper arms. If your shoulders aren't flexible enough to do this exercise, try the **Chair Dip** on page 55.

1. You can do this exercise while standing or sitting in a sturdy, armless chair.
2. Keep your feet flat on the floor, shoulder-width apart.
3. Hold weight in one hand with palm facing inward. Raise that arm toward ceiling.
4. Support this arm below elbow with other hand. Breathe in slowly.
5. Slowly bend raised arm at elbow and bring weight toward shoulder.
6. Hold position for 1 second.
7. Breathe out and slowly straighten your arm over your head. Be careful not to lock your elbow.
8. Repeat 10-15 times.
9. Repeat 10-15 times with other arm.
10. Repeat 10-15 more times with each arm.

TIP If it's difficult for you to hold hand weights, try using wrist weights.

This exercise strengthens hips, thighs, and buttocks. For an added challenge, you can modify the exercise to improve your balance. (See **Progressing to Improve Balance** on page 68.)

Side Leg Raise

1. Stand behind a sturdy chair with feet slightly apart, holding on for balance. Breathe in slowly.
2. Breathe out and slowly lift one leg out to the side. Keep your back straight and your toes facing forward. The leg you are standing on should be slightly bent.
3. Hold position for 1 second.
4. Breathe in as you slowly lower your leg.
5. Repeat 10-15 times.
6. Repeat 10-15 times with other leg.
7. Repeat 10-15 more times with each leg.

TIP As you progress, you may want to add ankle weights.

Back Leg Raise

This exercise strengthens your buttocks and lower back. For an added challenge, you can modify the exercise to improve your balance. (See **Progressing to Improve Balance** on page 68.)

1. Stand behind a sturdy chair, holding on for balance. Breathe in slowly.
2. Breathe out and slowly lift one leg straight back without bending your knee or pointing your toes. Try not to lean forward. The leg you are standing on should be slightly bent.
3. Hold position for 1 second.
4. Breathe in as you slowly lower your leg.
5. Repeat 10-15 times.
6. Repeat 10-15 times with other leg.
7. Repeat 10-15 more times with each leg.

TIP As you progress, you may want to add ankle weights.

Knee Curl

Walking and climbing stairs are easier when you do both the **Knee Curl** and **Leg Straightening** exercises. For an added challenge, you can modify the exercise to improve your balance. (See **Progressing to Improve Balance** on page 68.)

1. Stand behind a sturdy chair, holding on for balance. Lift one leg straight back without bending your knee or pointing your toes. Breathe in slowly.
2. Breathe out as you slowly bring your heel up toward your buttocks as far as possible. Bend only from your knee, and keep your hips still. The leg you are standing on should be slightly bent.
3. Hold position for 1 second.
4. Breathe in as you slowly lower your foot to the floor.
5. Repeat 10-15 times.
6. Repeat 10-15 times with other leg.
7. Repeat 10-15 more times with each leg.

TIP As you progress, you may want to add ankle weights.

This exercise strengthens your thighs and may reduce symptoms of arthritis of the knee.

Leg Straightening

1. Sit in a sturdy chair with your back supported by the chair. Only the balls of your feet and your toes should rest on the floor. Put a rolled bath towel at the edge of the chair under thighs for support. Breathe in slowly.

2. Breathe out and slowly extend one leg in front of you as straight as possible, but don't lock your knee.

3. Flex foot to point toes toward the ceiling. Hold position for 1 second.

4. Breathe in as you slowly lower leg back down.

5. Repeat 10-15 times.

6. Repeat 10-15 times with other leg.

7. Repeat 10-15 more times with each leg.

TIP As you progress, you may want to add ankle weights.

Chair Stand

This exercise, which strengthens your abdomen and thighs, will make it easier to get in and out of the car. If you have knee or back problems, talk with your doctor before trying this exercise.

1. Sit toward the front of a sturdy, armless chair with knees bent and feet flat on floor, shoulder-width apart.

2. Lean back with your hands crossed over your chest. Keep your back and shoulders straight throughout exercise. Breathe in slowly.

3. Breathe out and bring your upper body forward until sitting upright.

4. Extend your arms so they are parallel to the floor and slowly stand up.

5. Breathe in as you slowly sit down.

6. Repeat 10-15 times.

7. Rest; then repeat 10-15 more times.

TIP   People with back problems should start the exercise from the sitting upright position.

Discussion Topics Ideas

Sports
- What kind of sports do you enjoy to watch or play?
- What is your favorite sports team?
- How do you think the Packers will do this season? Do they have a chance to reach the Super Bowl?

Current events
- What are your thoughts on the president's response to the current pandemic?

Past and Current Life Events and Accomplishments
- What kind of work did you do before retirement?
- What is your most proud accomplishment?
- How long were you married or how long have you been married?
- Tell me about your children and grandchildren.

Favorites
- Tell me about some of your favorite memories. Why are they your favorite?
- What are some favorite activities you enjoy?

Buddies- Intervention Group

Week 1

First session: Introduction Session

Getting to know the participant

Did you introduce yourself to the participant? Yes, No, Not Sure

Did you spend time getting to know the participant Yes, No, Not Sure

Did you ask the participant if they have any food allergies or food intolerances? Yes, No, Not Sure

Are there any diet restrictions present? Yes, No, Not Sure
If so, what are they?

Did you discuss physical activity component and rules of the study? Yes, No, Not Sure

Did you provide physical activity parameters? Yes, No, Not Sure

Did you discuss the social support aspect of the study? Yes, No, Not Sure

Second Session: (Same questions can be used for subsequent visits)

What did you discuss with the participant today?

Did you discuss high calorie and protein foods? If so, which ones?

 "Did you perform physical activity exercises today, if so which ones?"

Appendix E

Health Related Quality of Life Questionnaire

Healthy Days Core Module (CDC HRQOL– 4)

1. Would you say that in general your health is

Please Read

a.	Excellent	1
b.	Very good	2
c.	Good	3
d.	Fair	4
	or	
e.	Poor	5

Do not read these responses

Don't know/Not sure   7
Refused   9

2. Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

a.	Number of Days	--
b.	None	8 8

Don't know/Not sure   7 7
Refused   9 9

3. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

a. Number of Days --
b. None   8-8   If both Q2 and Q3 = "None," skip next question

Don't know/Not sure   7 7
Refused   9-9

4. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

a.	Number of Days.	- -
b.	None	8 8

Don't know/Not sure   7 7
Refused   9 9

Appendix F

Mini Nutrition Assessment Form Short Form-MNA-SF

Mini Nutritional Assessment
MNA®

Nestlé
NutritionInstitute

Last name:		First name:	
Sex:	Age:	Weight, kg:	Height, cm:	Date:

Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake ☐

B Weight loss during the last 3 months
0 = weight loss greater than 3 kg (6.6 lbs)
1 = does not know
2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)
3 = no weight loss ☐

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out ☐

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes   2 = no ☐

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems ☐

F1 Body Mass Index (BMI) (weight in kg) / (height in m)^2 ☐
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater ☐

IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2.
DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

F2 Calf circumference (CC) in cm
0 = CC less than 31
3 = CC 31 or greater ☐

Screening score ☐ ☐
(max. 14 points)

			Save
12-14 points:	☐	Normal nutritional status	Print
8-11 points:	☐	At risk of malnutrition	
0-7 points:	☐	Malnourished	Reset

Ref.   Vellas B, Villars H, Abellan G, et al. *Overview of the MNA® - Its History and Challenges.* J Nutr Health Aging 2006;10:456-465.
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For more information: **www.mna-elderly.com**

Appendix G

MyPlate for Older Adults

Appendix H

Weekly Physical Activity Log-(Implement on 4th week of each month)

Weekly Physical Activity Log

Aerobic and Strengthening Activities

Name: _____

My goal is to do aerobic activities for a total of _____ hours and _____ minutes this week.

What I Did:	My Effort:	When I Did It and For How Long:							Total hours or minutes
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
Example: Walked	Moderate		30 min	30 min		30 min		30 min	2 hours
Example: Basketball	Vigorous						30 min		30 min
Total number of hours and minutes I did these activities this week:									

My goal is to do strengthening activities for a total of _____ days this week.

What I Did:	When I Did It:							Total days
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
Example: Sit-ups	Yes			Yes				2 days
Example: Shoveling dirt	Yes		Yes			Yes		3 days
Total number of days I did these activities this week:								