

**Factors Associated with Eating Assistance Among Long-term Care Residents:
A Making the Most of Mealtimes (M3) Analysis**

By

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Abstract

Introduction: Long-term care (LTC) residents requiring eating assistance are at nutritional risk. **Objectives:** To identify characteristics of LTC residents requiring eating assistance and examine factors associated with eating challenges. **Methods:** Secondary data from the Making the Most of Mealtimes study was analyzed including a Mini Nutritional Assessment–Short Form, Patient-Generated Subjective Global Assessment, energy intake, Edinburgh Feeding Evaluation in Dementia, knee height, ulna length, weight and Cognitive Performance Scale. Descriptive statistics, analyses of variance and linear regressions were conducted. **Results:** 23% of participants required some form of eating assistance. Energy intake was highest for residents requiring eating assistance “Often”. More eating challenges were associated with higher energy intake, lower Body Mass Index, poor nutritional status, and increased cognitive impairment. **Conclusion:** Residents requiring any eating assistance were more likely to be malnourished and have more eating challenges. Interventions are needed to improve the nutritional status of residents with varying assistance requirements.

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Table of Contents

ABSTRACT	I
ACKNOWLEDGEMENTS	II
TABLE OF CONTENTS	IV
LIST OF TABLES	VII
LIST OF COPYRIGHTED MATERIAL	VIII
LIST OF APPENDICES	IX
LIST OF ABBREVIATIONS	X
CHAPTER 1: INTRODUCTION	1
Overview	1
Research Objectives	3
Research Questions	3
Key Terms	3
Significance	4
Chapter Summaries	4
CHAPTER 2: LITERATURE REVIEW	6
Demographics of LTC Residents in Canada	6
Nutritional Issues.....	6
Malnutrition	7
Factors Influencing Food Intake	8
Eating Difficulties Associated with Health Conditions	12
Person-Centered Eating Assistance	16
Time Allotted for Quality Eating Assistance	16

Social Interactions with Eating Assistants	19
Safe Eating Assistance Practices.....	20
Dignified Mealtime Care.....	21
Research Gaps	22
M3 Conceptual Framework.....	23
Conclusion.....	24
CHAPTER 3: METHODOLOGY.....	25
Making the Most of Mealtimes (M3).....	25
Methods for Current Research Study	26
Population of Interest	26
Data Collection.....	27
Data Analysis	32
CHAPTER 4: FACTORS ASSOCIATED WITH EATING ASSISTANCE	
AMONG OLDER ADULTS RESIDING IN LONG-TERM CARE (LTC): A	
MAKING THE MOST OF MEALTIMES (M3) ANALYSIS.....	41
Introduction	41
Methods	42
The Making the Most of Mealtimes (M3)	42
Variables	43
The Sample.....	44
Ethical Approval	45
Data Analysis	45
Results	46

Participant Characteristics.....	46
Factors Associated with Eating Assistance Requirements.....	52
Factors Associated with Eating Challenges	59
Discussion.....	64
Diet.....	64
Health.....	67
Mealtime Assistance	68
Eating Challenges.....	69
Study Limitations.....	74
Conclusion.....	74
CHAPTER 5: OVERALL DISCUSSION	75
Strengths	76
Limitations.....	77
Implication of Findings	77
Policy.....	78
Take Away Points.....	79
Summary.....	80
REFERENCES.....	81
APPENDICES.....	96

List of Tables

Table 3.1 Variable Sources	28
Table 3.2 Data Analysis Summary	34
Table 4.1 Characteristics of LTC Residents Requiring Eating Assistance.....	49
Table 4.2 Factors Associated with Eating Assistance Requirements	53
Table 4.3 Differences Between Eating Assistance Requirements	56
Table 4.4 Eating Challenges of LTC Residents.....	58
Table 4.5 Factors Associated with Eating Challenges	60

List of Copyrighted Material

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Appendix A: M3 Data Conceptual Framework 97

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List of Appendices

Appendix A: M3 Data Conceptual Framework	97
Appendix B: M3 Data Collection Overview	99
Appendix C: Ethical Approval Certificate.....	101
Appendix D: Variables of Interest	102
Appendix E: Overview of Data Collection Tools.....	104
Appendix F: Resident Mealtime Observation Form.....	106
Appendix G: Food Intake Form.....	110
Appendix H: Resident Chart Review.....	113
Appendix I: Minimum Data Set (MDS) Form.....	120
Appendix J: Adapted Screening Tool for Acute Neuro Dysphagia (STAND) Form	130
Appendix K: Modified PG-SGA Form.....	134

List of Abbreviations

BMI	Body Mass Index
CIHR	Canadian Institutes of Health Research
CPS	Cognitive Performance Scale
CVD	Cardiovascular Disease
DV	Dependent Variable
Ed-FED	Edinburgh Feeding Evaluation in Dementia
IV	Independent Variable
kcal	kilocalorie
LTC	Long-Term Care
M3	Making the Most of Mealtimes
MDS	Minimum Data Set
MNA	Mini Nutritional Assessment
ONS	Oral Nutrition Supplements
PG-SGA	Patient-Generated Subjective Global Assessment
RD	Registered Dietitian
RN	Registered Nurse
SPSS	Statistical Package for Social Science

CHAPTER 1:

INTRODUCTION

Overview

Older adults, individuals 65 years of age and older, represent 16.5% of the Canadian population (Statistics Canada, 2016). While the majority of older adults report their health and social needs as relatively good, there are those for whom assistance is needed to meet their complex care needs (Public Health Agency of Canada, 2010). Approximately 4.5% of older adults in Canada reside in nursing homes, chronic care or long-term care (LTC) facilities (Statistics Canada, 2012). As our population continues to age, providing adequate care to meet the needs of older adults is critical and LTC facilities continue to be an important formal care system for individuals with higher care requirements. Despite the importance of adequate food and fluid intake, and good nutritional status for good health and well-being, a large proportion of LTC residents are experiencing malnutrition, jeopardizing their already fragile, health status (High, 2001; Kuikka et al., 2009; Salva et al., 2009).

Within LTC facilities, malnutrition in the form of undernutrition is highly prevalent and requires a greater understanding and attention to modulate the problem. Keller (2013) broadly defines undernutrition as inadequate nutrition to meet an individual's physiological needs. This form of malnutrition is common when consumption of protein and/or energy is inadequate and can lead to a progressive loss of lean muscle mass and adipose tissue (Funderburg & Mathews, 2011). Insufficient food and fluid intake, as a result of a decline in self-eating abilities, may be contributing to this form of malnutrition within LTC facilities (Morley, & Silver, 1995).

Many residents in LTC homes are reliant on others to help assist them with mealtime activities. Eating assistance may include opening food or beverage containers, providing encouragement or physical assistance for individuals experiencing eating difficulties. The ability to access and consume food and fluids for residents requiring eating assistance is often dependent upon the type of assistance required, LTC staffing levels, the availability of family or volunteers to help with mealtime activities, and the number of other residents requiring assistance (Keller et al., 2014). These factors can negatively impact an individual's food access and may cause inadequate consumption for good health and well-being.

Even when mealtime assistance is sufficiently available to a resident, they may still have inadequate food intake. It is not simply the availability of mealtime assistance, but also the quality of assistance which a resident is receiving. Providing person-centered care may be important in regards to the quality of eating assistance. Person-centered mealtime care provides choices and accommodates preferences, supports independence, promotes social interactions and respect to the individual (Reimer & Keller, 2009). The importance of this research area and the need for improving mealtime care standards is illustrated by the high prevalence of undernutrition in LTC residents requiring eating assistance (Keller, 2013; Simmons et al., 2008; Simmons, Osterweil, & Schnelle, 2001; Simmons et al., 2013).

This thesis utilized data from the study, "Making the Most of Mealtimes (M3): Determinants of Food Intake in Long-term Care". The M3 Study looks at key modifiable determinants of food and fluid intake for LTC residents across four Canadian provinces, using a multi-site, cross-sectional design.

Research Objectives

1. To identify the characteristics of LTC residents requiring eating assistance.
2. To examine resident level factors associated with eating challenges.

Research Questions

1. What are the characteristics of LTC residents with varying levels of eating assistance?
2. What are the eating challenges experienced by LTC residents with varying levels of eating assistance?
3. What resident level factors are independently associated with eating challenges?

Key Terms

Undernutrition: broadly defined by Keller (2013) as inadequate nutrition to meet an individual's physiological needs. It often results from inadequate consumption of protein and/or energy, causing a progressive loss of lean muscle mass and adipose tissues (Funderburg & Mathews, 2011).

Eating Assistance: assisting an individual to consume food and/or fluids (e.g., opening containers, providing encouragement, or physical assistance) (Keller et al., 2014).

Person-centered Mealtime Care: mealtime care which provides choices and preferences, supports independence, promotes social interactions and respects the individual (Reimer & Keller, 2009).

Dementia: a syndrome which can produce changes in short- and long-term memory, attention and executive function (Chang, 2012). For the purposes of this study dementia refers to the formal diagnosis of this condition, as identified in the chart review.

Cognitive impairment: problems related to attention, working memory, verbal and visual learning, reasoning, problem solving, and social cognition. (Cognitive Impairment, n.d.).

Within this study, cognitive impairment was measured using the Cognitive Performance Scale (CPS), ranging from intact, borderline intact, mild, moderate, moderate/severe, severe and very severe (Morris et al., 1994).

Significance

Residents in LTC requiring some form of eating assistance are often at a greater risk of undernutrition. These individuals are more reliant on mealtime care in order to meet their nutritional needs in comparison to residents who do not require assistance at meals. Residents in LTC do have the right to refuse meals, and this may impact their nutritional status over time. However, declines in nutritional status due to inadequate quality or quantity of mealtime care are modifiable. No extensive research study currently exists examining the demographic, diet and health characteristics of LTC residents who require eating assistance. This research study will assist in determining factors most influential on eating abilities. This information may help in determining methods to improve the quality of eating assistance in LTC facilities in a manner that will promote both adequate food and fluid intake, and dignified mealtime care.

Chapter Summaries

The current research study utilized secondary data from the M3 study to identify the characteristics of LTC resident requiring varying levels of eating assistance and examine the factors associated with eating challenges. This thesis is structured as a paper-based manuscript and includes the following:

Chapter 2 presents a critical review of the literature on eating assistance of older adults residing in LTC. This review discusses the basic demographics, food consumption

patterns, factors related to intake, nutrient issues, person-centered eating assistance and the conceptual framework of the M3 study.

Chapter 3 provides information about the M3 study and the methodological approach used for this study.

Chapter 4 presents the manuscript titled, “Factors Associated with Eating Assistance Among Older Adults Residing in Long-term Care (LTC): A Making the Most of Mealtimes (M3) Analysis”.

Chapter 5 provides a general discussion and summary of the research findings including strengths, limitations and implications.

CHAPTER 2:

LITERATURE REVIEW

Demographics of LTC Residents in Canada

Approximately five percent of Canada's growing population of older adults live in some type of care facility, including nursing homes, chronic care and LTC facilities. The majority of residents in LTC facilities are female (Canadian Institute for Health Information, 2006). LTC populations are typically older than 85 years of age and possess multiple health conditions, including stroke, diabetes, arthritis and dementia (Benbow & Benbow, 2011; Whitlatch & Noelker, 2016). Dementia is especially common with approximately 45% of LTC populations having a formal diagnosis of this condition (Jansen, 2009; Wellman, & Kamp, 2012; Wong, Gilmour, & Ramage-Morin, 2016). Health conditions may create eating difficulties for LTC residents, influencing their overall nutritional status (Keller, 2013).

Nutritional Issues

Poor food and fluid intake is commonly observed in Canadian LTC facilities (Bell, Tamura, Masaki, & Amella, 2013) and may be responsible for the high prevalence of undernourished residents. Poor food and fluid intake may occur as a result of depression, swallowing disorders, inability to self-feed or refusal to eat (Copeman, 2011; Morley, & Silver, 1995). Inadequate intake makes it more difficult for residents to reach their nutritional requirements for good health status. In older adulthood, individuals may have increased nutrient needs, making food and fluid intake of high priority. Increased nutrient requirements in conjunction with low intake can be very detrimental to overall health.

LTC residents within North America have commonly reported inadequacies in essential micro and macro nutrients. Macronutrient inadequacies include protein and energy intake (Lengyel, Whiting, & Zello, 2008; Morley, & Silver, 1995). Lower intake of these macronutrients, especially energy may make it more difficult for residents to meet other nutrient requirements for good health. These inadequacies may be due to the fact that residents are not consuming adequate amounts of their provided meals. For those with self-eating difficulties, the quality and quantity of mealtime care may be very influential on their ability to consume an adequate amount of their meal, making these individuals more vulnerable to undernutrition. Undernutrition can result in unintentional weight loss, producing detrimental effects on quality of life through decreased bone mineral density, muscle loss and increased risk of frailty (Keller, 2013). Dehydration in older adults can cause irritability, confusion, constipation, dizziness, falls, stroke and renal failure (Hamilton, 2001).

Malnutrition

There are many formal definitions for malnutrition, but in general, it is a deficiency or excess of nutrient intake (Teitelbaum et al., 2005). Malnutrition is highly prevalent in LTC settings ranging from 18-77 % depending on the defining criteria (Boström, Van Soest, Kolewaski, Milke, & Estabrooks, 2011; Chang & Robert, 2011; Keller et al., In Press ; Sitter & Lengyel, 2011; van Nie-Visser et al., 2014; Verbrugge et al., 2013). In LTC populations, malnutrition in the form of undernutrition is most concerning and refers specifically to inadequate nutrition to meet an individual's physiological needs (Keller, 2013). This form of malnutrition often results from inadequate consumption of protein and/or energy, causing a progressive loss of lean

muscle mass and adipose tissues (Funderburg & Mathews, 2011). Undernutrition is common in LTC populations and unfortunately frequently remains undiagnosed and untreated (Sacks et al., 2000; Skates & Anthony, 2012). Some older adults may be admitted into LTC in a malnourished state, especially those coming directly from hospital (Leydon & Dahl, 2008).

Malnutrition may go undiagnosed as it can be difficult to distinguish from the natural aging process (Sacks et al., 2000). When malnutrition, specifically in the form of undernutrition, is not identified early and treated, it can have detrimental effects for an older adult including the risk of infections, falls and fractures, low quality of life and mortality (Dawson-Hughes, 2008; High, 2001; Kuikka et al., 2009;). Identifying undernutrition early so that nutritional interventions can occur can be an important practice to protect the health of residents in LTC facilities.

Factors Influencing Food Intake

There are many factors which can impact food intake in older adulthood. These can include physical factors related to the dining environment, social factors related the interactions with other individuals during mealtimes, physiological factors related to a resident's mental or emotional state and clinical factors related to a resident's physical health and well-being. In LTC, residents' food and fluid intake can be impacted by many of these factors at the same time and may therefore require individualized care to match their specific needs.

Physical Factors

Research has shown that dining rooms with non-institutional features are associated with higher food and fluid consumption compared to institutional-like settings

(Reed et al., 2005). Non-institutional features can include tablecloths, centre pieces and other items which are more homelike. Using bulk delivery methods for meals, as opposed to tray delivery is also associated with increased food and fluid intake (Desai, Winter, Young, & Greenwood, 2007). In LTC, tray delivery methods may represent a more institutionalized setting, therefore impacting food and fluid intake. Having familiar background music playing throughout the meal has been found to improve food and fluid intake, specifically for residents with Alzheimer's disease (Thomas & Smith, 2009). Maintaining a low noise level, free from televisions, intercoms and institutional noise during mealtimes can be important for adequate food and fluid intake (Layne, 1990; McDaniel, Hunt, Hackes, & Pope, 2001). Adequate lighting above dining tables which does not produce any glare is also important. Noise and light can impact a resident's comfort level therefore affecting food and fluid intake. In addition, glare may decrease intake by causing discomfort and distracting a resident from their meal (McDaniel et al., 2001).

Social Factors

Social isolation at mealtimes could decrease food and fluid intake (Paquet et al., 2008; Spangler & Chidester, 1999). Therefore it is important to encourage residents to socialize with other residents, staff, family, volunteers and other individuals present during mealtimes (Keller, 2013). This could be as simple as having a resident eat in the dining room as opposed to their room as it is a more social environment (Nijs, de Graaf, van Staveren, & de Groot, 2009; Reed et al., 2005). For residents receiving eating assistance, it is both the physical assistance and social interaction which is beneficial for food and fluid intake (Pearson, Fitzgerald, & Nay, 2003). There is also the matter of

ensuring that social interactions, especially at mealtimes are positive. Many facilities assign dining room seating to residents which can limit their freedom to choose their own dining companions (Keller, 2013). These assignments should consider the personality of the residents and be flexible to changes if needed to encourage positive social interactions that benefit food and fluid intake.

Psychological Factors

Appetite is very influential to an individual's food and fluid intake and is often associated with physiological well-being in older adulthood. Depression can cause a decrease in appetite and fluid intake (Hamilton, 2001). Declines in cognition and physiological well-being can cause older adults to forget to eat or reduce their desirability to eat (Funderburg & Mathews, 2011). Maintaining a good appetite may help protect against inadequate food intake and undernutrition in later life. Further declines in cognition may impact a resident's ability to eat independently (Du, DiLuca, & Growdon, 1993), increasing their need for eating assistance. Residents experiencing severe cognitive decline may become distracted, agitated, or have difficulty recognizing food or utensils at mealtimes (Greenwood et al., 2005). Encouragement or verbal cuing at meals can be beneficial to residents experiencing these psychological factors (Amella, 1998).

Clinical Factors

Tooth loss, dentures, dry mouth, dysphagia, visual impairments and impaired motor skills are common issues associated with eating difficulties in older adulthood (Copeman, 2011; Funderburg & Mathews, 2011). Chewing or swallowing difficulties may require the use of modified diet texture such as soft, minced or pureed (Copeman, 2011). LTC residents requiring these texture modifications may face additional food and

fluid intake issues if they are not well accepted or viewed as less appetizing (Keller, Chambers, Niezgodna, & Duizer, 2012).

Vision impairments, including cataracts and glaucoma, can make it difficult for an individual to see or recognize food placed in front of them. This visual loss cannot only impair appetite by eliminating the visual appeal of food, but it may also impede one's ability to physically transfer food from the plate to mouth (Funderburg & Mathews, 2011; Keller, 2013). In order to improve the visual appeal of foods for these residents, it may be beneficial to describe the food in an appetizing way (Hogstel & Robinson, 1998) or provide a variety of colourful foods within a meal and display them on a contrasting coloured plate (Dunne, Nearing, Cipolloni, & Cronin-Golomb, 2004; Stroebele & De Castro, 2004).

Tremors or joint pain and weakness may also prevent an individual from adequately eating independently. Food may be dropped as it is moved from plate to mouth, or not consumed if packaged foods are difficult to open and utensils difficult to grip or maneuver (Keller, 2013). Many of these clinical factors are more commonly seen in older age groups. As a result, some LTC residents may find it challenging to transport food from the plate to their mouth even when it is prepared and served to them (Kayser-Jones, 1996). Food spillage needs to be accounted for with residents experiencing these challenges, as this food is typically not being consumed. Without proper assistance, LTC residents with impaired eating abilities may be unable to achieve adequate intake of energy and nutrients, posing the risk of undernutrition.

Eating Difficulties Associated with Health Conditions

Due to the increase in health conditions and prescription medication use in institutionalized populations, LTC residents may already be placed at increased nutritional risk (Lengyel et al., 2008). Some health conditions may also require added dietary changes or restrictions. In addition, the medication for these conditions can impact taste and smell sensations, as well as the absorption of nutrients (Wellman, & Kamp, 2012). These effects, combined with the poor food and fluid intake which is typical in LTC, can result in detrimental effects to overall health and well-being.

Common health condition in LTC which have been identified to impact food and fluid intake include dementia, arthritis, stroke and depression (Bergdahl et al., 2005; Correia et al., 2010; Du et al., 1993; Kelsheimer & Hawkins, 2000; Meijers et al., 2014; Perry & McLaren, 2003; Westergren et al., 2001).

Dementia

Dementia is a syndrome involving memory loss, cognitive impairment, personality changes, communication and language challenges, difficulty recognizing people or objects, and changes in judgment, intellectual reasoning, mood and behaviour (Keller, 2013). Dementia can produce changes in short- and long-term memory, attention and executive function which can greatly impact a resident's eating abilities (Chang, 2012).). Approximately 45% of LTC residents have a formal diagnosis of dementia (Jansen, 2009; Wellman, & Kamp, 2012; Wong et al., 2016). These individuals may have a difficult time recognizing objects, including food or the utensils (Keller, 2013), making it difficult to start a meal (Correia, Morillo, Filho, & Mansur; 2010; Edahiro et al., 2012; Meijers, Schols, & Halfens, 2014). Dementia has also been shown to produce difficulties

with starting meals due to changes in food preference as the condition develops (Correia et al., 2010; Meijers et al., 2014). It is important for LTC facilities to offer a menu with a wide variety to meet the varying food preferences of their residents (Keller, 2013).

Once the resident begins their meal, they may become easily distracted by other people or objects in the dining room, requiring more time and encouragement to consume meals. Individuals experiencing dementia may also require verbal cues as a reminder to swallow the food in their mouth and prevent pocketing of food or choking (Layne, 1990). Behavioural issues can be common in LTC residents experiencing dementia (Keller, 2013), which can in turn impact dietary intake. When eating difficulties become advanced and eating assistance is required, individuals may verbally reject food or spit food out making it difficult to maintain good nutritional status (Correia et al., 2010; Meijers et al., 2014). It can be difficult to understand the preferences of the individual when providing eating assistance, especially with advanced cognitive impairments. The rejection of food can occur because the resident does not like it, the temperature is too hot or cold, or they simply are not hungry. It is important that staff utilize person-centered care approaches so they can understand these preferences and adjust care to match the individual's needs. For example, if an individual is sensitive to the temperature of their food, it may be helpful to let it sit at room temperature for a few moments. LTC staff need to be trained to identify eating difficulties in LTC residents to provide appropriate care to match the residents changing mealtime needs. Individuals can also develop harmful delusions with food, where they believe their food has been poisoned or damaged in some other way, causing them to avoid consuming it (Correia et al., 2010;

Meijers et al., 2014). Person-centered care approaches may be useful in these situations to acknowledge the concern of the resident and reassure them of the safety of their food.

Arthritis

Arthritis is a common health condition in older adult populations, involving inflammation at the joints (Keller, 2013). Approximately 40% of men and 60% of women over 75 years of age report being diagnosed with arthritis in Canada (Statistics Canada, 2017). This condition causes chronic pain which can interfere with daily activity and function, including eating (Onubogu, 2014; Shipham, 2003). Individuals with arthritis may experience impairments in handgrip and dexterity (Shipham, 2003). Cutting up food and opening packages or containers can be difficult for individuals with arthritis due to loss of function in the hands (Kelsheimer & Hawkins, 2000; Thyberg, Hass, Nordenskiöld, & Skogh, 2004). Residents experiencing arthritis may consume less food and fluid because of the pain associated with performing mealtime tasks, food spillage due to loss of function in the hands, or inability to perform tasks such as opening containers or gripping utensils. In addition, some common arthritis medications have been found to decrease appetite, negatively impacting food and fluid intake (Kelsheimer & Hawkins, 2000).

Stroke

Approximately 21% of LTC residents in Canada have been diagnosed with a stroke (Canadian Institute for Health Information, 2014). Residents who have suffered from a stroke often have difficulties eating independently. Chewing and swallowing difficulties are common after a stroke, as well as difficulties transferring food from plate to mouth (Medin, Windahl, von Arbin, Tham, & Wredling, 2011; Perry & McLaren,

2003; Westergren, Karlsson, Andersson, Ohlsson, & Hallberg, 2001). Individuals can experience motor and sensory impairments in the arms and hands, vision and perceptual deficits, and difficulty closing lips to swallow food and fluids (Perry & McLaren, 2003; Westergren et al., 2001). In addition to physical eating difficulties, stroke victims may also experience reduced appetite, distractibility and fatigue (Kumlien & Axelsson, 2002; Perry & McLaren, 2003), which can negatively impact food and fluid consumption, placing them at risk for malnutrition. The eating assistance needs for these individuals can vary greatly. Some individuals may require full physical assistance to eat, where others may only require supervision and prompting (Kumlien & Axelsson, 2002). These varying eating assistance requirements demonstrate the benefit of providing individualized assistance to match the mealtime care needs of each resident.

Depression

Like many other conditions, depression may go undiagnosed in LTC residents due to the presence of other coexisting symptoms and conditions. Approximately 31% of residents in Canadian LTC facilities have been diagnosed with depression (Canadian Institute for Health Information, 2014). Depression in LTC is associated with cognitive impairments and swallowing difficulties (Lin, Wang, Chen, Wu, & Portwood, 2005). As previously illustrated, cognitive decline can cause distractibility, agitation or difficulty recognizing food and utensils, which may require encouragement or supervision during mealtimes (Amella, 1998; Greenwood et al., 2005). Eating difficulties for residents experiencing depression may also be related to changes in appetite (Bergdahl et al., 2005; Du et al., 1993). Maintaining a good appetite is important for LTC resident to protect

against undernutrition. Residents experiencing depression may benefit from encouragement as well as supervision at mealtimes to monitor food and fluid intake.

Person-Centered Eating Assistance

Without eating assistance, many residents are unable to adequately consume food and fluids on their own. Despite the need for eating assistance in LTC facilities, this type of care may not always be provided in ways which meet the needs of residents. Eating assistance has multiple components which influence its perceived quality. The concept of person-centered care has been established to help maximize quality of life within LTC facilities for both care providers and residents. Person-centered care is individual based, providing respect for the specific needs, preferences and values of the care recipient (Rowles, & Teaster, 2016). This type of care can also be extended to the mealtime care provided in LTC facilities, including eating assistance. Eating assistance must be provided with an adequate amount time, the use of safe eating practices and in a dignified manner (Reimer, & Keller, 2009).

Time Allotted for Quality Eating Assistance

LTC facilities are responsible for providing many types of care to their residents. This may include monitoring medications, providing medical treatments, bathing, dressing and other activities of daily living (Jackson & Gaugler, 2016; Keller, 2013; Wister & McPherson, 2014). With such extensive care duties, time is a finite resource for LTC staff. Previous research has found that the typical time allotted for eating assistance during mealtimes is insufficient for adequate food and fluid intake (Durkin, Shotwell, & Simmons, 2014; Simmons et al., 2008; Simmons et al., 2001). The average amount of time to provide eating assistance at a single meal was found to be a mere ten minutes in

some North American LTC facilities (Simmons et al., 2008; Simmons et al., 2001). Despite the evidence that providing increased or simply adequate time for eating assistance can improve caloric intake, many facilities do not have the appropriate mealtime staffing to provide this level of care. The average amount of time required to adequately assist an individual to eat a meal is approximately 30 to 40 minutes (Simmons et al., 2008; Simmons & Schnelle, 2006). This ten minute timeframe provided is far below this and would likely leave LTC residents with insufficient mealtime care to meet their needs (Simmons et al., 2008; Simmons & Schnelle, 2006). These residents receiving insufficient time for eating assistance have been shown to experience unintentional weight loss, impacting their quality of life (Simmons et al., 2008). Some research has suggested that this time gap can be addressed with the use of family members and volunteers, however, there does seem to be some concerns with training costs and availability of these individuals (Durkin et al., 2014; Green, Martin, Roberts, & Sayer, 2011).

Volunteers and Family

Volunteers and family have been shown to provide a very individualized form of assistance. Those who volunteer as eating assistants tend to put a high priority on getting to know the individual in regards to their eating difficulties, wants and mealtime needs (Steele, Rivera, Bernick, & Mortensen, 2007). Volunteers are also likely free from the added time pressure faced by most staff in LTC as a result of the inadequate portion of time typically allotted for providing mealtime care (Simmons et al., 2008; Steele et al., 2007). Without this added time pressure, volunteer eating assistants may have an easier time providing care which is person-oriented in comparison to task-oriented.

Despite how useful volunteer and family eating assistants are in providing eating assistance to residents, some possible concerns include the training costs and their availability. Although these individuals do not receive financial compensation for their time, there are still some costs involved to ensure these individuals are providing quality assistance. Unpaid eating assistants need to be offered appropriate training and support in order to ensure the safety of the individual receiving the assistance (Green et al., 2011). Volunteer programs should provide training, education and assessment to the volunteer, as well as available supervision during mealtimes (Copeman, 2011; Green et al., 2011; Layne, 1990). The benefits of having volunteers available to deliver quality mealtime assistance to LTC residents should be recognized to outweigh the time and financial costs involved with implementing these types of programs. Not only can volunteer eating assistants help residents at mealtimes, but other individuals may also benefit indirectly as LTC staff may have more time to assist them (Durkin et al., 2014).

The availability of family and volunteers will dictate how much time an individual has to commit to offering eating assistance to residents, as their availability needs to align with the scheduled mealtimes in LTC. Mealtimes during weekends tend to have less volunteer eating assistance because of individual availability (Lipner, Bosler, & Giles, 1990; Steele et al., 2007).

Family and friends may be great resources for eating assistants as they offer a familiar face for residents. Of course this may not be a popular solution among individuals with attitudes or beliefs that the facility should be responsible for providing this care. Volunteers may also be useful for helping residents without social support networks to accommodate eating assistance support, including those without an advocate

who may be less likely to receive individualized care (Kayser-Jones, 1996). In addition to the quantity or amount of time allotted for assisting a resident, the way the task is performed is also equally important. As mentioned, person-centered care approaches may help improve the quality of mealtime care. Even when adequate time is provided for eating assistance, intake may still be inadequate due to poor quality of care and its effect on the individual receiving the assistance.

Social Interactions with Eating Assistants

Many studies have illustrated the importance of a supportive environment in tackling the eating difficulties of LTC residents (Layne, 1990; Slaughter, Eliasziw, Morgan, & Drummond, 2011). Mealtimes are not only important for ensuring that individuals maintain good nutritional status, but they may also provide an opportunity for social interaction within LTC. It is important that eating assistants communicate with the resident throughout the meal (Copeman, 2011). Eating assistants should engage the resident in conversation and avoid conversations with other individuals which may exclude or talk about the individual in a negative manner. For example, staff members or other eating assistants should not ignore the resident when socializing with others during mealtimes. This may be especially true for residents with cognitive decline who are often excluded from social interactions. In addition, when the same staff member or volunteer is assisting a resident it may help form better relationships between the pair (Pearson et al., 2003). This may allow the eating assistant to gain a better perspective of the resident and how to provide person-centered care to meet their individual needs and preferences. Despite the clear importance of social interaction at mealtimes for LTC residents,

evidence exists indicating that little socialization typically occurs (Reimer, & Keller, 2009).

Safe Eating Assistance Practices

When eating assistance is not performed correctly it may cause detrimental outcomes for the resident receiving the assistance, including aspiration or choking (Keller, 2013). Safe eating assistance practices are especially important for individuals who may be experiencing dysphagia, as these individuals may be more prone to detrimental health outcomes. Safe practices for preventing these outcomes include using an appropriate pace, ensuring the individual is seated in an upright position and that the staff member is sitting at eye contact while they provide assistance (Copeman, 2011; Hogstel, & Robinson, 1989; Layne, 1990).

The proper positioning for individuals to eat is at 60-90 degrees upright. This positioning should be used for residents that eat independently or with assistance (Copeman, 2011; Layne, 1990). Staff members need to ensure that individuals who are assisted while in wheelchairs or in bed have their position adjusted to these safety requirements. Those assisting the resident also need to be mindful of their own position. The person assisting the resident should sit at or below eye level as this will help prevent the resident from tilting their head back, making it easier to safely swallow food and fluids (Layne, 1990). This concept should also be extended to nurses who are administering medications to residents, as providing medication above eye level will promote tilting of the head back, increasing the risk of choking and aspiration (Layne, 1990).

The pace of the food should be individualized in order to match the swallowing abilities of the resident. As a general rule no more than one teaspoon should be offered at a time when assisting an individual to eat (Hogstel, & Robinson, 1989; Layne, 1990). Eating assistants should use a slow pace to ensure that residents have the proper amount of time to safely chew and swallow food (Layne, 1990). A slow pace may also be beneficial from a person-centered perspective in order to allow residents to enjoy their food and not be rushed. Individuals with cognitive impairments often lose their ability to self-regulate the pace of their eating. These individuals may require eating assistance in the form of verbal cueing or cutting foods into smaller pieces in order to promote safe independent eating (Layne, 1990).

Dignified Mealtime Care

Another important component of eating assistance is that it is provided in a dignified manner which takes into account the needs of the individual. When providing mealtime care, independent eating should be encouraged whenever possible as this may support autonomy and choice for the resident. The use of adapted utensils and eating aids, and offering different types of foods (i.e. finger foods) can help improve eating independence for LTC residents with varying needs and function (Funderburg & Mathews, 2011; Hogstel, & Robinson, 1989; Layne, 1990). For example, swivel or long-handled utensils may help residents with limited motion to consume food independently. Providing finger foods has also been shown to improve intake for residents who struggle to use utensils (Hogstel, & Robinson, 1989). It is important to consider these alternatives to full physical eating assistance when possible in order to preserve the resident's independence.

Food should be placed in view of the resident in an attempt to increase appetite and described in situations where visual impairments prevent the individual from seeing their meal so that the resident knows what they are eating (Hogstel, & Robinson, 1989). Describing the meal in an appetizing way can also act as verbal cueing for individuals who are distracted during mealtimes. This may help refocus the individual on the task of eating in order to improve intake (Hogstel, & Robinson, 1989).

Sitting as opposed to standing is not only a safe assistance technique, but it may also help prevent residents from feeling rushed, allowing them to consume more of their meal (Hogstel, & Robinson, 1989). When the act of providing eating assistance is task oriented there may be the mentality to complete the task in a quick, time efficient matter. However, completing a task quickly does not always result in quality care. Dignified mealtime care recognizes and addresses the needs of the individual above simply completing the task at hand. It is therefore dignified to provide the resident with a calm mealtime setting for them to enjoy their meal with adequate time to match their eating ability.

Research Gaps

Few studies exist in the literature focused on eating assistance. Many findings related to eating assistance in LTC have been a byproduct of alternate research topics. Some factors have been identified to impact food intake such as tooth loss or impaired motor skills, however these findings are related to the food intake of all residents and not necessarily specific to residents requiring eating assistance. Eating difficulties and abilities are discussed within the literature, but are not often categorized in ways that reflect eating assistance requirements. There is a wide range of eating challenges with

varying degrees of severity in LTC (Steele et al., 1997), therefore research should also consider the different eating assistance requirements of residents. Due to the increased eating challenges associated with cognitive impairment, many studies that focus on eating difficulties in LTC include only participants with conditions such as dementia or Alzheimer's disease. This makes it difficult to generalize findings to residents without dementia.

M3 Conceptual Framework

The M3 study collected over 2700 variables for each participant. This included variables related to eating assistance requirements and eating challenges which can be used to relate findings. These variables also provide a method for measuring eating challenges and requirements separately. Comprehensive data collection methods allow for accurate comparison between residents from various data collection sites. The M3 study included both residents with and without dementia and collected data on their level of cognitive impairment.

The M3 framework (Appendix A) consists of three domains which impact the food intake of LTC residents. The three domains include meal access (food availability, capacity to support eating), meal quality (sensory appeal, nutrient density) and mealtime experience (social interaction, ambiance) (Keller et al., 2014). These domains can be further influenced by four levels of influence (resident, staff, home, government) (Keller et al., 2014). The closest level of influence occurs at the resident level. This includes factors specific to each individual resident that influence their personal food intake. The second level looks at how staff influences the three domains of food intake. These factors may include the number of staff or their training (Keller et al., 2014). Next is the

home/facility level, which includes factors such as care approaches, food budget or dining environment. This level of influence looks at factors specific to the individual facility (Keller et al., 2014). The broadest level of influence is the government. This level may include variables such as provincial policies and regulations related to LTC standards for menu planning and meal timing (Keller et al., 2014).

Conclusion

In summary, food intake in LTC is complex, especially for those requiring eating assistance. Some of the main influential factors on intake include appetite, chewing and swallowing difficulties, vision impairments, physical issues and health conditions. These factors can lead to inadequacies in protein, energy and micronutrients if not properly addressed impacting overall health and nutritional status. In order to address poor food intake and nutrient inadequacies, some residents may require the use of eating assistance. Eating assistance may include opening containers, providing encouragement or physically assistance to move food from plate to mouth. Person-centered eating assistance may represent a high quality of care, which is provided with adequate time, positive social interactions, safe eating practices and in a dignified manner. Research focused specifically on eating assistance in LTC is needed to provide an accurate description of this population and their mealtime care requirements.

CHAPTER 3:

METHODOLOGY

Making the Most of Mealtimes (M3)

The M3 study examined key modifiable determinants of food and fluid intake for LTC residents across four Canadian provinces, using a multi-site, cross-sectional design. The determinants of food and fluid intake are categorized into three main domains: 1) meal access; 2) meal quality; and 3) mealtime experience (Keller et al., 2014). The main objectives of the M3 study were to measure food intake, compare it to standard requirements and identify key drivers of food intake in LTC that can be the basis for interventions (Keller et al., 2017). The study protocol is described elsewhere (Keller et al., 2017).

In each of the four participating provinces, Alberta, Manitoba, Ontario and New Brunswick, 8 LTC homes were selected (n=32) as research sites according to variations in profit and non-profit status, size and cultural background of the facilities. Approximately 20 residents within each home were used to form the sample population of 639 participants in the M3 study. Residents were eligible to participate if they were 65 years of age or older and had been living in the facility for at least one month. Residents were excluded if they were unable to speak English (or another common language between the participant and research staff such as French), on respite admission, had been recently hospitalized or medically unstable, required tube feeding, at the end of life, or did not routinely eat in the dining room (Keller et al., 2017).

The M3 study is a large scale study and collected data on multiple variables including three-day food and fluid intake (observed and weighed), meal quality, meal

access, mealtime experience, resident characteristics, staff characteristics, home characteristics and provincial characteristics (Appendix B) (Keller et al., 2017). Few research studies have been able to examine these types of determinants using standardized methods and large sample sizes. The M3 study is unique and important as it allows for accurate comparisons between the participants from various data collection sites. Ethical approval for the research was obtained from the Research Ethics Boards of the Universities of Alberta, Manitoba, Moncton, Waterloo and the University Health Network, Toronto (Appendix C). Approval was also obtained from LTC facilities which had individual review committees.

Methods for Current Research Study

For the purposes of this research project, only select variables from the M3 Study were used as they relate to the research objectives and questions identified in Chapter one.

Population of Interest

The population of interest for this research study consisted of the 639 LTC residents who participated in the M3 study. The Edinburgh Feeding Evaluation in Dementia (Ed-FED) questionnaire section of the Resident Mealtime Observation form (Appendix F) was used to categorize residents according to their eating assistance requirements. The entire Ed-FED questionnaire determines an individual's eating challenges, however, one of the ten questions within the Ed-FED questionnaire (Does the resident require physical help with feeding/eating?) was also used on its own for this study to categorize each participant's eating assistance requirements. Participants were given a score of one for "Never", two for "Sometimes" or three for "Often". As the Ed-FED questionnaire was completed three times for each participant, the rounded average

of these scores was used to place participants into three groups; 1) participants who “Never” require assistance, 2) those who “Sometimes” require assistance, and 3) those who “Often” require assistance.

Data Collection

This research study used secondary data from the M3 study. Variables of interest provided information about demographics, health and diet (Appendix D). Appendix E provides a brief overview of the data collection tools used for this study. Copies of the data collection forms used are found in Appendices F-K. Table 1 lists and describes the variables used in this study and where they were extracted from.

Table 3.1 Variable Sources

Collection Tool	Component of Tool	Variables
Resident Chart Review	Personal Information	age, gender, months since admission
	Food/Fluid Prescriptions	diet texture prescribed, liquid consistency prescribed, diet prescription
	Prescribed Oral Nutrition Supplements (ONS)	prescribed ONS any time of day
	Diagnoses	diagnosis of dementia, asthma, congestive heart failure, COPD/emphysema, current cancer, diabetes, endocrine diagnosis other than diabetes, cardiovascular disease, depressions, mental health diagnosis other than depression, GI disease, liver disease, muscular degeneration (glaucoma), osteoarthritis, osteoporosis, parkinson's disease, neurological diagnosis, other than parkinson's disease, renal disease, rheumatoid arthritis or stroke, # of formal diagnoses
	Medications	total # medications, total # vitamin/mineral supplements
	Body Assessment Measures	knee height BMI ^a , ulna BMI ^b
	Mini Nutritional Assessment (MNA)	MNA Category
Food Intake	Three-day Average Food Intake	avg. energy intake (kcal/kg body wt.)
Minimum Data Set (MDS)	Cognitive Performance Scale (CPS)	CPS score
	Communication and Vision	vision abilities ^c
	Dental and Oral Health Issues	wears dentures, has non-intact teeth, reports mouth pain, dry mouth or chewing difficulties, presence of gum inflammation/bleeding

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Adapted Screening Tool for Acute Neuro Dysphagia (STAND)	Dysphagia Risk	resident risk for dysphagia
Patient-Generated Subjective Global Assessment (PG-SGA)	Total PG-SGA Score	PG-SGA category
Meal Observation	Ed-FED Questionnaire ^d	three-day avg. eating assistance requirement category ^c , three-Day avg. Ed-FED score ^f
	Other Eating Behaviours	three-Day avg. Other Eating Behaviours score ^g
	Meal Timing	avg. meal duration ^h
	Mealtime Assistance	avg. # of staff assisting, avg. # of family/volunteers assisting, avg. # of staff and family/volunteers assisting

^aHeight is estimated based on knee height in BMI calculation [(current weight/Knee Height estimated height) 2]

^bHeight is estimated with use length of forearm (ulna) in BMI calculation [(current weight/ulna estimated height) 2]

^cAbility to see in adequate light with glasses or other visual appliance normally used

^dThe Edinburgh Feeding Evaluation in Dementia Questionnaire

^eEating assistance categories=Never; Sometimes; Often

^fEd-FED Score ranges from 10-30, where a score of 10 represents no observation of eating challenges and 30 represents the highest observation of eating challenges

^gOther Eating Behaviours Score ranges from 9-27, where a score of 9 represents no observation of Other Eating Behaviours and 27 represents the highest observation of Other Eating Behaviours

^h9 meals in total per resident

Mealtime Observation Form

The Mealtime Observation form (Appendix F) was completed for one meal per day for three days of meal observations. Using observation only, one of the M3 research assistants conducted this standardized checklist on eating assistance, eating behaviours and social interactions during mealtimes (Keller et al., 2017). This included the validated Ed-FED Questionnaire which scored on ten items related to eating challenges and assistance required (Stockdell, & Amella, 2008; Watson, R., & Deary, 1997), as well as nine additional eating challenge items scaled to match the Ed-FED questionnaire (Keller, et al., 2017).

Food Intake Form

The Food Intake form (Appendix G) was completed for three full days of meals and snacks for each resident participating in the study. These were three nonconsecutive days which included two weekdays and a weekend day (Keller, et al., 2017). Each individual food item on the main plate was weighed by a research assistant at the beginning and end of each meal to determine the amount consumed for each item. Estimations were used for beverages, side dishes, desserts and food spillage. Food consumed between meals was obtained by asking the facility staff (Keller, et al., 2017).

Resident Chart Review Form

The demographic variables in the M3 data set were obtained from the Resident Chart Review form (Appendix H). The project coordinator within each of the four provinces reviewed each resident's chart to identify diagnoses, medications, vitamin/mineral supplements, diet prescriptions, use of oral nutritional supplements and weight history (Keller et al., 2017).

Minimum Data Set (MDS) Form

The Minimum Data Set (MDS) is a validated research and clinical tool (Snowden et al., 1999). A MDS form (Appendix I) was completed by the project coordinator by interviewing registered/ licensed practical nurses from the unit regarding MDS items (Keller et al., 2017). MDS items collected included Activities of Daily Living (ADLs), Abusive Behaviour scale, Cognitive Performance Scale (CPS), depression rating, and pain rating (Keller et al., 2017).

Adapted Screening Tool for Acute Neuro Dysphagia (STAND) Form

The Adapted Screening Tool for Acute Neuro Dysphagia (STAND) form (Appendix J) was completed by the project coordinator. This is a standardized and validated tool for determining a resident's risk for swallowing problems (Keller et al., 2017). Residents on thickened fluids were deemed to be at risk for dysphagia and therefore did not complete STAND (Keller et al., 2017). All other residents were assessed for their swallowing abilities and monitored while consuming apple sauce or pudding, water and a dry swallow. Signs of dysphagia including coughing, wet voice quality and throat clearing were noted throughout the process of consuming these items (Keller et al., 2017) Due to the varying abilities of the resident participants, there were individuals who only completed select parts of STAND and others who completed no parts of STAND.

Patient-Generated Subjective Global Assessment Form

A Patient-Generated Subjective Global Assessment (PG-SGA) (Appendix K) was conducted to assess nutritional status. For residents with dementia, staff assistance was required to complete the PG-SGA. The project coordinator interviewed a personal support worker or health care aid regarding risk factors associated with food intake

(Keller et al., 2017). A physical exam and review of each resident's health record was also completed by the coordinator. The PG-SGA categorized the individual into one of the following categories: well nourished, moderate malnutrition or severe malnutrition (Bauer, Capra & Ferguson, 2002).

Data Analysis

Statistical Package for the Social Sciences (SPSS) software version 24.0 (IBM Corporation, 2016) was utilized for the data analysis. Participants without data on eating assistance (n=5) were excluded from the analysis. Table 2 provides an overview of the data analysis process for each research question as identified in Chapter 1. Descriptive statistics (means, standard deviation, frequencies, percentages) were completed using variables of interest (Appendix D) for the entire sample (n=639). These descriptive statistics were completed for each eating assistance category (Never; Sometimes; Often) to compare residents with varying eating assistance requirements.

Bivariate analyses were completed using eating assistance categories and multiple variables of interest. A Welch analysis of variance (ANOVA) was used for variables which were continuous as equal variances could not be assumed. Games-Howell post hoc tests were completed for significant results to determine the mean differences among eating assistance categories. These post hoc tests determined which means were significantly different from the other eating assistance categories. Chi-square analyses were completed using categorical variables. Linear regressions were completed using the three-day average Ed-FED score and variables of interest to determine resident level factors associated with eating challenges. Scatter plots and unstandardized beta values were used to determine the directionality of any significant linear regressions.

Data that were missing or incomplete for analyzing descriptive statistics were excluded from the analyses as indicated in the results table by the “n” value. For the bivariate analyses and linear regression, pairwise deletion procedures were followed for instances of missing or incomplete data. Pairwise deletion excluded data from the analysis when one or both variables were missing for a participant (Zhang & Wang, 2013).

Table 3.2 Data Analysis Summary

What are the characteristics of LTC residents with varying levels of eating assistance?				
Collection Tool	Component of Tool	Independent Variable	Dependent Variable	Data Analysis
Resident Chart Review	Personal Information	Age (continuous)	Three-Day Average of Eating Assistance Requirements (categorical) 1. Never 2. Sometimes 3. Often	Descriptive statistics (means, standard deviations, frequencies, percentages) Used to describe all residents in the M3 sample (n=639) and each individual eating assistance category
		Gender (categorical) 1. Male 2. Female		
		Months Since Admission (numerical)		
	Food/Fluid Prescriptions	Diet Texture Prescribed (categorical) 1. Regular 2. Soft 3. Minced/Moist 4. Pureed 5. Liquidized		
Liquid Consistency Prescribed (categorical) 1. Regular 2. Thickened				
Diet Prescriptions (categorical, nominal) 0. None 1. No added salt 2. Diabetic 3. Renal 4. High Energy 5. High Protein 6. Other				
	Prescribed Oral Nutrition Supplements	Prescribed Oral Nutrition Supplement (ONS) (categorical) 0. No 1. Yes		

34

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	Diagnoses	Medical Diagnoses (categorical) Cardiovascular Disease (CVD) Dementia Osteoarthritis GI Disease Depression Osteoporosis Stroke Endocrine Diagnosis (not diabetes) Macular Degeneration, Glaucoma Diabetes Mental Health diagnosis (not depression) Chronic Obstructive Pulmonary Disease (COPD)/Emphysema Current Cancer Renal Disease Congestive Heart Failure Parkinson's Disease Neurological diagnosis, (not Parkinson's disease) Rheumatoid Arthritis Asthma Liver Disease 0. No 1. Yes		
		Total Number of formal diagnoses (continuous)		
	Medications	Total number of Medications (continuous)		
		Total Number of Vitamin/Minerals (continuous)		
	Body Assessment	Knee Height BMI ^a (continuous)		
	Measures	Ulna BMI ^b (continuous)		

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	Mini Nutritional Assessment (MNA)	MNA Category (categorical, ordinal) 1. Malnourished 2. At Risk of Malnutrition 3. Normal Nutritional Status		
Food Intake	Three-day Food Intake	Avg. energy (kcal) intake/kg body wt. (continuous)		
Patient-Generated Subjective Global Assessment (PG-SGA)	Total PG-SGA Score	PG-SGA Category (categorical, ordinal) 1. Well Nourished 2. Moderate Malnutrition 3. Severe Malnutrition		
Minimum Data Set (MDS)	Cognitive Performance Scale (CPS)	CPS Score (categorical, ordinal) 0. Intact 1. Borderline Intact 2. Mild 3. Moderate 4. Moderate/Severe 5. Severe 6. Very Severe		
Mealtime Observation	Ed-FED Questionnaire	Three-Day Average Ed-FED Score (range = 10-30) ^c (continuous)		

Continued...

What are the eating challenges experienced by LTC residents with varying levels of eating assistance?				
Collection Tool	Component of Tool	Independent Variable	Dependent Variables	Data Analysis
MDS	Communication and Vision	Vision Abilities ^d (categorical, ordinal) 0. Adequate 1. Minimal 2. Moderate Difficulty 3. Severe Difficulty/ No Vision	Three-Day Average of Eating Assistance Requirements (categorical) 1. Never 2. Sometimes 3. Often	Bivariate analyses (Welch ANOVA with Games-Howell hoc test, Chi-square)
	Dental or Oral Health Issues	Wears a Denture (categorical) 0. No 1. Yes		
		Has broken, Fragmented or Otherwise Non-intact Natural Teeth (categorical) 0. No 1. Yes		
		Reports Mouth/Facial Pain (categorical) 0. No 1. Yes		
		Reports Dry Mouth (categorical) 0. No 1. Yes		
		Reports Chewing Difficulties (categorical) 0. No 1. Yes		
		Presence of Gum Inflammation/Bleeding (categorical) 0. No 1. Yes		
		Is the Resident at Risk for Dysphagia (categorical) 0. No 1. Yes		
Adapted Screening Tool for Acute Neuro Dysphagia (STAND)	Dysphagia Risk	Is the Resident at Risk for Dysphagia (categorical) 0. No 1. Yes		

Continued...

Mealtime Observation	Edinburgh Feeding Evaluation in Dementia (Ed-FED)	Three-Day Average Ed-FED Score (range = 10-30) ^e (continuous)		
	Other Eating Behaviours	Three-Day Average Other Eating Behaviours Score (Range =9-27) ^e (continuous)		
	Meal Timing	Average Duration of Each Meal ^f (continuous)		
	Mealtime Assistance	Average Number of Staff Assisting Individual at all Meals (continuous)		
		Average Number of Family/Volunteers Assisting at all Meals (continuous)		
Average Number of Staff + Family/Volunteers Assisting at all Meals (continuous)				
What resident level factors are independently associated with eating challenges?				
Collection Tool	Component of Tool	Independent Variable	Dependent Variable	Data Analysis
Resident Chart Review	Personal Information	Age (continuous)	Three-Day Average Ed-FED Score (10- 30)	Linear regression
		Gender (categorical) 1.Male 2.Female		
		Months Since Admission (numerical)		
	Food/Fluid Prescriptions	Diet Texture Prescribed (categorical) 1.Regular 2.Soft 3.Minced/Moist 4.Pureed 5.Liquidized		
Liquid Consistency Prescribed (categorical) 1. Regular 2. Thickened				

Continued...

		Diet Prescriptions (categorical) 0. None 1. No added salt 2. Diabetic 3. Renal 4. High Energy 5. High Protein 6. Other		
	Prescribed Oral Nutrition Supplements	Prescribed ONS (categorical) 0. No 1. Yes		
Food Intake	Three-day Food Intake	Avg. energy (kcal) intake/kg body wt. (continuous)		
Resident Chart Review	Diagnoses	Medical Diagnoses (categorical) CVD Dementia Osteoarthritis GI Disease Depression Osteoporosis Stroke Endocrine Diagnosis (not diabetes) Macular Degeneration, Glaucoma Diabetes Mental Health diagnosis (not depression) COPD/Emphysema Current Cancer Renal Disease Congestive Heart Failure Parkinson's Disease Neurological diagnosis, (not Parkinson's disease) Rheumatoid Arthritis Asthma		

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		Liver Disease 0. No 1. Yes		
		Total Number of Formal Diagnoses (continuous)		
	Medications	Total Number of Medications (continuous)		
		Total Number of Vitamin/Minerals (continuous)		
	Body Measures	Knee Height BMI ^a (continuous)		
		Ulna BMI ^b (continuous)		
	Mini Nutritional Assessment (MNA)	MNA Category (categorical, ordinal) 1. Malnourished 2. At Risk of Malnutrition 3. Normal Nutritional Status		
PG-SGA ^c	Total PG-SGA Score	PG-SGA Category (categorical, ordinal) 1. Well Nourished 2. Moderate Malnutrition 3. Severe Malnutrition		
Minimum Data Set (MDS)	Cognitive Performance Scale (CPS)	CPS Score (categorical, ordinal) 0. Intact 1. Borderline Intact 2. Mild 3. Moderate 4. Moderate/Severe 5. Severe 6. Very Severe		

^aHeight is estimated based on knee height in BMI calculation [(current weight/Knee Height estimated height)²]

^bHeight is estimated with use length of forearm (Ulna) in BMI calculation [(current weight/Ulna estimated height)²]

^cEd-FED Score ranges from 10-30, where a score of 10 represents no observation of eating challenges and 30 represents the highest observation of eating challenges

^dAbility to see in adequate light with glasses or other visual appliance normally used

^eOther Eating Behaviours Score ranges from 9-27, where a score of 9 represents no observation of Other Eating Behaviours and 27 represents the highest observation of Other Eating Behaviours

^f9 meals in total per resident

CHAPTER 4:
**FACTORS ASSOCIATED WITH EATING ASSISTANCE AMONG OLDER
ADULTS RESIDING IN LONG-TERM CARE (LTC): A MAKING THE MOST
OF MEALTIMES (M3) ANALYSIS**

Introduction

While the majority of older adults report their health and social needs as relatively good, some older adults require assistance to meet their complex care needs (Public Health Agency of Canada, 2010). As our population continues to age, providing adequate care to meet the needs of older adult is critical and LTC facilities continue to be an important formal care system for individuals with higher care requirements.

Malnutrition is well-known in LTC as rates range from 18- 77%, depending on the defining criteria (Boström et al., 2011; Chang & Robert, 2011; Sitter & Lengyel, 2011; van Nie-Visser et al., 2014; Verbrugge et al., 2013). Most recently, a study reported 44% of residents as malnourished (Keller et al, in press). Keller (2013) broadly defines undernutrition as inadequate nutrition to meet an individual's physiological needs. This form of malnutrition is common when consumption of protein and/or energy is inadequate and can lead to a progressive loss of lean muscle mass and adipose tissue (Funderburg & Mathews, 2011). Insufficient food and fluid intakes, as a result of a decline in self-eating abilities, may be contributing to undernutrition within LTC facilities (Morley & Silver, 1995). Residents requiring eating assistance are often at a greater risk of undernutrition and are therefore more reliant on this assistance in order to meet their nutritional needs in comparison to residents who do not require assistance. Eating assistance may include opening food or beverage containers, providing encouragement or

physical assistance for individuals experiencing eating difficulties (Keller, 2013). The ability to access and consume food and fluids by residents requiring eating assistance is often dependent upon the type of assistance required, LTC staffing levels, the availability of family or volunteers to help with mealtime activities, and the number of other residents requiring assistance (Keller et al., 2014). When these factors negatively impact an individual's food access, their food and fluid intake may become inadequate to meet their nutritional requirements for good health.

Eating assistance has multiple components which influence its perceived quality. The concept of person-centered care has been established to help maximize quality of life of LTC residents and may represent a high quality form of eating assistance. Person-centered care is individually based, providing respect for the specific needs, preferences and values of the resident (Rowles, & Teaster, 2016). This can include mealtime care provided in LTC facilities, such as eating assistance. Eating assistance which is person-centered should be provided with adequate time, the use of safe eating practices and in a dignified manner (Reimer, & Keller, 2009).

The study objectives for this work were to identify characteristics of LTC residents in the Making the Most of Mealtimes (M3) study requiring eating assistance and examine factors associated with eating challenges.

Methods

The Making the Most of Mealtimes (M3)

The M3 Study examines key modifiable determinants of food and fluid intake for 639 LTC residents across four Canadian provinces from 32 diverse LTC facilities, using a multi-site, cross-sectional design. The M3 study focused on how meal access, meal

quality and mealtime experience influence the food intake of older adults residing in LTC (Keller et al., 2014; Keller et al., 2017). The complete study protocol is described elsewhere (Keller et al., 2017).

Variables

M3 is a large scale study and provided many variables for analysis. The M3 research team collected the following variables by reviewing each residents chart in the LTC facility: age, gender, number of months since admission, diet texture prescribed, liquid consistency prescribed, diet prescription (i.e. diabetic, high protein, etc.), Oral Nutrition Supplement (ONS) prescription, medical diagnoses (i.e. dementia, depression, stroke, etc.), total number of formal medical diagnoses, total number of medications and total number of vitamin/mineral supplements. During the resident chart review, body measurements were collected in order to calculate knee height and Ulna BMIs. A Mini Nutritional Assessment (MNA) was also completed to measure nutritional risk. A separate Patient-Generated Subjective Global Assessment (PG-SGA) was completed to categorize the nutritional status of the resident.

The following variables were collected by the M3 study using the validated Minimum Data Set (MDS) tool, Cognitive Performance Scale (CPS) category, visual abilities, wearing dentures, having non-intact teeth, reporting mouth pain, dry mouth or chewing difficulties, and presence of gum inflammation/bleeding. Dysphagia risk was determined using the standardized and validated Adapted Screening Tool for Acute Neuro Dysphagia (STAND).

Three Mealtime Observations (two weekdays, one weekend) were completed by the M3 study for each resident. These observations included the validated Edinburgh

Feeding Evaluation in Dementia (Ed-FED) Questionnaire which scored on ten items related to eating challenges and assistance required (Stockdell, & Amella , 2008; Watson, & Deary, 1997), as well as nine additional eating challenge items which were scaled to match the Ed-FED questionnaire, mealtime duration, total number of staff assisting with meal and the total number of family and/or volunteers assisting with meal (Keller, et al., 2017).

Food intake was measured for three full days of meals and in between snacks for each resident using weighed and observed measures. These were three nonconsecutive days which included a weekend day and two weekdays (Keller, et al., 2017). Estimations were used to determine food waste due to spillage and consumption of beverages, side dishes and desserts. Since the M3 study did not measure the activity level of residents, estimated energy requirements could not be calculated for the participants. Energy intake was therefore evaluated using the kilocalories per kilogram body weight energy requirement estimations.

The Sample

The population of interest for this research study consists of the 639 LTC residents who participated in the M3 study. Participants without data on eating assistance requirements were excluded from the analysis, forming a sample population of 634 participants for analysis. The Edinburgh Feeding Evaluation in Dementia (Ed-FED) questionnaire section of the Resident Mealtime Observation form categorized residents according to their eating assistance requirements. The entire Ed-FED questionnaire determines an individual's eating challenges, however, one of the ten questions within the Ed-FED questionnaire (does the resident require physical help with feeding/eating) was

also used on its own for this study to categorize each participant's eating assistance requirements. Participants were given a score of one for "Never", two for "Sometimes" or three for "Often". As the Ed-FED questionnaire was completed three times for each participant, the rounded average of these scores was used to place participants into three groups; 1) participants who "Never" require assistance, 2) those who "Sometimes" require assistance, and 3) those who "Often" require assistance. These eating assistance categories will be referred to throughout this article.

Ethical Approval

Ethical approval for this research was obtained from the Research Ethics Boards of the Universities of Alberta, Manitoba, Moncton, Waterloo and the University Health Network, Toronto and from LTC facilities with individual review committees (Keller et al., 2017).

Data Analysis

Statistical Package for the Social Sciences (SPSS) software version 24.0 (IBM Corporation, 2016) was used to analyze secondary data from the M3 study. Participants without data on eating assistance were excluded from the analysis. Descriptive statistics (means, standard deviation, frequencies, percentages) were completed for the overall sample and for each individual eating assistance category (Never' Sometimes; Often).

Bivariate analyses were completed using eating assistance category and variables related to eating challenges and mealtime care. Welch ANOVAs were used for continuous variables and Chi-square analyses were used for categorical variables. Welch ANOVA procedures were used as equal variances could not be assumed, and Games-Howell post hoc tests were used for significant ANOVAs. These post hoc tests

determined which means were significantly different from the other eating assistance categories. Linear regressions were completed using the three day average Ed-FED and variables related to demographics, health and diet. Scatter plots and unstandardized beta values were used to determine the directionality for significant linear regressions.

Data that were missing or incomplete for analyzing descriptive statistics were excluded from the analyses as indicated in the results table by the “n” value. Pairwise deletion procedures were followed for missing data within the bivariate and linear regression analyses. Pairwise deletion excludes data when one or both variables for the analysis are missing for a participant (Zhang & Wang, 2013).

Results

Participant Characteristics

Participant characteristics are provided in Table 3. Based on the inclusion criteria, 634 participants were included in the data analysis. 77% of the participants “Never” required eating assistance, while 11% needed assistance “Sometimes” and 12% needed eating assistance “Often”. The average age of the sample was 86.8 ± 7.8 years and they were 69% female. Participants had been living in LTC for an average of two years and four months, however, the length of residence increased with the need for more eating assistance.

The majority of participants in the “Never” eating assistance category had a regular diet texture (61.2%), where the majority of those in the “Often” category had a pureed texture (57.3%). The majority of participants were on regular or unthickened fluid consistencies (89.3%), however, this percentage differed between eating assistance categories, with the “Never” category (95.5%) being the highest and the “Often” category

(60.0%) the lowest. While the majority of participants had no diet prescription (60.7%), diabetic (17.4%) and other (19.4%) diet prescriptions were the most common diet prescriptions. Some of the diets included in the other diet prescription category were allergy specific, lactose intolerance, vegetarian and high fibre. The prescription of ONS increased with eating assistance requirements. Those in the “Often” category consumed the highest average amount of calories (27.8 ± 10.8 kcal/kg) in proportion to their body weight across the 3 days of data collection while the “Sometimes” category consumed the lowest (23.2 ± 7.3 kcal/kg).

Dementia and cardiovascular disease were the most prevalent medical diagnosis at 65.1% and 73.8%, respectfully, with an average of 5.4 ± 2.0 formal diagnoses per resident. These diagnoses were not diagnosed by the M3 research team, meaning that the results only captured preexisting diagnoses within the resident’s medical chart. Diagnosis of dementia was highest for residents in the “Often” category (89.3%). The average number of medications for each resident was 7.5 ± 3.5 where the average number of vitamins/mineral supplements was 1.5 ± 1.2 .

Both knee height and Ulna BMI were measured. These results differed slightly with knee height BMI being slightly higher than Ulna BMI. BMI scores decreased with eating assistance category, where the “Often” category had the lowest BMI for both knee height (23.9 ± 5.0) and Ulna (22.4 ± 4.7) calculations. Many residents (46.4%) were categorized at risk for malnutrition using the MNA. The majority of the residents in the “Often” category were considered to be at risk of malnutrition (61.3%) or malnourished (33.3%). Using the PG-SGA, the majority of residents were found to well nourished

(56.1%), however the majority of residents in the “Sometimes” (50.7%) and “Often” (58.7%) categories were found to have moderate malnutrition.

Cognitive impairment was measure by research staff using the CPS to provide further insight into levels of cognition According to the CPS results, 45.1% of participants fell within the mild to moderate cognitive decline range. Declines were most severe within the “Often” category, with 86.5% of participants considered to have severe or very severe cognitive decline. Scores from the Ed-FED questionnaire were found to increase with need for eating assistance.

Table 4.1 Characteristics of LTC Residents Requiring Eating Assistance

Variable	Eating Assistance Categories ^a			
	Overall ^b % (n)	Never % (n)	Sometimes % (n)	Often % (n)
Age	(634) ^c 86.8 ± 7.8 ^d	(487) 86.9 ± 7.6	(72) 87.3 ± 8.7	(75) 85.4 ± 8.4
Gender	(634)	(487)	(72)	(75)
Male	31.4 (199)	32.9 (160)	29.2 (21)	24.0 (18)
Female	68.6 (435)	67.1 (327)	70.8 (51)	76.0 (57)
Months Since Admission	(634) 27.8 ± 27.0	(487) 24.6 ± 24.6	(72) 33.4 ± 26.0	(75) 43.4 ± 36.1
Diet Texture Prescribed	(634)	(487)	(72)	(75)
Regular	52.8 (335)	61.2 (298)	41.7 (30)	9.3 (7)
Soft	14.4 (91)	16.2 (79)	11.1 (8)	5.3 (4)
Minced/Moist	21.6 (137)	19.7 (96)	31.9 (23)	24.0 (18)
Pureed	10.7 (68)	2.9 (14)	15.3 (11)	57.3 (43)
Liquidized	0.5 (3)	0.0 (0)	0.0 (0)	4.0 (3)
Liquid Consistency Prescribed	(634)	(487)	(72)	(75)
Regular	89.3 (566)	95.5 (465)	77.8 (56)	60.0 (45)
Thickened	10.7 (68)	4.5 (22)	22.2 (16)	40.0 (30)
Diet Prescriptions ^e	(634)	(487)	(72)	(75)
None	60.7 (385)	60.4 (294)	51.4 (37)	72.0 (54)
No Added Salt	3.8 (24)	4.1 (20)	4.2 (3)	1.3 (1)
Diabetic	17.4 (110)	19.3 (94)	18.1 (13)	4.0 (3)
Renal	0.3 (2)	0.4 (2)	0.0 (0)	0.0 (0)
High Energy	7.7 (49)	6.8 (33)	12.5 (9)	9.3 (7)
High Protein	8.2 (52)	6.8 (33)	15.3 (11)	10.7 (8)
Other	19.4 (123)	18.5 (90)	30.6 (22)	14.7 (11)
Prescribed Oral Nutrition Supplements (ONS)	(634) 30.8 (195)	(487) 23.6 (115)	(72) 48.6 (35)	(75) 60.0 (45)

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Three-day Avg. Energy Intake (kcal/kg body wt.)	(629)	(483)	(72)	(74)
	24.5 ± 7.9	24.2 ± 7.3	23.2 ± 7.8	27.8 ± 10.8
Medical Diagnoses ^e				
CVD	73.8 (468)	76.2 (371)	61.1 (44)	70.7 (53)
Dementia	65.1 (413)	60.0 (292)	75.0 (54)	89.3 (67)
Osteoarthritis	39.7 (252)	41.1 (200)	38.9 (28)	32.0 (24)
GI Disease	34.2 (217)	35.3 (172)	31.9 (23)	29.3 (22)
Depression	31.1 (197)	31.6 (154)	33.8 (24)	25.3 (19)
Osteoporosis	30.8 (195)	29.8 (145)	34.7 (25)	33.3 (25)
Stroke	26.2 (166)	28.5 (139)	25.0 (18)	12.0 (9)
Endocrine Diagnosis (not diabetes)	23.5 (149)	23.4 (114)	26.4 (19)	21.3 (16)
Macular Degeneration, Glaucoma	22.7 (144)	23.0 (112)	20.8 (15)	22.7 (17)
Diabetes	21.8 (138)	23.6 (115)	19.4 (14)	12.0 (9)
Mental Health diagnosis (not depression)	16.6 (105)	18.1 (88)	12.7 (9)	10.7 (8)
COPD/Emphysema	15.5 (98)	16.8 (82)	13.9 (10)	8.0 (6)
Current Cancer	15.2 (96)	16.0 (78)	12.7 (9)	12.0 (9)
Renal Disease	14.8 (94)	16.0 (78)	13.9 (10)	8.0 (6)
Congestive Heart Failure	13.0 (82)	15.0 (73)	2.8 (2)	9.3 (7)
Parkinson's Disease	6.9 (44)	6.2 (30)	9.7 (7)	9.3 (7)
Neurological diagnosis, (not Parkinson's disease)	6.2 (39)	6.8 (33)	1.4 (1)	6.7 (5)
Rheumatoid Arthritis	6.0 (38)	7.2 (35)	4.2 (3)	0.0 (0)
Asthma	4.9 (31)	5.3 (26)	2.8 (2)	4.1 (3)
Liver Disease	1.1 (7)	1.4 (7)	0.0 (0)	0.0 (0)
Formal Diagnoses (Total)	(634)	(487)	(72)	(75)
	5.4 ± 2.0	5.6 ± 2.0	5.1 ± 1.9	4.8 ± 2.2
Medications	(634)	(487)	(72)	(75)
	7.5 ± 3.5	7.9 ± 3.5	6.3 ± 3.2	6.3 ± 3.1
Vitamins/Mineral Supplements	(634)	(487)	(72)	(75)
	1.5 ± 1.2	1.6 ± 1.2	1.2 ± 1.0	1.2 ± 1.3
Knee Height BMI ^f	(601)	(470)	(67)	(64)
	26.4 ± 5.8	27.0 ± 5.8	24.4 ± 5.6	23.9 ± 5.0

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Ulna BMI ^g	(621)	(476)	(71)	(74)
	25.3 ± 5.8	26.1 ± 5.7	23.3 ± 5.5	22.4 ± 4.7
Mini Nutritional Assessment (MNA)	(633)	(486)	(72)	(75)
Normal Nutritional Status	43.0 (272)	51.0 (248)	27.8 (20)	5.3 (4)
At Risk of Malnutrition	46.4 (294)	43.4 (211)	51.4 (37)	61.3 (46)
Malnourished	10.6 (67)	5.6 (27)	20.8 (15)	33.3 (25)
Patient-Generated Subjective Global Assessment (PG-SGA)	(633)	(487)	(71)	(75)
Well Nourished	56.1 (355)	63.7 (310)	35.2 (25)	26.7 (20)
Moderate Malnutrition	38.4 (243)	33.5 (163)	50.7 (36)	58.7 (44)
Severe Malnutrition	5.5 (35)	2.9 (14)	14.1 (10)	14.7 (11)
CPS Score (0-6)	(629)	(483)	(72)	(74)
Intact	10.5 (66)	12.6 (61)	5.6 (4)	1.4 (1)
Borderline Intact	13.2 (83)	16.8 (81)	2.8 (2)	0.0 (0)
Mild	20.8 (131)	26.5 (128)	4.2 (3)	0.0 (0)
Moderate	24.3 (153)	26.1 (126)	31.9 (23)	5.4 (4)
Moderate/Severe	6.4 (40)	5.8 (28)	9.7 (7)	6.8 (5)
Severe	15.9 (100)	11.0 (53)	34.7 (25)	29.7 (22)
Very Severe	8.9 (56)	1.2 (6)	11.1 (8)	56.8 (42)
Three-Day Average Ed-FED Score ^h	(634)	(487)	(72)	(75)
	12.4 ± 2.3	11.4 ± 1.2	14.4 ± 1.9	16.5 ± 1.7

^aRounded three-day average eating assistance category. 3 point scale (Never; Sometimes; Often) in response to the question “does the resident require physical help with eating?”

^bFive study participants were excluded because the corresponding three-day average eating assistance category variable was missing

^cFrequency total for eating assistance category

^dMean + standard deviation

^eSome participants may be represented in multiple categories

^fHeight is estimated based on knee height in BMI calculation [(current weight/Knee Height estimated height)²]

^gHeight is estimated with use length of forearm (Ulna) in BMI calculation [(current weight/Ulna estimated height)²]

^hEd-FED Score ranges from 10-30, where a score of 10 represents no observation of eating challenges and 30 represents the highest observation of eating challenges

Factors Associated with Eating Assistance Requirements

ANOVAs were conducted to explore factors associated with eating assistance requirements. These results are displayed in Table 4. There was a significant effect of Ed-FED score [$F(2, 631) = 550.60, p < 0.01$], Other Eating Behaviours score [$F(2, 631) = 202.55, p < 0.01$], meal duration [$F(2, 631) = 5.42, p < 0.05$], number of staff assisting at mealtime [$F(2, 631) = 432.55, p < 0.01$], number of family/volunteers assisting at mealtime [$F(2, 631) = 19.52, p < 0.01$] and number of staff and family/volunteers assisting at mealtime [$F(2, 631) = 484.88, p < 0.01$] on eating assistance requirements.

Table 4.2 Factors Associated with Eating Assistance Requirements

Factors^a	df	F statistic	p value
Ed-FED Score (3-day; range = 10-30)	2, 631	550.60	<0.01**
Other Eating Behaviours Score (3-day; range = 9-27)	2, 631	202.55	<0.01**
Duration of Meal	2, 631	5.42	0.021*
Staff Assisting Individual at Mealtime	2, 631	423.55	<0.01**
Family/Volunteers Assisting at Mealtime	2, 631	19.52	<0.01**
Staff & Family/Volunteers Assisting at Mealtime	2, 631	484.88	<0.01**

^aAverage scores used in each category for calculations

*Relationship is significant at 0.05

**Relationship is significant at 0.01

Post-hoc results are shown in Table 5. The mean three day average Ed-FED score for “Never” category was significantly different ($p < 0.01$) from the “Sometimes” and “Often” categories. The “Sometimes” and “Often” groups were also significantly different ($p < 0.01$) from each other for Ed-FED score. The “Never” category had the lowest Ed-FED score followed by the “Sometimes” and “Often” categories. For Other Eating Behaviours score, the mean score for the “Never” group was significantly different ($p < 0.01$) from both the “Sometimes” and “Often” groups. The “Never” category also had the lowest Other Eating Behaviours score. The “Sometimes” and “Often” groups were not significantly different ($p = 0.134$) in their mean scores.

Mean scores for meal duration were significantly different between ($p < 0.05$) the “Sometimes” and “Often” groups, where residents in the “Sometimes” category had the longest meal duration. There were no significant mean differences for the “Never” group with either the “Sometimes” ($p = 0.090$) or “Often” ($p = 0.222$) groups. For the average number of staff assisting at mealtime, the mean scores were significantly different ($p < 0.01$) between all three eating assistance groups: “Never”, “Sometimes”, “Often”. The number of staff assisting increased with eating assistance requirements.

The means for average number of family/volunteers assisting at mealtime were significantly different ($p < 0.01$) for the “Never” category with both the “Sometimes” and “Often” categories. However, the means were not significantly different ($p = 0.55$) between the “Sometimes” and “Often” categories. Number of staff and family/and volunteers assisting were also combined and analyzed, as residents could have received assistance from one or both types of these assistants during mealtimes. The average number of staff and family/volunteers assisting at mealtimes were significantly different

($p < 0.01$) between all three groups: “Never”, “Sometimes”, and “Often”. The number of individuals assisting each resident increased with eating assistance requirements.

Table 4.3 Differences Between Eating Assistance Requirements

	Never	Sometimes	Often
Ed-FED Score (3-day) ^a	11.42 ± 1.19a	14.43 ± 1.94b	16.54 ± 1.73c
Other Eating Behaviours Score (3-day) ^b	10.08 ± 1.24a	12.27 ± 1.35b	12.73 ± 1.54b
Duration of Meal ^c	40.19 ± 12.20ab	44.12 ± 14.91a	37.14 ± 15.08b
Staff Assisting Individual at Mealtime ^d	0.0910 ± 0.23a	0.716 ± 0.47b	1.017 ± 0.39c
Family/Volunteers Assisting at Mealtime ^d	0.0396 ± 0.11a	0.103 ± 0.17b	0.141 ± 0.26b
Staff & Family/Volunteers Assisting at Mealtime ^d	0.1302 ± 0.27a	0.816 ± 0.46b	1.158 ± 0.30c

^aScores range from 10-30, where 30 represents the highest observation of eating challenges

^bScores range from 9-27, where 27 represents the highest observation of other eating behaviours

^cMeasured in minutes

^dValues for the average number of individuals assisting each resident

Means with different letters are significantly different (p<0.05) by Games Howel post-hoc test

Chi-square tests were used to distinguish factors associated with eating assistance requirements. These analyses produced six significant relationships ($p < 0.05$) with eating assistance requirements, which are provided in Table 6. The probability associated with the Chi-square statistic was significant for wearing dentures ($X^2 = 28.794$, $p = 0.000$), having non-intact natural teeth ($X^2 = 10.780$, $p = 0.005$), chewing difficulties ($X^2 = 11.385$, $p = 0.003$), presence of inflamed/bleeding gums ($X^2 = 23.337$, $p = 0.000$), dysphagia risk ($X^2 = 7.273$, $p = 0.026$) and vision abilities ($X^2 = 69.641$, $p = 0.000$). Categorical variables which did not result in significant chi-square statistics included resident reports of mouth/facial pain ($X^2 = 1.793$, $p = 0.408$), and dry mouth ($X^2 = 0.182$, $p = 0.913$).

Table 4.4 Eating Challenges of LTC Residents

Challenges	Eating Assistance Category [%; (n)]						
Wears Dentures	Never	Sometimes	Often	Total	X ²	p value	
No	67.1 (167)	12.9 (32)	20.1 (50)	100.0			
Yes	82.9 (316)	10.5 (40)	6.6 (25)	100.0	28.794	< 0.001	
Total	76.7 (483)	11.4 (72)	11.9 (75)	(630)			
Non-intact Natural Teeth	Never	Sometimes	Often	Total	X ²	p value	
No	78.7 (440)	10.6 (59)	10.7 (60)	100.0			
Yes	61.4 (43)	17.1 (12)	21.4 (15)	100.0	10.780	0.005	
Total	76.8 (483)	11.3 (71)	11.9 (75)	(629)			
Reports Chewing Difficulties	Never	Sometimes	Often	Total	X ²	p value	
No	78.3 (450)	11.1 (64)	10.6 (61)	100.0			
Yes	60.7 (34)	14.3 (8)	25.0 (14)	100.0	11.385	0.003	
Total	76.7 (484)	11.4 (72)	11.9 (75)	(631)			
Inflamed/ Bleeding Gums	Never	Sometimes	Often	Total	X ²	p value	
No	78.5 (439)	11.6 (65)	9.8 (55)	100.0			
Yes	64.2 (43)	6.0 (4)	29.9 (20)	100.0	23.337	< 0.001	
Total	77.0 (482)	11.0 (69)	12.0 (75)	(626)			
Dysphagia Risk	Never	Sometimes	Often	Total	X ²	p value	
No	82.2 (212)	8.1 (21)	9.7 (25)	100.0			
Yes	73.1 (275)	13.6 (51)	13.3 (50)	100.0	7.273	0.026	
Total	76.8 (487)	11.4 (72)	11.8 (75)	(634)			
Vision Abilities	Never	Sometimes	Often	Total	X ²	p value	
Adequate	82.7 (278)	8.9 (30)	8.3 (28)	100.0			
Minimal Difficulty	83.1 (152)	8.7 (16)	8.2 (15)	100.0			
Moderate Difficulty	50.6 (39)	19.5 (15)	29.9 (23)	100.0	69.641	< 0.001	
Severe Difficulty/ No Vision	39.4 (13)	33.3 (11)	27.3 (9)	100.0			
Total	76.6 (482)	11.4 (72)	11.9 (75)	(629)			

Factors Associated with Eating Challenges

Linear regression analyses revealed 22 (out of 42) significant relationships with eating challenges. The linear regression results are provided in Table 7. Using the R^2 value as reference, the strongest significant regression with the Ed-FED score was using the CPS score ($R^2 = 0.359$, $p < 0.01$). This is followed by diet texture ($R^2 = 0.233$, $p < 0.01$), MNA category ($R^2 = 0.215$, $p < 0.01$), PG-SGA category ($R^2 = 0.146$, $p < 0.01$), liquid consistency ($R^2 = 0.135$, $p < 0.01$), prescribed ONS ($R^2 = 0.119$, $p < 0.01$) and Ulna BMI ($R^2 = 0.100$, $p < 0.01$). Lower strength associations include months since admission ($R^2 = 0.072$, $p < 0.01$), knee height BMI ($R^2 = 0.071$, $p < 0.01$), dementia diagnosis ($R^2 = 0.057$, $p < 0.01$), number of medications ($R^2 = 0.050$, $p < 0.01$), diabetic diet prescription ($R^2 = 0.020$, $p < 0.01$), diabetes diagnosis ($R^2 = 0.015$, $p < 0.01$), congestive heart failure diagnosis ($R^2 = 0.012$, $p < 0.01$), renal disease diagnosis ($R^2 = 0.012$, $p < 0.01$) and number of vitamins/minerals ($R = 0.012$, $p < 0.01$), rheumatoid arthritis diagnosis ($R^2 = 0.011$, $p < 0.01$), high protein diet prescription ($R^2 = 0.010$, $p < 0.05$), high energy diet prescription ($R^2 = 0.007$, $p < 0.05$), no diet prescription ($R^2 = 0.006$, $p < 0.05$), energy per kg/body weight ($R^2 = 0.006$, $p < 0.05$), mental health diagnosis other than depression ($R^2 = 0.006$, $p < 0.05$).

Table 4.5 Factors Associated with Eating Challenges

	R²	F ratio	df	Unstandardized B	p value
Age	0.001	0.874	1, 632	0.011	0.350
Gender ^a	0.010	6.534	1, 632	0.492	0.011
Months Since Admission	0.072	48.712	1, 632	0.022	<0.001*
Diet Texture Prescribed ^b	0.233	192.044	1, 632	0.990	<0.001*
Liquid Consistency Prescribed ^c	0.135	98.544	1, 632	2.683	<0.001*
Diet Prescriptions					
None	0.006	3.988	1, 632	0.366	0.046**
No added salt	0.000	0.071	1, 632	-0.126	0.790
Diabetic	0.020	12.758	1, 632	-0.839	0.000*
Renal	0.003	1.640	1, 632	-2.052	0.201
High Energy	0.007	4.485	1, 632	0.711	0.035**
High Protein	0.010	6.511	1, 632	0.832	0.011**
Other	0.002	1.214	1, 632	-0.250	0.271
Prescribed ONS any Time of Day	0.119	85.430	1, 632	1.686	<0.001*
Energy Intake (kcal/kg body wt.)	0.006	3.929	1, 627	0.022	0.048**

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	R²	F ratio	df	Unstandardized B	p value
Medical Diagnoses					
CVD	0.006	3.538	1, 632	-0.381	0.060
Dementia	0.057	37.891	1, 632	1.124	<0.001*
Osteoarthritis	0.000	0.105	1, 632	-0.059	0.746
GI Disease	0.001	0.610	1, 632	-0.148	0.435
Depression	0.001	0.613	1, 631	-0.151	0.434
Osteoporosis	0.005	3.456	1, 632	0.360	0.063
Stroke	0.004	2.816	1, 632	-0.341	0.094
Endocrine Diagnosis (not diabetes)	0.001	0.824	1, 632	-0.192	0.364
Macular Degeneration, Glaucoma	0.001	0.825	1, 631	0.194	0.364
Diabetes	0.015	9.833	1, 632	-0.678	0.002*
Mental Health diagnosis (not depression)	0.006	3.912	1, 631	-0.473	0.048**
COPD/Emphysema	0.003	1.838	1, 632	-0.337	0.176
Current Cancer	0.002	1.502	1, 631	-0.307	0.221
Renal Disease	0.012	7.506	1, 632	-0.689	0.006*
Congestive Heart Failure	0.012	7.362	1, 631	-0.723	0.007*
Parkinson's Disease	0.003	2.130	1, 632	0.510	0.145
Neurological diagnosis (not Parkinson's disease)	0.004	2.716	1, 632	-0.616	0.100
Rheumatoid Arthritis	0.011	7.104	1, 632	-1.004	0.008*
Asthma	0.000	0.048	1, 631	-0.091	0.827
Liver Disease	0.001	0.515	1, 632	-0.618	0.473
Total Number of Formal Diagnoses	0.006	3.625	1, 632	-0.084	0.057

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	R²	F ratio	df	Unstandardized B	p value
Total Number of Medications	0.050	33.031	1, 632	-0.146	<0.001*
Total Number of Vitamin/Minerals	0.012	7.481	1, 632	-0.202	0.006*
Knee Height BMI	0.071	45.880	1, 599	-0.103	<0.001*
Ulna BMI	0.100	68.538	1, 619	-0.124	<0.001*
MNA Category ^d	0.215	173.121	1, 631	-1.592	<0.001*
PG-SGA Category ^e	0.146	108.033	1, 631	1.424	<0.001*
CPS Score ^f	0.358	349.841	1, 627	0.757	<0.001*

^a1=male, 2=female

^b1=regular, 2=soft, 3=minced/moist, 4=pureed, 5=liquidized

^c1=regular, 2=thickened

^d1=malnourished, 2=at risk of malnutrition, 3=normal nutritional status

^e1=well nourished, 2=moderate malnutrition, 3=severe malnutrition

^f0=intact, 1=borderline intact, 2=mild, 3=moderate, 4=moderate/severe, 5=severe, 6=very severe

*Regression is significant at the 0.05 level

**Regression is significant at the 0.01 level

Scatter plots and unstandardized beta coefficients showed that of the significant relationships, eleven were positive and the other eleven were negative. Months since admission was positive, indicating that longer time in LTC was associated with more eating challenges. Energy showed a similar positive relationship, increasing with eating challenges. Both knee height and Ulna BMI had a negative directionality. This indicates that a lower BMI is associated with more eating challenges and the reverse. Similarly, the totals for both medications and vitamins/minerals had negative relationships with eating challenges.

In addition to the continuous variables mentioned above, scatter plots also revealed directionality for categorical and binary variables. Prescribed diet texture was analyzed using ranked values. The scatter plot illustrated a positive directional relationship, where higher ranked diet textures (i.e. liquidized) were associated with more eating challenges. CPS and PG-SGA score values were also ranked and indicated a similar positive relationship, with higher ranked values associated with more eating challenges. Higher CPS scores meant more cognitive impairments and higher PG-SGA rankings meant severe malnutrition. The MNA showed negative directionality using ranked values, where lower rankings represented malnourishment and were associated with higher Ed-FED scores.

Nine binary variables were plotted with Ed-FED scores. Liquid consistency was ranked as one for regular and two for thickened. A positive relationship was found, illustrating that thickened liquid consistency was associated with more eating challenges. The three diet prescriptions were scored as zero for not prescribed and one for prescribed. Both high protein and high energy prescriptions had positive directionality, being

associated with more eating challenges. In comparison, diabetic diet had a negative relationship, where its prescription was associated with less eating challenges. Five medical diagnoses were also significant and had a similar binary valuing. Diagnosis of dementia had a positive relationship, showing an association with more eating challenges. Diagnosis of congestive heart failure, CVD, renal disease and rheumatoid arthritis all had negative directionality, showing an association with less eating challenges.

Discussion

The objectives of the study were (1) to identify the characteristics of LTC residents requiring eating assistance and (2) to examine resident level factors associated with eating challenges. The average age of the residents participating in the study was above 85 and thus, comparable to other LTC populations (Benbow & Benbow, 2011; Whitlatch & Noelker, 2016). Overall the sample population was mostly female (68.6%), with a high prevalence of dementia (65.1%), as is typical in LTC (Canadian Institute for Health Information, 2006). Approximately one fourth of the study participants required some level of eating assistance (Sometimes; Often). Past research has found that approximately half of LTC populations require some form of eating assistance (Kolodny & Malek, 1991; Steele, Greenwood, Ens, Robertson, & Seidman-Carlson, 1997), where more current research has estimated this to be about a third of residents (Liu et al., 2016).

Diet

Residents requiring eating assistance had a wide variety of prescribed diet textures. Most residents in the “Sometimes” category consumed a regular diet (41.7%) however, there was also a large number who consumed minced/moist (31.9%). One fourth of residents in the “Often” category consumed minced/moist, but over half

(57.3%) required a pureed diet texture. Thickened fluid consistency was most common for residents in the “Sometimes” (22.2%) and “Often” (40.0%) categories. Residents requiring eating assistance were also more likely to be at risk of dysphagia, explaining the use of modified diet texture and thickened fluids. Although these modifications can provide more safety to the resident by decreasing the risk of choking and aspiration, they may impact nutritional status. Dietetic professionals recognize a resident’s right to these risks through the concept of liberalized diets (Dorner, Niedert, & Welch, 2002). Liberalized diets recognize that a diet is only effective if it is consumed by the resident. Adequate food intake is required for good nutritional status, therefore unconsumed diets can be detrimental regardless of their nutrient content. Restrictive diets can be less appealing to the resident impacting food intake and quality of life (Dorner et al., 2002). Past research has also found that diet texture modifications are associated with significantly lower food and fluid intake (Bannerman & McDermott, 2011) and thickened liquid consistency may negatively impact hydration status (Vivanti, Campbell, Suter, Hannan-Jones, & Hulcombe, 2009). Dietitians in LTC need to interpret the risks and benefits of prescribing these modified diet textures for residents. Causation cannot be determined within the current study however, it is important to note that the texture modifications found for residents requiring eating assistance may influence food and fluid intake. Eating assistance may be especially important for residents with these modifications, for providing encouragement and assistance, as well as close monitoring of food and fluid intake.

The increase in ONS prescription seen within the “Sometimes” and “Often” eating assistance categories may be due to low BMI or poor nutritional status which was

also found within these groups. ONS are used to prevent unintentional weight loss and improve wound healing in LTC (Johnson et al., 2009). Previous research in Canada has found nursing staff to be primarily responsible for prescribing ONS, as opposed to dietitians (Johnson et al., 2009). Due to the increased availability of ONS, LTC facilities with limited access to dietitians may rely more on ONS as opposed to a food first strategy for increasing nutrient consumption. It is important that food first strategies are promoted in LTC facilities and used alongside ONS for addressing nutritional risk.

The M3 study did not measure the activity level of the participants and therefore estimated energy requirements could not be calculated. Given the data available from the M3 study, the kilocalorie per kg body weight estimation is the best approach for estimating energy intake. The joint report by the Food and Agriculture Organization of the United Nations and World Health Organization identified that individuals should consume approximately 25-35 kilocalories per kilogram of their body weight (as cited in American Dietetic Association, 2000, p. 31). Within LTC populations, other research has recommended 21-23 kcal/kg body weight multiplied by an activity factor of 1.2 (25.2 - 27.6 kcal/kg) to account for the typical daily activity and stress of a resident in LTC (Silver et al., 2013). These energy estimations were not met by residents within the “Never” (24.2 kcal/kg) and “Sometimes” (23.2 kcal/kg) categories, raising concern about the nutritional status of residents in LTC. The higher energy intake (27.8 kcal/kg) found in the “Often” category may be due to the prescription of ONS and more eating assistance provided to those residents. In addition, residents requiring eating assistance (Sometimes; Often) had moderate to severe malnutrition and low BMIs, indicating they may have increased energy requirements. Residents require consistent eating assistance

before nutritional status can be improved or modulated. Longitudinal studies are required to determine changes in nutritional status over time. In older adulthood, having a BMI which extends into the overweight category ($> 25 \text{ kg/m}^2$) is protective (Health Canada, 2003; Johnson & Bales, 2014), due to the risk of falls and fractures, emphasizing the importance of BMIs. Results from this study suggest that residents in LTC, especially those requiring eating assistance, may not be consuming adequate energy, putting them at risk of undernutrition and other detrimental health effects, including decreased bone mineral density, muscle loss and increased risk of frailty (Keller, 2013).

Health

Dementia was the most prevalent diagnosis after cardiovascular disease, especially among residents requiring the most eating assistance. Cognitive impairment was measure by research staff to provide further insight into levels of cognition. Residents requiring eating assistance also had further cognitive impairments compared to residents who did not require assistance. There is an overwhelming amount of research illustrating the eating challenges associated with cognitive impairment including difficulty starting a meal, distractibility, and not recognizing utensils or food (Chang, 2012; Correia et al.; 2010; Edahiro et al., 2012; Meijers et al., 2014). These difficulties may explain the high prevalence of cognitive impairment and increased eating challenges found for residents requiring eating assistance. However, there was also a high prevalence of dementia within the “Never” category. Dementia appears to be a complicated condition which may be experienced differently by each individual. Although dementia is more common with residents who require eating assistance, other characteristics, such as cognition may be more reflective of eating assistance

requirements. The more severe cognitive impairments found within the “Sometimes” and “Often” categories may be related to the progression of dementia. Cognitive impairments can vary between residents with dementia, influencing their mealtime care needs.

Therefore, cognitive impairment should also be taken into account when providing assistance to residents to ensure that their needs and preferences are being met for optimal health and well-being.

Mealtime Assistance

Average meal duration was longest for the “Sometimes” category, with insignificant differences between the “Never” and “Often” categories. These results may reflect the lack of eating challenges for those in the “Never” category and the management of eating challenges through eating assistance for those in the “Often” category. Providing assistance to residents in the “Often” category may be prioritized, as this group tends to experience a higher amount of eating challenges and has the most staff providing eating assistance. Despite having less eating challenges than the “Often” category, residents in the “Sometimes” category may require more time and energy to consume their meal without adequate assistance, in comparison to those in the “Often” category. Eating assistance by volunteers and family was similar between the “Sometimes” and “Often” categories. In addition, demographic results showed that the “Sometimes” category had the lowest energy intake (23.2 kcal/kg body wt.) compared to the other eating assistance categories, which may also reflect inadequate assistance. Eating assistance must be provided on a consistent basis to reduce the risk of malnutrition for residents requiring eating assistance.

Residents requiring the most eating assistance had the highest number of staff members assisting at mealtimes, however, residents in the “Sometimes” and “Often” categories were similar in regards to the number of volunteers and family members assisting at mealtimes. Even though volunteers and family members provided less overall eating assistance in comparison to staff, they are still an integral part of mealtimes for residents requiring eating assistance and may be a valuable resource at mealtimes. Although eating assistance for snacks was not examined, previous research has found this assistance to be limited or absent (Vivanti et al., 2009). Ensuring that assistance is also adequate for snacks may help increase food and fluid intake for these residents.

Eating Challenges

Eating challenges measured from the Ed-FED questionnaire such as, food spillage or refusal were significantly different between all three eating assistance categories, increasing with assistance requirements. There is a wide range of eating challenges, which can each exist with varying degrees of severity in LTC (Steele et al., 1997). This emphasizes the need for person-centered mealtime care, as not all residents experience these challenges in the same way, and may benefit from individualized care strategies to match their specific eating needs.

In addition to the scores from the Ed-FED questionnaire, the Other Eating Behaviours scores were also evaluated with eating assistance requirements. Although there was an association between the Other Eating Behaviours score and eating assistance requirements, further post hoc comparisons illustrated that there was no significant difference between the “Sometimes” and “Often” eating assistance categories. Factors measured in the Other Eating Behaviours questionnaire such as the use of adapted

utensils or treating food in an unusual way were similar among residents receiving eating assistance (Sometimes; Often). Once these other eating behaviours are already established they do not appear to further influence requirements.

Oral health issues, including having non-intact natural teeth, chewing difficulties and gum inflammation, were associated with more eating assistance. Research has shown that poor oral health in older adulthood can lead to malnutrition (Coleman, 2002; Kumar, Ratogi, & Madan, 2012; Sahyoun, Lin, & Krall, 2003; Sheiham & Steele, 2001). Residents requiring eating assistance were also less likely to wear dentures, which may influence their ability to consume certain diet textures if natural teeth are not present or well maintained. Dentures should be worn at mealtimes if they are needed by the resident. Poor oral health can cause toothaches, loose teeth, fractured teeth, tooth decay, temperature sensitivity and/or oral sores creating pain and discomfort for the individual (Riley & Gilbert, 2001). Basic oral hygiene practices are important for residents in LTC, to minimize the pain associated with these oral health issues. Eating assistants should be mindful of this associated pain and be gentle when assisting a resident in transferring food from plate to mouth. Residents experiencing tooth loss or poor oral health status may also limit their consumption of high fibre foods such as whole fruits and vegetables because of the hard texture and chewing required to eat them (Marshall, Warren, Hand, Xie, & Stumbo, 2002). These residents may benefit from consuming diet textures which are easier to chew, minimizing any pain or discomfort (Bannerman & McDermott, 2011). Referral to dental care specialists may also be needed to treat existing oral health conditions.

Visual impairments may also cause residents to require more eating assistance. Residents requiring eating assistance (Sometimes; Often) had poorer vision compared to residents who did not require assistance. It may be difficult for residents to consume meals independently if they cannot locate their plate or utensils to transfer food from plate to mouth (Funderburg & Mathews, 2011; Keller, 2013). Poor vision can also take away from the visual appeal of food. Mealtime strategies for residents with poor vision may include describing the meal in an appetizing way (Hogstel & Robinson, 1998) and serving colourful food on contrasting coloured plates (Dunne et al., 2004; Stroebele & De Castro, 2004).

Lastly, eating challenges were evaluated with multiple resident level factors. Factors which were found to be associated with eating challenges were similar to factors associated with eating assistance requirements, suggesting that more eating challenges likely requires more eating assistance. Eating challenges measured in the Ed-FED questionnaire included food spillage, refusal to eat, spitting out food and refusal to swallow. The R^2 value from the each linear regression was used to determine the strength of the association, where higher R^2 values represented stronger associations. Longer time spent in the facility had a low strength association with more eating challenges. This may be due to the worsening of health condition and increased care requirements that can occur with time. Eating challenges may change over time and therefore it is important that each resident's eating assistance requirements are evaluated periodically and adjusted to match their mealtime care needs.

There was a strong association with cognitive impairment and a lower strength association with dementia, emphasizing the need for eating assistance to be provided to

individuals experiencing these conditions. These associations were expected as past research has shown that these residents may experience distractibility, difficulty starting a meal, difficulty recognizing food or utensils and pocketing of food in the mouth (Correia, Morillo, Filho, & Mansur; 2010; Edahiro et al., 2012; Keller, 2013; Meijers, Schols, & Halfens, 2014). Eating assistance may be vital in combating these behaviours and minimizing their effect on food and fluid intake. Person-centered eating assistance may be most effective for LTC residents, as it provides individualized support to target specific mealtime care requirements and needs.

There were other diagnoses which had low strength associations with less eating challenges. These diagnoses included diabetes, congestive heart failure, renal disease, rheumatoid arthritis and mental health conditions other than depression. Although these conditions may require medically complex care, they may not directly affect a resident's ability to eat independently. If these conditions are being properly managed and monitored by LTC staff they may have less impact on the health of residents. This may involve special diet prescriptions and the use of medications or vitamin and mineral supplements which also had lower strength associations with less eating challenges. Monitoring blood glucose or cholesterol levels may be important in the care of residents with diabetes or congestive heart failure. It should also be noted that diabetes (21.8%), congestive heart failure (13.0%), renal disease (14.8%), rheumatoid arthritis (6.0%) and mental health conditions (16.6%) were less prevalent than other medical diagnoses within the study population.

Changes in diet texture and liquid consistency had a strong association with more eating challenges. Modified diet textures and liquid consistencies seem to be commonly

used to combat eating challenges in LTC residents. These modifications may also be used for resident safety, by reducing the risk of choking and aspiration (Holmes, 2008).

Residents with more eating challenges may require more extreme texture modifications such as pureed or liquidized, where soft or minced textures may be sufficient enough for residents with moderate amounts of eating challenges. Eating assistance can also be used as a tool for monitoring food and fluid intake and ensuring effective nutritional interventions are implemented.

Eating challenges were also strongly associated with malnutrition and low BMI, illustrating the detrimental effects which can be related to eating challenges and the importance of managing eating challenges quickly and in a dignified manner. Despite these associations with malnutrition risk and low BMI, eating challenges also had a lower strength association with higher energy intake. These results demonstrate that high energy intake does not necessarily indicate that nutritional status is good. Regular nutritional assessment and the monitoring of food intake is required to determine a resident's nutritional health. The positive association with energy intake is likely due to those with eating challenges receiving more eating assistance. Assistance for residents with many eating challenges may be prioritized over residents who are more independent. Residents with low to moderate eating challenges may still require some level of eating assistance to meet their energy and nutrient recommendations. In addition, residents with more eating challenges were also associated with high energy diets and ONS prescriptions. These prescriptions may contribute to the higher energy intake found for residents with the most eating challenges. The low BMI and malnourishment of these residents may also indicate that they have higher energy requirements. If residents with

increased eating challenges were consuming enough energy, a low risk of malnutrition and higher BMI would be expected, however, this is not reflected in the results. It is important that residents at nutritional risk consistently receive adequate eating assistance. Improving/modulating malnutrition can be long and complex process requiring consistent support to improve nutritional status over time.

Study Limitations

Limitations of the current study include that the LTC facilities where the data was collected were not randomly selected. The data was only collected in one city per province and therefore, the results may not be generalizable to all LTC facilities within Canada. The sample was not equal across all three categories of eating assistance requirements, with approximately a fourth of the sample requiring any eating assistance. The question used to categorize eating assistance requirements was also part of the Ed-FED questionnaire to determine eating challenges which may have influenced the results. Lastly, the study findings can only illustrate associations between factors and not causation due to the observational collection methods.

Conclusion

In summary, poor energy intake may be a concern for residents in all eating assistance categories and can lead to undernutrition if not properly addressed. Factors associated with eating challenges include cognitive impairment, modified diet textures, thickened fluids, ONS prescription, low BMI and risk of malnutrition. Residents with more eating challenges likely require more individualized care to meet their specific mealtime needs.

CHAPTER 5:

OVERALL DISCUSSION

The objectives of the study were (1) to identify the characteristics of LTC residents requiring eating assistance and (2) to examine resident level factors associated with eating challenges. Secondary data from the M3 study was used for the current research study. Results from this analysis are presented in the previous manuscript (Chapter 4). No extensive research exists examining diet and health characteristics of LTC residents who require eating assistance.

The M3 study is a large scale study which examined multiple determinants of food and fluid intake for LTC residents across four Canadian provinces, using a multi-site, cross-sectional design. Few research studies have been able to examine these types of determinants using standardized methods and large sample sizes. The M3 study is unique as it allows for adequate comparisons between the participants from various data collection sites.

This first research objective was to identify the characteristics of LTC residents requiring eating assistance. When the study population was divided into different eating assistance categories (Never; Sometimes; Often), there were many differences in demographics, health and diet characteristics, especially between the “Never” and “Often” categories. Most importantly, there was a high prevalence of undernutrition for LTC residents requiring eating assistance. Length of time in the facility increased with eating assistance requirements which may indicate the progression of eating challenges with time. Residents requiring eating assistance consumed thickened fluids and modified diet textures, which was likely due to the higher risk of dysphagia. The prescription of

ONS was higher for these residents, perhaps due to malnourishment and low BMIs. Energy intake was highest for residents requiring the most eating assistance, however intake did not indicate good nutritional status as the prevalence of malnutrition was highest for these residents.

Diagnosis of dementia and severe of cognitive impairment were more common for residents requiring eating assistance. The severity of cognitive impairment is very influential on eating abilities and mealtime care should be individualized to match the eating abilities of these residents. Oral health may affect assistance requirements, emphasizing the importance of good oral hygiene practices in LTC.

The second objective of this study was to examine resident level factors associated with eating challenges. Similar to eating assistance requirements, residents with more eating challenges had lived in the facility for a longer amount of time, and consumed thickened fluids and modified diet textures. Diagnosis of dementia and cognitive declines were associated with more eating challenges. Energy intake was highest for residents with more eating challenges, possibly due to the use of ONS and high protein and high energy diets. However as with eating assistance requirements high energy intake did not indicate good nutritional status. Eating challenges were related to malnourishment and low BMI. Individual with more eating challenges require adequate mealtime care and eating assistance on a consistence basis to improve or modulate their nutritional status over time.

Strengths

The M3 study is a comprehensive examination of the determinants of food and fluid intake which includes a large sample size and recruitment of participants from a

variety of diverse facilities and across four Canadian provinces. The incorporation of many valid and reliable data collection tools have strengthened the validity of these findings. This study focused specifically on eating assistance and was therefore able to relate findings to eating assistance requirements. The participants included both residents with and without dementia as both of these groups may require eating assistance.

Limitations

The M3 data was originally collected to answer different research questions and the current study (secondary data analysis) had no control over the study design and data collection methods. Data was only collected in one city per province and the LTC facilities where the data was collected were not randomly selected, therefore, the results may not be generalizable to all LTC facilities within Canada. The sample was not equal across all three categories of eating assistance requirements with approximately a fourth of the sample requiring any eating assistance. Eating assistance was measured for mealtimes only, not during snack times. The question used to categorize eating assistance requirements was also part of the Ed-FED questionnaire to determine eating challenges which may have influenced the results. Lastly, the study findings can only illustrate associations between factors and not causation due to the observational collection methods.

Implication of Findings

Findings from this study have several implications to the field of nutrition and highlight factors associated with eating assistance requirements and eating challenges. Mealtime care and eating assistance should be person-centered, to match each resident's specific challenges and the severity of those challenges. Residents requiring eating

assistance may be especially at risk for malnutrition. More time and/or staff may be required for mealtime assistance in LTC to meet the requirements of residents requiring eating assistance, which may involve training more LTC staff. These results may act as the basis for future research studies regarding malnutrition in LTC, such as the second phase of the M3 study, focusing on interventions. Interventions using person-centered eating assistance are needed to determine the impact of this dignified mealtime care approach.

Approximately one third of residents not requiring eating assistance were still found to have moderate to severe malnutrition, despite having few eating challenges. Future research is needed to understand the mealtime care requirements of these individuals and determine effective strategies for improving their nutritional status. Research is also needed to understand the mealtime care requirements specific to LTC residents with cognitive impairment.

Policy

The importance of mealtime care needs to be addressed within LTC policy. Eating assistance can be provided by all LTC staff including dietary aids, dietitians, administrative staff or recreation therapists, not just nurses and personal support workers/health care aides. Training other LTC staff to provide eating assistance may help in meeting the mealtime care requirements of residents. A training program for other LTC staff would be required to ensure that eating assistance is provided in a safe and dignified manner. Training programs could also be used for volunteer eating assistants.

Policies and care strategies in LTC should also support person-centered mealtime care practices and food first strategies. It is important that these care strategies are taught

in post-secondary education for nursing and care staff, especially within LTC settings. These strategies are more dignified for residents and are suggested to benefit food and fluid intake. Eating assistance requirements should to be evaluated regularly within LTC settings as eating challenges can vary over time.

Take Away Points

1. What are the characteristics of LTC residents with varying levels of eating assistance?

- Residents requiring eating assistance lived in LTC longer than residents not requiring eating assistance
- Diet texture modifications (i.e. minced, pureed) and thickened fluids were more common for residents requiring eating assistance
- Prescription of ONS increased with eating assistance requirements
- Energy intake was highest for residents requiring eating assistance often and lowest for residents requiring assistance sometimes
- Prevalence of dementia and cognitive impairment increased with eating assistance requirements
- BMI decreased with eating assistance requirements
- Residents requiring any eating assistance were more likely to be malnourished

2. What are the eating challenges experienced by LTC residents with varying levels of eating assistance?

- Residents requiring eating assistance sometimes had the longest mealtime duration
- The number of staff assisting a resident increased with eating assistance requirements

- Oral health issues including non-intact teeth, chewing difficulties and inflamed/bleeding gums were associated with more eating assistance
- Residents requiring eating assistance were more likely to be at risk for dysphagia
- Vision difficulties were associated with more eating assistance

3. What resident level factors are independently associated with eating challenges?

- Longer time spent living in the LTC facility was related to more eating challenges
- More diet texture modifications and thickened fluids were related to more eating challenges
- High protein, high energy diets and consumption of ONS were related to more eating challenges
- High energy intake was related to more eating challenges
- Diagnosis of dementia and cognitive impairments were related to more eating challenges
- Low BMI and malnourishment was related to more eating challenges

Summary

By observing mealtimes in Canadian LTC facilities, a better understanding about the relationship between eating assistance requirements and undernutrition has been provided. Inadequate energy intake is a concern for residents within all eating assistance categories and can lead to undernutrition if not properly addressed. Food intake and nutritional status of residents requiring eating assistance sometimes should be monitored as eating challenges and mealtime care needs can change over time. Eating assistance practices in LTC should focus on person-centered care approaches which are individualized to meet the varying mealtime needs of residents.

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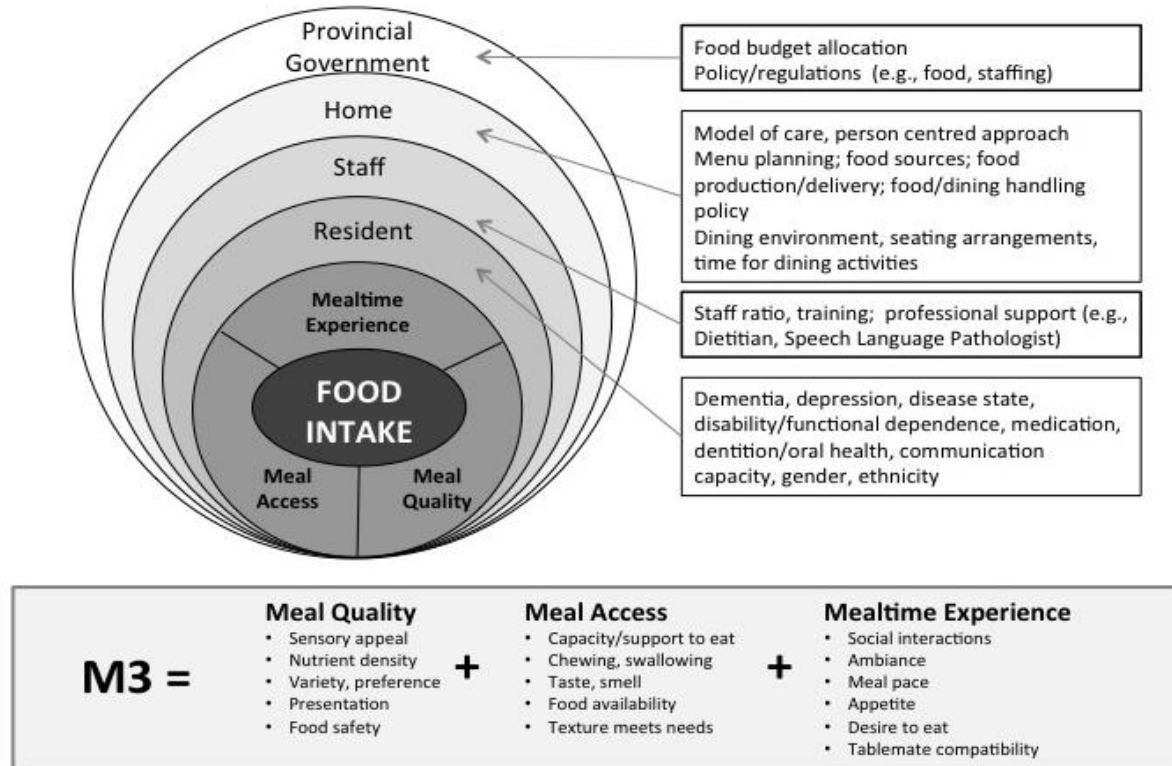
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Appendices

Appendix A: M3 Data Conceptual Framework

M3 Date Conceptual Framework



Used with permission

Keller, H., Carrier, N., Duizer, L., Lengyel, C., Slaughter, S., & Steele, C. (2014)

Appendix B: M3 Data Collection Overview

M3 Data Collection Overview

Dependent Variable	3-day food & fluid intake for each participant (observed & measured)	
Independent Variables	Meal <u>Quality</u>	<i>nutritious, sensory appeal, variety, presentation, food safety</i>
	Meal <u>Access</u>	<i>dentition, dysphagia, eating ability - assistance required</i>
	Mealtime <u>Experience</u>	<i>social interaction, physical environment</i>
	<u>Resident</u> Characteristics	<i>diagnoses, medication, cognition, pain, ADL, depression</i>
	<u>Staff</u> Characteristics	<i>staff ratios, person centred care surveys, professional availability, dining activity training</i>
	<u>Residence</u> Characteristics	<i>location, size, owner-operator model, menus, food production & procurement, food budgets, food delivery systems</i>
	<u>Provincial</u> Characteristics	<i>food budget allocation, regulations for timing of meals & snacks, food safety regulations, requirements for menu development</i>

Appendix C: Ethical Approval Certificate



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RENEWAL APPROVAL

September 30, 2016

TO: Christina Lengyel
Principal Investigator 

FROM: Kevin Russell, Chair
Joint-Faculty Research Ethics Board (JFREB) 

Re: Protocol #J2014:139 (HS17338)
"Making the Most of Mealtimes (M3) Determinants of Food
Intake in Long Term Care"

Please be advised that your above-referenced protocol has received approval for renewal by the Joint-Faculty Research Ethics Board. **This approval is valid for only year and will expire October 18, 2017.**

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Coordinator in advance of implementation of such changes.

Variables of Interest

Dependent Variable

Eating Assistance Requirements	Based on the mealtime observation does the resident require eating assistance 1. Never 2. Sometimes 3. Often
--------------------------------	---

Independent Variables

Demographic	age, gender, months since admission
Diet	diet texture prescribed, liquid consistency prescribed, diet prescription, prescribed ONS, avg. energy intake (kcal/kg body wt.)
Health	diagnosis of dementia, asthma, congestive heart failure, COPD/emphysema, current cancer., diabetes, endocrine diagnosis other than diabetes, cardiovascular disease, depressions, mental health diagnosis other than depression, GI disease, liver disease, muscular degeneration (glaucoma), osteoarthritis, osteoporosis , parkinson’s disease, neurological diagnosis, other than parkinson’s disease , renal disease, rheumatoid arthritis or stroke, # formal diagnoses, # medications, # vitamin supplements, knee height BMI, Ulna BMI, MNA category, PG-SGA category, cognitive performance category, vision, abilities, wears dentures, has non-intact teeth, reports mouth pain, dry mouth or chewing difficulties, presence of gum inflammation/bleeding, at risk for dysphagia
Mealtime Variables	avg. meal duration, Three-Day avg. Ed-FED score, Three-Day avg. Other Eating Behaviours score, avg. # of staff assisting, avg. # of family/volunteers assisting, avg. # of staff +family/volunteers assisting

Appendix E: Overview of Data Collection Tools

Overview of Data Collection Tools

Data Collection Tool	Variables
Meal Observation	avg. meal duration, three-Day avg. Ed-FED score, three-Day avg. Other Eating Behaviours score, avg. # of staff assisting, avg. # of family/volunteers assisting, avg. # of staff +family/volunteers assisting
Food Intake	energy intake (kcal/kg body wt.)
Resident Chart Review	age, gender, months since admission, diet texture prescribed, liquid consistency prescribed, diet prescription, diagnosis of dementia, asthma, congestive heart failure, COPD/emphysema, current cancer., diabetes, endocrine diagnosis other than diabetes, cardiovascular disease, depressions, mental health diagnosis other than depression, GI disease, liver disease, mascular degeneration (glaucoma), osteoarthritis, osteoporosis , parkinson's disease, neurological diagnosis, other than parkinson's disease , renal disease, rheumatoid arthritis or stroke, # formal diagnoses, # medications, # vitamin supplements, knee height BMI, Ulna BMI
Minimum Data Set (MDS)	cognitive performance category, vision abilities, wears dentures, has non-intact teeth, reports mouth pain, dry mouth or chewing difficulties, presence of gum inflammation/bleeding
Adapted Screening Tool for Acute Neuro Dysphagia (STAND)	at risk for dysphagia
Patient-Generated Subjective Global Assessment (PG-SGA)	PG-SGA category

Appendix F: Resident Mealtimes Observation Form



ID : ____ Site ID : ____
 Date : _____ Researcher : _____

Making the Most of Mealtime : Resident Meal Observation

Record (circle): Day 1 Day 2 Day 3 Meal (circle): B L S

1. EdFED-Q Score as: Never or Not Applicable = 1 Sometimes = 2 Often = 3	Tick Marks or NA	Item Score
a. Does the resident require close supervision while feeding/eating?		
b. Does the resident require physical help with feeding/eating?		
c. Is there spillage while feeding/eating?		
d. Does the resident tend to leave food on the plate at the end of the meal?		
e. Does the resident ever refuse to eat?		
f. Does the resident spit out his food?		
g. Is there spillage of food out of the mouth?		
h. Does the resident turn his head away while being fed?		
i. Does the resident refuse to open his mouth?		
j. Does the resident refuse to swallow?		
TOTAL SCORE (total item scores)		

2. Other Eating Behaviours Score as: Never or Not Applicable = 1 Sometimes = 2 Often = 3	Tick Marks or NA	Item Score
a. Does the resident receive close supervision with feeding/eating?		
b. Does the resident receive verbal prompting to eat?		
c. Does the resident use adaptive utensils to eat?		
d. Does the resident appear distracted e.g. watching TV, or people, repetitive behaviours thereby seeming to forget food in front of them		
e. Does the resident treat the food in an unusual way e.g. repetitive behaviours of manipulating food without eating, doing strange things with food such as pouring liquids onto plate etc.		
f. Does the resident lack energy to eat?		
g. Does the resident appear to have chewing problems?		
h. Does the resident cough during the meal?		
i. Does the resident choke during the meal?		
TOTAL SCORE (total item scores)		

ID : ____ Site ID : ____
Date : _____ Researcher : _____

3. Person Centered Care (N/A if not applicable)

Resident...	Y = 1 N = 0	Resident...	Y = 1 N = 0
i) Is told where to sit/ assigned seating		Is given choice /not assigned seating	
ii) Clothing protector is put on (no asking) (if there are no protectors mark as "N/A")		Requests or is asked if they want a clothing protector or if it should be put on (if there are no protectors mark as "N/A")	
iii) Is restrained		Is not restrained	
iv) Is not asked meal preference		Is asked meal preference	
v) Has a long wait to get food		Is provided food quickly	
vi) Receives medications at meals		Do not receive medications at meals	
vii) Is not informed of actions before taken		Is informed of actions before taken	
viii) Is blatantly excluded from staff's process-related conversations e.g., staff loudly discuss a resident's food selection or diet type		Is discreetly excluded from staff's process-related conversations e.g., staff quietly discuss a resident's food selection or diet type	
ix) Is not included in social conversations with staff e.g., staff ignore nearby residents during their conversations		Is included in social conversations with staff e.g., staff engage nearby residents during their conversations	
x) Receives no nonverbal social interaction from staff		Receives nonverbal social interaction from staff e.g., smile, touch hand	
xi) Does not talk to tablemates		Has some talk with tablemates	
xii) Is not addressed respectfully		Is addressed respectfully	
xiii) Does not eat or drink at the table with staff		Eats or drinks at the table with staff	
xiv) Is forced/coerced to eat		Is allowed to determine if they want to eat	
xv) Is rushed to leave dining area		Is permitted to linger in dining area	
xvi) Waits to get assistance to leave (if no residents require assistance mark as "N/A")		Receives assistance when they want to leave (if no residents require assistance mark as "N/A")	
xvii) Is discouraged from mealtime tasks (including self-feeding)		Is allowed to be involved in mealtime tasks (including self-feeding)	
xviii) Has their dishes piled on the table		Has their dishes removed when finished	

ID : ____ Site ID : ____
 Date : _____ Researcher : _____

a) For residents who require eating assistant (Note: if resident does not require assistance, mark each cell as “N/A”).

Resident...	Y= 1 N= 0	Resident...	Y= 1 N= 0
i) Waits for assistance with food in front of them		Does not wait for assistance with food in front of them	
ii) Has an apron or washcloth used to wipe their mouth		Has a napkin used to wipe their mouth	
iii) Stops being assisted, staff leaves		Is continuously assisted	
iv) Is assisted at the same time as other residents		Receives one-on-one assistance	
v) Is rushed when assisted to eat		Is given enough time when assisted to eat	
vi) Not told what they're eating when assisted		Told what they're eating by those who assist	
vii) Assisted by staff using unsafe practices e.g., staff standing, resident in hunched over or reclined position, overloading spoon or fork, fast pace		Assisted by staff using safe practices e.g., staff sitting, resident in upright position, reasonable amount of food on spoon or fork, relaxed pace	

Appendix G: Food Intake Form

M3 : FOOD INTAKE FORM

ID _____ Site ID _____

Date : _____ Researcher: _____ Page _____ of _____

Menu Wk:	Day:	FI Record	1	2	3	B	L	D	Offered Texture:	Fluid:	
Meal timing:		Assistance:							Other (only completed once for day):		
Arrival:		# staff serve							Took nutrient supplements:		
First food/Fluid:		# staff assist with eating							Took Med Pass ONS (e.g. Ensure):		
Main Plate:		# family/volunteer assist									
Finishes meal:		Did this resident leave the dining room	Y	N							
Est. eating time (mins):		Extensive wandering	Y	N							

Time	Description of Food/Fluid Items	Estimated Food Intake			Weighed Food Intake			Comments
		Portion Offered (ml/g)	Portion Leftover (%)	Portion Eaten (ml/g)	Plate weight: Before Meal (g)	g After Meal (g)	Actual Eaten (g)	

Making the Most of Mealtimes : Food Intake Form

ID ____ Site ID ____ Date _____

Researcher: _____ Page ____ of ____

SNACKS

Time	Description of Food/Fluid Items	Estimated Food Intake			Comments
		Portion Offered (ml/g)	Portion Leftover (%)	Portion Eaten (ml/g)	

Food Offered After Supper and Before Midnight? Recorded: Y N

Appendix H: Resident Chart Review

ID: _____ Site ID: _____
Date: _____ Assessor: _____

Prescription

None (0) _____
No Salt Added (1) _____
Diabetic (2) _____
Renal (3) _____
High Energy/Protein (4) _____
Other (5) _____ Specify: _____

Cultural Preferences Met: No = 0 Yes = 1 Specify: _____

PRESCRIBED ORAL NUTRITION SUPPLEMENTS:

(e.g., Ensure, protein fortification)

With Meals: Yes = 0 No = 1 Kcal: _____ Pro: _____ (g)

Specify Products: _____

Between Meals: Yes = 0 No = 1 Kcal: _____ Pro: _____ (g)

Specify Products: _____

MedPass: Yes = 0 No = 1 Kcal: _____ Pro: _____ (g)

Specify Products: _____

ID: _____ Site ID: _____
 Date: _____ Assessor: _____

DIAGNOSES:

List all of the resident's MAJOR medical and psychiatric diagnoses:

Diagnosis	Y=1 / N=0
Diabetes	
Other endocrine	
CVD (MI, atherosclerosis, HTN, DVT, PVD)	
Congestive Heart Failure	
Stroke	
Osteoarthritis	
Rheumatoid arthritis	
Osteoporosis	
Alzheimers dementia	
Dementia other than AD	
Parkinson's Disease	
Other Neurologic (ALS, MS, CP)	
Depression	
Other mental health	
COPD/emphysema	
Asthma	
Macular degeneration, glaucoma	
Current cancer	
GI disease	
Renal disease	
Liver disease	
Other Major Diagnosis (Specify):	

ID: _____ Site ID: _____
Date: _____ Assessor: _____

ACUTE STATE:

Identify any potential reason for food intake being different than usual (e.g., infection, recent fall, pain, psychological stress):

UNSUPERVISED FOOD & MICRONUTRIENTS:

Family routinely (e.g. 1/week) bring food in: No = 0 Yes = 1

Specify: _____

Family provide with micronutrient supplements: No = 0 Yes = 1

Specify Type & Frequency Taken: _____

Resident has own supply of food: No = 0 Yes = 1

Specify: _____

Resident has own supply of micronutrient supplements: No = 0 Yes = 1

Specify Type & Frequency Taken: _____

ID: _____ Site ID: _____
 Date: _____ Assessor: _____

MINI NUTRITIONAL ASSESSMENT – SF

Area	Score Guide	Score	Source of Info
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		Chart Staff Resident/Family
b) Weight loss during the past 3 months?	0 = Weight loss greater than 3 kg 1 = Does not know 2 = Weight loss between 1 and 3 kg 3 = No weight loss		Chart Staff Resident/Family
c) Mobility	0 = Bed or chair bound 1 = Able to get out of bed / chair but does not go out (of room) 2 = Goes out (of room)		Chart Staff Resident/Family
d) Has suffered psychological stress or acute disease in the past 3 months?	0 = Yes 2 = No		Chart Staff Resident/Family
e) Neuropsychological problems	0 = Severe dementia or depression 1 = Mild dementia 2 = No psychological problems		Chart Staff Resident/Family
f) Body Mass Index	0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater		Chart Staff Resident/Family
Total Score:			

BODY MEASURES:

Knee Height (KH):

Knee Height: _____ cm

Estimated Height (from KH): _____ m

Knee Height BMI: _____

Ulna Length (UL):

Ulna length: _____ cm

Estimated Height (from UL): _____ m

Ulna BMI: _____

Calf Circumference:

Calf Circumference: _____ cm

Any Calf Edema: YES = 1 NO = 0

Appendix I: Minimum Data Set (MDS) Form

ID: _____ Site ID _____
Date: _____ Assessor: _____

MDS Items- CODE FOR LAST 3 DAYS, UNLESS OTHERWISE SPECIFIED

SECTION C. Cognition

1. COGNITIVE SKILLS FOR DAILY DECISION MAKING

Making decisions regarding tasks of daily life- e.g., when to get up or have meals, which clothes to wear or activities to do

- 0. **Independent-** Decisions consistent, reasonable, and safe
- 1. **Modified independence-** Some difficulty in new situations only
- 2. **Minimally impaired-** In specific recurring situations, decisions become poor or unsafe; cues / supervision necessary at those times
- 3. **Moderately impaired-** Decisions consistently poor or unsafe; cues / supervision required at all times
- 4. **Severely impaired-** Never or rarely makes decisions
- 5. **No discernible consciousness, coma (Skip to section G)**

2. MEMORY/RECALL ABILITY- *Code for recall of what was learned or known*

a. **Short-term memory OK-** Seems / appears to recall after 5 minutes

- 0. Yes, memory OK
- 1. Memory problem

b. **Long-term memory OK-** Seems / appears to recall distant past

- 0. Yes, memory OK
- 1. Memory problem

c. **Procedural memory OK-** Can perform all or almost all steps in a multitask sequence without cues

- 0. Yes, memory OK
- 1. Memory problem

3. PERIODIC DISORDERED THINKING OR AWARENESS

a. **Easily distracted-** e.g., episodes of difficulty paying attention; gets sidetracked

- 0. Behaviour not present
- 1. Behaviour present, consistent with usual functioning
- 2. Behaviour present, appears different from usual functioning (e.g., new onset or worsening; different from a few weeks ago)

4. ACUTE CHANGE IN MENTAL STATUS FROM PERSON'S USUAL FUNCTIONING- *e.g., restlessness, lethargy, difficult to arouse, altered environmental perception*

- 0. No
- 1. Yes

5. CHANGE IN DECISION MAKING AS COMPARED TO 90 DAYS AGO (OR SINCE LAST ASSESSMENT)

- 0. Improved
- 1. No change
- 2. Declined
- 8. Uncertain

SECTION D. Communication and Vision

1. MAKING SELF UNDERSTOOD (Expression)

Expressing information content- both verbal and nonverbal

- 0. Understood-** Expresses ideas without difficulty
- 1. Usually understood-** Difficulty finding words or finishing thoughts BUT if given time, little or no prompting required
- 2. Often understood-** Difficulty finding words or finishing thoughts AND prompting usually required
- 3. Sometime understood-** Ability is limited to making concrete requests
- 4. Rarely or never understood**

3. HEARING

- a. Ability to hear (with hearing appliance normally used)
 - 0. Adequate-** No difficulty in normal conversation, social interaction, listening to TV
 - 1. Minimal difficulty-** Difficulty in some environments (e.g., when person speaks softly or is more than 2 metres (6 feet) away
 - 2. Moderate difficulty-** Problem hearing normal conversation, requires quiet setting to hear well
 - 3. Severe difficulty-** Difficulty in all situations (e.g., speaker has to talk loudly or speak very slowly; or person reports that all speech is mumbled)
 - 4. No hearing**

4. VISION

- a. Ability to see in adequate light (with glasses or with other visual appliance normally used)
 - 0. Adequate-** Sees fine detail, including regular print in newspaper / books
 - 1. Minimal difficulty-** Sees large print, but not regular print in newspaper / books
 - 2. Moderate difficulty-** Limited vision; not able to see newspaper headlines, but can identify objects
 - 3. Severe difficulty-** Object identification in question, but eyes appear to follow objects; sees only light, colors, shapes
 - 4. No vision**

SECTION E. Mood and Behaviour

1. INDICATORS OF POSSIBLE DEPRESSED, ANXIOUS, OR SAD MOOD

Code for indicators observed in last 3 days, irrespective of the assumed cause

	Not present	Present but not exhibited in last 3 day	Exhibited on 1-2 of last 3 days	Exhibited daily in last 3 days
a. Made negative statements- e.g., <i>Nothing matters, Would rather be dead, What's the use, Regret having lived so long, Let me die</i>				
b. Persistent anger with self or others- e.g., easily annoyed, anger at care received				
c. Expressions, including nonverbal, of what appears to be unrealistic fears- e.g., fear of being abandoned, being left alone, being with others; intense fear of specific objects or situations				
d. Repetitive health complaints- e.g., persistently seeks medical attention, incessant concern with body functions				
e. Repetitive anxious complaints / concerns (non-health-related)- e.g., persistently seeks attention / reassurance regarding schedules, meals, laundry, clothing, relationships				
f. Sad, pained, or worried facial expressions- e.g., furrowed brow, constant frowning				
g. Crying, tearfulness				
h. Recurrent statements that something terrible is about to happen- e.g., believes he or she is about to die, have a heart attack				
i. Withdrawal from activities of interest- e.g., long-standing activities, being with family / friends				
j. Reduced social interactions				
k. Expressions, including nonverbal, of a lack of pleasure in life (anhedonia)- e.g., <i>I don't enjoy anything anymore</i>				

ID: _____ Site ID _____
 Date: _____ Assessor: _____

3. BEHAVIOUR SYMPTOMS

Code for indicators observed, irrespective of the assumed cause

	Not present	Present but not exhibited in last 3 day	Exhibited on 1-2 of last 3 days	Exhibited daily in last 3 days
a. Wandering- Moved with no rational purpose, seemingly oblivious to needs or safety				
b. Verbal abuse- e.g., others were threatened, screamed at, cursed at				
c. Physical abuse- e.g., others were hit, shoved, scratched, sexually abused				
d. Socially inappropriate or disruptive behaviour- e.g., made disruptive sounds or noises, screamed out, smeared or threw food or feces, hoarded, rummaged through other's belongings				
f. Resists care- e.g., taking medications / injections, ADL assistance, eating				

SECTION F. Psychosocial Well-Being

1. SOCIAL RELATIONSHIPS

b. Visit with a long-standing social relation or family member

- 0. Never
- 1. More than 30 days ago
- 2. 8-30 days ago
- 3. 4-7 days ago
- 4. In last 3 days
- 8. Unable to determine

c. Other interaction with long-standing social relation or family member- e.g., telephone, email

- 0. Never
- 1. More than 30 days ago
- 2. 8-30 days ago
- 3. 4-7 days ago
- 4. In last 3 days
- 8. Unable to determine

ID: _____ Site ID _____
 Date: _____ Assessor: _____

2. SENSE OF INVOLVEMENT

	Not present	Present but not exhibited in last 3 day	Exhibited on 1-2 of last 3 days	Exhibited daily in last 3 days
a. At ease interacting with others				
b. At ease doing planned or structured activities				
c. Accepts invitations into most group activities				
d. Pursues involvement in life of facility- e.g., makes or keeps friends; involved in group activities; responds positively to new activities; assists at religious services				
e. Initiates interaction(s) with others				
f. Reacts positively to interactions initiated by others				
g. Adjusts easily to change in routine				

4. MAJOR LIFE STRESSORS IN LAST 90 DAYS

- 0. No
- 1. Yes

SECTION G. Functional Status

1. ADL SELF-PERFORMANCE

Consider all episodes over 3-day period.

If all episodes are performed at the same level, score ADL at that level.

If any episodes at level 6, and others less dependent, score ADL as a 5.

Otherwise, focus on the three most dependent episodes (or all episodes if performed fewer than 3 times). If most dependent episode is 1, score ADL as 1. If not, score ADL as least dependent of those episodes in range 2-5.

- 0. **Independent**- No physical assistance, set-up, or supervision in any episode
- 1. **Independent, set-up help only**- Article or device provided or placed within reach, no physical assistance or supervision in any episode
- 2. **Supervision**- Oversight / cueing
- 3. **Limited assistance**- Guided manoeuvring of limbs, physical guidance without taking weight
- 4. **Extensive assistance**- Weight-bearing support (including lifting limbs) by 1 helper where person still performs 50% or more of subtasks

ID: _____ Site ID _____
 Date: _____ Assessor: _____

- 5. **Maximal assistance-** Weight-bearing support (including lifting limbs) by 2+ helpers-or-
 Weight-bearing support for more than 50% of subtasks
- 6. **Total dependence-** Full performance by others during all episodes
- 8. **Activity did not occur during entire period**

	0	1	2	3	4	5	6	8
a. Bathing- How takes a full-body bath / shower. Includes how transfers in and out of tub or shower AND how each part of body is bathed: arms, upper and lower legs, chest, abdomen, perineal area- EXCLUDE WASHING OF BACK AND HAIR								
b. Personal hygiene- How manages personal hygiene, including combing hair, brushing teeth, shaving, applying make-up, washing and drying face and hands- EXCLUDE BATHS AND SHOWERS								
c. Dressing upper body- How dresses and undresses (street clothes, underwear) above the waist, including prostheses, orthotics, fasteners, pullovers, etc.								
d. Dressing lower body- How dresses and undresses (street clothes, underwear) from the waist down, including prostheses, orthotics, belts, pants, skirt, shoes, fasteners, etc.								
f. Locomotion- How moves between locations on same floor (walking or wheeling). If in wheelchair, self-sufficiency once in chair								
h. Toilet use- How uses the toilet room (or commode, bedpan, urinal), cleanses self after toilet use or incontinent episode(s), changes pad, manages ostomy or catheter, adjusts clothes- EXCLUDE TRANSFER ON AND OFF TOILET								
i. Bed mobility- How moves to and from lying position, turns from side to side, and positions body while in bed								
j. Eating- How eats and drinks (regardless of skill). Includes intake of nourishment by other means (e.g., tube-feeding, total parenteral nutrition)								

2. LOCOMOTION / WALKING

a. **Primary mode of locomotion**

- 0. Walking, no assistive device
- 1. Walking, uses assistive device- e.g., cane, walker, crutch, pushing wheelchair
- 2. Wheelchair, scooter
- 3. Bed-bound

5. CHANGE IN ADL STATUS AS COMPARED TO 90 DAYS AGO, OR SINCE LAST ASSESSMENT IF LESS THAN 90 DAYS AGO

- 0. Improved
- 1. No change
- 2. Declined
- 8. Uncertain

ID: _____ Site ID _____
 Date: _____ Assessor: _____

SECTION H. Continence

1. BLADDER CONTINENCE

- 0. **Continent-** Complets control; DOES NOT USE any type of catheter or other urinary collection device
- 1. **Control with any catheter or ostomy** over last 3 days
- 2. **Infrequently incontinent** – Not incontinent over last 3 days, but does have incontinent episodes
- 3. **Occasionally incontinent-** Less than daily
- 4. **Frequently incontinent-** Daily, but some control present
- 5. **Incontinent-** No control present
- 8. **Did not occur-** No urine output from bladder in last 3 days

3. BOWEL CONTINENCE

- 0. **Continent-** Complete control; DOES NOT USE any type of ostomy device
- 1. **Control with ostomy-** Control with ostomy device over last 3 days
- 2. **Infrequently incontinent** – Not incontinent over last 3 days, but does have incontinent episodes
- 3. **Occasionally incontinent-** Less than daily
- 4. **Frequently incontinent-** Daily, but some control present
- 5. **Incontinent-** No control present
- 8. **Did not occur-** No bowel movement in last 3 days

SECTION J. Health Conditions

3. PROBLEM FREQUENCY

	Not present	Present but not exhibited in last 3 days	Exhibited on 1 of last 3 days	Exhibited on 2 of last 3 days	Exhibited daily in last 3 days
l. Constipation					
m. Diarrhea					
n. Vomiting					
q. Aspiration					
r. Fever					
u. Peripheral edema					

4. DYSPNEA (Shortness of breath)

- 0. Absence of symptom
- 1. Absent at rest, but present when performed moderate activities
- 2. Absent at rest, but present when performed normal day-to-day activities
- 3. Present at rest

ID: _____ Site ID _____
 Date: _____ Assessor: _____

5. FATIGUE *Inability to complete normal daily activities- e.g., ADLs, IADLs*

- 0. None
- 1. **Minimal-** Diminished energy but completes normal day-to-day activities
- 2. **Moderate-** Due to diminished energy, UNABLE TO FINISH normal day-to-day activities
- 3. **Severe-** Due to diminished energy, UNABLE TO START SOME normal day-to-day activities
- 4. **Unable to commence any normal day-to-day activities-** Due to diminished energy

6. PAIN SYMPTOMS *Always ask the person about pain frequency, intensity, and control. Observe person and ask others who are in contact with the person.*

a. Frequency with which person complains or shows evidence of pain (including grimacing, teeth clenching, moaning, withdrawal when touched, or other nonverbal signs suggesting pain)

- 0. No pain
- 1. Present but not exhibited in last 3 days
- 2. Exhibited on 1-2 of last 3 days
- 3. Exhibited daily in last 3 days

b. Intensity of highest level of pain present

- 0. No pain
- 1. Mild
- 2. Moderate
- 3. Severe
- 4. Times when pain is horrible or excruciating

c. Consistency of pain

- 0. No pain
- 1. Single episode during last 3 days
- 2. Intermittent
- 3. Constant

7. INSTABILITY OF CONDITIONS

	No	Yes
a. Conditions / diseases make cognitive, ADL, mood, or behaviour patterns unstable (fluctuating, precarious, or deteriorating)		
b. Experiencing an acute episode, or a flare-up of a recurrent or chronic problem		
c. End-stage disease, 6 or fewer months to live		

SECTION K. Oral and Nutritional Status

2. NUTRITIONAL ISSUES

	No	Yes
a. Weight loss of 5% or more in last 30 days, or 10% or more in LAST 180 DAYS		
b. Dehydrated, or BUN/Cre ratio > 20 (Ratio, country specific)		
c. Fluid intake less than 1,000 ml per day (less than four 8 oz cups/day)		
d. Fluid output exceeds input		
e. Decrease in amount of food or fluid usually consumed		
f. Ate one or fewer meals on AT LEAST 2 OF LAST 3 DAYS		

ID: _____ Site ID _____
Date: _____ Assessor: _____

5. DENTAL OR ORAL

	No	Yes
a. Wears a denture (removable prosthesis)		
b. Has broken, fragmented, loose, or otherwise nonintact natural teeth		
c. Reports mouth or facial pain / discomfort		
d. Reports having dry mouth		
e. Reports difficulty chewing		
f. Presents with gum (soft tissue) inflammation or bleeding adjacent to natural teeth or tooth fragments		

SECTION L. Skin Condition

1. MOST SEVERE PRESSURE ULCER

0. No pressure ulcer
1. Any area of persistent skin redness
2. Partial loss of skin layers
3. Deep craters in the skin
4. Breaks in skin exposing muscle or bone
5. Not codeable, e.g., necrotic eschar predominant

SECTION M. Activity Pursuit

3. TIME ASLEEP DURING DAY

0. Awake all or most of the time (no more than one nap in the morning or afternoon)
1. Had multiple naps
2. Asleep most of the time, but some periods awake and alert (e.g., at meals)
3. Largely asleep or unresponsive

Appendix J: Adapted Screening Tool for Acute Neuro Dysphagia (STAND) Form

Adapted STAND Data Collection Form

1. *PUREES: Offer a teaspoonful of applesauce or pudding*

___ (0) No difficulty noted.

___ (1) Difficulty noted. Specify Problem(s) and **PROCEED TO STEP #4.:** _____

- a. Coughing/throat clearing
- b. Wet/gurgling Voice
- c. Holding food in mouth
- d. Pocketing of Food in Cheek
- e. Loss of Food From Mouth
- f. Delayed/difficult/painful swallow
- g. Shortness of breath
- h. Multiple swallows to clear bolus
- i. Severe coughing and/or change in breathing.

2. *PUREES: Offer a teaspoonful of applesauce or pudding*

___ (0) No difficulty noted.

___ (1) Difficulty noted. Specify Problem(s) and **PROCEED TO STEP #4.:** _____

- a. Coughing/throat clearing
- b. Wet/gurgling Voice
- c. Holding food in mouth
- d. Pocketing of Food in Cheek
- e. Loss of Food From Mouth
- f. Delayed/difficult/painful swallow
- g. Shortness of breath
- h. Multiple swallows to clear bolus
- i. Severe coughing and/or change in breathing.

3. *PUREES: Offer a teaspoonful of applesauce or pudding*

___ (0) No difficulty noted.

___ (1) Difficulty noted. Specify Problem(s) and **PROCEED TO STEP #4.:** _____

- a. Coughing/throat clearing
- b. Wet/gurgling Voice
- c. Holding food in mouth
- d. Pocketing of Food in Cheek
- e. Loss of Food From Mouth
- f. Delayed/difficult/painful swallow
- g. Shortness of breath
- h. Multiple swallows to clear bolus
- i. Severe coughing and/or change in breathing.

ID ____ Site ID ____

Date _____ Researcher _____

4. *DRY SWALLOW*

___ (0) No difficulty noted.

___ (1) Coughing, voice gurgly and/or respiration has changed. **TERMINATE TEST.**

5. *DRY SWALLOW*

___ (0) No difficulty noted.

___ (1) Coughing, voice gurgly and/or respiration has changed. **TERMINATE TEST.**

6. *WATER- Offer 3oz. drinking from a cup*

___ (99) Not Done/not completely done. Specify Problem(s): ____

- a. Coughing/throat clearing
- b. Wet/gurgling Voice
- c. Holding food in mouth
- d. Pocketing of Food in Cheek
- e. Loss of Food From Mouth
- f. Delayed/difficult/painful swallow
- g. Shortness of breath
- h. Multiple swallows to clear bolus
- i. Other: _____

___ (0) No difficulty noted. **COMPLETE DOCUMENTATION**

___ (1) Difficulty noted. Specify Problem(s): ____

- j. Coughing/throat clearing
- k. Wet/gurgling Voice
- l. Holding food in mouth
- m. Pocketing of Food in Cheek
- n. Loss of Food From Mouth
- o. Delayed/difficult/painful swallow
- p. Shortness of breath
- q. Multiple swallows to clear bolus

7. *If the participant is cognitively aware ask the following:*

- | | | |
|--|-------|-------|
| a) do you think you have a swallowing problem? | Yes=1 | No =0 |
| b) do you cough while drinking? | Yes=1 | No=0 |
| c) do you choke while drinking? | Yes=1 | No=0 |

ID _____ Site ID _____

Date _____ Researcher _____

d) do you cough while eating?	Yes=1	No=0
e) do you choke while eating?	Yes=1	No=0

8. *Is a swallowing evaluation required?*

Yes if any difficulties were noted in steps 1 through 6 OR if two of the above questions (7B TO 7E) are answered with a "yes" (excluding question 7A)

No if there no difficulties were noted throughout the test.

Yes= 1 No=0

Comments:

Appendix K: Modified PG-SGA Form

Participant ID _____ Site ID _____

Date _____ RA _____

PG-SGA (modified for LTC)

A) Weight

Current weight _____ Date weight taken: _____

Weight loss

Weight in previous month: _____ Amount Lost _____
(add a point if weight loss in past two weeks)

≥ 10%	_____	(4)
5.0 – 9.9%	_____	(3)
3.0 – 4.9%	_____	(2)
2.0 – 2.9%	_____	(1)
0.0 – 1.9%	_____	(0)

Weight 6 months ago: _____ Amount Lost _____
(only if 1 month not available)

≥ 20%	_____	(4)
10 – 19.9%	_____	(3)
6.0 – 9.9%	_____	(2)
2.0 – 5.9%	_____	(1)
0.0 – 1.9%	_____	(0)

Only score highest value for EITHER weight lost in past month OR past 6 months

B) Active Diagnoses (each worth 1 point; additive)

Cancer _____ Pulmonary or cardiac cachexia _____ Wound/fistula _____

Trauma _____ Age greater than 65 years _____ AIDS _____

C) Physical Exam

	No deficit (0)	Mild (1)	Moderate (2)	Severe (3)
Orbital fat pads				
Triceps skin fold				
Fat overlying ribs				
Temples				
Clavicles				
Shoulders				
Interosseous muscles				
Scapula				
Thigh				
Calf				
Ankle edema				
Sacral edema				
Ascites				

Participant ID _____ Site ID _____
 Date _____ RA _____

D) Food Intake

Source: Chart _____ Staff/Family _____ Observation _____ Older Adult _____

- | | |
|--|---|
| <input type="checkbox"/> Unchanged (0) | <input type="checkbox"/> Only liquids (3) |
| <input type="checkbox"/> More than Usual (0) | <input type="checkbox"/> Only nutritional supplements (3) |
| <input type="checkbox"/> Normal food less than usual (1) | <input type="checkbox"/> Very little of anything (4) |
| <input type="checkbox"/> Little solid food (2) | <input type="checkbox"/> Enteral /parenteral (0) |

E) Challenges & Symptoms (additive score)

Source: Chart _____ Staff/Family _____ Observation _____ Older Adult _____

- | | |
|---|--|
| <input type="checkbox"/> No problems eating (0) | <input type="checkbox"/> No appetite (3) |
| <input type="checkbox"/> Nausea (1) | <input type="checkbox"/> Vomiting (3) |
| <input type="checkbox"/> Constipation (1) | <input type="checkbox"/> Diarrhea (3) |
| <input type="checkbox"/> Mouth sores (2) | <input type="checkbox"/> Dry mouth (1) |
| <input type="checkbox"/> Taste changes/no taste (1) | <input type="checkbox"/> Slow to eat (1) |
| <input type="checkbox"/> Problems swallowing (2) | <input type="checkbox"/> Feels full quickly (1) |
| <input type="checkbox"/> Pain (3) | <input type="checkbox"/> Refuses to eat (3) |
| <input type="checkbox"/> Current infection (3) | <input type="checkbox"/> Other (depression, dental problems) (1) |

F) Activities/Function Over PAST Month

Source: Chart _____ Staff/Family _____ Observation _____ Older Adult _____

- Normal (0)
- Not normal but able to be up and about, fairly normal activity (1)
- Not feeling up to most things, but in bed/chair less than half of day (2)
- Able to do little activity and spend most of the day in bed or chair (3)
- Bedridden, rarely out of bed (3)

Total Score

Circle Appropriate Category

No weight loss; no decrease in food intake; no symptoms affecting food intake; no deficit in function; no deficit in fat or muscle mass; no edema (or improved for any of these categories) Well nourished	A
5% wt loss in 1 month or 10% in 6 mo; decreased intake; symptoms impact intake; moderate functional deficit; mild/moderate loss of fat and/or muscle Moderate malnutrition	B
> 5% wt loss in 1 month or > 10% in 6 mo; severe deficit in food intake; symptoms affect food intake; severe functional deficit; obvious signs of fat, muscle loss, edema Severe malnutrition	C

Participant ID _____ Site ID _____
Date _____ RA _____

BODY MEASURES:

KNEE HEIGHT

Knee Height: _____ cm

Estimated Height (from knee measurement): _____ m

Knee Height BMI: _____

ULNA LENGTH:

Ulna length: _____ cm

Estimated Height (from ulna measurement): _____ m

Ulna BMI: _____

CALF CIRCUMFERENCE:

Calf Circumference: _____ cm

Any Calf Edema: YES = 1 NO = 0