The Association of Eating Assistance with Energy Intake of Long Term Care

Residents with Cognitive Impairment:

The Making the Most of Mealtimes Study (M3)

by

Kelsey Mann

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

In partial fulfilment of the requirements of the degree of

MASTER OF SCIENCE

Department of Food and Human Nutritional Sciences

University of Manitoba

Winnipeg

Abstract

Introduction: Long term care (LTC) residents with cognitive impairment (CI) are at an increased risk of becoming malnourished due to eating challenges and eating assistance factors. **Objective**: To examine resident and eating assistance factors associated with energy intake of LTC residents with CI. **Methods:** Secondary data from the Making the Most of Mealtimes study utilized the Relational Behavioural Scale, Minimum Data Set, Screening Tool for Acute Neuro Dysphagia, Patient Generated - Subjective Global Assessment, Mini Nutritional Assessment-Short Form and score ≥ 3 from the Cognitive Performance Scale. Descriptive statistics, backwards stepwise regressions, bivariate analyses and linear regressions were completed. **Results:** Higher energy intake was associated with being male, younger age, dysphagia risk, more vitamins consumed, less eating challenges, greater severity of CI and frequently receiving eating assistance. **Conclusion:** Interventions to support eating independence and address eating challenges are needed to improve food intake for persons with CI in LTC.

Acknowledgments

I am extremely fortunate to have had the support from so many people, in so many ways. Without this support, this thesis would not have been possible.

To my supervisor Dr. Christina Lengyel, thank for your constant support and guidance. If it were not for you, I would not be where I am today. Thank you for seeing something in me and encouraging me to pursue this Master's degree.

To my advisory committee, Dr. Carla Taylor, Dr. Susan Slaughter and Dr. Corey Mackenzie, thank you for sharing your valuable time and expertise throughout my project.

I would also like to thank Dr. Robert Tate for the support, guidance and wisdom he provided throughout my project.

To my family and friends, thank you for supporting me throughout my years of university. Especially my mom, you have been an inspiration throughout my life and I am deeply indebted to you. Without your guidance, support, and good nature I would not have been able to pursue a Master's degree. Thank you for always supporting my dreams and aspirations.

To my partner Tyler, thank you for your continuous encouragement and constant support during my Master's program.

Dedication

This thesis is dedicated to my grandma, Lilja Mann, whom passed away in the last year of my Master's program. Your contributions to my life will be felt forever. Thank you for all the laughs, love and support. You are greatly missed.

Table of Contents

List of Tables

List of Appendices

List of Abbreviations

ADL	Activities of Daily Living
BMI	Body Mass Index
CIHR	Canadian Institute of Health Research
CPS	Cognitive Performance Scale
DRI	Dietary Reference Intake
DEAP	Dining Environment Assessment Protocol
Ed-FED	Edinburgh Feeding Evaluation in Dementia
kcal	kilocalories
kcal/kg	kilocalories per kilogram of bodyweight
LTC	Long Term Care
M3	Making the Most of Mealtimes Study
MDS	Minimum Data Set
MNA-SF	Mini Nutritional Assessment Short Form
MO	Mealtime Observation
M-RCC	Mealtime Relational Care Checklist
MTS	Mealtime Scan
OHE	Oral Health Exam
ONS	Oral Nutritional Supplements
PCC	Person-Centered Care
PEM	Protein Energy Malnutrition
PG-SGA	Patient Generated - Subjective Global Assessment
RBS	Relational Behavioural Scale
RD	Registered Dietitian
SPSS	Statistical Package for Social Sciences
STAND	Screening Tool for Acute Neuro Dysphagia

CHAPTER 1

INTRODUCTION

Overview

Poor food and fluid intake is the main cause of malnutrition in long term care (LTC) homes (Keller, Beck, & Namasivayam, 2015). Malnutrition places older adults at risk for infections, delayed wound healing, pressure sores, functional limitations, morbidity, and mortality (Lou, Dai, Huang, & Yu, 2007). Currently, more than half of older adults residing in LTC homes experience malnutrition (Keller et al., 2014). Individuals with cognitive impairment residing in LTC are at an increased risk of becoming malnourished (Bell, Tamura, Masaki & Amella, 2013). Cognitive impairment in older adults has a variety of possible causes including medication side effects, delirium due to certain illnesses, depression, and dementia with Alzheimer's being the most common (National Institute on Aging, 2014). Dementia is a progressive disease that may affect cognitive, behavioural and functional decline leading to increased dependence at mealtimes such as: inability to initiate or maintain attention to the eating task and/or get food into the mouth, lack of appetite, confusion about the need to eat, consumption of inappropriate substances or amounts of food, recognizing food and utensils, and swallowing and chewing difficulties (Liu & Thomas, 2014; Lin, Watson, & Wu, 2010).

Individuals with cognitive impairment often require eating assistance in order to meet nutritional needs. The level of assistance that is needed during mealtimes may include setting-up the meal, opening packages, encouragement, partial assistance, and/or full eating assistance for resident with eating difficulties (Keller et al., 2014). When assisting a person with cognitive impairment, it is fundamental to match the level of assistance to the needs and capabilities of the resident in a dignified manner (Sloane, Ivey, Helton, Barrick, & Cerna 2008; Reimer & Keller,

2009). If adequate amounts of monitoring and assistance are provided, it may positively improve nutritional intake and overall quality of life among LTC residents with cognitive impairment (Lin et al, 2010; Reed, Zimmerman, Sloane, Williams, & Boustani 2005).

To date, the majority of the research conducted in LTC in Canada and worldwide has focused on food intake without thoroughly considering potential reasons for poor food and fluid intake. The Making the Most of Mealtimes (M3) research study is a national Canadian study examining key modifiable determinants of food and fluid intake in three categories: 1) Meal Quality (e.g., nutritious, appealing food; 2) Meal Experience (e.g., eating environment); and Meal Access (e.g., dentition, swallowing, eating ability). Determining which of these factors are most important is the purpose of M3 (Keller, 2014). In 2015, data were collected on 639 residents residing in 32 LTC homes in four Canadian provinces (Alberta, Manitoba, Ontario and New Brunswick). The M3 study is the first comprehensive, multi-disciplinary approach to examine determinants of food and fluid intake of older adults living in LTC homes. For this research proposal, data previously collected from the Making the Most of Mealtimes Study (M3) will be analysed.

Research Objectives

1) To identify resident level factors associated with energy intake of LTC resident with cognitive impairment

2) To examine eating assistance factors associated with energy intake of LTC residents with cognitive impairment

Research Questions

This research study seeks to answer the following questions:

1)   What is the average energy (kilocalories per kilogram of bodyweight) in LTC residents with cognitive impairment? What proportion of LTC residents with cognitive impairment do not meet the accepted energy intake of 30 kilocalories per kilogram of bodyweight?

2)   What factors at the resident level are independently associated with energy intake (kilocalories) in LTC residents with cognitive impairment?

3)   What eating assistance factors are associated with energy intake (kilocalories) in LTC residents with cognitive impairment?

Significance of Research

As cognitively impaired residents represent over two-thirds of Canada's LTC population, this research could not come at a more opportune time. Improving the problems with food and fluid intake in LTC may help to decrease the high costs of caring for frail and cognitively impaired older adults in Canada and throughout the world. There is an extensive amount of research showing that poor nutritional status among residents with cognitive impairment may be able to be prevented or significantly reduced. The results of this research project will contribute to the literature by providing a comprehensive understanding about the association of eating assistance factors and energy intake among individuals with cognitive impairment in LTC facilities.

Chapter Summary

For the current research study, data previously collected from the Making the Most of Mealtimes Study (M3) was analysed. This thesis is structured as a paper-based manuscript and includes the following:

Chapter 2 presents a critical review of the literature describing demographics of older adults with cognitive impairment residing in LTC, nutritional issues associated with this population, current interventions and implications for health care.

Chapter 3 presents on overview of the M3 study and the specific methods used for the current research study.

Chapter 4 presents the manuscript titled "The Association of Eating Assistance with Energy Intake of Long Term Care Residents with Cognitive Impairment: The Making the Most of Mealtimes Study (M3)".

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

CHAPTER 2

LITERATURE REVIEW

Demographics of Older Adults

The population continues to age worldwide where the number of older people (especially the oldest old) has increased rapidly (World Health Organization, 2015). In 2016, 16.5% of Canadian population were older adults (aged 65 and older) (Statistics Canada, 2016a). It is projected that 20% of Canadian will be aged over 65 by 2024 (Statistics Canada, 2016a). Of the aging population, women are overrepresented accounting for 54.7% of those aged 65 and over. This is due to the fact that women have a higher life expectancy and tend to live longer than men (Statistics Canada, 2016b). The acceleration of the aging population is due to the influx of baby boomers (individuals born between 1946 and 1965), low fertility rates and increased life expectancy (Statistics Canada, 2016b). As people age, they are more likely to live in places such as LTC facilities. Among those living in LTC, almost half are over the age of 85, 78% are female and 45% have a dementia diagnosis (Canadian Institute for Health Information, 2011; Statistics Canada, 2016b). People who live in LTC facilities usually require extensive assistance with activities of daily living (ADLs), which include eating, bathing, dressing, toileting, transferring and continence.

Older Adults with Cognitive Impairment

Cognitive impairment ranges from mild to more severe impairment. Cognitive impairment in older adults has a variety of possible causes including medication side effects, delirium due to certain illnesses, depression, and dementia with Alzheimer's being the most common (National Institute on Aging, 2014). Dementia refers to a large class of disorders caused by variety diseases that result in deficits in memory, thinking ability and other cognitive

domains (Hanson, Ersek, Lin & Carey 2013; Alzheimer Society, 2010). Dementia has profound effects on health and quality of life (Hanson et al., 2013). There are several forms of dementia; Alzheimer's disease is the most common and contributes to 60-70% of the cases (World Health Organization, 2012). The World Health Organization has recognized dementia as a public health priority. Unfortunately, there is a lack of awareness and understanding of dementia in many countries which has resulted in stigmatization and barriers to care (World Health Organization, 2012). In 2016, 564,000 Canadians were living with dementia and it is estimated that by 2031, this number will increase by 66% to approximately 1 million (Alzheimer Society, 2017a). The incidence of dementia tends to be higher in women than in men and the increases with advanced age (approximately 20-30% by age 85) (World Health Organization, 2012; Galesi, Leandro-Merhi & de Oliveria, 2013). This is primarily due to the fact women live longer than men. In addition, women's hormonal changes at menopause are also believed to contribute to an increased risk of dementia (Public Health Agency of Canada, 2010). The prevalence of dementia tends to increase with age (World Health Organization, 2012) and the incidence of dementia doubles every additional 5 years of life (Galesi et al., 2013). Although dementia affects so many, it is imperative to understand that it is not a normal part of aging (World Health Organization, 2012). Almost 40% of people aged over 65 do experience some form of memory loss which is known as "age associated memory impairment". However, brain diseases such as Alzheimer's disease and other dementias are different (Alzheimer Society, 2015).

Prevalence of Malnutrition and Nutritional Issues in LTC

The issue of malnutrition in LTC homes is not a new one. Malnutrition among older adults is more prevalent in LTC as compared to those who live in the community (Public Health Agency of Canada, 2010). Those living in a LTC environment are more likely to have

deterioration of their health and functional abilities, and are more chronically ill (Public Health Agency of Canada, 2010; American Dietetic Association, 2005). The prevalence of malnutrition in LTC facilities varies from 3%-83% (Chang & Roberts, 2011; Lengyel, Whiting, & Zello, 2008; Reed et al., 2005; Woo, Chi, Hui, Chan & Sham, 2005; Sitter & Lengyel, 2011; Reimer & Keller, 2009, Lou et al., 2007; Keller et al., 2017a). A recent study found that 44% residents were malnourished (Keller et al., 2017a). This high variation may be partially due to the fact that there is currently no universal definition or way of measuring malnutrition. Although there are multiple definitions for malnutrition they all touch on factors such as insufficient dietary intake of essential nutrients and protein energy malnutrition (PEM) (Verbrugge et al., 2013). PEM can be both a primary and secondary problem (Verbrugge et al., 2013). Malnutrition in LTC is commonly seen as undernutrition, as residents do not consume adequate amounts of energy and nutrients (Meijers, Schols, & Halfens, 2014; Bostrom, Van Soest, Kolewaski, Milke & Estrabrooks, 2011). Among older adults, "malnutrition can be classified into wasting (involuntary weight loss), sarcopenia (loss of muscle mass and strength) and cachexia (involuntary loss of fat free mass)" (Meijers et al., p.596., 2014).

Malnutrition in older adults can have serious negative consequences as well as a variety of deleterious effects (Meijers et al., 2014; Bostrom, 2011). Some examples of these negative effects include: promoting the decline of immune and sensory functions, worsens symptoms of chronic diseases (such as cardiovascular disease and diabetes), impairs wound healing, impairs immune response, increases rates of infection, increases the risk of fracture and falls (Reimer & Keller, 2009), increases the development of pressure sores, and increases risk of mortality (Public Health Agency of Canada, 2010; Keller, 1993; Reed et al., 2005, Suominen et al., 2005; Meijers et al., 2014; Bostrom, 2011). Those who are malnourished are more often found to be

female, older in age and have more comorbidities (Meijers et al., 2014; Chang & Roberts, 2011; Galesi et al., 2013). Other characteristics that contribute to malnutrition in older adults include cognitive status, higher depressive symptoms/lower psychological well-being, ability to eat independently, swallowing difficulties (dysphagia), poor dentition, and medication effects (Reed et al., 2005; Reimer & Keller, 2009; Chang & Roberts, 2011; Muurien, Savikko, Soini, Suominen & Pitkala., 2015). Loss of muscle mass and frailty can cause fatigue that inhibits the ability to consume food and produce an effective swallow (Amella, 2002). Dysphagia is a particularly salient contributor to malnutrition in LTC because people will start to eat less and experience weight loss as their swallowing abilities decline. Many start to feel bothered by their swallowing issues and find eating unenjoyable (Cartwright, 2013). To accommodate dysphagia residents will likely need a modified diet. Modified textured foods such as a puree diet have been shown to have poor sensory appeal and low nutrient density (Keller et al., 2014). Therefore, ensuring adequate food intake with this type of diet remains a challenge

Nutritional Inadequacies in LTC

As people age their energy needs decline, but the need for nutrients remains the same or even greater than younger people (Suominen et al., 2004). Residents in LTC have been found to consume inadequate amounts of food to meet their individual energy and nutrient needs (Morley & Silver, 1995). Inadequate intake of micro and macronutrients are common in LTC and can greatly impact older adult's functional ability as well as their ability to thrive (Marshall, Stumbo, Warren & Xie, 2001). Based Dietary Reference Intakes (DRI) women and men with a sedentary lifestyle over the age 71 years should consume approximately 1550 and 2000 kcal respectively (Keller, 2013; Government of Canada, 2011). A study conducted in Winnipeg, Manitoba by Sitter & Lengyel (2011) showed that approximately half of the participants were consuming less

than the recommended servings for all food groups from Canada's Food Guide. Additionally, residents were not consuming dark orange or dark green vegetables daily. This was associated with insufficient vitamin D levels despite supplementation (Sitter & Lengyel, 2011). Lengyel et al. (2008) found that 32-100% of residents had inadequate levels of folate, magnesium, zinc, vitamin E, vitamin B6 and vitamin C. Keller et al. (2015) suggests that approximately 50% of food offered in LTC is not being consumed, therefore poor intake in LTC may be able to be prevented and treated.

Body Mass Index (BMI) is widely used to assess nutritional status in individuals. A BMI of $18.5 - 24.9$ kg/m^2 is generally accepted as the optimal range, however, this current method does not distinguish between younger and older adults (Bahat et al., 2012; Beck & Ovesen, 1998). Previous research has suggested that having a BMI in the overweight category (>25 kg/m^2) may be more protective against mortality (Johnson & Bales, 2014). BMI screens for undernutrition, but does not identify unintentional weight loss in older adults. It has been suggested that the key to effective nutritional screening is not only to identify undernutrition but to anticipate nutritional depletion and ultimately try to prevent it from happening (Beck & Ovesen, 1998).

Medications

On average, older adults in LTC take an average of seven to eight medications per day (American Dietetic Association, 2005; Keller et al., 2017a). Taking multiple medications can have profound effects on nutritional intake as it may induce poor eating and increase weight loss (American Dietetic Association, 2005). Many medications that are prescribed to older adults cause a decrease in appetite, anorexia, somnolence, nausea, confusion, cramping, diarrhea, and a change in taste receptors (Sloane et al., 2008; American Dietetic Association, 2005).

Psychoactive drugs can have sedative effects which interfere with eating processes (Chang & Roberts, 2011). Drugs can change the amount and way nutrients are absorbed, used or excreted by the body, which can highly impact the nutritional status of residents in LTC (Alzheimer's Association, 2001). Therefore, consuming multiple medications may increase the risk of an older adult becoming malnourished or may worsen malnutrition symptoms.

Oral Health

Poor oral heath status in older adults in LTC can greatly impact their nutritional status by limiting food choices and energy intake (Sloane et al., 2008). Many residents in LTC are unable to practice oral hygiene because of physical and/or cognitive challenges (Ziebolz et al., 2017). Oral health in LTC residents is rarely examined and approximately 50% of older adults living in LTC have untreated dental cavities (Keller et al., 2014). Dry mouth is common among older adults and can alter the intake of calories, protein, fat, carbohydrates, calcium, folate, fiber, vitamin D and antioxidants (American Dietetic Association, 2005; Sloane, 2008). Other oral health issues that affect intake are decayed or missing teeth, periodontal disease, and missing, inadequate or improper fitting dentures (Sloane et al., 2008). Lack of teeth or improper fit of dentures can reduce chewing ability, limit food selection as well as affect the ability to perceive food flavor, cause pain and distress impacting food and fluid intake (American Dietetic Association, 2005; Keller et al., 2014). Assessments of oral health status and providing oral care may be difficult to perform in LTC residents with cognitive impairment as they may be unable to communicate oral issues and/or may resist assistance with oral care (Ziebolz et al., 2017). There are several behavioural changes that may indicate that the resident has oral health issues, which include: refusal to eat (particularly hard or cold foods), frequently pulling at the face or mouth, leaving previously worn dentures out of their mouth, increased restlessness, moaning or

shouting, disturbed sleep, refusal to take part in daily activities and aggressive behaviour (Alzheimer Society, 2017). Therefore, cognitive impairment influences oral conditions and may increase the need for periodontal treatment (Ziebolz et al., 2017).

Sensory Changes

In addition to poor oral health, sensory loss can also affect nutritional intake. In older adults, vision, taste and smell can be affected, especially in those with cognitive impairment (Keller et al., 2014). When olfactory and taste perception is lost, flavor of foods may be altered which may affect older adults sense of appetite (American Dietetic Association, 2005). When a person is visually impaired it weakens their ability to see or recognize food and can eliminate visual appeal of food. Visual or sensory losses can also affect the ability of a person to recognize the pleasures of eating (Amella, 2002). Residents with higher severity of cognitive impairment often have deficient contrast sensitivity and may have trouble distinguishing between certain foods, the plate and the physical environment around them (i.e., tablecloth) (Dunne & Dahl 2007).

Factors Associated with Malnutrition and Eating Performance in LTC

Cognitive Impairment

Cognitive impairment is common among residents residing in LTC facilities (Liu, Galik, Boltz, Nahm, & Resenick, 2015). The number of older adults living with dementia has increased as they now make up more than two-thirds of the LTC population (Liu et al., 2014; Carrier, West, & Ouellet, 2007). Dementia may cause a person to act in different or unpredictable ways (Alzheimer's Association, 2001). When a person is malnourished the progression of cognitive decline can be greatly affected (Malara et al., 2014). Residents in early to mid-stages of dementia commonly acquire taste and smell dysfunctions and are often prescribed medications such as

depressants that trigger anorexia and weight loss (Hanson et al., 2013). Prolonged irreversible eating problems are uncommon at early to mid-stages of dementia (Hanson et al., 2013). However, eating difficulties such as the inability to effectively plan and carry out a motor act have been found in individuals with minimal cognitive deficits in the early stages of dementia (Slaughter & Hayduk., 2012). As the cognitive impairment progresses to more moderate or advanced stages, the person will likely experience behavioural problems such was wandering, uncooperative behaviour, restlessness, aggression, hallucinations, sleep disorders, incontinence and screaming (Garcia et al., 2012; Suominen et al., 2005).

In a study by Slaughter & Hayduk (2012), it was found that the risk of eating disabilities was 2.6 times greater for residents with more advanced dementia. Those with moderate to advanced dementia lose the ability to recognize food, may not be responsive to the sense of hunger or forget to eat or drink as well as forget they have already eaten (Alzheimer's Association, 2001; Shatenstein & Ferland, 2000). Eating may become problematic as they may encounter issues such as trouble closing their mouth, prolonged and poorly coordinated swallowing, choking or food avoidance due to dysphagia, spillage of food from mouth, pooling food in mouth, and refusal to eat (Chang & Roberts, 2011; Hanson et al.,2013). In addition, a weakened and uncoordinated movement of the tongue affects chewing abilities (Galesi et al., 2013). The study by Namasivayam, Steele & Keller (2015) showed that "reduced tongue strength was associated with longer meal times, reduced food intake, and the presence of observable choking and coughing at the meal" (p. 1083). The moderate to advanced stages of dementia typically cause apraxia or visuospatial dysfunction, which is the inability to execute complex coordinated movements such as specific hand and leg movements (Hanson et al., 2013; Alzheimer Society, 2015; Slaughter et al., 2012). Eating difficulties are inevitable among

residents with dementia and typically progress as the disease advances (Liu et al., 2014). In addition, eating problems in advanced dementia are universal (Hanson et al., 2013; Lin et al., 2010).

Malnourished residents with dementia are found to have greater functional impairments in ADLs (Malara et al., 2014). The ability to feed oneself is the first ADL that an individual can perform, and it is the last ADL that is lost (Amella, 1999; Liu et al., 2016, Aselage, 2010). Individuals in early to mid-stage dementia may require more energy for their daily activities and behavioural issues (Galesi et al., 2013) therefore, nutritional supplementation may be required. It has been suggested that weight loss may be a beneficial way to assess the relationship between dementia and nutritional status as it relates to energy expenditure (Galesi et al., 2013). Additionally, weight loss may indicate that the resident needs more encouragement or eating assistance at meals (Hanson et al., 2013).

Diet

A therapeutic diet is a diet that is ordered by a physician to help treat a disease or condition in which certain substances are increased or decreased in the diet (American Dietetic Association, 2005). Carrier et al. (2007) found a special diet such as a therapeutic diet reduced the risk of becoming malnourished compared with regular/standard diet. In contrast, others have observed unintended weight loss with therapeutic diets because of the restriction of unfamiliar foods or elimination of seasonings, which may make the diet unpalatable (Sloane et al., 2008; American Dietetic Association, 2005). The American Dietetic Association (2005) suggests that limiting familiar foods may be counterproductive when trying to maintain weight and minimize weight loss, especially in individuals with dementia. Dementia residents thrive when they are in

a familiar routine and when they are surrounded by familiar objects; therefore, providing familiar meals and foods is essential.

Environmental

Focusing on pleasurable eating (Sloane et al., 2008) and the physical environment at mealtimes rather than just the food itself, may help improve food intake. When a person has dementia, a quiet environment, a regular routine, a calm and soothing voice, and a flexible caregiver/staff member are essential (Alzheimer's Association, 2001). Absence of environmental distractions (noise), non-institutional features (tablecloths) and social interactions all contribute to increased energy intakes in older adults (Reed et al., 2005). Noisy and chaotic dining rooms from televisions, radio, clattering plates, med carts, and conversations (shouting) between residents as well as caregivers, can be a distraction to LTC residents during mealtimes (Sloane et al., 2008). Creating a homelike environment may help prevent overstimulation that often occurs in large communal dining halls (Reimer & Keller, 2009). Even the smallest changes in the layout of the room, décor and style of meal service can make a huge difference (Reimer & Keller, 2009). Playing familiar music during mealtimes has been found to decrease agitation and increase food intake in residents with cognitive impairment (Vucea, Keller, & Ducak, 2014; Thomas & Smith, 2009).

When eating in a LTC dining room environment compared to a bedroom setting, the resident is more likely to have adequate food and fluid consumption (Reed et al., 2005; Sloane et al., 2008). When residents eat in their rooms, they are often served last and their meal may become cold by the time they are served (Sloane et al., 2008). Additionally, they may not be positioned properly, putting them at risk for aspiration. Furthermore, health care aides are often

not present to provide assistance if and when it is needed in the event of choking, or if assistance needed with eating (Sloane et al., 2008).

Positive social interactions and honoring residents' needs such as food preferences may improve quality of life (Keller et al., 2014). Therefore, the types of food service delivery methods used in each LTC facility may influence food and fluid intake. Tray delivery systems may represent more of an institutionalized setting and therefore have a negative impact on the amount of food consumed and increase the risk of malnutrition (Carrier et al., 2007, Keller et al., 2014). Additionally, the dishes, lids, and food packages that are served on trays are often hard to manipulate for residents (Carrier et al., 2007).

Decentralized foodservice systems also known as bulk food portioning delivery systems are proven to be more effective than a centralized system, as it increases food consumption in residents with dementia (Shatenstein & Ferland, 2000). When food is plated on the unit, it allows the opportunity for the resident to see and smell the food, interact with staff as well as choose the meal from a small section of choices (Keller et al., 2014). However, bulk food portioning may create distractions and more noise during mealtimes (Keller et al., 2014). More research is needed to look at food service factors and whether or not they are helping or hindering LTC residents' quality of life. Making changes to the way the food is served and presented may help decrease unintentional weight loss and increase caloric intake in LTC facilities (Grieger & Nowson, 2007; Vucea et al., 2014).

Staffing Levels and Eating Assistance

Person-centered care (PCC) is extremely important in LTC, especially during mealtimes as varied levels of assistance are needed. PCC is an approach that aims to see the person as an individual rather than focusing on their illness or abilities that they may have lost (Alzheimer

Society, 2015). PCC considers the whole person, while considering each individual's unique qualities, abilities, interests, preferences and needs (Alzheimer Society, 2015). There are four themes related to person-centered mealtime care principles that have emerged within the literature. They are: 1) Providing choices and preferences; 2) Showing respect; 3) Supporting independence; and 4) Promoting social interaction (Reimer & Keller, 2009). Mealtimes should meet the resident's biological, social, psychological, moral and spiritual needs (Reimer & Keller, 2009). Residents look forward to mealtimes; it is often the highlight of their day and it provides an opportunity for social interaction and relationships between other residents as well as their caregivers (Keller et al., 2014).

Poor food intake and weight loss in residents with cognitive impairment may not necessarily be due to the inability to eat independently, but more so due to factors related to eating assistance (Chang & Roberts, 2011). Factors such as failure to help residents eat independently, no eating assistance, social isolation during mealtimes, and inadequate staff training/education, all contribute to the high rates of malnutrition in residents in LTC (Bostrom et al., 2011; Chang & Roberts, 2011; Simmons, Osterweil, & Schnelle, 2001; Lou et al., 2007). When adequate amounts of monitoring and assistance are provided, it positively improves nutritional intake and quality of life among LTC residents (Lin et al, 2010; Reed et al., 2005). This is especially true when one-on-one assistance is provided during mealtimes (Lin et al., 2010; Liu et al., 2015).

Staffing levels such as staff shortages and the length of time required to assist a dependent older adult greatly affects the nutritional status of LTC residents (American Dietetic Association, 2005). When residents are provided with longer eating times it improves nutritional status (Chang & Roberts, 2011). A rushed approach to eating assistance may stimulate anxiety in

not only the resident, but also the caregiver (Sloane et al., 2008). Simmons et al. (2001) found that on average the total amount of assistance given to residents by staff or caregivers at mealtimes is a mere six to ten minutes, which is not nearly enough time to provide adequate assistance. The short amount of allotted time for each resident is likely due to the high demand of residents who require full eating assistance and understaffing of the LTC facility. An average of 35-40 minutes has been shown to be the appropriate amount of time for residents to respond and receive an adequate amount of food intake (Simmons & Schnelle, 2006). A rushed approach and a short amount of time provided to assist at meals can cause unintentional weight loss and may impact their overall quality of life (Sloane et al., 2008). Providing longer amounts of time may be beneficial and allow the residents a comfortable quantity of time to finish their meals (Bunn et al., 2016).

Excessively or unnecessarily assisting a person with eating could alter how much the individual consumes, impacting their well being and overall quality of life. Several studies have found that staff in LTC tend to focus on the mechanical task of eating and often overlook the resident's individual needs and abilities during mealtimes (Hung & Chaudhury, 2011; Pelletier, 2004). This type of eating assistance not only affects the meal experience, but also negatively impacts the personhood/dignity of a resident with dementia (Hung & Chadbury, 2011). Residents should be encouraged to eat independently rather than be "force fed" (Liu et al., 2016). Verbal assistance by staff encouraged residents to continue with eating tasks and promotes independent eating (Liu et al., 2015). When providing assistance, staff should rely on cues from residents such as turning their head away which signals that they have had enough, or leaning forward and opening their mouth which signals they want more to eat (Lin et al., 2010). At the end of the day,

staff should be helping residents thrive, especially vulnerable residents like those with cognitive impairment.

When assisting a person with cognitive impairment, it is fundamental to match the level of assistance to the needs and capabilities of the resident (Sloane et al., 2008). The level of assistance that is needed during mealtimes varies with as little as setting up the meal, opening packages, encouragement, and partial assistance with specific foods to full eating assistance (Keller et al., 2014). The attitude and overall perception that staff display has huge impact on how much the resident will consume (American Dietetic Association, 2005). Positive energy and attitudes may improve how much an individual consumes (American Dietetic Association, 2005). When staff value the social aspect of mealtimes and find ways to respect and honour the residents, it creates a positive dining experience and increases food intake (Reimer & Keller, 2009). Health care professionals such as nurses and aides see first-hand what the residents are eating and may be the first to realize when a resident is having difficulty eating (Lou et al., 2007; Lin et al., 2010).

Family caregivers often express that assistance at mealtimes is less than what is actually needed so they feel obligated to go help their loved ones during mealtimes (Hanson et al., 2013). When family assist with eating, residents are found to have higher food intake (Lin et al., 2010). This could be due to the type of care that is being provided as a family member may put the resident at ease by touching, cueing and encouraging the resident. Additionally, a sense of familiarity may be comforting to residents with cognitive impairment. Encouraging families to visit at mealtimes may be desirable as family can reassure and make residents feel at ease (Lin et al., 2010).

Providing training for staff may increase the amount of PCC as well as decrease the prevalence of malnourished residents. When staff is inconsistently assigned and have inadequate training, they are unaware of individual resident cues and are unable to identify eating difficulties (Lin et al., 2010). For many residents with dementia, abilities and initiative change from meal to meal (Gibbs-Ward & Keller, 2005). Therefore, one cannot assume that the daily needs of the resident are the same (Lin et al., 2010).

Implications for Health Care

In the next 30 years, demand for LTC required by dementia patients will increase over 10 times the current demand (Canadian Nurses Association, 2016). It is evident that better strategies are needed in LTC to help alleviate inadequate food and fluid intake in LTC. In theory, several of the risk factors associated with malnutrition are reversible (Woo et al., 2005). Future interventions should not solely focus on improving food intakes, but rather improving mealtimes among older adults in LTC (Keller et al., 2015). Interventions that target eating assistance at mealtimes may help improve mealtimes and quality of life in residents with cognitive impairment residing in LTC.

Interventions such as training/education programs may be beneficial so that staff are aware of how to appropriately assist those who have cognitive impairment. Evidence has shown that approximately 50% of LTC residents who require total eating assistance are able to consume some of their food independently when small environmental changes and supports are provided. (Keller et al., 2014). Actions or behaviours of mealtime staff such as interruptions, failure to respond to resident cues or removing the tray can cause the resident to stop eating (Amella, 2002). Staff should be knowledgeable and attentive when assisting at mealtimes and rely on resident's cues and prompts.

Interventions that target improving the meal environment may be needed, such as providing adequate lighting, and reducing noise in LTC dining areas (Keller et al., 2014). Creating a warm and positive atmosphere for the residents during mealtimes has shown to be positively correlated with increase food intake. To implement these recommendations, multiple organizational levels are needed. This includes the residents, all staffing levels and even the family members or caregivers (Keller et al., 2014).

It is imperative to support residents to be as self-sufficient as possible, such as encouraging them to eat themselves. Some examples of ways to do this include offering finger (bite-size) foods to make it easier for the person to manipulate and providing a bowl instead of plate (Alzheimer Association, 2017b). Additionally, when appropriate assistance is provided at mealtimes it may promote increased and adequate intake of food (Verbrugghe et al., 2013). Individuals with greater severity of cognitive impairment require adequate and person-centered eating assistance. Focusing on eating performance rather than solely focusing on nutritional intake is essential. Eating independently by oneself is an important indicator of quality of life for residents in LTC (Liu et al, 2016). The progression of dementia is inevitable, but improving the quality of care for residents in LTC may improve their overall quality of life. Abdelhamid et al. (2016) suggest that randomized trials should be tailored for residents with dementia at each stage of the disease. Older adults with greater severity in cognitive impairment often require total eating assistance and are prescribed puree or fluid diets, whereas many older adults with mild dementia are still able to eat independently with or without assistance. Therefore, providing training to staff on how to help these individuals maintain their independence is essential.

Research Gaps

Research involving residents with cognitive impairment is generally limited as obtaining informed consent and level of impairment is challenging. There is evidence that shows that providing appropriate eating assistance at meals may increase food and fluid intake in LTC residents with cognitive impairment. However, few studies exist focusing specifically on eating assistance and its impact on energy intake, while some use observational methods failing to calculate usual intake. More research is needed to examine the factors that contribute to better energy intake in residents with cognitive impairment in LTC.

CHAPTER 3

METHODOLOGY

The Making the Most of Mealtimes Study (M3)

Data previously collected from the Making the Most of Mealtimes Study (M3) was utilized for this research project. The M3 Study is a large, comprehensive, multi-site cross sectional study examining the determinants of food and fluid intake of older adults in LTC homes across Canada. This was accomplished by examining three domains: meal quality (e.g., taste, preferences), mealtime experience (e.g., dining room size, ambiance), and meal access (e.g., number of staff to assist, eating capacity) (Keller et al., 2015). Data collection for the M3 study took place from February 2015- December 2015 in four Canadian provinces: Alberta, Manitoba, Ontario, and New Brunswick. Twenty residents were randomly selected from 32 LTC homes (eight per province), 160 residents per province with a total of 639 residents. The LTC sites were selected based on their diversity in regards to type of facility (profit/not for profit), size, and special characteristics (ethnicity/cultural). In each province, data were collected by two trained research assistants, a project coordinator and a dental hygienist. Participants were included in the M3 study if they met the following criteria: ≥ 65 years of age, medically stable residing in selected units, resided in the LTC home for at least one month, able to give consent or have an alternative decision maker provide consent on their behalf, and eat most or all meals in the LTC dining room. Exclusion criteria included the following: resided in LTC home for less than a month, medically unstable, on respite admission, requires tube feeding, at the end of life, does not routinely eat in the dining room areas, and unable to speak English (French and Cantonese in two other provinces).

Over 200 variables using a variety of measurements was collected at the resident, home and government levels. Person-centered practices, eating behaviours, food intake, mealtime environments, and home level variables of food cost, production and delivery were determined. Mealtime environment measures included the Dining Environment Assessment Protocol (DEAP) and Mealtime Scan (MTS). The DEAP examined the physical dining space and the MTS assessed the dining environment during meals. More details about the M3 protocol can be found elsewhere (Keller et al., 2017b).

Ethics

Ethics was approved by the Research Ethics Boards at the Universities of Alberta, Manitoba, Waterloo, Moncton and the University Health Network, Toronto (Appendix A). Ethics approval was also obtained from LTC homes with individual review committees. Informed consent was obtained from all participants or their alternative decision makers.

Methods for Current Research Study

Population of Interest

The population of interest for this research project was cognitively impaired residents from the Making the Most of Mealtimes (M3) study, who had a Cognitive Performance Scale (CPS) score of 3 (moderate) - 6 (very severe) (Morris et al., 1994). In total, 353 out of 639 LTC residents (55.2%) from the M3 study were included.

Data Collection

This research project utilized secondary data from the M3 study. The following data collection measurements were used for the data analysis as they related to the research questions described in Chapter One.

Food and Fluid Intake

A three-day food and fluid intake assessment (Appendix B) for each participant (observed and measured) for breakfast, lunch and supper was carried out on three non-consecutive days (two weekdays and one-weekend day) for four weeks per site on five participants per week (total of 9 assessments). This captured the average energy intake of each participant. To minimize error and promote efficiency in data collection, the food intake for groups of five residents was assessed each week based on seating arrangements in the dining room. Two dietary assessment methods were used: 1) Weighed: all foods served and the food left on the plate after the meal, and 2) Observed: beverages and side dishes were estimated through observation prior, during, and after the meal. The main plate was weighed as each food was served at the beginning of the meal and leftovers were weighed at the end of the meal to determine amount consumed. Snacks that were consumed between meals were recorded by LTC staff (including oral supplements). Micronutrient supplements, oral nutritional supplements or meal replacements (Ensure or Resource) were recorded. The number of staff serving, staff assisting with eating, family/volunteers assisting and residents leaving the dining room and/or wandering extensively was documented. Recipes were requested from each site, however not all sites were able to provide every recipe. In this situation, recipes were obtained from Food for Fifty (13th edition). All recipes were entered into the Food Processor Nutrient Analysis Software (ESHA Inc, 2015, version 10.14.2, Salem, Oregon).

Resident Meal Observations

Resident Meal Observations (Appendix C) consisted of two parts: the Edinburgh Feeding Evaluation in Dementia Questionnaire (Ed-FED) and the Mealtime Relational Care Checklist (M-RCC). The Ed-FED is a valid and reliable observational instrument commonly used to

identify eating difficulties and help define the level of assistance needed (Stockdell & Amella, 2008; Keller et al., 2017b; Watson & Dreary, 1997). The Ed-FED scores eating challenges and assistance required used 10 items which are scored on a 3-point rating scale (1-3) (Never/Not Applicable, Sometimes, Often) (Keller et al., 2017b; Watson & Dreary, 1997). Total scores range from 10 to 30, where 10 is the lowest score indicating no observed eating challenges, and 30 is the highest score indicating high eating challenges. Nine additional items were also recorded to look at further eating challenges and were scaled to be consistent with the Ed-FED (Keller et al., 2017b; Watson & Dreary, 1997). The Mealtime Relational Care Checklist (M-RCC) examines mealtime practices of care staff. It includes 26 positive and their contrasting more negative behaviours (Keller et al., 2017b; Keller, H. H., Chaudhury, H., Pfisterer, K. J., & Slaughter, S. E. 2017). The M-RCC focused on care staff practices that were dignified, supported resident participation during mealtimes, promoted social interaction among residents and care staff, and attended to key hospitality concepts. Research assistants recorded via observation eating behaviours, how staff interacted with residents, eating assistance, and social interaction once per day for three days of observation. In addition to the checklist, extra notes were taken if observations were out of the ordinary (Keller et al., 2017b).

Relational Behaviour Scale

The Relational Behavioural Scale (RBS) (Appendix D) is a validated and reliable tool which investigates the types of behaviours carried out during an eating assistance care episode (Keller et al., 2017b; McGilton et al., 2012). The RBS is a three-item measure used to assess the quality of assistance that was provided by the staff or caregiver. The scale consists of three domains or subscales: 1) stays with the resident during the care episode, 2) pace of care, and 3) focus of care. Each of the subscales is rated on a 7-point semantic rating scale. The scores range

from 3 -21, where the total score is derived by summing the totals of all three subscales. A score of 0 represents a low negative level of relational behaviours and a total score of 21 represents a high positive level of relational behaviours. During the M3 study, the RBS was only used for those requiring total eating assistance and completed alongside the meal observations. This was completed once per day for three days of observation.

Minimum Data Set

The Minimum Data Set (MDS) (Appendix E) is a component of the interRAI designed to report functional dependence, cognitive impairment and many other resident characteristics. These interRAI tools are standardized assessment instruments and have been found to be reliable and valid when tested. (Keller et al., 2017b; Morris, Fries & Morris, 1999; Morris et al., 1994; Smart et al., 2011). The interRAI Activities of Daily Living hierarchy scale (Appendix F) is a measure of ADL performance based on eating, locomotion, toilet use and personal hygiene. The scores range from 0-6, where lower scores indicate independence and higher scores indicate greater decline (progressive loss) in ADL performance (Canadian Institute for Health Information, 2011). There is also one additional category which records if the activity did not occur during the time period (Morris et al., 1999). The interRAI Cognitive Performance Scale (CPS) (Appendix G) evaluates a person's cognitive impairment. It combines information on a person's ability to make daily decisions, their ability to make themselves understood and their memory impairment. The CPS is based on a 7-point scale, where a score of 0 represents a person who is experiencing no difficulties and 6 indicates that the person has very severe cognitive/memory problems and is unable to make daily decisions, make themselves understood or feed themselves. A person who is comatose would likely receive a score of 6 (Canadian Institute for Health Information, 2010).

Resident Chart Review

Residents' medical charts (Appendix H) were reviewed to identify demographic information, number of months since admission, total number of formal diagnoses (i.e., stroke, depression, diabetes, etc.), total number of medications, total number of vitamin/mineral supplements, diet texture prescribed, prescribed liquid consistency, diet prescription (i.e., high protein, renal, etc), oral nutritional supplements (ONS) prescribed, weight history and body measurements (used for ulna BMI).

Mini Nutritional Assessment- Short Form

The Mini Nutritional Assessment Short Form (MNA-SF) (Appendix I) is a short reliable and valid screening tool used to assess nutritional risk (Kaiser et al., 2009). The MNA-SF scores range from 0 – 14, where a higher score (12-14) indicates normal nutritional status, mid scores of (8-11) show a risk of malnutrition, lower scores (0-7) indicate that the resident is malnourished. Information about MNA-SF was collected by the M3 project coordinators during chart reviews (BMI, weight change/loss, change in food intake, mobility, psychological stress or neuropsychological problems).

Patient Generated - Subjective Global Assessment

The Patient-Generated Subjective Global Assessment (PG-SGA) (Appendix J) is a reliable and valid modified version of the SGA that is used to assess nutritional status (Keith, 2008). The PG-SGA was designed for oncology outpatients to provide more landmarks for a physical exam as well as risk factors for poor food intake (Keller et al., 2017b; Bauer, Capra & Ferguson, 2002). The scored PG-SGA consists of a medical history (weight loss, nutrition impact symptoms, intake, and functional capacity) using a check box format and a physical examination assessing fat, muscle stores, and fluid status (Keith, 2008; Desbrow et al., 2005). For each

component of the PG-SGA, rating scores (0 to 4) are given depending on the impact on nutritional status. Typical scores range from 0 to 35, with a higher score reflecting a greater risk of malnutrition (Desbrow et al., 2005). In the M3 study, family or caregivers of residents with cognitive impairment were also interviewed on day of completion for risk factors associated with food intake (e.g., chewing problems).

Screening Tool for Acute Neuro Dysphagia

The Screening Tool for Acute Neuro Dysphagia (STAND) (Appendix K) is a standardized brief screening protocol that determines a resident's risk of dysphagia (Keller et al., 2017b; Shepard et al., 2007). STAND is validated with 92% sensitivity and 60% specificity for detecting aspiration (Keller et al., 2017b; Shepard et al., 2007). Screening tests such as the STAND are scored as a pass/fail and only give an idea of the risk of a condition. Residents were asked about their swallowing ability and monitored during consumption of apple sauce, water, and a dry swallow. Residents were not eligible if they were already at risk of dysphagia or on thickened fluids. The dysphagia risk variable is a composite variable where risk is defined as: a) resident already on thickened fluids, or b) failed STAND or c) coughing or choking observed at meals by the M3 researchers.

Oral Health Exam

A standardized oral assessment (Appendix L) based on the Canadian Health Measures Survey was used to examine dentition and oral health (Keller et al., 2017b). All oral assessments were completed by trained dental hygienists in each province.

Data Entry and Cleaning Measures

Entering the data was carried out by the research assistants in each province. Individual food items that were weighed and observed for each resident were entered into the Food Processor Nutrient Analysis Software (ESHA Inc, 2015, version 10.14.2, Salem, Oregon). When specific foods were not found in the database, a comparable brand was used which had similar nutrient compositions. All data was double checked after each entry to ensure consistency and to minimize errors. To increase efficiency, reliability and validity, cleaning of the data was performed separately in each province, followed by a final cleaning of all the data at the University of Waterloo by the M3 data analyst Jill Morrison (MSc.).

Data Analysis

The data was statistically analyzed by K. Mann using the statistical analysis program Statistical Package for Social Sciences (SPSS) release 24.0 for Windows (IBM Corporation 2016). Table 3.1 provides a summary of the data analyses for each research question previously presented in Chapter 1. Descriptive statistics (means, standard deviations, frequencies, ranges, percentages) were conducted for persons with cognitive impairment and were separated by sex.

Energy intake was compared using kilocalorie per kilogram of bodyweight as well as kilocalories for specific analyses. A frequency distribution was used to estimate the proportion of persons with cognitive impairment whose energy intake was higher or lower than the average of 30 kcal/kg bodyweight as caloric requirements for older adults in LTC under moderate stress can be met at 25-35 kcal/kg/day (Bales & Ritchie, 2009). The M3 study did not measure the physical activity level of residents therefore estimated energy requirements could not be calculated. To estimate the mean energy intake (kcal/kg bodyweight) in LTC residents with cognitive impairment, a 95% confidence interval was constructed.

A multiple linear regression model, adjusting for age and sex, was completed using energy intake (kilocalories) and multiple resident level variables of interest to determine factors independently associated with energy intake. Resident level factors refer to variables that were collected at the resident level as opposed to the unit or home level. A $p \leq 0.2$ cut point for bivariate associations was used to determine which variables were candidates to include in the initial full regression model (Hosmer & Lemeshow, 2000). The $p \leq 0.2$ cut point was used to avoid leaving out potential confounding variables (Hassard, 1991). A backwards stepwise selection technique was carried out to remove variables from the model and come to a final parsimonious model. Dummy variables were created for two categorical variables (CPS score and eating assistance at meals) that had more than two levels. The continuous dependent variable was energy intake.

Independent samples t-tests were completed to assess how the energy intake (kilocalories), the continuous dependent variable, varied between the Ed-FED, Other Eating Behaviours and the M-RCC variables. The Ed-FED, Other Eating Behaviours and M-RCC variables were all transformed into dichotomous variables summarized across three days of observation where: 0 - indicated that the event/behaviour was not observed at all over the three (or less) meals where observations were made and 1- indicated that the event/behaviour occurred at least once. Additionally, a linear regression was completed using energy intake and relational behavior scale (RBS) items averaged across three days of observation. Each of the RBS subscales were transformed from 7-point semantic rating scale to continuous variables.

If any data for the descriptive statistics and/or confidence interval output were missing or incomplete, it was excluded from the analysis. All deleted information was recorded in the results table and is indicated by the "n" value. For the bivariate analyses and multiple

regressions, the pairwise deletion method was followed. In pairwise deletion, when data is

missing for one or two variables, it is excluded from the analysis (Zhang & Wang, 2013).

Table 3.1. Data Analyses Summary of Research Questions

1. What is the average energy (kcal/kg bodyweight) in LTC residents with cognitive impairment? What proportion of LTC residents with cognitive impairment do not meet the accepted energy intake of 30 kcal/kg bodyweight?

M3 Tool	Variable Type of Variable	Independent Variable	Dependent Variable	Data Analysis
Food Intake	3-day Average Food and Fluid Intake	N/A	Energy intake (kilocalorie per kg of bodyweight)	Mean with Confidence Interval
	3-day Average Food and Fluid Intake	N/A	% higher & lower than 30 kilocalories per kg of bodyweight	Proportion with Confidence Interval

2. What factors at the resident level are independently associated with energy intake (kcal) in LTC residents with cognitive impairment?

M3 Tool	Variable	Independent Variable	Dependent Variable	Data Analysis

Resident Chart Review	Personal Information	Sex-male (categorical)
		  0. No
		  1. Yes- Male
			Energy intake (kcal)	Multiple Linear Regression (Backwards stepwise using P value < 0.2)

		Age (continuous)		
		Months since admission		
	Body Assessment measures	Ulna BMI[a] (continuous)		
	Medications	Total number of drugs and vitamins (continuous)		
		Total number of vitamin/minerals (continuous)		
	Food/Fluid Prescriptions	Modified texture (categorical)		

Continued…

		0. No (includes regular and soft/bite sized 1. Yes (minced/moist, pureed, liquidized)		
		Thickened consistency liquids prescribed (categorical) 0. No, regular thin liquids 1. Yes, thickened fluids		
		Any diet prescription (categorical) 0. No, diet prescription 1. Yes, diet prescription		
	Prescribed Oral Nutrition Supplements	Any ONS Prescribed at any time of day (categorical) 0. No 1. Yes		
	Diagnoses	Total number of formal diagnoses, not including "other" (continuous)		
	Mini Nutritional Assessment-Short Form screen score	MNA-SF total score (continuous)		
Minimum Data Set (MDS)	Cognitive Performance Scale (CPS)	CPS Score (categorical) 3. Moderate 4. Moderate/Severe 5. Severe 6. Very Severe		
	Activities of Daily Living (ADL) -Long Form Score	Total ADL score based on the sum of 7 sub-scores[b] (continuous)		
	Aggressive Behaviour Scale (ABS)	Sum of scores for 4 behavioral symptoms[c] (continuous)		
Mealtime Observation	Mealtime Relational Care Checklist (M-RCC)	Three-day average positive: negative ratio Person Centred Care (PCC) ratio (continuous)		
	Meal Details	Average duration of each meal[d] (continuous)		
	Challenging Mealtime behaviors	Did the resident wander at any meal? (categorical) 0. No 1. Yes		

M3 Tool	Variable	Independent Variable	Dependent Variable	Data Analysis
	Edinburgh Feeding Evaluation in Dementia (Ed-FED)	Three-day average Ed-FED score[e] (continuous)		

		Physical assistance required during mealtimes (categorical)
		  0. Never
		  1. Sometimes
		  2. Often		

Adapted Screening Tool for Acute Neuro Dysphagia (STAND)	Dysphagia Risk	Is resident at risk for Dysphagia?[f] (categorical)		
Oral Health Exam	Oral Health Exam	Total natural teeth (continuous)		

		Any issue with denture fit (upper or lower)? (categorical)
		  0. No
		  1. Yes		

		Oral status likely to affect food intake (categorical)
		  0. No/unlikely
		  1. Yes, potential significant impact		

3. What eating assistance factors are associated with energy intake (kcal) in LTC residents with cognitive impairment?

M3 Tool	Variable	Independent Variable	Dependent Variable	Data Analysis

Mealtime Observation	Ed-FED	Does the resident require close supervision while feeding/eating? (categorical)
		  0. Event never/rarely displayed at meal
		  1. Event displayed sometimes/often during at least one meal
			Energy intake (kilocalories)	T-test and linear regression

		Does the resident require physical help with feeding/eating? (eating assistance) (categorical) 0. Event never/rarely displayed at meal		

Continued…

		1. Event displayed sometimes/often during at least one meal		
		Is there spillage while feeding/eating? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Does resident tend to leave food on plate at the end of meal? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Does the resident refuse to eat? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Does the resident spit out his food? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Is there spillage of food out of the mouth? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Does the resident turn his head away while being fed? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal		
		Does the resident refuse to open his mouth? (categorical) 0. Event never/rarely displayed at meal		

		1. Event displayed sometimes/often during at least one meal
	Does the resident refuse to swallow? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal	
Other Eating Behaviours[g]	Does the resident receive close supervision with feeding/eating? (categorical) 0. Event never/rarely displayed at meal 1. Event displayed sometimes/often during at least one meal	
	Does the resident receive verbal prompting? (categorical) 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal	
	Does the resident use adaptive utensils to eat? (categorical) 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal	
	Does the resident appear distracted? (categorical) 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal	
	Does the resident treat the food in unusual way? 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal	
	Does the resident lack energy to eat? 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal	

		Does the resident appear to have chewing problems? 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal		
		Does the resident cough during the meal? 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal		
		Does the resident choke during the meal? 0. Behaviour never/rarely displayed at meal 1. Behaviour displayed sometimes/often during at least one meal		
	Mealtime Relational Care Checklist (M-RCC)	0. Did not wait for assistance with food in front of them 1. Waits for assistance with food in front of them		
		0. Had napkin used to wipe their mouth 1. Had an apron or washcloth used to wipe their mouth		
		0. Was continually assisted 1. Stopped being assisted staff left		
		0. Received one-on-one assistance 1. Was assisted at the same time as other residents		
		0. Was given enough time when assisted to eat 1. Was rushed when assisted to eat		
		0. Was told what they were eating when assisted 1. Was not told what they were eating when assisted		
		0. Assisted by staff using safe practices 1. Assisted by staff using safe practices		
Relational Behaviour Scale (RBS)	Behaviour Group	Three-day average score (continuous)		
	Altering the Pace of Care	Three-day average score (continuous)		
	Focus of Care	Three-day average score (continuous)		

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

[b]Sum of ADL 7 sub-scores: personal hygiene, dressing upper body, dressing lower body, locomotion, toilet use, bed mobility, & eating

[c]Sum of scores for 4 behavioural symptoms: verbal abuse, physical abuse, socially inappropriate/disruptive, & resists care

[d]Nine meals in total per resident

[e]Ed-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

[f]Dysphagia risk is a composite variable – risk defined as: a) already on thickened fluids, b) failed STAND or c) coughing or choking observed at meals by M3 researchers

[g]Other 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

CHAPTER 4

THE ASSOCIATION OF EATING ASSISTANCE WITH ENERGY INTAKE OF LONG TERM CARE (LTC) RESIDENTS WITH COGNITIVE IMPAIRMENT: THE MAKING THE MOST OF MEALTIMES STUDY (M3)

Introduction

The demand for LTC in Canada is increasing dramatically as the population continues to age. Individuals living in a LTC environment are more likely to have deterioration of their health and functional abilities, and are more chronically ill (Public Health Agency of Canada, 2010; American Dietetic Association, 2005). The prevalence of malnutrition in LTC facilities varies from 3%-83%, due to poor food and fluid intakes (Chang & Roberts, 2011; Lengyel, Whiting, & Zello, 2008; Reed, Zimmerman, Sloane, Williams, & Boustani, 2005; Woo, Chi, Hui, Chan & Sham, 2005; Sitter & Lengyel, 2011; Reimer & Keller, 2009, Lou et al., 2007, Keller et al., 2017a). Malnutrition in LTC is commonly seen as undernutrition, as residents do not consume adequate amounts of energy and nutrients (Meijers, Schols, & Halfens, 2014; Bostrom, Van Soest, Kolewaski, Milke & Estrabrooks, 2011). Malnutrition places older adults at risk for infections, delayed wound healing, pressure sores, functional limitations, morbidity, and mortality (Lou, Dai, Huang, & Yu, 2007).

Cognitive impairment may impact a person's ability to eat independently and is often related to multiple eating difficulties (Bell, Tamura, Masaki & Amella, 2013). Therefore, eating assistance is often required at meals to meet residents with cognitive impairment nutritional needs. The level of assistance that is needed during mealtimes may include setting-up the meal, opening packages, encouragement, partial assistance, and/or full eating assistance for residents with eating difficulties (Keller et al., 2014). When assisting a person with cognitive impairment

it is fundamental to match the level of assistance to the needs and capabilities of the resident in a dignified manner (Sloane et al., 2008; Reimer et al., 2009). If adequate amounts of monitoring and assistance are provided, it may positively improve nutritional intake and overall quality of life among LTC residents with cognitive impairment (Lin et al, 2010; Reed et al., 2005).

The research objectives of this study were to identify factors that may influence energy intake of residents from the Making the Most of Mealtimes (M3) study with cognitive impairment as well as examine the association of eating assistance on energy intake.

Methods

The Making the Most of Mealtimes Study (M3)

Data previously collected from the Making the Most of Mealtimes Study (M3) was utilized for this research project. The M3 Study is a large, comprehensive, multi-site cross sectional study examining the determinants of food and fluid intake of older adults in 32 diverse LTC homes across Canada. This was accomplished by examining meal quality, mealtime experience, and meal access. Data collection for the M3 study took place from February 2015- December 2015 in four Canadian provinces: Alberta, Manitoba, Ontario, and New Brunswick. Twenty residents were randomly selected from 32 LTC homes (eight per province), 160 residents per province with a total of 639 residents. For this research study, data previously collected from the M3 study was utilized. More details about the M3 protocol can be found elsewhere (Keller et al., 2017b).

The Sample

The population of interest for this research project was cognitively impaired residents from the Making the Most of Mealtimes (M3) study, who had a Cognitive Performance Scale (CPS) score of 3 (moderate) - 6 (very severe) (Morris et al., 1994). In total, 353 out of 639 LTC residents (55.2%) from the M3 study were included.

Variables

Food and Fluid Intake

A three-day food and fluid intake assessment (Appendix B) was completed for each resident (observed and measured) for breakfast, lunch and supper on three non-consecutive days (two weekdays and one-weekend day) for a total of 9 assessments. Beverages and side dishes were measured by estimation when weighing was not feasible. Snacks (including oral supplements) that were consumed between meals were recorded on a sheet by LTC staff. Physical activity was not recorded during the M3 study; therefore, estimated energy requirements could not be calculated. For this specific analysis only, energy intake was calculated using kcal/kg of bodyweight. For all other analyses energy intake (kilocalories) was used.

Resident Meal Observations

Resident mealtime observations (Appendix C) were completed once per day for three days of observation using the Edinburgh Feeding Evaluation in Dementia Questionnaire (Ed-FED) and Mealtime Relational Care checklist (M-RCC). The Ed-FED is a valid and reliable observational instrument commonly used to identify eating difficulties and help define the level of assistance needed (Stockdell & Amella, 2008; Keller et al., 2017b; Watson & Dreary, 1997). The Ed-FED total scores range from 10 to 30, where a higher score indicates more eating challenges. Nine additional items were also recorded to examine further eating challenges and scaled to be consistent with Ed-FED (Keller et al., 2017b; Watson & Dreary, 1997). The Mealtime Relational Care Checklist (M-RCC) examined mealtime practices of care staff and included 26 positive and their contrasting more negative behaviours (Keller et al., 2017b; Lengyel et al., 2016).

Relational Behaviour Scale

The validated Relational Behavioural Scale (RBS) (Appendix D) is a three- item measure used to investigate the types of behaviours carried out during an eating assistance care episode (Keller et al., 2017b; McGilton et al., 2012). The scale consists of three domains or subscales: 1) stays with the resident during the care episode, 2) pace of care, and 3) focus of care. Each of the subscales are rated on a 7-point semantic rating scale. The scores range from 3-21, where the total score is derived by summing the totals of all three subscales. A score of 0 represents a low negative level of relational behaviours where higher scores represent more positive relational behaviours. The RBS was only completed for those requiring total eating assistance.

Minimum Data Set

The Minimum Data Set (MDS) (Appendix E) collected a variety of variables, but for this study the Activities of Daily Living (ADL) (Appendix F) and Cognitive Performance Scale (CPS) (Appendix G) were analyzed. The ADL hierarchy scale measured performance based on eating, locomotion, toilet use and personal hygiene. The scores range from 0-6, where lower scores indicate independence and higher scores indicate greater decline (progressive loss) in ADL performance (CIHI, 2013). The CPS evaluates a person's cognitive impairment by examining a person's ability to make daily decisions, ability to make themselves understood, and their level of memory impairment. The CPS is based on a 7-point scale, where a score of 0 represents a person who is experiencing no difficulties, whereas a 6 indicates that the person has very severe cognitive/memory problems and is unable to make daily decisions, make themselves understood or feed themselves. A person who is comatose would likely receive a score of 6 (CIHI, 2010).

Resident Chart Review

Residents' Chart Review (Appendix H) identified the following variables: demographic information, number of months since admission, total number of formal diagnoses (i.e., stroke, depression, diabetes, etc.), total number of medications, total number of vitamin/mineral supplements, diet texture prescribed, prescribed liquid consistency, diet prescription (i.e., high protein, renal, etc.), oral nutritional supplements (ONS) prescribed, weight history, and body measurements (used for ulna BMI). All diagnoses were pre-existing and gathered from the resident's medical chart.

Screening Tool for Acute Neuro Dysphagia

The Screening Tool for Acute Neuro Dysphagia (STAND) (Appendix K) is a standardized brief screening protocol that determines a resident's risk of dysphagia (Keller et al., 2017b; Shepard et al., 2007). STAND is validated with 92% sensitivity and 60% specificity for detecting aspiration (Keller et al., 2017b; Shepard et al., 2007). Screening tests such as the STAND are scored as a pass/fail and only give an idea of the risk of a condition. Residents were asked about their swallowing ability and monitored during consumption of apple sauce, water, and a dry swallow. Residents were not eligible if they were already at risk of dysphagia or on thickened fluids. The dysphagia risk variable is a composite variable where risk is defined as: a) resident already on thickened fluids, or b) failed STAND or c) coughing or choking observed at meals.

Patient Generated - Subjective Global Assessment

The Patient Generated - Subjective Global Assessment (PG-SGA) (Appendix J) is a reliable and valid modified version of the SGA that is used to assess nutritional status (Keith, 2008). The PG-SGA was designed for oncology outpatients to provide more landmarks for a physical exam as well as risk factors for poor food intake (Keller et al., 2017b; Bauer et al., 2002). The scored

PG-SGA consists of a medical history (weight loss, nutrition impact symptoms, intake, and functional capacity) using a check box format and a physical examination assessing fat, muscle stores, and fluid status (Keith, 2008; Desbrow et al., 2005). For each component of the PG-SGA, rating scores (0 to 4) are given depending on the impact on nutritional status. Typical scores range from 0 to 35, with a higher score reflecting a greater risk of malnutrition (Desbrow et al., 2005). Family or caregivers of residents with cognitive impairment were also interviewed on day of completion for risk factors associated with food intake (e.g., chewing problems).

Mini Nutritional Assessment- Short Form

The Mini Nutritional Assessment Short Form (MNA-SF) (Appendix I) is a short reliable and valid screening tool used to assess nutritional risk (Kaiser et al., 2009). The MNA-SF scores range from 0 – 14, where a higher score (12-14) indicates normal nutritional status, mid scores (8-11) show a risk of malnutrition, lower scores (0-7) indicate that the resident is malnourished. Information about MNA-SF was collected during chart reviews (BMI, weight change/loss, change in food intake, mobility, psychological stress or neuropsychological problems).

Oral Health Exam

A standardized oral assessment (Appendix L) based on the Canadian Health Measures Survey was used to examine dentition and oral health. All oral assessments were completed by trained dental hygienists in each province.

Ethics

Ethics was approved by the Research Ethics Boards at the Universities of Alberta, Manitoba, Waterloo, Moncton and the University Health Network, Toronto (Appendix A). Ethics approval was also obtained from LTC homes with individual review committees. Informed consent was obtained from all participants or their alternative decision makers.

Data Analysis

The previously collected M3 data was analyzed using the statistical analysis program

Statistical Package for Social Sciences (SPSS) version 24.0 for Windows (IBM Corporation,

2016). Descriptive statistics (means, standard deviations, frequencies, ranges, percentages) were

conducted for persons with cognitive impairment and were separated by sex.

Energy intake was compared using kilocalorie per kilogram of bodyweight as well as

kilocalories for specific analyses. A frequency distribution was used to estimate the proportion of

persons with cognitive impairment whose energy intake was higher or lower than the average of

30 kcal/kg bodyweight as caloric requirements for older adults in LTC under moderate stress can

be met at 25-35 kcal/kg/day (Bales & Ritchie, 2009). The M3 study did not measure the physical

activity level of residents therefore estimated energy requirements could not be calculated. To

estimate the mean energy intake (kcal/kg bodyweight) in LTC residents with cognitive

impairment, a 95% confidence interval was constructed.

A multiple linear regression model, adjusting for age and sex, was completed using

energy intake (kilocalories) and multiple resident level variables of interest to determine factors

independently associated with energy intake. Resident level factors refer to variables that were

collected at the resident level as opposed to the unit or home level. A $p \leq 0.2$ cut point for

bivariate associations was used to determine which variables were candidates to include in the

initial full regression model (Hosmer & Lemeshow, 2000). The $p \leq 0.2$ cut point was used to

avoid leaving out potential confounding variables (Hassard, 1991). A backwards stepwise

selection technique was carried out to remove variables from the model and come to a final

parsimonious model. Dummy variables were created for two categorical variables (CPS score

and eating assistance at meals) that had more than two levels. The continuous dependent variable was energy intake.

Independent samples t-tests were completed to assess how the energy intake, the continuous dependent variable, varied between the Ed-FED, Other Eating Behaviours and the Mealtime Relational Care Checklist variables. The Ed-FED, Other Eating Behaviours and M-RCC variables were all transformed into dichotomous variables summarized across three days of observation where: 0 - indicated that the event/behaviour was not observed at all over the 3 (or less) meals where observations were made and 1- indicated that the event/behaviour occurred at least once. Additionally, a linear regression was completed using energy intake and relational behavior scale (RBS) items averaged across three days of observation.

If any data for the descriptive statistics and/or confidence interval output were missing or incomplete, it was excluded from the analysis. All deleted information was recorded in the results table and is indicated by the "n" value. For the bivariate analyses and multiple regressions, the pairwise deletion method was followed. In pairwise deletion, when data is missing for one or two variables, it is excluded from the analysis (Zhang & Wang, 2013).

Results

Participant Characteristics

A summary of participant characteristics can be found in Table 4.1. The study population included 353 residents of whom 70.5% (n = 249) were female and 29.5% (n = 104) were male. The residents' age ranged from 62-107 years with a mean age of 87.0 ± 7.9 years. Residents had been living in the LTC facilities for an average of 2.6 years (median =1.9 years).

The majority of residents (63.7%) did not have a diet prescription, while fewer women than men had diet prescriptions, 67.1% and 55.8%, respectively. In general, 13.9% of residents

were prescribed a diabetic diet and 17.3% had diet prescription in the "other" category. A prescription of Oral Nutritional Supplements (ONS) was more common for women (39.8%) than men (34.6%). The average energy intake was 1546 ± 411 kcal with a confidence interval ranging from 742 - 2351 kcal. Approximately 70% of the residents did not meet the accepted 30 kilocalories per kilogram of bodyweight as the average was 25 ± 8 kcal/kg.

According to the Mini Nutritional Assessment (MNA-SF), more than half of the residents (52.4%) were at risk of becoming malnourished. The Patient-Generated Subjective Global Assessment (PG-SGA) revealed that 46.3% were well-nourished and 45.5% had moderate malnutrition. The average amount of medications prescribed per resident was 8.0 ± 3.4 with vitamins/mineral supplements being 1.3 ± 1.2. On average, every resident had an average of 5.3 ± 2.0 diagnoses, with the most common being cardiovascular disease (71.1%) and dementia (83.9%). Based on the CPS results, 43.6% of residents had moderate cognitive decline and scores were higher in men than women, 53.8% and 39.4%, respectively. Additionally, 28.3% had severe cognitive decline.

Based on observations from the Ed-FED questionnaire, 61.0% "never" required eating assistance, 18.1% required eating assistance "sometimes", and 20.9% required eating assistance "often". The average meal duration was 41.2 ± 13.8 minutes, and ranged from 12.1 – 89.1 minutes. The oral health exam revealed that 27.7% of the residents had issues with their dentures. Overall, 68% of the residents' oral health status likely affected their food intake and was more common in women (65.6%) than men (34.4%).

Table 4.1. Characteristics of Residents with Cognitive Impairment

Variables	Overall % (N)	Male % (N)	Female % (N)
Age (years)	(353)	(104)	(249)
Mean ± SD	87.0 ± 7.9	84.8 ± 7.3	87.8 ± 7.9
Range	62 – 107	65-102	62-107
CI[a]	71.6; 102.3	70.6; 99.1	72.3; 103.4
Months since admission	(353)	(104)	(249)
Mean (months) ± SD	31.4 ± 29.6	25.2 ± 23.8	34.0 ± 31.4
Median	23.0	21.5	25
Range	1-170	1-139	1-170
BMI Ulna[b]	(348)	(104)	(244)
Mean ± SD	24.1 ± 4.9	24.7 ± 4.6	23.9 ± 5.1
Range	11.7 – 38.9	14.5 – 37.3	23.3 – 11.7
CI	14.5; 33.78	15.7;33.6	14.0; 33.8
Prescribed Liquid Consistency	(353)	(104)	(249)
Regular, Thin Liquids	83.9 (296)	76.9 (80)	87.8 (216)
Thickened	16.1 (57)	23.1 (24)	13.3 (33)
Diet Type	(353)	(104)	(249)
Regular	41.1 (145)	39.4 (41)	41.8 (104)
Soft	12.2 (43)	11.5 (12)	12.4 (31)
Minced/Moist	28.0 (99)	33.7 (35)	225.7 (64)
Pureed	17.8(63)	15.4 (16)	18.9 (47)
Liquidized	0.8 (3)	0 (0)	1.2 (3)
Diet Prescription[c]	(353)	(104)	(249)
None	63.7 (225)	55.8 (58)	67.1 (167)
No Added Salt	2.8 (10)	1.9 (2)	3.2 (8)
Diabetic	13.9 (49)	20.2 (21)	11.2 (28)
Renal	0.0 (0)	0.0 (0)	0 (0)
High Energy	9.1 (32)	9.6 (10)	8.8 (22)
High protein	9.3 (33)	10.6 (11)	8.8 (22)
Other	17.3 (61)	20.2 (21)	16.1 (40)

Continued…

48

Oral Nutritional Supplements (ONS)	(353)	(104)	(249)
	38.2 (135)	34.6 (36)	39.8 (99)
Medical Diagnoses[c,d]			
Asthma	4.0 (14)	4.8 (5)	3.6 (9)
Dementia Diagnosis (including AD)	83.9 (296)	81.7 (85)	39.8 (99)
Congestive Heart Failure	8.2 (29)	8.7 (9)	8.1 (20)
COPD/Emphysema	11.0 (39)	16.3 (17)	8.8 (22)
Cancer	13.6 (48)	18.3 (19)	11.7 (29)
Cardiovascular Disease	71.1 (251)	75.0 (78)	69.5 (173)
Diabetes	18.7 (66)	24.0 (25)	16.5 (41)
Endocrine	22.1 (78)	17.3 (18)	24.1 (60)
Depression	31.0 (109)	31.1 (32)	30.9 (77)
Mental Health diagnosis (not depression)	15.3 (54)	11.5 (12)	16.9 (42)
Gastrointestinal disease	32.3 (114)	31.7 (33)	32.5 (81)
Liver	0.8 (3)	0.0 (0)	1.2 (3)
Macular Degeneration/Glaucoma	23.2 (82)	18.3 (19)	25.3 (63)
Osteoarthritis	36.0 (127)	28.8 (30)	39.0 (97)
Osteoporosis	30.3 (107)	8.7 (9)	39.4 (98)
Parkinson's disease	7.4 (26)	13.5 (14)	4.8 (12)
Neurological disease (not Parkinson's disease)	4.2 (15)	6.7 (7)	3.2 (8)
Renal disease	13.9 (49)	17.3 (18)	12.4 (31)
Rheumatoid arthritis	4.0 (14)	2.9 (3)	4.4 (11)
Stroke	21.2 (75)	31.7 (33)	16.9 (42)
Diagnosis Total	(353)	(104)	(249)
Mean ± SD	5.3 ± 2.0	5.3 ± 2.1	5.2 ± 1.9
Median	5.0	5.0	5.0
Range	1 – 12	1 – 12	1 – 11
Medications	(353)	(104)	(249)
Mean ± SD	8.0 ± 3.4	8.6 ± 3.4	7.7 ± 3.3
Median	8.0	8.5	7.0
Range	0 – 18	1 – 17	0 – 18

Continued…

	(353)	(104)	(249)
Vitamin Total	(353)	(104)	(249)
Mean ± SD	1.3 ± 1.2	1.3 ± 1.1	1.3 ±1.2
Median	1.0	1.0	1.0
Range	0 – 6	0 – 5	0 – 6
MNA Category	(353)	(104)	(249)
Malnourished	16.1 (57)	9.6 (10)	18.9 (47)
At Risk of Malnutrition	52.4 (185)	56.7 (59)	50.6 (126)
Normal Nutrition Status	31.4 (111)	33.7 (35)	30.5 (76)
Total MNA Score	(353)	(104)	(249)
Mean ± SD	9.7 ± 2.5	9.94 ± 2.5	9.63 ± 2.5
Range	0 – 13	0 – 13	2 – 13
PG-SGA Category (n = 352)	(352)	(104)	(248)
Well-nourished	45.5 (160)	49.0 (51)	44.0 (109)
Moderate malnutrition	46.3 (163)	41.3 (43)	48.4 (120)
Severe Malnutrition	8.2 (29)	9.6 (10)	7.7 (19)
CPS Score[e]	(353)	(104)	(249)
Moderate	43.6 (154)	53.8 (56)	39.4 (98)
Moderate/Severe	11.9 (42)	13.5 (14)	11.2 (28)
Severe	28.3 (100)	22.1 (23)	30.9 (77)
Very Severe	16.1 (57)	10.6 (11)	18.5 (46)
Wanders at Any Meal	(353)	(104)	(249)
	6.2 (22)	6.7 (7)	6.0 (15)
Issues with Dentures	(289)	(93)	(196)
	27.7 (80)	35.0 (28)	26.5 (52)
Total Number of Natural Teeth	(294)	(93)	(201)
Mean ± SD	9.88 ± 10.2	8.6 ± 9.7	10.5 ±10.4
Median	6	5	7
Range	0 – 30	0 – 29	0 – 30
Oral Status Likely to Affect Food Intake (n=297)	(297)	(95)	(202)
	68.0 (202)	34.4 (55)	65.6 (105)
Dysphagia Risk	(353)	(104)	(249)
	59.8 (211)	71.2 (74)	55.0 (137)

Continued…

Three-day Average Ed-FED Score[f]	(349)	(104)	(245)
Mean ± SD	13.4 ± 2.5	13.0 ± 2.5	13.5 ± 2.5
Median	12.7	12.3	13.0
Eating Assistance at Meals[g]	(349)	(104)	(245)
Never	61.0 (213)	65.4 (68)	59.2 (145)
Sometimes	18.1 (63)	17.3 (18)	18.4 (45)
Often	20.9 (73)	17.3 (18)	22.4 (55)
Average Duration of Each Meal (minutes)	(351)	(104)	(247)
Mean ± SD	41.2 ± 13.8	39.6 ± 13.6	41.9 ± 14.0
Median	41.0	39.9	41.3
Range	12.1 – 89.1	12.1 – 75.6	13.6 – 89.1
Energy (kcal) Intake per Kilogram of Bodyweight	(348)	(102)	(246)
Mean ± SD	25 ± 8	24 ± 7	26 ± 9
Median	24	22	24
Range	2 – 90	9 – 45	2 – 91
CI	9; 42	10; 38	9; 43
Average Energy Intake (kcal)	(353)	(104)	(249)
Mean ± SD	1546 ± 411	1702 ± 425	1482 ± 387
Median	1544	1746	1482
Range	131 – 2788	606 – 2783	673 – 2259
CI	742; 2351	870; 2534	722; 2241
Proportion of Residents Higher/Lower Than 30 kcal/kg of Bodyweight	(348)	(102)	(246)
< 29.99	73.3 (255)	79.4 (81)	70.4 (174)
> 30.00	26.7 (93)	20.6 (21)	29.3 (72)

[a]Confidence Interval (lower; upper)

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

[c]Some participants may be represented in multiple categories

[d]All diagnoses were pre-existing and gathered from the resident's medical chart.

[e]Cognitive impairment was assessed using the CPS for this research study

[f]Ed-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

[g]Categorized from Question b on the Ed-FED questionnaire (does the resident require physical help with eating)

Resident Level Factors Associated with Energy Intake

A multiple regression (Appendix M) and a backwards stepwise regression (Appendix N) were both originally used to assess resident level factors associated with energy intake. After completion, results from both models were similar. The final model reflects the results generated from the backwards stepwise regression. Initially, fourteen variables were used in the model and seven significant variables remained in the final model (Table 4.2), which included: age ($p < 0.001$), sex ($p < 0.001$), dysphagia risk ($p = 0.031$), total number of vitamin/mineral supplements ($p = 0.001$), total MNA-SF score ($p = 0.002$), total Ed-FED score ($p = 0.001$), cognitive impairment ($p = 0.007$) and eating assistance received at meals ($p = 0.052$). These seven remaining variables together accounted for 27.0% of the variability for energy intake.

Table 4.2. Resident Level Factors Associated with Energy Intake in Residents with Cognitive Impairment

Predictor	Unstandardized B	Standard Error	p value
Age	-13.35	2.42	<0.001***
Sex[a]	152.12	41.63	<0.001***
Dysphagia Risk[b]	84.08	38.71	0.031**
Total Number of Vitamin/Minerals	53.33	16.40	0.001***
Total MNA-SF Score[c]	26.75	8.44	0.002***
Total Ed-FED Score[d]	-40.04	12.49	0.001***
Cognitive Impairment[e]			0.007***
Moderate	*		
Moderate/Severe	55.94	64.17	
Severe	130.54	48.52	
Very Severe	146.31	71.60	
Eating Assistance Received at Meals			0.05**
Never/Rarely[f]	*		
Sometimes	-116.18	59.49	
Often	76.60	80.95	

Note: Final model of backwards regression (Appendix M - Full Model).
y intercept = 2764.03, Adjusted R^2 = 0.27
* Referent Category
  ** Significant at the 0.05 level
*** Significant at the 0.01 level

[a]0 = female, 1 = male
[b]0 = No, 1 = Yes (dysphagia risk is a composite variable and defined as a) already on thickened fluids, or b) failed STAND or c) coughing or choking observed at meals by M3 researchers)
[c]Score ranges from 0-14, where a higher score indicates better nutritional status
[d]Score ranges from 10-30, where 10 = no observation of eating challenges, and 30 = the highest observation of eating challenges
[e]Cognitive Performance Scale Score: 3 = moderate, 4 = moderate/severe, 5 = severe, 6 = very severe
[f]Categorized from Question b on the Ed-FED questionnaire (Does the resident require physical help with eating?)

Eating Challenges and Eating Assistance Factors Associated with Energy Intake

Independent samples t-tests were conducted to examine which eating assistance factors were associated with energy intake. Nine significant relationships were found and are displayed in Table 4.3. From the Ed-FED questionnaire, residents who "never" required close supervision while eating had higher average energy intake (M = 1648, SD = 372) compared to residents who "sometimes/often" required (M = 1489, SD= 403), t (347) = 3.77, p < 0.001. Those who "never" required physical help while eating had higher energy intake (M = 1647, SD = 364) compared to those who "sometimes/often" required physical help (M = 1460, SD = 410, t (347) = 4.51, p < 0.001. Residents who "never" left food on the plate at the end of the meal had higher energy intake (M = 1808, SD = 349) compared to the "sometimes/often" category (M = 1505, SD = 387), t (347) = 5.64, p < 0.001. Residents who "never" refused to eat had higher energy intake (M = 164, SD = 380) in comparison to those who "sometimes/often" refuse to eat (M = 1427, SD = 408), t (347) = 4.13, p < 0.001. Those who "never" turn his/her head away while being fed had higher energy intake (M = 1576, SD = 394) compared to residents who "sometimes/often" did (M = 1454, SD = 404), t (347) = 2.05, p = 0.041.

Three significant effects were found from the Other Eating Behaviours section of the meal observation form. Residents who "never" received close supervision with eating had higher energy intake (M = 1640, SD = 366) than those who "sometimes/often" received close supervision (M = 1492, SD = 410), t (347) = 3.54, p < 0.001. Residents who "never" received verbal prompting to eat had higher intake (M = 1633, SD = 387) than those who "sometimes/often" received (M = 1514, SD = 398), t (347) = 2.74, p = 0.007. Additionally, those who "never" lacked energy to eat had higher energy intake (M = 1605, SD = 379) than the

residents who only "sometimes/often" lacked energy (M = 1484, SD = 416), t (347) = 2.80, p = 0.005.

One significant relationship was found from the Mealtime Relational Care Checklist (M-RCC) section. Residents who were "sometimes/often" assisted by staff using unsafe practices (e.g., staff standing while assisting, resident in a reclined position, fast paced assistance) had higher energy intake (M = 1597, SD = 368) as opposed to those who were "never" assisted in this way (M = 1437, SD = 445), t (195) = -2.43, p = 0.016.

Additionally, a linear regression was carried out to identify eating assistance factors associated with energy intake (Table 4.4.). The results showed no significant relationship between relational behavioural scale (RBS) scores and energy intake.

Table 4.3. Eating Challenges and Eating Assistance Factors Associated with Energy Intake in Residents with Cognitive Impairment

Ed-FED[a]	Category[b]	N	Mean	SD	t	df	p value
Does the resident require close supervision while feeding/eating?	Never[c]	152	1648	372	3.77	347	<0.001**
	Sometimes[d]	197	1489	403			
Does the resident require physical help while feeding?	Never	183	1647	364	4.51	347	<0.001**
	Sometimes	166	1460	410			
Is there spillage while feeding/eating?	Never	114	1560	446	0.06	347	0.955
	Sometimes	235	1557	373			
Does the resident tend to leave food on the plate at the end of the meal?	Never	61	1808	349	5.64	347	<0.001**
	Sometimes	288	1505	387			
Does the resident ever refuse to eat?	Never	244	1614	380	4.13	347	<0.001**
	Sometimes	105	1427	408			
Does the spit out his/her food?	Never	325	1566	399	1.34	347	0.180
	Sometimes	24	1453	360			
Is there spillage of food out of the mouth?	Never	231	1554	386	-0.30	347	0.766
	Sometimes	118	1567	420			
Does the resident turn his/her head away while being fed?	Never	297	1576	394	2.05	347	0.041*
	Sometimes	52	1454	404			
Does the resident refuse to open his mouth?	Never	277	1575	394	1.58	347	0.116
	Sometimes	72	1493	407			
Does the resident refuse to swallow?	Never	333	1560	393	0.38	347	0.702
	Sometimes	16	1521	494			

Continued…

Other Eating Behaviours	Category	N	Mean	SD	t	df	p
Does the resident receive close supervision with feeding/eating?	Never	156	1640	366	3.54	347	<0.001**
	Sometimes	193	1492	410			
Does the resident receive verbal prompting to eat?	Never	130	1633	387	2.74	347	0.007**
	Sometimes	219	1514	398			
Does the resident use adaptive utensils to eat?	Never	282	1545	403	-1.25	347	0.214
	Sometimes	67	1612	369			
Does the resident appear distracted?	Never	254	1569	403	0.82	347	0.415
	Sometimes	95	1530	383			
Does the resident treat the food in an unusual way?	Never	283	1554	397	-0.42	347	0.672
	Sometimes	66	1577	400			
Does the resident lack energy to eat?	Never	214	1605	379	2.80	347	0.005**
	Sometimes	135	1484	416			
Does the resident appear to have chewing problems?	Never	296	1550	405	-0.85	347	0.395
	Sometimes	53	1601	354			
Does the resident cough during the meal?	Never	204	1543	387	-0.82	347	0.415
	Sometimes	145	1579	412			
Does the resident choke during the meal?	Never	334	1556	398	-0.50	347	0.620
	Sometimes	15	1608	394			

Mealtime Relational Care Checklist	Category	N	Mean	SD	t	df	p
Waited for assistance with food in front of them	Never	149	1510	455	0.007	199	0.995
	Sometimes	52	1509	459			
Had an apron or washcloth used to wipe their mouth	Never	122	1488	449	-1.23	198	0.220
	Sometimes	78	1569	464			
Stopped being assisted, staff left	Never	103	1497	434	0.18	198	0.855
	Sometimes	97	1485	436			
Was assisted at the same time as other residents	Never	134	1465	441	-1.10	197	0.274
	Sometimes	65	1537	417			
Was rushed when assisted to eat	Never	162	1457	428	-1.92	195	0.057
	Sometimes	35	1609	418			
Was not told what they were eating when assisted	Never	109	1462	462	-0.84	196	0.404
	Sometimes	89	1514	385			
Assisted by staff using unsafe practices	Never	139	1437	445	-2.43	195	0.016**
	Sometimes	58	1597	368			

[a]Ed-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
[b]Summarized meal observation form variables over three days of observation of eating assistance
[c]Behaviour never/rarely displayed at any meal
[d]Behaviour displayed sometimes/often during at least one meal
  * Significant at the 0.05 level
** Significant at the 0.01 level

Table 4.4. Eating Assistance Factors Associated with Energy Intake in Residents with Cognitive Impairment (n= 93)

RBS Items[a]	R^2	*F* Ratio	df	Unstandardized B	p value
Stays with resident during the care episode	0.052	5.07	1, 92	78.91	0.087
Altering the pace of care	0.007	0.66	1, 92	30.23	0.785
Focus of care	0.002	0.184	1, 92	-12.25	0.669

[a]RBS items were transformed to continuous variables from three-item subscales with a 7-point semantic rating scale

Discussion

The objectives of the current research study were to identify resident level factors related to energy intake, and to examine eating assistance factors associated with energy intake in LTC residents with cognitive impairment.

Energy intake was generally low for residents with cognitive impairment with an average energy intake of 25 kcal/kg of bodyweight. Older adults residing in LTC are considered to be sedentary and under moderate stress, therefore an average of 25-35 kcal/kg of bodyweight should be consumed (Bales & Ritchie, 2009). Considering this information, the accepted caloric requirement was set to 30 kcal/kg (average) for this study. Overall, 73.3% of residents were below this recommendation with an average intake of 25 kcal/kg. A research study by Bernstein et al. (2002), found similar results where the average energy intake was 25 kcal/kg of bodyweight. Akner & Floistrup (2003) found significantly higher intakes with an average of 29 kcal/kg of bodyweight. These higher intakes were likely due the inclusion of a younger sample ranging from 51-96 years old (Akner & Floistrup, 2003).

The average energy intake was 1546 kcal, with 1481 kcal for women and 1701 kcal for men. According to the Government of Canada (2011), the average estimated energy requirements for sedentary women and men 71 years old and over is 1550 and 2000 kcal, respectively (Government of Canada, 2011). The M3 study did not measure the activity level of residents therefore the results from this study could not be compared to the Dietary Reference Intakes. Research studies have found that average energy intakes range from 1205-1640 kcal (Kulnik & Elmadfa, 2008; Suominen et al., 2004; Shatenstein & Ferland, 2000; Akner & Floistrup, 2003; Mila Villarroel et al., 2012). Overall, the results show that residents with

cognitive impairment are not consuming adequate energy which places them at risk for poorer nutritional health and quality of life (Laque et al., 2000).

The total number of vitamins/minerals prescribed ranged from 0-6, with an average of 1.3 per resident. More vitamins/minerals prescribed per resident was significantly associated with higher energy intake in residents with cognitive impairment. When vitamins/minerals are supplemented, older adults exhibit less nutritional deficiencies, and have improved immune cell function (Wells & Dumbrell, 2006). Several studies agree that vitamins/minerals supplementation may improve nutritionally inadequate LTC diets (Dunne & Dahl, 2007; Wendland, Greenwood, Weinburg & Young, 2003). When multiple medications and supplements are taken concurrently, polypharmacy may occur leading to adverse drug reactions and can be detrimental to older adults in LTC (Viveky et al., 2012). Due to issues such as polypharmacy and high administrative costs not all residents in LTC are prescribed vitamin/mineral supplements.

Although oral health was not significantly associated with energy intake, 68% of the residents did have poor oral health status that was deemed likely to affect food intake. Zenthöfer et al. (2017) found greater oral health issues are common among persons with cognitive impairment. In the current study, the average total number of natural teeth ranged from 0 -30, with an average of 10 teeth. Research has shown that poor oral health and oral health problems (e.g., missing teeth) are associated with malnutrition (Ziebolz et al., 2017; Soini, Muurinen, Routasalo, & Sandelin, 2006). Furthermore, the results of the present study showed that 28% of the residents with cognitive impairment had issues with the fit of their dentures (upper or lower). Other studies showed slightly higher results where 34 – 50% of residents suffered from loose or ill-fitting dentures, or dentures needed to be replaced (Porter et al., 2015; Morley et al., 1995).

Poor oral health status may cause pain and discomfort which makes it extremely difficult to consume foods such as fruits and vegetables (Marshall, Warren, Hand, Xie, & Stumbo, 2002; Lamy, Mojon, Kalykakis, Legrand & Butz-Jorgenson, 1999). Research suggests that there is an association between oral health/inflammation and systemic health, which may play a role in the development of diseases such cardiovascular, type 1 and 2 diabetes mellitus or osteoporosis (Soini et al., 2006; Touger-Decker & Mobley., 2013). Poor oral status has also been shown to be associated with oral inflammation, which may decrease of muscle strength in the mouth as well as handgrip strength, increasing the risk of disability in older adults (Hämäläinen, Rantanen, Keskinen, & Meurman, 2004; Soini et al., 2006). Mealtime staff should be aware of what to look for in regards to specific individualized oral health issues that may cause discomfort during mealtimes. Staff plays a key role identifying oral health issues and referring residents to dentists (Van Lacker et al., 2012). A multi-disciplinary team including dental health professionals are needed in LTC with regular check-ups and monitoring.

Lower energy intake was significantly associated with being female and older age. Similar results were found in previous studies that included both cognitively intact and cognitively impaired residents (Woo et al., 2005; Blaum, Fries & Fiatarone, 1995). In the study by Lee et al. (2001) lower intake was found in cognitively impaired women. These findings may have been due to the demographics in LTC as the majority of residents residing in LTC are women (Chang & Roberts, 2011). As woman have a higher life expectancy and tend to live longer than men (Statistics Canada, 2016b).

The present study showed that having a higher MNA-SF total score (better nutritional status) was significantly associated with increased energy intake. Similarly, Suominen et al., (2005) found that residents with lower MNA-SF scores consumed less food. Multiple factors

including the loss of lean body mass are found to reduce intake and is often associated with malnutrition in older adults (Verbrugghe et al., 2013). About half of the residents (52%) were at risk of malnutrition according to the MNA-SF. Similar results were found in Ziebolz et al. (2017) as 52% were assessed for being at nutritional risk, however this study did not solely include residents with cognitive impairment. It is important to recognize residents who are at risk of malnutrition and provide them with immediate and individually tailored nutritional support to prevent further health declines (Suominen et al., 2004).

Among the residents with cognitive impairment, 59.8% were at risk of dysphagia. This finding is similar to the prevalence rate of 52.7% found by Park et al. (2013). Dysphagia risk was found to be a significant predictor of higher energy intake in cognitively impaired residents. This may be explained by those who were at risk of dysphagia were likely receiving eating assistance, being monitored and supervised. Residents who are at risk of dysphagia often need specific strategies and supervision at mealtimes to facilitate safe and adequate oral intake. Previous studies found that increased intake at meals was associated with eating assistance in older adults with dysphagia in an acute care hospital (Wright, Cotter and Hanson, 2008; Manning et al., 2012). An eating assistance intervention carried out in a LTC home in China found better eating/swallowing ability and improved eating compliance among cognitively impaired residents with dysphagia (Chen et al., 2016). Manning et al. (2012) argue that increased intake may be due to the fact that eating assistants often target vulnerable residents at mealtimes such as those who are malnourished and/or have dysphagia. Diet modifications such as moving from a regular diet to a softer texture (e.g., pureed or minced) is often used to help control dysphagia symptoms and has been known to increase intake in residents (Holmes, 2008). In the present study, 58.9% of residents had a modified diet texture other than a "regular" diet, which may have also contributed

to higher intakes. A research study found higher intake in residents with dysphagia when their diet was modified (Germain, Dufrense & Gray-Donald, 2006). Several negative consequences have been found from unrecognized dysphagia such as providing inappropriate foods/textures, not being positioned properly at mealtimes and given large unmanageable spoonful of food that were forced to eat quickly (Kayser-Jones, & Pengilly, K, 1999). It is essential that those at risk of dysphagia are recognized and given the support they need during mealtimes.

In the present study, increased food intake was associated with greater severity in cognitive impairment, which is likely due to the fact that these residents received total eating assistance. Residents with more significant cognitive impairment commonly require a greater amount of eating assistance (Simmons et al., 2001, Simmons & Schelle, 2003). These results agree with Steele et al. (1997), who found that residents residing in cognitive impairment units had highest consumption levels due to the higher levels of eating assistance provided at meals. Additionally, Verbrugge et al (2013) also found that greater severity in cognitive status is commonly associated with malnutrition in residents. The relationship between cognitive impairment and nutritional risk is multifaceted and tends to be a reciprocal problem (Verbrugge et al., 2013). Although lower food intake was found in persons with significant cognitive impairment, cognitive impairment itself did not automatically lead to lower intake. Similarly, Berkhout, Cools & Houwelingen (1998) the eating challenges associated with cognitive decline can lead to weight loss in residents.

Greater eating challenges (higher Ed-FED scores) were associated with lower intake in residents with cognitive impairment. There is an extensive amount of research that support this finding as eating difficulties are common and often inevitable among residents with cognitive impairment (Lin et al., 2009; Steele et al., 2007; Berkhout et al., 1998; Blaum et al., 1995).

Eating difficulties typically progress as the severity of impairment increases (Liu et al., 2014, Steel et al., 1997). Several eating assistance factors and eating challenges were associated with lower energy intake in this study, which included: residents who left food on their plate, refused to eat, turned head away while being assisted and lacked energy to eat. Factors such as refusing to eat may be due to the way the food looks, smells or culture preferences but it likely due to eating assistance factors (Chang & Roberts, 2008). When assisting a person with cognitive impairment it is fundamental to match the level of assistance to the needs and capabilities of the resident (Sloane et al., 2008). Individual needs in residents vary as everyone experiences challenges in a different way. It may be beneficial to create individualized care plans to address specific problems related to eating difficulties in residents with cognitive impairment.

Total eating assistance was found to overcome eating difficulties that are associated with cognitive impairment. However, occasional eating assistance is not sufficient to overcome eating challenges. Residents who occasionally require assistance during mealtimes are likely on the cusp of losing their ability to eat independently. They may not seem as though they need as much attention as those requiring total eating assistance, but they need to be supported during mealtimes. The study by Lin et al. (2010), found that residents with moderate dependency could eat independently with appropriate staff, but were not given any eating assistance and were commonly ignored by staff resulting in lower food intake. An eating assistance intervention carried out by Simmons et al. (2001) found a high rate of residents did not benefit/respond to implementation of eating assistance at meals as these specific residents were able to eat independently and preferred to do so. Furthermore, they suggested that the most beneficial method to help these specific residents would be an eating assistance trial intervention to identify unresponsiveness to assistance rather than relying on individual resident characteristics

(Simmons et al., 2001). Additionally, Steele et al. (1997) found that early signs of declining ability to eat independently were not commonly recognized, which suggests greater priority needs to be placed on earlier detection of residents declining ability to eat. Physical capability highly influences ability to perform eating tasks independently (Liu et al., 2016). Therefore, routinely screening resident's physical capability and creating individualized plans may help improve eating performance and increase intake. It is evident that greater effort into supporting residents on the cusp of losing their capacity to eat is required.

In the present study, those who required close supervision while eating had lower energy intake when compared between groups (sometimes often vs. never). Additionally, it was found that residents who received supervision also had lower intake when compared between groups. It is not known if these specific residents received eating assistance. Nevertheless, these findings demonstrate that residents who require and/or receive supervision may not be getting the beneficial care that they need during mealtimes. If eating assistance was provided it may have positively improved intake. Failure in identifying resident with poor oral intake puts the resident at nutritional risk. Therefore, physical capability of the resident should be routinely assessed in residents who require supervision to improve their nutritional needs.

An unexpected finding from the present study was that residents with cognitive impairment who were assisted by staff using unsafe practices (staff standing while assisting, resident is hunched over or in a reclined position, spoon or fork is overloaded and/or assistance is very fast paced) had higher average energy intake. This finding should be interpreted cautiously as there are many factors that influence eating practices. Even though it seems negative that this practice may have occurred under special circumstances, no harm was intended. Out of 197 residents requiring eating assistance, 30% residents were assisted by staff using unsafe practices.

It is essential for residents to receive an adequate amount of nutritious food; however, it should only be provided with a level of assistance necessary to eat in a safe and dignified manner (Kayser-Jones, 1997). Quick paced assistance may have resulted in a higher proportion of food consumed. Residents with cognitive impairment require longer periods of time to eat due to their eating difficulties and inadequate staffing in LTC makes it difficult to take care of everyone's individual needs during meals (Chang & Lin, 2005; Durkin, Shotwell, & Simmons, 2014). Chang et al. (2005) suggests that it may be necessary to increase time requirements for staff to safely assist with meals. It has been shown that to promote food intake and independence during meals, an average of 42 minutes per resident per meal is required for adequate eating assistance (Simmons et al., 2008). Research has suggested that encouraging family/volunteers to be involved with mealtime assistance may be an effective way to help alleviate LTC staffing demands and relieves pressures experienced by mealtime care staff (Durkin et al., 2014). If family/volunteers are providing eating assistance to residents, they should be offered appropriate training and support to ensure the safety of the individual receiving the assistance (Green et al., 2011).

The Relational Behavioural Scale (RBS) was evaluated with energy intake and no significant relationships were found. This tool was only used for residents who required total eating assistance. The RBS proved to be an insufficient tool for measuring eating assistance, as all scores were very high which created a ceiling effect. Ceiling effects happen when the highest possible score (or close to) is observed which significantly decreases the likelihood that the person's true level of functioning was accurately measured (Taylor, 2010).

Limitations

A few limitations of this study need to be considered when interpreting the findings. The LTC facilities included in the M3 study were purposively selected; therefore, the results of this study may not be representative of all Canadian LTC facilities. Some data collection measures were not possible due to cognitive capacity and/or behavioral issues making data collection challenging (e.g., oral health assessment and anthropometric). Eating assistance at meals was determined by the question from the Ed-FED questionnaire which could have influenced that number of residents in each category. The present study excluded residents with mild cognitive impairment (CPS score < 3). As a result, some residents who experienced difficulties at mealtimes due to cognitive decline may not have been included in this study.

Conclusion

The findings of this study illustrate that eating challenges and eating assistance factors are important predictors of food intake. Resident level factors associated with energy intake in residents with cognitive impairment include: older age, greater eating challenges, being female, more vitamins prescribed, higher MNA score, dysphagia risk, higher CPS score, and frequently receiving eating assistance at meals. Interventions to support eating independence and address eating challenges are needed to promote adequate food intake for persons with cognitive impairment in LTC.

CHAPTER 5

GENERAL DISCUSSION

The objectives of the current research study were to identity resident level factors related to energy intake and to examine eating assistance factors associated with energy intake in LTC residents with cognitive impairment. This current study utilized secondary data from the Making the Most of Mealtimes (M3) study. The results from this study are presented in the previous manuscript (Chapter 4).

The M3 study is a national Canadian study that used multi-site, cross sectional design to examine the key drivers of food and fluid intake in LTC homes. The study is novel as it includes rigorous methodology, a comprehensive collection of data across diverse LTC homes, and a large sample size of residents; it is the first of its kind in the world.

The first objective of this study was to identify resident level factors associated with energy intake of LTC residents with cognitive impairment. Overall, energy intake was relatively low for persons with cognitive impairment; however, cognitive impairment itself may not have led to lower intake. Older age and being female were associated with lower energy intake. Having poor nutritional status and consuming less vitamin and mineral supplements were associated with lower intake. Although oral health was not significantly associated with energy intake, close to three-quarters of the residents had poor oral health status that was deemed likely to affect food intake. Poor oral health may influence eating difficulties and assistance required at meals. Therefore, encouraging good oral hygiene practices and routinely examining oral health is needed. Dysphagia risk was found to be a significant predictor of higher energy intake, which can be explained by the monitoring and eating assistance received at meals. Eating challenges and eating assistance are important predictors of food intake in residents with cognitive

impairment. Increased energy intake with greater severity of cognitive impairment was observed and this may be due to the provision of total eating assistance at mealtimes. The severity of cognitive impairment is a significant predictor of eating challenges, which reflects the needs of residents at mealtimes. Individualized care plans need to be developed to match the needs and capabilities of residents. Total eating assistance was found to overcome eating difficulties (e.g., food and utensil recognition) that were associated with cognitive impairment; however, occasional eating assistance was not sufficient to modulate eating challenges.

The second objective of this study was to examine eating assistance factors associated with energy intake of LTC residents with cognitive impairment. Eating assistance factors were related to lower energy intake when compared between those requiring eating assistance (sometimes/often vs. never). Factors included leaving food on the plate at the end of the meal, receiving verbal prompting to eat, lacking energy to eat, refusing to eat, and turning their head away while being assisted. Residents who required close supervision and received supervision had lower intake when compared between groups. Residents who require supervision should be closely monitored by staff as they may require eating assistance rather than only being supervised. An unexpected finding was that higher energy intake was found in residents who were assisted by staff using unsafe practices likely due to receiving eating assistance. Unsafe practices may have been used due to a lack of staff available at meals therefore over assisting (e.g., overloading spoon) or assisting at a rapid pace was carried out to save time. This emphasizes the need to address staffing issues as well as the quality of care at mealtimes.

Strengths

The M3 study has consistent methodology and a large sample size including residents with cognitive impairment. It used consistent and quality data collection with rigorous training of

staff. The data was collected prospectively with validated tools. This current study addresses the gap in the literature about the eating assistance factors that influence energy intake of LTC residents with various levels of cognitive impairment. Research involving residents with cognitive impairment is generally limited and may be related to receiving consent and level of impairment of the individual.

Limitations

The eight LTC homes included in the M3 study were purposively sampled; therefore, results of this study may not be considered representative of all Canadian LTC facilities. As the analyses in the present study were based on secondary data, there were no additional data collected. Due to the cross-sectional nature of the data, only associations can be inferred from the results. The observational collection of data may have introduced to some bias and poor categorization of specific measures used such as the Ed-FED questionnaire. It was difficult to obtain data for all snacks between meals as there were many care staff involved and obtaining consistent involvement was difficult. Not having accurate information on foods consumed between meals could have altered the total energy intake of residents. Estimated energy requirements could not be calculated as physical activity information was not collected. The relationship between energy intake and estimated energy requirements may have enhanced this study as residents with cognitive impairment have specific energy needs related to due to behavioral issues (e.g., wandering, pacing). Residents with mild cognitive impairment (CPS score < 3) were excluded from this study. Consequently, some residents who experienced difficulties at mealtimes due to cognitive decline may not have been included in this study.

Implications of Findings

Better strategies are needed to support residents on the cusp of losing their ability to eat independently. Consistently providing these residents with assistance they require at meals, may help modulate eating challenges that affect persons with cognitive impairment. Eating assistance requirements should be routinely assessed as eating challenges in residents with cognitive impairment may vary from day to day. The quality of care that is provided during mealtimes in LTC is important as malnutrition is prevalent. When assistance is provided at meals it must be carried out in a safe and dignified manner to promote adequate intake and improve quality of life of residents with cognitive impairment. As poor food intake was found in residents with greater severity in cognitive impairment, future research specifically tailored for these individuals is required. To investigate cause and effect of energy intake and eating assistance, future longitudinal studies may be needed. Overall, this study may help address many of the current research gaps and provide a basis for future cost-effective solutions to help alleviate poor food intake in LTC.

Policy

The results of this study impact policy in LTC facilities in Canada. Training programs should be provided for all LTC staff allowing all positions to safely assist residents at mealtimes to alleviate staffing demands. Anyone assisting residents to eat at mealtimes must be provided with adequate training to ensure consistency in service, safe procedures are applied, and in a comforting and dignified manner. Individual assessments focusing on resident's ability to eat independently should be routinely assessed. Additionally, mealtime audits should be completed regularly to ensure safe practices are being carried out at mealtimes.

Take Away Points

1. What is the average energy (kcal/kg bodyweight) in LTC residents with cognitive impairment? What proportion of LTC residents with cognitive impairment do not meet the accepted energy intake of 30 kcal/kg bodyweight?

   - LTC residents with cognitive impairment consumed an average of 25.3 kcal/kg of bodyweight

   - Approximately three quarters (73.3%) of the residents with cognitive impairment did not meet the accepted energy intake of 30 kcal/kg of bodyweight

2. What factors at the resident level are independently associated with energy intake (kilocalories) in LTC residents with cognitive impairment?

   - Older age and being female was independently associated with lower energy intake in residents with cognitive impairment

   - Greater severity in cognitive impairment was independently associated with higher energy intake in residents with cognitive impairment

   - Residents who only "sometimes" received eating assistance at meals was independently associated with lower energy intake in residents with cognitive impairment

   - Consuming more vitamins and mineral supplements was independently associated with higher energy intake in residents with cognitive impairment

   - Having a higher MNA-SF total score (better nutritional status) was independently associated with higher energy intake in residents with cognitive impairment

   - Being at risk of dysphagia was independently associated with higher energy intake in residents with cognitive impairment

3. What eating assistance factors are associated with energy intake (kilocalories) in LTC residents with cognitive impairment?

- Requiring close supervision at meals was related to lower energy intake

- Requiring physical help (eating assistance) at meals was associated with lower energy intake

- Leaving food on the plate at the end of a meal was associated with lower intake

- Refusing to eat was associated with lower intake

- Resident turning their head away while being assisted was related to lower energy intake

- Receiving verbal prompting to eat was related to lower energy intake

- Lacking energy to eat was associated with lower energy intake

- Receiving close supervision during mealtimes was related to lower energy intake

- Being assisted by staff using unsafe practices was associated with higher energy intake

Summary

The results of this study demonstrate that eating challenges and eating assistance factors are important predictors of food intake. Several modifiable areas of mealtime care were identified that can likely be addressed through the development of tailored interventions for residents on the cusp of losing their eating independence as well as improved policy guidelines for staff and volunteers.

References

Abdelhamid, A., Bunn, D., Copley, M., Cowap, V., Dickinson, A., Gray, L., ... & Poland, F.
(2016). Effectiveness of interventions to directly support food and drink intake in people
with dementia: systematic review and meta-analysis. *BMC Geriatrics*, *16*(1), 1.

Akner, G., & Floistrup, H. (2003). Individual assessment of intake of energy, nutrients and water
in 54 elderly multidiseased nursing-home residents. *Journal of Nutrition Health and
Aging*, *7*(1), 2-12.

Alzheimer's Association. (2017a). Dementia numbers in Canada. Retrieved September 17, 2010,
from: http://www.alzheimer.ca/en/Home/About-dementia/What-is-dementia/Dementia-
numbers

Alzheimer's Association. (2017b). Foods, eating and alzheimer. Retrieved November 9, 2017
from: https://www.alz.org/care/alzheimers-food-eating.asp

Alzheimer's Association. (2001). Managing nutrition in dementia care: a supportive approach for
caregivers. *Alzheimer's Association- Western New York Chapter,* 1-30.

Alzheimer Society of Canada (2017). Dental care. Retrieved October 13, 2017, from:
http://www.alzheimer.ca/en/Home/Living-with-dementia/Day-to-day-living/Personal-
care/Dental-care

Alzheimer Society of Canada (2015). Normal aging vs. Dementia. Retrieved January 4, 2016,
from: http://www.alzheimer.ca/en/About-dementia/What-is-dementia/Normal-aging-vs-
dementia

Alzheimer Society of Canada. (2010). Rising tide: the impact of dementia on canadian society.

Retrieved from:

http://www.alzheimer.ca/sites/default/files/Files/national/Advocacy/ASC_Rising_Tide_F

ull_Report_e.pdf

Amella, E. J. (1999). Factors influencing the proportion of food consumed by nursing home

residents with dementia. *Journal of the American Geriatrics Society*, *47*(7), 879-885.

Amella, E. J. (2002). Resistance at mealtimes for persons with dementia. *Journal of Nutrition*

Health Aging. *6*(2)

American Dietetic Association. (2005). Liberalization of the diet prescription improves quality

of life for older adults in long-term care. *Journal of the American Dietetic Association,*

105(12), 1955-1965.

Aselage, M. B. (2010). Measuring mealtime difficulties: eating, feeding and meal behaviours in

older adults with dementia. *Journal of Clinical Nursing*,*19*(56), 621-631.

Bahat, G., Tufan, F., Saka, B., Akin, S., Ozkaya, H., Yucel, N., ... & Karan, M. A. (2012). Which

body mass index (BMI) is better in the elderly for functional status? *Archives of*

gerontology and geriatrics, *54*(1), 78-81.

Bales, C. W., & Ritchie, C. S. (Eds.). (2009). *Handbook of clinical nutrition and aging*. New

York, NY, USA: Humana Press.

Bauer, J., Capra, S., & Ferguson, M. (2002). Use of the scored patient-generated subjective

global assessment (PG-SGA) as a nutrition assessment tool in patients with

cancer. *European Journal of Clinical Nutrition*, *56*(8), 779.

Beck, A. M., & Ovesen, L. (1998). At which body mass index and degree of weight loss should

    hospitalized elderly patients be considered at nutritional risk? *Clinical Nutrition*, *17*(5),

    195-198.

Bell, C. L., Tamura, B. K., Masaki, K. H., & Amella, E. J. (2013). Prevalence and measures of

    nutritional compromise among nursing home patients: weight loss, low body mass index,

    malnutrition, and feeding dependency, a systematic review of the literature. *Journal of*

    the American Medical Directors Association, *14*(2), 94-100.

Berkhout, A. M., Cools, H. J., & Van Houwelingen, H. C. (1998). The relationship between

    difficulties in feeding oneself and loss of weight in nursing-home patients with

    dementia. *Age and Ageing*, *27*(5), 637-641.

Bernstein, M. A., Tucker, K. L., Ryan, N. D., O'neill, E. F., Clements, K. M., Nelson, M. E., &

    Singh, M. A. F. (2002). Higher dietary variety is associated with better nutritional status

    in frail elderly people. *Journal of the American Dietetic Association*, *102*(8), 1096-1104.

Blaum, C. S., Fries, B. E., & Fiatarone, M. A. (1995). Factors associated with low body mass

    index and weight loss in nursing home residents. *The Journals of Gerontology Series A:*

    Biological Sciences and Medical Sciences, *50*(3), M162-M168.

Boström, A. M., Van Soest, D., Kolewaski, B., Milke, D. L., & Estabrooks, C. A. (2011).

    Nutrition status among residents living in a veterans' long-term care facility in Western

    Canada: a pilot study. *Journal of the American Medical Directors Association*, *12*(3),

    217-225.

Bunn, D. K., Abdelhamid, A., Copley, M., Cowap, V., Dickinson, A., Howe, A., ... & Smithard, D. (2016). Effectiveness of interventions to indirectly support food and drink intake in people with dementia: Eating and Drinking Well in Dementia (EDWINA) systematic review. *BMC Geriatrics*, *16*(1), 1.

Canadian Nurses Association (2016). Dementia in canada: Recommendations to support care for canada's aging population. Retrieved from: https://www.cna-aiic.ca/~/media/cna/page-content/pdf-en/dementia-in-canada_recommendations-to-support-care-for-canadas-aging-population.pdf?la=en

Canadian Institute for Health Information. (2011). Health care in canada: A focus on seniors and aging. Retrieved from https://secure.cihi.ca/free_products/HCIC_2011_seniors_report_en.pdf

Canadian Institute for Health Information. (2010). Caring for seniors with alzheimer's disease and other forms of dementia. Retrieved from http://www.alzheimer.ca/ns/~/media/Files/on/PPPI%20Documents/CIHI_Report_Dementia_Aug_2010_EN.pdf

Carrier, N., West, G. E., & Ouellet, D. (2007). Cognitively impaired residents' risk of malnutrition is influenced by foodservice factors in long-term care. *Journal of Nutrition for the Elderly*, *25*(3-4), 73-87

Cartwright, A. (2013). Time to recognise dysphagia as a contributing factor to malnutrition. *British Journal of Community Nursing, 18*, S6-S6.

Chang, C. C., & Lin, L. C. (2005). Effects of a feeding skills training programme on nursing

      assistants and dementia patients. *Journal of Clinical Nursing*, *14*(10), 1185-1192.

Chang, C. C., & Roberts, B. L. (2008). Feeding difficulty in older adults with dementia. *Journal*

      of Clinical Nursing, *17*(17), 2266-2274.

Chang, C. C., & Roberts, B. L. (2011). Malnutrition and feeding difficulty in Taiwanese older

      with dementia. *Journal of Clinical Nursing*, *20*(15-16), 2153-2161.

Chen, L. L., Li, H., Lin, R., Zheng, J. H., Wei, Y. P., Li, J., ... & Chen, H. Y. (2016). Effects of a

      feeding intervention in patients with Alzheimer's disease and dysphagia. *Journal of*

      Clinical Nursing, *25*(5-6), 699-707.

Desbrow, B., Bauer, J., Blum, C., Kandasamy, A., McDonald, A., & Montgomery, K. (2005).

      Assessment of nutritional status in hemodialysis patients using patient-generated

      subjective global assessment. *Journal of Renal Nutrition*, *15*(2), 211-216.

Dunne, J. L., & Dahl, W. J. (2007). A Novel Solution is Needed to Correct Low Nutrient Intakes

      in Elderly Long-Term Care Residents. *Nutrition Reviews*, *65*(3), 135-138.

Durkin, D. W., Shotwell, M. S., & Simmons, S. F. (2014). The impact of family visitation on

      feeding assistance quality in nursing homes. *Journal of Applied Gerontology, 33*(5), 586-

      602.

Galesi, L. F., Leandro-Merhi, V. A., & de Oliveira, M. R. M. (2013). Association between

      indicators of dementia and nutritional status in institutionalised older

      people. *International Journal of Older People Nursing*,*8*(3), 236-243.

Garcia, L. J., Hébert, M., Kozak, J., Sénécal, I., Slaughter, S. E., Aminzadeh, F., Dalziel, W.,

Charles, J., & Eliasziw, M. (2012). Perceptions of family and staff on the role of the

environment in long-term care homes for people with dementia. *International*

Psychogeriatrics, *24*(05), 753-765.

Germain, I., Dufresne, T., & Gray-Donald, K. (2006). A novel dysphagia diet improves the

nutrient intake of institutionalized elders. *Journal of the American Dietetic Association*,

106(10), 1614-1623.

Gibbs-Ward, A. J., & Keller, H. H. (2005). Mealtimes as active processes in long-term care

facilities. *Canadian Journal of Dietetic Practice and Research*,*66*(1), 5-11.

Government of Canada (2011). Estimated Energy Requirements. Retrieved December 20, 2017,

from: https://www.canada.ca/en/health-canada/services/food-nutrition/canada-food-

guide/food-guide-basics/estimated-energy-requirements.html

Green, S. M., Martin, H. J., Roberts, H. C., & Sayer, A. A. (2011). A systematic review of the

use of volunteers to improve mealtime care of adult patients or residents in institutional

settings. *Journal of Clinical Nursing, 20*(13-14), 1810-1823.

Grieger, J. A., & Nowson, C. A. (2007). Nutrient intake and plate waste from an Australian

residential care facility. *European Journal of Clinical Nutrition*,*61*(5), 655-663.

Hämäläinen, P., Rantanen, T., Keskinen, M., & Meurman, J. H. (2004). Oral health status and

change in handgrip strength over a 5-year period in 80-year-old people. *Gerodontology*,

21(3), 155-160.

Hanson, L. C., Ersek, M., Lin, F. C., & Carey, T. S. (2013). Outcomes of feeding problems in

    advanced dementia in a nursing home population. *Journal of the American Geriatrics*

    Society, *61*(10), 1692-1697.

Hassard, T. H. (1991). *Understanding biostatistics*. Mosby year book.

Holmes, S. (2008). Nutrition and eating difficulties in hospitalised older adults. *Nursing*

    Standard, *22*(26), 47-57.

Hosmer, D. W., & Lemeshow, S. (2000). *Applied Logistic Regression*. 2nd ed. New York John

    Willey & Sons

Hung, L., & Chaudhury, H. (2011). Exploring personhood in dining experiences of residents

    with dementia in long-term care facilities. *Journal of Aging Studies*, *25*(1), 1-12.

Johnson, M. A., & Bales, C. W. (2014). Is there a best body mass index for older adults? Moving

    closer to evidence-based recommendations regarding "overweight," health, and mortality.

    Journal of Nutrition in Gerontology and Geriatrics, 33(1), 1-9.

Kaiser, M. J., Bauer, J. M., Ramsch, C., Uter, W., Guigoz, Y., Cederholm, T., ... & Tsai, A. C.

    MNA-International Group (2009) Validation of the Mini Nutritional Assessment short-

    form (MNA-SF): a practical tool for identification of nutritional status. *Journal of*

    Nutrition, Health and Aging, *13*(9), 782-788.

Kayser-Jones, J., & Pengilly, K. (1999). Dysphagia among nursing home residents. *Geriatric*

    Nursing, *20*(2), 77-84.

Keith, J. N. (2008). Bedside nutrition assessment past, present, and future: a review of the

    Subjective Global Assessment. *Nutrition in Clinical Practice*, *23*(4), 410-416.

Keller, H. H., Carrier, N., Slaughter, S. E., Lengyel, C., Steele, C. M., Duizer, L., ... & Duncan, A. M. (2017a). Prevalence and determinants of poor food intake of residents living in long-term care. *Journal of the American Medical Directors Association*.

Keller, H. H., Carrier, N., Slaughter, S., Lengyel, C., Steele, C. M., Duizer, L., & Boscart, V. M. (2017b). Making the Most of Mealtimes (M3): protocol of a multi-centre cross-sectional study of food intake and its determinants in older adults living in long term care homes. *BMC Geriatrics*, *17*(1), 15.

Keller, H. H., Chaudhury, H., Pfisterer, K. J., & Slaughter, S. E. (2017). Development and Inter-Rater Reliability of the Mealtime Scan for Long-Term Care. *The Gerontologist*.

Keller, H. (2013). *Aging well with nutrition* (2nd ed.). Canada.

Keller, H. H. (1993). Malnutrition in institutionalized elderly: how and why? *Journal of the American Geriatrics Society*, *41*(11), 1212-1218.

Keller, H., Carrier, N., Duizer, L., Lengyel, C., Slaughter, S., & Steele, C. (2014). Making the Most of Mealtimes (M3): grounding mealtime interventions with a conceptual model. *Journal of the American Medical Directors Association*, *15*(3), 158.

Keller, H., Beck, A. M., & Namasivayam, A. (2015). Improving food and fluid intake for older adults living in long-term care: a research agenda. *Journal of the American Medical Directors Association*, *16*(2), 93-100.

Kulnik, D., & Elmadfa, I. (2008). Assessment of the nutritional situation of elderly nursing home residents in Vienna. *Annals of Nutrition and Metabolism*, *52*(Suppl. 1), 51-53.

Lamy, M., Mojon, P., Kalykakis, G., Legrand, R., & Butz-Jorgensen, E. (1999). Oral status and nutrition in the institutionalized elderly. *Journal of Dentistry*, *27*(6), 443-448.

Lauque, S., Arnaud-Battandier, F., Mansourian, R., Guigoz, Y., Paintin, M., Nourhashemi, F., & Vellas, B. (2000). Protein-energy oral supplementation in malnourished nursing-home residents. A controlled trial. *Age and Ageing*, *29*(1), 51-56.

Lee, L., Kang, S. A., Lee, H. O., Lee, B. H., Park, J. S., Kim, J. H., ... & Lee, J. E. (2001). Relationships between dietary intake and cognitive function level in Korean elderly people. *Public Health*, *115*(2), 133-138.

Lengyel, C. O., Whiting, S. J., & Zello, G. A. (2008). Nutrient inadequacies among elderly residents of long-term care facilities. *Canadian Journal of Dietetic Practice and Research*, *69*(2), 82-88.

Lin, L. C., Watson, R., & Wu, S. C. (2010). What is associated with low food intake in older people with dementia? *Journal of Clinical Nursing*, *19*(12), 53-59.

Liu, W., Galik, E., Boltz, M., Nahm, E. S., & Resnick, B. (2015). Optimizing Eating Performance for Older Adults with Dementia Living in Long-term Care: A Systematic Review. *Worldviews on Evidence Based Nursing*, *12*(4), 228-235.

Liu, W., Cheon, J., & Thomas, S. A. (2014). Interventions on mealtime difficulties in older adults with dementia: A systematic review. *International Journal of Nursing Studies*, *51*(1), 14-27.

Liu, W., Galik, E., Boltz, M., Nahm, E. S., Lerner, N., & Resnick, B. (2016). Factors associated

    with eating performance for long term care residents with moderate to severe cognitive

    impairment. *Journal of Advanced Nursing*,*72*(2), 348-360.

Lou, M. F., Dai, Y. T., Huang, G. S., & Yu, P. J. (2007). Nutritional status and health outcomes

    for older people with dementia living in institutions. *Journal of Advanced Nursing*, *60*(5),

    470-477.

Malara, A., Sgrò, G., Caruso, C., Ceravolo, F., Curinga, G., Renda, G. F., Spadea, F., Garo, M.,

    Rispolli, V. (2014). Relationship between cognitive impairment and nutritional

    assessment on functional status in Calabrian long-term-care. *Clinical Interventions in*

    Aging, *9*, 105.

Manning, F., Harris, K., Duncan, R., Walton, K., Bracks, J., Larby, L., ... & Batterham, M.

    (2012). Additional feeding assistance improves the energy and protein intakes of

    hospitalised elderly patients. A health services evaluation. *Appetite*, *59*(2), 471-477.

Marshall, T. A., Stumbo, P. J., Warren, J. J., & Xie, X. J. (2001). Inadequate nutrient intakes are

    common and are associated with low diet variety in rural, community-dwelling

    elderly. *The Journal of nutrition*, *131*(8), 2192-2196.

Marshall, T. A., Warren, J. J., Hand, J. S., Xie, X. J., & Stumbo, P. J. (2002). Oral health,

    nutrient intake and dietary quality in the very old. *The Journal of the American Dental*

    Association, *133*(10), 1369-1379.

McGilton, K. S., Sidani, S., Boscart, V. M., Guruge, S., & Brown, M. (2012). The relationship between care providers' relational behaviors and resident's mood and behavior in long-term care settings. *Aging & Mental Health*, *16*(4), 507-515.

Meijers, J. M., Schols, J. M. G. A., & Halfens, R. J. G. (2014). Malnutrition in care home residents with dementia. *The Journal of Nutrition, Health & Aging*,*18*(6), 595-600.

Mila Villarroel, R., Abellana Sangrà, R., Padro Massaguer, L., & Farran Codina, A. (2012). Assessment of food consumption, energy and protein intake in the meals offered in four Spanish nursing homes. *Nutricion hospitalaria*, *27*(3).

Morley, J. E., & Silver, A. J. (1995). Nutritional issues in nursing home care. *Annals of Internal Medicine*, *123*(11), 850-859.

Morris, J. N., Fries, B. E., Mehr, D. R., Hawes, C., Phillips, C., Mor, V., & Lipsitz, L. A. (1994). MDS cognitive performance scale©. *Journal of Gerontology*, *49*(4), M174-M182.

Morris, J. N., Fries, B. E., & Morris, S. A. (1999). Scaling ADLs within the MDS. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *54*(11), M546-M553.

Muurinen, S., Savikko, N., Soini, H., Suominen, M., & Pitkälä, K. (2015). Nutrition and psychological well-being among long-term care residents with dementia. *The Journal of Nutrition, Health & Aging*, *19*(2), 178-182.

Namasivayam, A. M., Steele, C. M., & Keller, H. (2015). The effect of tongue strength on meal consumption in long term care. *Clinical Nutrition*.

National Institute on Aging (2014). Assessing cognitive impairment in older adults. Retrieved

    December 1, 2017, from: https://www.nia.nih.gov/health/assessing-cognitive-

    impairment-older-patients

Park, Y. H., Han, H. R., Oh, B. M., Lee, J., Park, J. A., Yu, S. J., & Chang, H. (2013).

    Prevalence and associated factors of dysphagia in nursing home residents. *Geriatric*

    Nursing, *34*(3), 212-217.

Pelletier, C. A. (2004). What do certified nurse assistants actually know about dysphagia and

    feeding nursing home residents? *American Journal of Speech-Language Pathology,13*(2),

    99-113.

Porter, J., Ntouva, A., Read, A., Murdoch, M., Ola, D., & Tsakos, G. (2015). The impact of oral

    health on the quality of life of nursing home residents. *Health and Quality of Life*

    outcomes, *13*(1), 102.

Public Health Agency of Canada. (2010). The Chief Public Health Officer's Report on The State

    of Public Health in Canada 2010. Retrieved April, 2016, from: http://www.phac-

    aspc.gc.ca/cphorsphc-respcacsp/2010/fr-rc/cphorsphc-respcacsp-06-eng.php

Reed, P. S., Zimmerman, S., Sloane, P. D., Williams, C. S., & Boustani, M. (2005).

    Characteristics associated with low food and fluid intake in long-term care residents with

    dementia. *The Gerontologist*, *45*(1), 74-81.

Reimer, H. D., & Keller, H. H. (2009). Mealtimes in nursing homes: striving for person-centered

    care. *Journal of Nutrition for the Elderly*, *28*(4), 327-347.

Shatenstein, B., & Ferland, G. (2000). Absence of nutritional or clinical consequences of

    decentralized bulk food portioning in elderly nursing home residents with dementia in

    Montreal. *Journal of the American Dietetic Association*, *100*(11), 1354-1360.

Shephard, T.J., Kovach, A.M., Hale, K., & Miller, A. (2007). STAND (Screening Tool for Acute

    Neurological Dysphagia) study results. *American Association of Neuroscience Nurses*

    Annual Meeting, San Diego, Ca, April, 2007.

Simmons, S. F., Osterweil, D., & Schnelle, J. F. (2001). Improving Food Intake in Nursing

    Home Residents with Feeding Assistance: A Staffing Analysis. *The Journals of*

    Gerontology Series A: Biological Sciences and Medical Sciences, *56*(12), M790-M794.

Simmons, S. F., & Schnelle, J. F. (2003). Implementation of Nutritional Interventions in Long

    Term Care. *Alzheimer's Care Today*, *4*(4), 286-296.

Simmons, S. F., & Schnelle, J. F. (2006). Feeding Assistance Needs of Long-Stay Nursing Home

    Residents and Staff Time to Provide Care. *Journal of the American Geriatrics*

    Society, *54*(6), 919-924.

Simmons, S. F., Keeler, E., Zhuo, X., Hickey, K. A., Sato, H. W., & Schnelle, J. F. (2008).

    Prevention of unintentional weight loss in nursing home residents: a controlled trial of

    feeding assistance. *Journal of the American Geriatrics Society*, *56*(8), 1466-1473.

Sitter, M., & Lengyel, C. (2011). Nutritional Status and Eating Habits of Older Manitobans:

    After Relocating to a Personal Care Home. *Canadian Journal of Dietetic Practice and*

    Research, *72*(2), e134-e139.

Slaughter, S. E., & Hayduk, L. A. (2012). Contributions of Environment, Comorbidity, and

    Stage of Dementia to the Onset of Walking and Eating Disability in Long-Term Care

    Residents. *Journal of the American Geriatrics Society*, *60*(9), 1624-1631.

Sloane, P. D., Ivey, J., Helton, M., Barrick, A. L., & Cerna, A. (2008). Nutritional issues in long-

    term care. *Journal of the American Medical Directors Association*, *9*(7), 476-485.

Smart, K. A., Herrmann, N., & Lanctôt, K. L. (2011). Validity and responsiveness to change of

    clinically derived MDS scales in Alzheimer disease outcomes research. *Journal of

    geriatric psychiatry and neurology*, *24*(2), 67-72.

Soini, H., Muurinen, S., Routasalo, P., & Sandelin, E. (2006). Oral and nutritional status-is the

    MNA a useful tool for dental clinics/discussion. *The Journal of Nutrition, Health &

    Aging*, *10*(6), 495.

Statistics Canada. (2016a). Annual Demographic Estimates: Canada, Provinces and Territories.

    Retrieved from: http://www.statcan.gc.ca/pub/91-215-x/91-215- x2016000-eng.pdf

Statistics Canada (2016b). Senior Women. Retrieved from: http://www.statcan.gc.ca/pub/89-

    503-x/2015001/article/14316-eng.pdf

Steele, C. M., Greenwood, C., Ens, I., Robertson, C., & Seidman-Carlson, R. (1997). Mealtime

    difficulties in a home for the aged: not just dysphagia. *Dysphagia*, *12*(1), 43-50.

Stockdell, R., & Amella, E. J. (2008). The Edinburgh Feeding Evaluation in Dementia Scale:

    determining how much help people with dementia need at mealtime. *AJN The American

    Journal of Nursing*, *108*(8), 46-54.

Suominen, M., Laine, A., Routasalo, P., Pitkala, K. H., & Rasanen, L. (2004). Nutrient content of served food, nutrient intake and nutritional status of residents with dementia in a Finnish nursing home. *Journal of Nutrition and Health and Aging, 8*(4), 234-239.

Suominen, M., Muurinen, S., Routasalo, P., Soini, H., Suur-Uski, I., Peiponen, A., Finne-Soveri, H., & Pitkala, K. H. (2005). Malnutrition and associated factors among aged residents in all nursing homes in Helsinki. *European Journal of Clinical Nutrition*, *59*(4), 578-583.

Taylor, T. H. (2010). Ceiling effect. *Encyclopedia of Research Design. Ceiling Effect. (Ed. Salkind NJ). SAGE Publications: Thousand Oaks*, 133-5.

Thomas, D. W., & Smith, M. (2009). The effect of music on caloric consumption among nursing home residents with dementia of the Alzheimer's type. *Activities, Adaptation & Aging*, *33*(1), 1-16.

Touger-Decker, R., & Mobley, C. (2013). Position of the Academy of Nutrition and Dietetics: oral health and nutrition. *Journal of the Academy of Nutrition and Dietetics*, *113*(5), 693-701.

Van Lancker, A., Verhaeghe, S., Van Hecke, A., Vanderwee, K., Goossens, J., & Beeckman, D. (2012). The association between malnutrition and oral health status in elderly in long-term care facilities: a systematic review. *International Journal of Nursing Studies*, *49*(12), 1568-1581.

Verbrugghe, M., Beeckman, D., Van Hecke, A., Vanderwee, K., Van Herck, K., Clays, E., Bocquaert, I., Derycke, H., & Verhaeghe, S. (2013). Malnutrition and associated factors in nursing home residents: a cross-sectional, multi-centre study. *Clinical Nutrition*, *32*(3), 438-443.

Viveky, N., Toffelmire, L., Thorpe, L., Billinsky, J., Alcorn, J., Hadjistavropoulos, T., & Whiting, S. J. (2012). Use of vitamin and mineral supplements in long-term care home residents. *Applied Physiology, Nutrition, and Metabolism*, *37*(1), 100-105.

Vucea, V., Keller, H. H., & Ducak, K. (2014). Interventions for improving mealtime experiences in long-term care. *Journal of Nutrition in Gerontology and Geriatrics*, *33*(4), 249-324.

Watson, R., & Deary, I. J. (1997). Feeding difficulty in elderly patients with dementia: confirmatory factor analysis. *International Journal of Nursing Studies*, *34*(6), 405-414.

Wells, J. L., & Dumbrell, A. C. (2006). Nutrition and aging: assessment and treatment of compromised nutritional status in frail elderly patients. *Clinical Interventions in Aging*, *1*(1), 67.

Wendland, B. E., Greenwood, C. E., Weinberg, I., & Young, K. W. (2003). Malnutrition in institutionalized seniors: the iatrogenic component. *Journal of the American Geriatrics Society*, *51*(1), 85-90.

Woo, J., Chi, I., Hui, E., Chan, F., & Sham, A. (2005). Low staffing level is associated with malnutrition in long-term residential care homes. *European Journal of Clinical Nutrition*, *59*(4), 474-479.

World Health Organization. (2012). Dementia: A Public Health Priority. Retrieved from http://apps.who.int/iris/bitstream/10665/75263/1/9789241564458_eng.pdf?ua=1

World Health Organization. (2015). World Report on Ageing and Health. Retrieved from: http://apps.who.int/iris/bitstream/10665/186463/1/9789240694811_eng.pdf?ua=1

Wright, L., Cotter, D., & Hickson, M. (2008). The effectiveness of targeted feeding assistance to

    improve the nutritional intake of elderly dysphagic patients in hospital. *Journal of Human*

    Nutrition and Dietetics, *21*(6), 555-562.

Zenthöfer, A., Baumgart, D., Cabrera, T., Rammelsberg, P., Schröder, J., Corcodel, N., &

    Hassel, A. J. (2017). Poor dental hygiene and periodontal health in nursing home

    residents with dementia: an observational study. *Odontology*, *105*(2), 208-213.

Zhang, Z., & Wang, L. (2013). Methods for mediation analysis with missing

    data. *Psychometrika*, *78*(1), 154-184.

Ziebolz, D., Werner, C., Schmalz, G., Nitschke, I., Haak, R., Mausberg, R. F., & Chenot, J. F.

    (2017). Oral Health and nutritional status in nursing home residents—results of an

    explorative cross-sectional pilot study. *BMC Geriatrics*, *17*(1), 39.

Appendices

Appendix A: *Ethical Approval Certificate*

Human Ethics
208-194 Dafoe Road
Winnipeg, MB
Canada R3T 2N2
Phone +204-474-7122
Email: humanethics@umanitoba.ca

UNIVERSITY ᴏꜰ MANITOBA | Research Ethics and Compliance

RENEWAL APPROVAL

Date: October 5, 2017   **New Expiry:** October 18, 2018

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"

Joint-Faculty Research Ethics Board (JFREB) has reviewed and renewed the above research. JFREB is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.*

This approval is subject to the following conditions:
1. Any modification to the research must be submitted to JFREB for approval before implementation.
2. Any deviations to the research or adverse events must be submitted to JFREB as soon as possible.
3. This renewal is valid for one year only and a Renewal Request must be submitted and approved by the above expiry date.
4. A Study Closure form must be submitted to JFREB when the research is complete or terminated.

Funded Protocols:
- **Please mail/e-mail a copy of this Renewal Approval, identifying the related UM Project Number, to the Research Grants Officer in ORS.**

Research Ethics and Compliance is a part of the Office of the Vice-President (Research and International)
umanitoba.ca/research

94

Appendix B: Food Intake Form

M3 : FOOD INTAKE FORM

Res ID: _____ Unit : _____ Site ID: _____

Date: _____ Researcher: _____

Making the Most of Mealtimes

UNIVERSITY OF MANITOBA

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

Dishes Weights: Plate: _____ g   Bowl: _____ g   Cup: _____ g   Other: _____ g

MEALS:

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

M3: FOOD INTAKE FORM

ID: _____ Site ID: _____ Date: _____
Researcher: _____ Page: ____ of _____

MEALS (continued):

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

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 C: Resident Meal Observation Form

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)		

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	

a) For residents who require eating assistance (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 D: Relational Behavioural Scale

M3
Making the Most of Mealtimes

UNIVERSITY of MANITOBA

Relational Behaviour Scale
(ONLY for those requiring Eating Assistance)

Circle only the highest intensity score for each behavior group that you observed during the meal.
Use the anchor points as a guide to choose a suitable level.

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

Behaviour Groups		Intensity During Rating Period	Examples
Staying with the resident during the care episode	1	Consistently not staying with the resident	No close proximity; no eye contact, no touch; harsh approach; no comfort level with resident; not showing acceptance with resident's touch; impedes the resident's actions; not knowing each other; loud, disruptive voice; not sitting beside person; no bending to lower self.
	2	Frequently not staying with the resident; the behaviour was interrupted	
	3	Occasionally not staying with the resident	
	4	Neutral	
	5	Occasionally staying with the resident	Close proximity; various forms of eye contact, various forms of touch that are comfortable for the resident; gentle approach; demonstrates a comfort level with resident, dancing, clapping, joking; showing acceptance with resident's touch; does not impede the resident's actions; knowing and acceptance of each other; using a soft voice; sitting beside person; bending to lower self.
	6	Frequently staying with the resident; the behaviour was interrupted	
	7	Consistently staying with the resident during the entire care episode	
Altering the pace of care by recognizing the person's rhythm and adapting to it	1	Consistently not altering the pace of care.	Does not hesitate or stops care when necessary, does not try another approach; not flexible and adaptable; no response to agitation or distress of any kind; no pause between tasks; not taking time, rushing through care; care not dependent on resident's lead.
	2	Frequently not altering the pace of care; the behaviour was interrupted	
	3	Occasionally not altering the pace of care	
	4	Neutral	
	5	Occasionally altering the pace of care	Hesitates in care when necessary, pauses, stops and tries another approach; is flexible and adaptable; immediate response to agitation or distress of any kind; pauses when task is completed; taking time, not rushing through care; care delivered in rhythm with resident; varied responses dependent on resident's lead.
	6	Frequently altering the pace of care; the behaviour was interrupted	
	7	Consistently altering the pace of care during the entire care episode	
Focus of care	1	Consistently focusing on the task	No acknowledging of resident's subjective experiences; no verbal reassurance throughout care; no orientating of resident to task; does not verbally addresses the resident; resident not allowed to participate; does not asks questions about the person or her/his family; no response to the resident's questions and behaviours; no eye contact.
	2	Frequently focusing on the task; the behaviour was interrupted	
	3	Occasionally focusing on the task	
	4	Neutral	
	5	Occasionally altering the focus of care	Acknowledges resident's subjective experiences; gives resident verbal reassurance throughout care; orientates resident to task (nurse lifts arms when she/he wants resident to do so); verbally addresses the resident; resident allowed to participate; asks questions about the person or his/her family; responsive to the resident's questions and behaviours; making conversation while making eye contact.
	6	Frequently focusing the care beyond the task; the behaviour was interrupted	
	7	Consistently focusing the care beyond the task during the entire care episode	

Appendix E: Minimum Data Set (MDS) Form

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

106

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., *Nothing matters, Would rather be dead, What's the use, Regret having lived so long, Let me die*				
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 don't enjoy anything anymore*				

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

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

SECTION H. Continence

1. BLADDER CONTINENCE
 0. Continent- Complete 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

 2. Declined
 8. Uncertain

110

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		

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 F: Activities of Daily Living (ADL) Hierarchy Scale

ADL Hierarchy Scale

inter RAI™

The four items used to score the scale (0-6) are:

- **Personal hygiene**
- **Toilet use**
- **Locomotion**
- **Eating**

Note: "Activity did not occur" (Code 8) is evaluated as "Total Dependence"

Person

Total dependence in four ADLS

No → Total dependence in eating and/or locomotion

Yes → 6 Total Dependence

No → Extensive assistance in eating or locomotion (total dependence in neither of the two)

Yes → 5 Dependent

No → At least extensive assistance in personal hygiene or toilet use (and less than extensive in both eating and locomotion)

Yes → 4 Maximal

No → Limited assitance in one or more of the four ADLs (and less than extensive in all four)

Yes → 3 Extensive

No → At least supervision in one ADL (and less than limited in all four)

Yes → 2 Limited

Yes → 1 Supervision

No → 0 Independent (in all 4 ADLs)

Source: Morris JN, Fries BE, Morris SA. (1999) Scaling ADLs within the MDS. Journals of Gerontology: Medical Sciences 54(11):M546-M553.

Updated 10/2016

Appendix G: Cognitive Performance Scale

Cognitive Performance Scale

interRAI™

Impairment Count (number of the following):
- Decision Making: Not Independent   (1, 2, 3)
- Understood: Not Independent   (1, 2, 3, 4)
- Short-Term Memory: Not OK   (1)

Severe Impairment Count (number of the following):
- Decision Making: Moderate Impairment   (3)
- Understood: Sometimes/Never   (3, 4)

Person

Decision Making

Not severely impaired (0-3)   Severely impaired (4)   Coma (5)

Impairment Count   2 or 3   Eating - Performance

Severe Impairment Count

Not totally dependent (0-5)   Totally dependent (6,8)

0	1	0	1	2		

0
Intact

1
Borderline
Intact

2
Mild
Impairment

3
Moderate
Impairment

4
Moderately Severe
Impairment

5
Severe
Impairment

6
Very Severe
Impairment
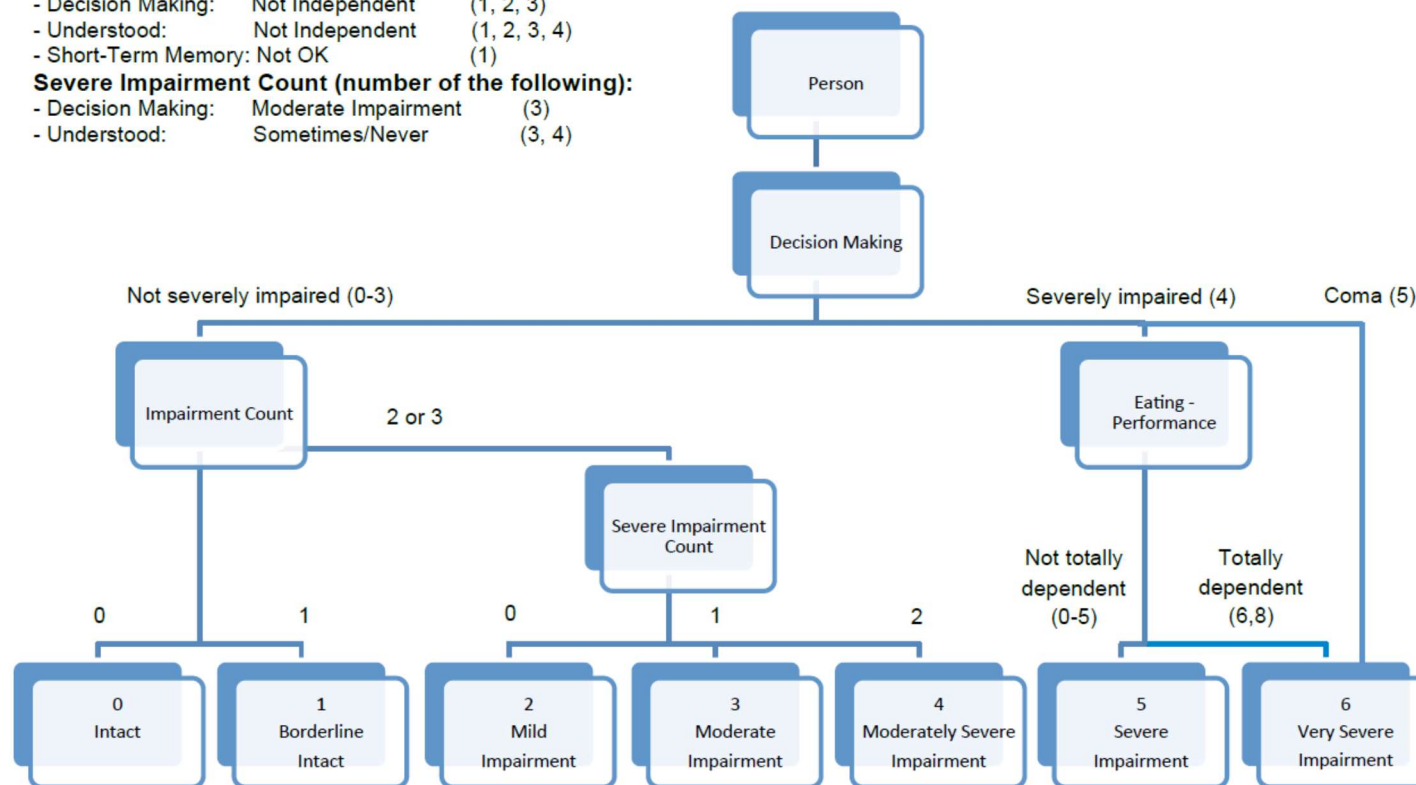
Source: Morris JN, Fries BE, Mehr DR, Hawes C, Philips C, Mor V, Lipsitz L. (1994) MDS Cognitive Performance Scale. Journal of Gerontology: Medical Sciences 49 (4): M174-M182.

Appendix H: Resident Chart Review

RESIDENT CHART REVIEW

Year of Birth: _____   _____

                   YYYY   Age in Years

Admission Date to LTC: _____ / _____ / _____   _____

(nursing home level)   YYYY   MM   DD   Months Admission

Gender: Male = 1   Female = 2

Ethnicity: _____

BODY WEIGHT HISTORY: *(past 6 months, note units)*

MM / YYYY	Weight (units)	MM / YYYY	Weight (units)	Weight Change
				1 month:
				3 month:
				6 month:

DIET:

Solids   Regular (1) _____

                         Minced Meat (2) _____

                         Minced (3) _____

                         Pureed (4) _____

Liquids   Regular (1) _____

                         Nectar (2) _____

                         Honey (3) _____

                         Pudding (4) _____

1

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: _____

_____

2

119

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):	

3

MEDICATIONS:

List all of the resident's medications and dose/frequency, including vitamin/mineral supplements and antibiotics. Identify if they are PRN. Do NOT include topicals (e.g., ointments).

Name	Dose/frequency

# Antibiotics =	# Psychotropics =	# Vitamin/Mineral =	# Other Meds =
TOTAL # MEDICATIONS:			

* Total should equal antibiotics + psychotropics + vitamin/mineral + other meds

4

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: _____

_____

_____

5

Appendix I: Mini Nutritional Assessment- Short Form (MNA-SF)

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

6

Appendix J: Screening Tool for Acute Neurological Dysphagia (STAND)

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.

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

127

       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 <u>any</u> 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: Patient Generated - Subjective Global Assessment

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)

$\geq 10\%$ _____ (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)

$\geq 20\%$ _____ (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				

D) Food Intake
Source: Chart _____   Staff/Family _____   Observation _____   Older Adult _____

_____ Unchanged (0)   _____ Only liquids (3)
_____ More than Usual (0)   _____ Only nutritional supplements (3)
_____ Normal food less than usual (1)   _____ Very little of anything (4)
_____ Little solid food (2)   _____ Enteral /parenteral (0)

E) Challenges & Symptoms *(additive score)*
Source: Chart _____   Staff/Family _____   Observation _____   Older Adult _____

_____ No problems eating (0)   _____ No appetite (3)
_____ Nausea (1)   _____ Vomiting (3)
_____ Constipation (1)   _____ Diarrhea (3)
_____ Mouth sores (2)   _____ Dry mouth (1)
_____ Taste changes/no taste (1)   _____ Slow to eat (1)
_____ Problems swallowing (2)   _____ Feels full quickly (1)
_____ Pain (3)   _____ Refuses to eat (3)
_____ Current infection (3)   _____ 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)

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

Total Score

131

Appendix L: Oral Health Exam

Oral Health Screen

Adapted from Canadian Health Measures Survey and OHAT

1. Record the appearance of the lips of the participant:

Healthy Smooth, moist	Dry, chapped	Bleeding, ulcerated
1	2	3

2. Is bad breath odour detectable?
OR... Does the participant complain of bad breath?

Yes = 1   No = 0

EXAM TERMINATED IF CANNOT PROCEED (i.e., won't open mouth) _____
Notes: _____
_____
_____

3. Record the appearance of the saliva of the participant:

Watery, free flowing	Dry, sticky, little present	Thick, very little/none
1	2	3

4a. Does the participant have any natural teeth?

Yes = 1   No = 0 *(Go to Question 5)*

4b. Count Sextant:

UR _____   UA _____   UL _____

LR _____   LA _____   LL _____

1

4c. Record the worst inflammation score for each of the following teeth:

T16	T12	T24	T36	T32	T44

Guide:

1 = No inflammation (firm; pale pink; pointed papillae)
2 = Mild inflammation (soft; darker pink; irregular papillae)
3 = Moderate inflammation (spongy; red colour; rounded/rolled papillae)
4 = Severe inflammation (spongy/depressive; dark red/cyanotic; bulbous/cratered papillae)
5 = Absent

5. Ask the participant the following questions:

In the past 12 months, have you experienced...
OR: Do you currently experience...

a) Pain in teeth when consuming hot,
   cold, sweet foods/drinks   Yes= 1   No= 0

b) A toothache   Yes= 1   No=0

c) Any jaw pain   Yes =1   No=0

                                                Unable to do = 9

*For participants with no natural teeth, ask about mouth pain:

Do you ever have any mouth pain?   Yes= 1   No= 0

6a. Does the participant have any dentures (including partial)?

Yes = 1   No = 0 *(Go to question 7)*

134

6b. Complete denture:

Complete	Score
Both jaws = 1	
Upper only = 2	
Lower only = 3	
No complete denture = 9	

6c. Partial denture:

Partial	Score
Both jaws = 1	
Upper only = 2	
Lower only = 3	
No partial denture = 9	

6d. Upper Denture fit *(pick worst category)*:

Upper	Score
Stable = 1	
Unstable = 2	
Unretentive = 3	
Needs repair = 4	
Not applicable = 9	

6e. Lower Denture Fit *(pick worst category)*:

Lower	Score
Stable= 1	
Unstable= 2	
Unretentive= 3	
Needs repair = 4	
Not applicable=9	

6f. Poor hygiene of dentures?   Yes = 1   No = 0

7a. Record the mucosal status of the participant   Unable to do = 99

Abnormality	Yes = 1 No = 0
7b. Angular chelitis	
7c. Denture stomatitis	
7d. Denture induced hyperplasia (epulis)	
7e. Glossitis	
7f. Sinus or fistula	
7g. Aphthous ulcer	
7h. Traumatic or unspecified ulcer	
White patches 7i. Leukoplakia	
7j. Planus	
7k. Candidiasis	
7l. Other – specify below	

8a. Does the participant need urgent dental treatment?

      Yes = 1   No = 0

8b. Other findings (e.g., broken or mobile teeth, denture fit, debris/plaque, etc.) and recommended treatments (including non-urgent):

_____
_____
_____
_____
_____
_____
_____
_____
_____

8c. Is food intake likely to be influenced by the oral health/dentition?

1	2	3	4	5
No	Unlikely	Potentially Challenging	Most likely	Significantly Impacted

136

Appendix M: Multiple Regression Model

Appendix M: Multiple Regression

	B	SEB	p value
Age	-13.69	2.56	0.000
Sex[a]	151.03	42.42	0.000
Average Ed-FED score[b]	-36.48	13.09	0.006
Dysphagia Risk[c]	92.63	40.56	0.023
MNA total score[d]	21.26	10.54	0.044
Total # vitamin	52.92	16.78	0.002
CPS score: Moderate/Severe[e]	64.96	66.99	0.333
CPS score: Severe	151.16	52.01	0.004
CPS score: Very Severe	170.35	80.46	0.035
Eating Assistance: Sometimes	-111.81	61.43	0.070
Eating Assistance: Often	69.51	84.91	0.414
Average meal duration	-2.04	1.43	0.156
Oral nutritional supplements	71.80	48.23	0.138
Modified diet texture	-47.16	44.73	0.292
Wander during meal	-73.20	82.29	0.374
ADL scale	-3.95	3.98	0.321
Ulna BMI	3.82	5.42	0.481
y - Intercept	2853.71		
R-Square		0.30	
Adjusted R-Square		0.27	

Note: Referent variables: CPS score of 3 (moderate) & eating assistance category "never"
[a]0= female, 1 = male
[b]Score ranges from 10-30, where 10 = no observation of eating challenges, and 30 = the highest observation of eating challenges
[c]0= No, 1= Yes (dysphagia risk is a composite variable and defined as a) already on thickened fluids, or b) failed STAND or c) coughing or choking observed at meals by M3 researchers)
[d]Score ranges from 0-14, where a higher score indicates better nutritional status
[e]Cognitive Performance Scale Score: 3= moderate, 4= moderate/severe, 5= severe, 6= very severe

138

Appendix N: Backwards Regression Full Model

Appendix N: Backwards Regression Full Model

	Model 1			Model 2			Model 3		
	B	SEB	p value	B	SEB	p value	B	SEB	p value
Age	-13.69	2.56	0.000	-13.72	2.49	0.000	-13.81	2.48	0.000
Sex[a]	151.03	42.42	0.000	155.33	42.06	0.000	149.74	41.91	0.000
Average Ed-FED score[b]	-36.48	13.09	0.006	-35.49	12.99	0.007	-36.62	12.88	0.005
Dysphagia Risk[c]	92.63	40.56	0.023	100.80	39.70	0.012	95.59	39.41	0.016
MNA total score[d]	21.26	10.54	0.044	27.14	9.15	0.003	27.56	9.14	0.003
Total # vitamin	52.92	16.78	0.002	53.69	0.16	0.001	54.18	16.43	0.001
CPS score: Moderate/Severe	64.96	66.99	0.333	68.21	66.40	0.305	58.69	65.20	0.369
CPS score: Severe	151.16	52.01	0.004	151.60	51.30	0.003	142.95	50.06	0.005
CPS score: Very Severe	170.35	80.46	0.035	172.08	79.78	0.032	145.99	73.77	0.049
Eating Assistance: Sometimes	-111.81	61.43	0.070	-118.19	60.46	0.051	-125.81	59.72	0.036
Eating Assistance: Often	69.51	84.91	0.414	63.16	83.86	0.452	53.86	83.27	0.518
Average meal duration	-2.04	1.43	0.156	-2.13	1.42	0.007	-2.22	1.42	0.120
Oral nutritional supplements	71.80	48.23	0.138	56.73	43.93	0.197	58.54	43.92	0.184
Modified diet texture	-47.16	44.73	0.292	-46.58	44.12	0.292	-49.19	43.86	0.263
Wander during meal	-73.20	82.29	0.374	-85.87	80.27	0.285	-68.41	77.91	0.381
ADL scale	-3.95	3.98	0.321	-3.25	3.90	0.405			
Ulna BMI	3.82	5.42	0.481						
y - Intercept	2853.71			2866.58			2842.37		
R-Square		0.30			0.55			0.30	
Adjusted R-Square		0.27			0.31			0.27	

Continued…

	Model 4			Model 5			Model 6		
	B	**SEB**	**p value**	**B**	**SEB**	**p value**	**B**	**SEB**	**p value**
Age	-13.42	2.44	0.000	-13.47	2.44	0.000	-13.09	2.42	0.000
Sex[a]	150.62	41.88	0.000	146.49	41.73	0.001	145.98	41.76	0.001
Average Ed-FED score[b]	-38.57	12.68	0.003	-39.23	12.67	0.002	-37.40	12.40	0.003
Dysphagia Risk[c]	97.70	39.32	0.013	92.80	39.08	0.018	93.21	39.11	0.018
MNA total score[d]	28.25	9.10	0.002	29.28	9.05	0.001	25.34	8.47	0.003
Total # vitamin	54.51	16.42	0.001	55.51	16.40	0.001	54.53	16.39	0.001
CPS score: Moderate/Severe[e]	63.44	64.95	0.329	52.91	64.27	0.411	48.79	64.23	0.448
CPS score: Severe	147.69	49.75	0.003	137.28	48.86	0.005	129.09	48.44	0.008
CPS score: Very Severe	153.03	73.30	0.038	136.14	71.71	0.058	136.60	71.77	0.058
Eating Assistance: Sometimes	-121.15	59.46	0.042	-123.14	59.45	0.039	-121.30	59.48	0.042
Eating Assistance: Often	64.08	82.42	0.437	54.89	82.03	0.504	54.91	82.09	0.504
Average meal duration	-2.18	1.42	0.126	-2.08	1.42	0.142	-2.12	1.42	0.135
Oral nutritional supplements	59.46	43.89	0.176	53.58	43.58	0.220			
Modified diet texture	-48.40	43.84	0.270						
Wander during meal									
ADL scale									
Ulna BMI									
y - Intercept	2813.00			2804.22			2811.03		
R-Square		0.30			0.30			0.30	
Adjusted R-Square		0.27			0.27			0.27	

Continued…

	Model 7		
	B	**SEB**	**p value**
Age	-13.35	2.42	0.000
Sex[a]	152.12	41.63	0.000
Average Ed-FED score[b]	-40.04	12.49	0.001
Dysphagia Risk[c]	84.08	38.71	0.031
MNA total score[d]	26.75	8.44	0.002
Total # vitamin	53.33	16.40	0.001
CPS score: Moderate/Severe[e]	55.94	64.17	0.384
CPS score: Severe	130.54	48.52	0.007
CPS score: Very Severe	146.31	71.60	0.042
Eating Assistance: Sometimes	-116.18	59.49	0.052
Eating Assistance: Often	76.60	80.95	0.345
Average meal duration			
Oral nutritional supplements			
Modified diet texture			
Wander during meal			
ADL scale			
Ulna BMI			
y - Intercept	2764.03		
R-Square		0.29	
Adjusted R-Square		0.27	

Note: Referent variables: CPS score of 3 (moderate) & eating assistance category "never"

[a]0= female, 1 = male

[b]Score ranges from 10-30, where 10 = no observation of eating challenges, and 30 = the highest observation of eating challenges

[c]0= No, 1= Yes (dysphagia risk is a composite variable and defined as a) already on thickened fluids, or b) failed STAND or c) coughing or choking observed at meals by M3 researchers)

[d]Score ranges from 0-14, where a higher score indicates better nutritional status

[e]Cognitive Performance Scale Score: 3= moderate, 4= moderate/severe, 5= severe, 6= very severe