THE RELATIONSHIP BETWEEN NURSE NUTRITION KNOWLEDGE AND UNINTENTIONAL WEIGHT LOSS IN NURSING HOME RESIDENTS

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SIGNED: Kimberly Penland
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DEDICATION

Elta, Marjorie, Pearl, Margaret, Mary Kay, Louise, Levi, and all the other residents who taught me how to care.
# TABLE OF CONTENTS

LIST OF ILLUSTRATIONS ........................................................................................................... 9

LIST OF TABLES ......................................................................................................................... 10

ABSTRACT ..................................................................................................................................... 11

CHAPTER 1: INTRODUCTION ...................................................................................................... 13

Background of the Problem ....................................................................................................... 13
  Aging Population ...................................................................................................................... 13
  Quality of Care in Nursing Homes ......................................................................................... 14
  Unintentional Weight Loss ...................................................................................................... 16
  Nurse Nutrition Knowledge .................................................................................................... 19
Significance .................................................................................................................................. 19
Purpose ....................................................................................................................................... 20
Aims ........................................................................................................................................... 20
Definition of Terms .................................................................................................................... 21
Summary ..................................................................................................................................... 25

CHAPTER 2: CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW ...................... 27

Conceptual Framework ............................................................................................................. 27
  Systems Research Organizing Model .................................................................................... 27
Review of the Literature ........................................................................................................... 33
  Nursing Home Compare ......................................................................................................... 33
Client .......................................................................................................................................... 35
  Nurse Nutrition Knowledge .................................................................................................. 35
  Level of Education .................................................................................................................. 38
  Age ........................................................................................................................................ 42
  Years in Long Term Care ...................................................................................................... 42
  Time at the Nursing Home .................................................................................................... 43
Context ......................................................................................................................................... 43
  Ownership Status .................................................................................................................... 43
Summary ..................................................................................................................................... 45

CHAPTER 3: METHODOLOGY .................................................................................................... 47

Introduction ............................................................................................................................... 47
Design ......................................................................................................................................... 47
Setting, Sample Selection and Recruitment of Subjects ............................................................ 47
  Setting ..................................................................................................................................... 47
  Sample Selection ..................................................................................................................... 48
  Recruitment: Subjects ............................................................................................................... 48
  Time Frame and Response Rate ............................................................................................. 49
Research Aims and Strategies for Analysis ................................................................................ 49
  Research Aims ......................................................................................................................... 49
TABLE OF CONTENTS – Continued

Data Cleaning and Missing Files .................................................................50
Content Validity ............................................................................................50

Item Analysis ...............................................................................................53
Difficulty ........................................................................................................54
Item Discrimination .......................................................................................54
Distracter Analysis ........................................................................................55
Strategies to Analyze Aim 2 ........................................................................55

Measures ........................................................................................................57
Demographic Data Sheet ..............................................................................57
NKQ-R ...........................................................................................................57
Nursing Home Compare ...............................................................................57

Summary .........................................................................................................58

CHAPTER 4: RESULTS ................................................................................59
Time Frame and Response Rate ..................................................................59
Study Setting and Sample ...........................................................................60
Study Setting ................................................................................................60
Study Sample ................................................................................................61

Description of Subjects by Nursing Home .................................................62

Psychometric Analysis .................................................................................64
Research Aim 1 ..............................................................................................64
Research Aim 2 ..............................................................................................67
Research Aim 2A ............................................................................................68
   LPN and RN groups ..................................................................................71
Research Aim 2B ...........................................................................................72
Research Aim 2C ............................................................................................72
Research Aim 2D ...........................................................................................73

Additional Analysis .....................................................................................74
Age and NKQ-R Scores ...............................................................................74
Age and UWL ...............................................................................................74
Age and Length of Time as Nurse, Employed in Long Term Care and Time at
Current Nursing Home ...............................................................................74

NKQ-R Scores by Facility ............................................................................75
Ownership Type ............................................................................................76

Summary .........................................................................................................77

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS ..................................80

Introduction .................................................................................................80
Research Aim 1 ..............................................................................................80
   Research Aim 1: Psychometric Analysis .................................................81
Research Aim 2 ..............................................................................................81
Research Aim 2A ...........................................................................................82
TABLE OF CONTENTS – Continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Aim 2B</td>
<td>84</td>
</tr>
<tr>
<td>Research Aim 2C</td>
<td>85</td>
</tr>
<tr>
<td>Research Aim 2D</td>
<td>85</td>
</tr>
<tr>
<td>Additional Analysis</td>
<td>85</td>
</tr>
<tr>
<td>Age and NKQ-R Scores</td>
<td>85</td>
</tr>
<tr>
<td>Age and UWL</td>
<td>86</td>
</tr>
<tr>
<td>Ownership Type</td>
<td>86</td>
</tr>
<tr>
<td>Limitations</td>
<td>87</td>
</tr>
<tr>
<td>Recommendations</td>
<td>88</td>
</tr>
<tr>
<td>Implications for Nursing Research and Practice</td>
<td>88</td>
</tr>
<tr>
<td>Summary</td>
<td>89</td>
</tr>
</tbody>
</table>

APPENDIX A: HUMAN SUBJECTS PROTECTION PROGRAM – CORRESPONDENCE FORM ...........................................90

APPENDIX B: LETTERS OF PERMISSION ....................................................................................................93

APPENDIX C: ORIGINAL NUTRITION KNOWLEDGE QUESTIONNAIRE .................................................................104

APPENDIX D: CONTENT VALIDITY INDEX ...................................................................................................113

APPENDIX E: NUTRITION KNOWLEDGE QUESTIONNAIRE, REVISED (NKQ-R) ........................................123

REFERENCES ..............................................................................................................................................129
LIST OF ILLUSTRATIONS

FIGURE 1: Systems Research Organizing Model (SROM) .............................................29
FIGURE 2: Hypothesized Systems Research Organizing Model (SROM) .........................32
LIST OF TABLES

TABLE 1: NKQ-R Items for Total Questionnaire and Three Subscales..........................53
TABLE 2: Description of Participating Nursing Homes......................................................60
TABLE 3: Description of Subjects’ Various Demographics..............................................62
TABLE 4: Description of Subject Demographics by Facility .........................................63
TABLE 5: Item Analysis of NKQ-R ..................................................................................65
TABLE 6: Means, Standard Deviations, and Ranges for the NKQ-R Scores and Subscale Scores..................................................................................................................67
TABLE 7: Kendall tau Correlations of the Total NKQ-R Scores, Subscale Scores and Unintentional Weight Loss (UWL) .................................................................68
TABLE 8: Means, Standard Deviations, and Ranges for the NKQ-R Based on Level of Education.....................................................................................................................69
TABLE 9: Means, Standard Deviations, and Ranges for the Subscales Based on Level of Education.....................................................................................................................70
TABLE 10: Kendall tau of Nursing Experience and NKQ-R and Subscale Scores...........73
TABLE 11: Means, Standard Deviations, and Ranges for the NKQ-R Based on Facility.....76
TABLE 12: Point Bi-serial Correlation for Relationship between Ownership Status, NKQ-R Scores and Percent of Weight Loss .................................................................................76
Unintentional weight loss is a common and significant problem among nursing home residents and an important indicator of malnutrition. Nursing home residents who lose more than 5% of their body weight in one month or 10% of body weight in six months are at increased risk for morbidity and mortality. Licensed nurses, who are responsible for maintaining the health and well-being of nursing home residents, have been shown to be deficient in nutrition knowledge. Little is known about the relationship between nurse nutrition knowledge and unintentional weight loss in nursing home residents.

The purpose of this study was to revise a nurse nutrition questionnaire to reduce respondent burden and to examine the psychometric properties of the revised instrument. The revised instrument was then used to describe the relationship between nurse nutrition knowledge and unintentional weight loss in nursing homes across Northeast Indiana.

A descriptive, correlational, and non-experimental design was used to describe the relationship between nurse nutrition knowledge and unintentional weight loss (UWL) in nursing home residents in Northeast Indiana. Licensed nurses (N = 101) from nine nursing homes were recruited for this study. Nurse nutrition knowledge was measured using a revised nutrition questionnaire (NKQ-R) and weight loss data was obtained from the Nursing Home Compare Database.

Content validity of the NKQ-R was acceptable. Item analysis demonstrated six items below the acceptable point biserial of .15, and one question demonstrated a very high P value of 98 and had a nonfunctioning distracter response. Four of these problematic items were in subscale ‘3’ (nutritional deficiencies of institutionalized older adults). Consistent with findings from previous studies, nurses scored below average on the nurse nutrition questionnaire,
however relationships between nurse nutrition knowledge and unintentional weight loss were not supported. Level of nurse education was positively correlated with NKQ-R scores. Nursing home ownership type was significantly related to NKQ-R scores and unintentional weight loss; nurses working in not-for-profit nursing homes scored higher on the NKQ-R than nurses working in not-for-profit nursing homes, and not-for-profit nursing homes had a lower incidence of UWL than the for-profit nursing homes in this study.
CHAPTER 1: INTRODUCTION

The first aim of this study was to revise a nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument. The second aim of this study was to use the revised questionnaire to describe the relationship between nurse nutrition knowledge and unintentional weight loss (UWL) in nursing home residents in Northeast Indiana. Weight loss can be intentional or unintentional: this study will focus on unintentional weight loss, which is the involuntary loss of weight over time (AARP, 2009). This line of inquiry will lead to interventions aimed at improving the nutritional health of nursing home residents. The following sections in this chapter will describe the background of the problem, quality of care in nursing homes; discuss UWL in nursing homes, and what is currently known about nurse nutrition knowledge. The significance and purpose for this study, specific aims, and definitions are included at the end of this chapter.

Background of the Problem

Aging Population

The United States healthcare system is about to face one of its greatest challenges: caring for an aging population. An internal survey conducted in 2005 at the Center for Disease Control ranked the aging population “as the greatest future health challenge of all the critical health issues the agency faces” (Collins, 2007, p. 2). Not only will the number of people over the age of 65 increase significantly over the next 40 years, but many will be living much longer with chronic disease and disability. Due to advances in technology and medicine within the past century, the leading causes of mortality have transitioned from infectious and acute diseases to chronic diseases and disability, which has resulted in an increase in life expectancy from 47 years in 1900 to 77.8 years in 2007 (NCHS, 2007). Heart disease, cancer and stroke are now the
leading causes of death and a major cause of disability in people over the age of 65 (Gorina, Hoyert, Lentzner, & Goulding, 2006). The first of the baby boomers born between 1946 and 1964 will reach the age of 65 in the year 2011 and all baby boomers will be aged 65 and older by the year 2030, representing 20% of the US population. The number of people aged 65 and older will more than double between 2008 and 2050, and the number of people aged 85 and older is expected to more than triple (US Census Bureau, 2007). As the number of people aged 65 and older with chronic disease and disability increases substantially over the next four decades, the need for nursing home care will likely increase (Nursing Home Use, 2007; Spillman & Lubitz, 2002). There are currently 1.6 million people aged 65 and older living in the 17,000 long-term care facilities in the U.S. (Administration on Aging, 2007). This number represents 3.6% of the population aged 65 and older. The US Department of Health and Human Services (1996) estimates that between 10 and 14 million people will require long term care services by the year 2020, increasing to between 14 and 24 million by the year 2060.

**Quality of Care in Nursing Homes**

Nursing homes provide short-term or long-term skilled nursing support to people who are no longer able to care for themselves or cannot be cared for by others at home due to illness or disability. Nursing home residents are among the most frail elders; nearly half have dementia, and more than half are confined to a bed or wheelchair (Houser, 2007). Nursing staff is responsible for most of the care and assessment in nursing homes. Certified nursing assistants (CNAs) provide 80-90% of the direct care, including transporting residents to the dining room, delivering food trays, feeding residents, documenting food intake, and communicating concerns to the licensed nurses (Riggs & Rantz, 2001). Licensed nurses are responsible for overseeing the
work of the CNAs, assessing residents and collaborating with other members of the healthcare team such as the physician and dietitian (Bureau of Labor Statistics, 2008-09).

In response to a growing public concern about the poor quality of care provided in the nation’s nursing homes, a landmark investigation was conducted in 1986 by the Institute of Medicine (IOM). The IOM report that stemmed from this investigation confirmed that many nursing home residents were being abused, neglected and were not given adequate care. As a result of this study, the Nursing Home Reform Act, embedded in the Omnibus Reconciliation Act (OBRA) of 1987, was established. OBRA is a series of initiatives designed to provide basic rights and services and improve the quality of care in nursing homes, and resulted in legislative requirements for all nursing homes participating in Medicare and Medicaid programs (Farris, 2007). One of these main requirements is that nursing homes that receive Medicare and Medicaid reimbursement are required to complete a Minimum Data Set (MDS) on every resident on a routine basis. The MDS is a federally mandated primary screening and assessment tool that must be completed on every resident in the facility regardless of source of payment; providing information about important quality measures that impact each resident’s health, physical functioning and general well-being (Medicare.gov). Every Medicare and Medicaid reimbursed nursing home must submit the MDS data electronically to the MDS database in their particular state. State data is then compiled into the national MDS database at the Centers for Medicare and Medicaid Services (CMS). Data sent to the CMS ultimately determines the per diem rate that the nursing home will be reimbursed for Medicare Part A recipients, and some states use this data to reimburse facilities for residents with Medicaid. Data sent to the CMS is also reported on the nursing home’s quality indicator report. These reports can be accessed by the public on the CMS’ Nursing Home Compare web-site (CMS.gov). A sub-set of 19 quality measures pertaining
to residents’ health, physical status, physical functioning and well-being is posted and can be used by consumers to assess and compare how well nursing homes are meeting the resident’s care and clinical needs. A list of the quality measures are at the end of this chapter.

**Unintentional Weight Loss**

One of the quality measures is *percent of long term residents who lose too much weight*, which falls under the nutrition/eating domain on the MDS report. Residents who have a full or quarterly MDS completed in the target quarter are qualified as a long term resident (QM Users Manual, 1-1).

Federal quality of care requirements stipulate that nursing home residents must maintain “acceptable parameters of nutritional status, such as body weight and protein levels, unless the resident’s clinical condition demonstrates that this is not possible” (Indiana Tag F0325/Regulation 42CFR 483.25(i)(1).

Weight loss of more than 5% per month may mean that the resident is too ill to consume enough calories to maintain weight due to a number of serious health issues. Too much weight loss may also indicate that the resident is not receiving enough assistance, that their medical care is poorly managed, or that the nursing home is not serving a balanced and nutritious meal (Nursing Home Compare, 2002).

Weight loss is a common and significant health problem for the elderly living in nursing homes (Dyck, 2008; Morely, 2003; Simmons et al., 2008; Thomas, Ashmen, Morely, & Evans, 2000) and is described as one of the largest and most silent epidemics occurring in America today (Burger, Kayser-Jones, & Bell, 2001). In spite of the Nursing Home Reform Act of 1987 (AARP, 2009) which addressed acceptable parameters of nutritional status, an alarming number of nursing home residents continue to suffer from weight loss and malnutrition (Suominen et al.,
Sixty percent of nursing home residents lose weight (Curfman, 2007) and between 33% and 85% are malnourished (Burger, Kayser-Jones, & Bell, 2001).

OBRA guidelines suggest monitoring nutrition status by assessing body weight and serum albumin level (Thomas, Hosam, Kamel, & Morley, 2004), although a generally accepted criterion for diagnosing malnutrition in the elderly has not been developed (Bauer et al., 2006; Morley, Thomas & Kamel, 2004). The link between weight loss and malnutrition is well established, and weight loss is a key indicator for risk of malnutrition (Callen & Wells, 2005; Chapman, 2006; Nourissat et al., 2007; Fontaine & Raynaud, 2008; Kyle, Genton, & Pichard, 2005; Hengstermann, Nieczaj, Steinhagen-Thiessen, & Schulz, 2008; Thomas, Kamel, & Morley, 2004; Visschedijk & Schols, 2006; Woo, Chi, Hui, Chan, & Sham, 2005).

Anorexia of aging, or decline in food intake, naturally occurs with aging, even in healthy people. Causes include decline in smell, decreased ability to chew, increased taste threshold, alterations in gastrointestinal functioning, elevated cholecystokinin levels which increase the gastrointestinal satiety single, increased leptin levels in males, cancer, use of therapeutic diets and decreased cognition. Many of these pathological changes that lead to a decline in food intake are reversible (Morley, 2002). Although there are a few acceptable reasons for weight loss in nursing home residents, any weight loss of more than 5% of body weight per month is not considered healthy (Thomas, Kamel, & Morley, 2004). Acceptable reasons for weight loss include obese residents who are placed on a normal diet, residents receiving treatment for diuresis, residents on calorie restricted diet plans, and residents who refuse food. If a resident refuses to eat, the physician and dietician must assess and chart the reason why the resident is refusing food, and must rule out treatable causes such as anorexia nervosa and depression (Thomas, Hosam, Kamel & Morley, 2004).
Malnutrition in the elderly increases functional dependence, morbidity, mortality, and increased use of healthcare resources (Abbassi & Rudman, 1994). Weight loss in the elderly is associated with increased risk for serious health problems, such as: increased bone loss and hip fractures, pneumonia, infectious diseases, pressure ulcers, functional decline, increased surgical risk factors and cardiac disease (Ensrud et al., 2003; Fontaine & Raynaud, 2008; Langmore, Skarupski, Park, & Fries, 2002; Wallace & Schwartz, 2002; Cohendy et al., 1999; Heymsfield, 1978). Weight loss has been linked to increased mortality in numerous studies (Shahar, Shahar, Kahar, & Nitzan-Kalusky, 2005; Luchsinger, Patel, Tang, Schupf, & Mayeux, 2008). Nursing home residents who lose 5% or more of their body weight in one month are ten times more likely to die than residents who gain weight, and a loss of 10% of body weight in a six month period increases the risk of death to ten times that of residents who gain weight in the same period (Sullivan, Johnson, Bopp, & Roberson, 2004). In a study by Ryan and colleagues (1995), residents who lost 5% of their body weight were four times more likely to die within one year than residents who did not lose weight.

Risk for weight loss in nursing home residents is often multifactoral (Schell & Kayser-Jones, 1999). Risk factors can be categorized as physical, psychological, or organizational (Rauscher, 1993). Physical and psychological factors related to weight loss are well documented and include chronic disease, disability secondary to chronic disease and the use of multiple medications. Psychological factors include depression, dementia and cognitive impairments (Allard et al., 2004, Cowan, Roberts, Fitzpatrick, While, & Baldwin, 2004).

Organizational factors that have been found to impact resident outcomes are: staffing patterns, type of ownership (not-for-profit versus for-profit), chain affiliation, resident room size, privacy, noise, number of beds, and amount of time spent with residents by the nursing home
staff (Castle & Mor, 1998; Copeman, 2000; Duncan Forbes-Thomson, & Bott, 2008; Kayser-Jones, Schell, Lyones, Kris, Chan & Beard, 2003). Organizational factors shown to impact resident food consumption are: the physical environment of the dining room (Mathey, Vanneste, deGraff, deGroot, & van Staveren, 2001; Roberts & Durnbaugh, 2002), lack of assistance and encouragement (Simmons & Patel, 2006), inadequate number of staff (Dyck, 2007; Kayser-Jones, 1997; Kayser-Jones & Schnell, 1997; Woo, Chi, Hui, Chan, & Sham, 2005), lack of leadership and supervision in the dining room (Gibbs-Ward & Keller, 2005; Kayser-Jones et al, 2003), incorrect documentation (Schnelle, Bates-Jensen, Chu, & Simmons, 2004), quality of nursing staff and resident interaction (Pearson, Fitzgerald, & Nay, 2003; Schell & Kayser-Jones, 1999; Remsburg, 2004), staff’s feeding beliefs (Crogan & Shultz, 2000; Pelletier, 2005), and inadequate nutrition knowledge in nurses (Crogan & Shultz, 2000; Crogan, Shultz, & Massey, 2001; Kayser-Jones & Schell, 1997; Lindseth, 1994; Pelletier, 2005; Perry, 1997; Schnelle, Bates-Jensen, Chu, & Simmons, 2004).

Nurse Nutrition Knowledge

It is well documented that nurses caring for the elderly in nursing homes do not have sufficient nutrition knowledge (Crogan & Shultz, 2000; Crogan, Shultz, & Massey, 2001; Kayser-Jones & Schell, 1997; Lindseth, 1994; Pelletier, 2005; Perry, 1997; Schnelle, Bates-Jensen, Chu, & Simmons, 2004), yet are responsible for the nutrition care and well-being of the residents. Previous studies that have measured nurse nutrition knowledge have consistently shown that scores are well below average.

Significance

Unintentional Weight Loss (UWL) is a prevalent problem in nursing homes and has a significant impact on resident morbidity and mortality (Dyck, 2008; Morely, 2003; Simmons et
al., 2008; Thomas, Ashmen, Morely, & Evans, 2000; Shahar, A., Shahar D., Kahar, & Nitzan-Kalusky, 2005; Luchsinger, Patel, Tang, Schupf, & Mayeux, 2008). Forty-five percent of nursing home residents are dependent upon nursing staff for at least minimal assistance with meals (Sahyoun, Pratt, Lentzner, Dey, & Robinson, 2001), putting them at higher risk for UWL and malnutrition than independent residents (Alibhai, Greenwood, & Payette, 2005; Christensson, & Unosson, 1999; Crogan & Alvine, 2006; Lou, Dai, Huang, & Yu, 2007; Schmid, Weiss, & Heseker, 2003; Wojszel, 2006).

Because weight loss and malnutrition could often be prevented or reversed in many elder nursing home residents if addressed early (Blaum, Fries, & Fiatarone, 1996; Evans, 2005; West, Ouellete & Ouellette, 2003), understanding the relationship between nurse nutrition knowledge and UWL could lead to focused interventions and improved outcomes in nursing home residents.

**Purpose**

The first aim of this study was to revise a nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument. The revised instrument was then used to describe the relationship between nurse nutritional knowledge and UWL in nursing homes across Northeast Indiana within an organizational framework.

**Aims**

Specific aims for this study were:

1) To revise the nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument.

2) To describe the relationship between nurse nutrition knowledge and UWL in nursing home residents in northeast Indiana.
2A) To describe the relationship between nurse nutrition knowledge and level of education of nurses working in nursing homes.

2B) To describe the relationship between UWL and level of education of nurses working in nursing homes.

2C) To describe the relationship between years of nursing experience and nurse nutrition knowledge.

2D) To describe the relationship between years of nursing experience and UWL in nursing home residents.

**Definition of Terms**

- **Plan of care**: Activities planned to help residents attain or maintain the highest practical physical, mental and psychosocial functioning (IOM, 1986).
- **Elderly**: Persons aged 65 years and older (US Census Bureau, 2006).
- **Expert panel**: Group of people who have worked extensively with the construct or related phenomena (DeVellis, 1991).
- **Medicare Part A**: Hospital insurance covered by Medicare. Includes inpatient care in skilled nursing facilities.
- **Medicaid**: National health program for low-income individuals and families.
- **Nurse nutrition knowledge**: “The science of foods, the nutrients, and substance therein, their action, interaction and balance in relation to health and diseases” (The Council on Food and Nutrition of the AMA).
- **Nutrition Knowledge Questionnaire-Revised (NKQ-R)**: 28 multiple choice questionnaire (with three subscales) to measure nurse nutrition knowledge of nursing home residents.
Subscale 1) Effects of aging on nutritional needs: Physiologic changes that occur with aging that effect nutritional needs of the older adult.

Subscale 2) Principles of nutritional assessment: The interpretation of information from dietary, laboratory, anthropometric and clinical studies (Gibson, 2005).

Subscale 3) Nutritional deficiencies of institutionalized older adults: Lack of essential nutrients in nursing home residents.

Nursing homes: Nursing homes provide care for people who cannot be cared for at home or in the community. Levels of care are:

Skilled: The type of health care given by skilled nursing or rehabilitation staff to manage, observe and evaluate care (Medicare.gov).

Intermediate: Intermittent or periodic care for residents who do not need continuous care. Services include assistance with activities of daily living, such as hygiene, grooming, eating, toileting, ambulating, and medications (Medicare.gov).

Nursing staff:

• Registered nurses are licensed by the state. Undergraduate academic programs for RNs are the Associate (two year), Diploma (three year) and Baccalaureate (four year) degrees. All three levels of nursing graduates take the same licensure examination. RNs are licensed by each State Board of Nursing and “bear primary responsibility and accountability for nursing practices based on specialized knowledge, judgment, and skill derived from the principles of biological, physical, and behavioral sciences” (ISBN, 2008).
Based on federal guidelines, nursing homes must staff an RN a minimum of eight (8) hours/day, seven (7) days a week. RNs most often function as supervisors and managers in nursing homes (Harrington, Carrillo, & Blank, 2009).

RN services include but are not limited to:

- Assessing health conditions.
- Deriving a nursing diagnosis.
- Executing a nursing regimen through the selection, performance, and management of nursing actions based on nursing diagnosis.
- Advocating the provision of health care services through collaboration with or referral to other health professionals.
- Executing regimens delegated by a physician with an unlimited license to practice medicine or osteopathic medicine (Indiana Code 25-23-1-1.1).

*Licensed practical and licensed vocational nurses* (LPN/LVN) have one year of education and work under the supervision of an RN. LPNs often provide direct care to residents, including assessing, documenting, passing medications, treatments, and supervising certified nursing assistants (Bureau of Labor Statistics, 2008-09).

LPN/LVN services include but are not limited to:

- Contributing to the assessment of the health status of individuals or groups.
- Participating in the development and/or modification of the strategy of care.
- Implementing the appropriate aspects of the strategy of care.
- Maintaining safe and effective nursing care.
- Participating in the evaluation of responses to the strategy of care (Indiana Code 25-23-1-1.3).
• **Certified nursing assistants** work under the supervision of a licensed nurse, either an RN or LPN/LVN, and provide most of the assistance with activities of daily living to residents, such as eating, toileting, dressing, grooming, hygiene and ambulation. Nursing assistants that work in nursing homes that participate in Medicare and Medicaid programs must complete a minimum of 75 hours of a state-approved training program, pass a competency exam, and maintain certification by completing 12 hours of continuing education every year ([http://www.hhs.gov/](http://www.hhs.gov/)).

• **Quality of life:** Social function, emotional health, self worth and physical health and functioning (Sloane et al., 2005).

• **Quality measures:** Nursing home quality measures are assessment data collected by Medicare from the Minimum Data Set (MDS) on all nursing home residents. The MDS is a federally mandated tool for implementing standardized assessments and facilitating the management of care provision in nursing homes. Quality measurement scores are posted on the Medicare website and are used to measure and compare the quality of care provided by nursing home staff. “Residents who lose too much weight” is one of the quality measures collected.

The quality measures for nursing home residents are:

- Percent of long-stay residents given influenza vaccine during the flu season
- Percent of long-stay residents who were assessed and given pneumococcal vaccination
- Percent of long-stay residents whose need for help with daily activities has increased
- Percent of long-stay residents who have moderate to severe pain
- Percent of high risk long-stay residents who have pressure sores
Percent of low risk long-stay residents who have pressure sores

Percent of long-stay residents who are physically restrained

Percent of long-stay residents who are more depressed or anxious

Percent of low risk long-stay residents who lose control of their bladder

Percent of long-stay residents who have/had a catheter inserted and left in their bladder

Percent of long-stay residents spend most of their time in bed or a chair

Percent of long-stay residents whose ability to move about in and around their room got worse

Percent of long-stay residents who had a urinary tract infection

Percent of long-stay residents who lose too much weight

Percent of short-stay residents given the influenza vaccine during flu season

Percent of short-stay residents who were assessed and given pneumococcal vaccination

Percent of short-stay residents who have delirium

Percent of short-stay residents who have moderate to severe pain

Percent of short-stay residents who have pressure sores

- *Unintentional weight loss (UWL):* UWL is weight loss in nursing home residents of 5% or more in 30 days, or 10% or more in 180 days (Medicare.gov).

**Summary**

More elders will be living with chronic disease and disability over the next several decades due to the aging cohort of baby boomers and increased life expectancy. This chapter discussed the implications of the aging population, many of who are living longer with chronic
diseases and disability. Undoubtedly, many in this aging population will be turning to nursing homes for care. Despite some improvement in nursing care delivery since OBRA was enacted in 1987, serious care issues remain unacceptably high (Scanlon, 2003; Eaton, 2005). Many nursing home residents must rely on the nursing staff for all of their nutritional needs; however studies show that nurses working in nursing homes do not have adequate nutritional knowledge for the residents they care for. Quality of life in elderly nursing home residents can be greatly impacted by the resident’s nutritional health (Crogan & Pasvogel, 2003; Sloane et al., 2005). Nursing homes are not only facilities that provide nursing care, but are often the resident’s last and only home. High quality nursing home care depends on 1) accurate and thorough assessment of each resident, 2) interdisciplinary plan of care based on the assessment, and 3) competent execution of all aspects of the plan of care (IOM 1986). Little is known about the relationship between nurse nutrition knowledge and UWL in nursing homes; a better understanding of what nurses know about nutrition is needed in order to guide interventions that will prevent UWL, resulting in the provision of high quality nursing home care and improving the quality of life among nursing home residents.
CHAPTER 2: CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

This chapter describes the Systems Research Organizing Model (SROM) which provides the conceptual framework for this study. The second section of the chapter is a review of the literature describing nurse nutrition knowledge, and demographic variables: age, level of education and nursing experience. Unintentional weight loss was discussed in Chapter one.

Conceptual Framework

Systems Research Organizing Model

Organizational factors within the healthcare system are complex; consisting of the “people, processes, technology, procedures, politics and a host of other variables all interacting and affecting each other” (Brewer, Verran, & Stichler, 2008, p. 7). Systems are complex components that must be viewed as a whole because the components continuously interact, are interdependent, and share a common goal. Numerous organization factors that impact resident outcomes were described in Chapter 1. The SROM meets the criteria for a nursing system’s research and was used to guide this study. The SROM is distinguished as a nursing systems model from a systems model by the inclusion of the nursing metaparadigm: client (patient), nurse (action), environment (system) and health (outcome), qualifying it for nursing systems research. The goal of nursing systems research is to predict and describe factors related to nursing practice in order to enhance patient outcomes (Brewer et al., nd). The Systems Research Organizing Model (SROM) was adapted by the faculty and doctoral students at the University of Arizona as an organizing framework to guide nursing systems research. In the SROM, system was changed to context in order to view the system as a whole and not merely a construct (Brewer, Verran, & Stichler, 2008; Effken, 2003).
The SROM is grounded in systems science and adapted from the Quality Health Outcomes Model. The QHOM was developed by the American Academy of Nursing Expert Panel on Quality Health Care as a framework for outcomes research and to explain a system’s effect on healthcare outcomes (Mitchell, Ferketich, & Jennings, 1998). The SROM and the QHOM both have origins in Donabedian’s linear model that was developed to assess healthcare quality based on process, structure, and outcome (Brewer, Verran, & Stichler, 2008). Donabedian proposed that there was no separation of the three, but there existed a cause and effect relationship; each of the three components had a direct influence on the next (Donabedian, 2003). Like the SROM, the QHOM is consistent with the nursing metaparadigm. The major constructs of the QHOM are client, system, intervention, and outcomes. Although it addresses several system-related concepts including reciprocal relationships, feedback loops, and multilevel measurements, the QHOM is not completely consistent with systems theory. A major tenant of systems theory is to view the system as a whole in order to predict and explain nursing care delivery and outcomes, but the QHOM uses system as a construct, therefore it can only examine system characteristics through its interactions with other model constructs and only in relationship to the model’s outcomes. The systems perspective is to view all elements of the subject of interest as an interrelated, complex, and dynamic structure; the SROM differs from the QHOM in that the SROM’s intent is to study the system as a whole, and not merely as a construct (Brewer, Verran, & Stichler, 2008).

Three major philosophical differences exist between the two models. First, the SROM uses context, rather than system as a construct, allowing the researcher to focus on the system as a whole. Second, the SROM puts client in the antecedent position, allowing the client to drive the action focus (intervention) rather than the action focus driving the client. The last major
philosophical difference is the SROM’s linkages between the action focus and the outcomes, indicating that the action focus may affect outcomes directly, rather than through system and clients (Figure 1), (Brewer, Verran, & Stichler, 2008).

FIGURE 1: The Systems Research Organizing Model (SROM)

The SROM recognizes the multidimensionality of nursing practice by addressing the system, parts of the system, and the interactions between the parts (Brewer et al, 2008). It is this focus on the system that differentiates the SROM from other models used in nursing and organization research. The SROM establishes nonlinear relationships among all four core constructs. All constructs are connected and unidirectional links are not assumed unless empirically proven (Effken, 2003). Feedback relationships indicate the self-regulating nature of complex organizations. Not all links in the model need to be tested in an individual research study. Several smaller studies may be looked at as whole to provide evidence to support the nonlinear relationships of all the constructs. The model is flexible and the variables are
interchangeable, which allows the investigator to place the variables where appropriate based on the purpose of the research (Verran, 2003). The SROM is highly abstract and may be used in any practice setting. For example, the SROM has been adopted as an informatics research organizing model, behavior health organizing model, and community based-research model. Doyle and Effken (2002) described how the model could be used to guide the evaluation of medication bar coding (Doyle & Effken, 2002), and is being used by other students and faculty at the University of Arizona to guide informatics research (Effken, 2003). Saewert (2003) used the Systems Research Organizing Model of Behavioral health (SROM-BH) as a conceptual framework to explain and predict mental health outcomes by examining client risk adjustment and other factors that affect consumer’s perception of quality of life. McEwen and Lamb (2002) used the SROM to guide their community-based research, investigating relationships among factors that impact the completion of Mycobacterium Tuberculosis treatment at the US-Mexico border.

Client is the focus of the system of interest. It is defined as system inputs that drive the model and can be organizational, demographic, or risk factors. Clients may be nurses, patients, communities, or characteristics of the organization. The main client characteristics are those that have influenced or are hypothesized to influence relationships between context, action focus, and outcomes. Client characteristics may directly or indirectly affect outcomes through the other model constructs. The client characteristics are what direct the action focus in current or future studies (Brewer, Verran, & Stichler, 2008). Placed into the client position in Lim’s (2008) dissertation, team member characteristics were used to test a hypothesized collaboration model.

Context is the setting of the system being studied and may directly and indirectly impact other model constructs. The most important characteristic of an organization’s context is the environment in which it functions (Verran & Mark, 1998). The context could be the physical
make-up of a nursing unit or could consist of a specific geographical location. The SROM expands what was traditionally known by nurse researchers as the environment to include sociopolitical context in which interactions occur. Expanding the context to include sociopolitical perspectives moves the focus from the nurse-patient relationship and broadens it to include the social, cultural, historical, political, and economic factors that impact the client and nursing practice. The sociopolitical focus allows the nurse to investigate the direct and indirect factors that impact outcomes at various levels of healthcare delivery. Context was defined as immigration policy, proximity to the Mexican Healthcare system, and constraints of staff working in tuberculosis clinics on the US-Mexico border in a study by McEwen and Lamb (2002). Like the construct client, context may directly or indirectly influence all other system constructs. Placement of the contextual variables must be determined and explained by the investigator, and the purpose of the research determines placement of the context’s factors. Context is static and not the focus for change in the study. However, if the researcher plans to alter the environment or context to determine if the intervention has a result on the outcome, then the context becomes the action focus. The context may have a significant impact on the other constructs, it is possible that it may have an even a greater effect on the outcome than the variables of interest (Brewer, Verran, & Stichler, 2008).

Action focus is considered the intervention that the researcher will manipulate in current or future studies. It is dynamic, and can be measured or changed within the study. Designation of the action focus variable depends on the purpose of the study. For example, Verran, Effken, and Lamb (2005) placed unit characteristics in the action focus in their study on the impact of unit characteristics on patient outcomes. The unit characteristics included 14 variables that had been shown in prior studies to affect patient outcomes. Organizational characteristics were placed
under context and included variables that were considered unlikely to be changed, such as culture, life cycle and structure.

The outcome is the final result of care that results from actions, interventions or changes that occurred in the system. Lim (2008) hypothesized that the outcome variable degree of collaboration would be affected by each of the other three model constructs. Outcomes can influence other constructs in the SROM. Outcomes could focus on individuals, groups, organizations, or large communities of people (Brewer, Verran, & Stichler, 2008).

In order to describe the relationships between client and contextual factors with the outcome of UWL, the SROM was the framework used to explore the variables of interest in this study (Figure 2). Licensed nurse characteristics were placed in the client position since it is what is hypothesized to drive the model. Context will consist of the ownership status of the nursing home. Unintentional Weight Loss (UWL) is the outcome of interest and was discussed in Chapter 1.

**FIGURE 2:** Hypothesized SROM Framework
Review of the Literature

Nursing Home Compare

The Centers for Medicare & Medicaid Services (CMS) introduced the Nursing Home Compare Database on the internet to consumers in 2002. The website presents detailed information at the facility level about current and past performances of all Medicare and Medicaid certified nursing homes in the US (http://www.hhs.gov/), providing the most extensive information available on the quality of US nursing homes (Kaiser Daily, 2008). Information available includes nursing home characteristics such as number of beds and type of ownership. Resident characteristics describes the percentage of residents who have triggered one of the quality indicators indicating the resident has or is at risk for developing a functional problem during the quarter that data was collected. Quality indicators reflect the adequacy of nursing care and include such things as pressure ulcers, restraint use, and unintentional weight loss. Information summarizing the results from the facility’s last state inspection and information about the number of nursing staff in each home also is available at Nursing Home Compare (Research Data Assistance Center, 2008). Data for the quality measures reported on the Nursing Home Compare website come from the MDS repository. The MDS is collected on all residents in nursing homes that participate in Medicare and Medicaid programs in the US. Data includes information on the residents’ health, physical functioning, mental status and general well-being. Interdisciplinary teams, headed by an RN, collect this data on admission, quarterly, yearly, and whenever a resident’s condition warrants a new assessment due to a change in status (hhs.gov).

Validity and reliability of the MDS has been established in previous studies (Chou, & Chi, 2008; Frederiksen, Tariot, & DeJonghe, 1996; Gerritsen et al., 2004; Gerritsen et al., 2008; Hicks, Rantz, Petroski, & Mukamel 2004; Morris et al., 1997; Resnick, Brandeis, Baumann, &
Morris, 1996; Sangl, Saliba, Gifford, & Hittle, 2005; Shin & Scherer, 2009), Criterion validity of the MDS was demonstrated with the Mini Mental Status Exam, Activities of Daily Living Scale (ADLs), Behavior Rating Scales (Snowden et al., 1999), the Brief Psychiatric Rating Scale, Dementia Mood Assessment Scale, Psychogeriatric Dependency Rating Scale, and the Physical Signs and Symptoms Scale (Blaum, O’Neill, Clements, Fries, & Fiatarone, 1997), suggesting the MDS has adequate validity in those areas of research. MDS validity was confirmed on the measures of cognitive function, ADLs, depression, agitation, social behavior and irritability (Lawton et al., 1998), perineal dermatitis risk factors (Toth, Bliss, Savik, & Wyman, 2008), and short term mortality (Abicht-Swensen, & Debner, 1999). Issues with the validity and reliability were noted in two studies: the MDS was found to underreport pain in cognitively impaired residents (Cohen-Mansfield, 2004) and greatly overestimated the number of urinary tract infections (Stevenson, Moore, & Sleeper, 2004). Validity and reliability of the MDS’ nutritional indicators and risk for poor nutritional outcomes has been demonstrated (Bowman & Keller, 2005). Corbett, Crogan and Short’s (2002) descriptive, longitudinal study found that selected MDS items such as: leaves 25% or more of food uneaten, functional eating ability, psychiatric or mood disorder and pharmacotherapy for a psychiatric or mood disorder may be useful for identifying residents at risk for weight loss or malnutrition. A cross-sectional study by Simmons, Lim and Schnelle (2002) found that the MDS’ weight loss quality indicator was effective at reflecting differences in nursing homes with a low or high prevalence of weight loss. Hawes and colleagues (1995) conducted field tests on various versions of the MDS and found the nutritional section of the MDS to be extremely reliable in supporting problem identification. The researchers added that these findings indicate that the MDS can provide extremely useful data in the clinical setting or as a research tool. A cross sectional observation study showed that some
nutritionally related variables measured by the MDS, particularly poor oral intake, were significantly associated with anthropometric and bioelectrical measures of nutritional status (Blaum, O’Neill, Clements, Fries, & Fiatarone, 1997). Bowman and Keller’s (2005) study utilized a dietician to assess 128 nursing home resident’s nutritional risk. Findings indicated that the MDS variables of dietary prescription, supplement use, swallowing problems and resident’s body mass index (BMI) were significantly associated with the nutritional risk rating.

Client

Nurse Nutrition Knowledge

Eighty percent of the hands-on-care in nursing homes is provided by certified nursing assistants (Beck, Ortigara, Mercer, & Shue, 1999) however it is the licensed nurses (RNs and LPNs/LVNs) who are responsible for assessing and identifying nutritional problems and initiating treatment interventions when problems are identified (Allen, 2003). The majority of nurses feel that nutritional assessment of patients is primarily a nursing responsibility (Duthie, 1988; Perry, 1997), but many nurses report feeling that they lack the necessary education to adequately assess resident’s nutritional status (Crogan & Shultz, 2000; Kowanko, Simon, & Wood, 1999). The most common cause for inadequate nutritional practices, such as nutritional screening and assessment among nurses, is inadequate nutritional knowledge (Mowe et al., 2007). Early recognition is one of the most important factors in preventing malnutrition (Ferguson, Capra, Bauer, & Banks, 1999); and accurate assessment and documentation is critical to formulating an individualized plan of care. Nurses who cannot correctly identify nutritionally at-risk residents thwart any chance of appropriate interdisciplinary interventions.

Nutritional knowledge among nursing staff has not been sufficient in several studies in nursing homes and acute care settings. Studies from acute care settings are included in some
studies; though the findings may not be generalizable to nursing homes. Scant empirical data are available regarding nutrition knowledge of LPNs and RNs in nursing homes, and because acute care nurses provide much of the same nutrition care as nurses in nursing homes, those studies are included in the review of the literature.

Nightingale and Reeves (1999) conducted a pilot study of healthcare providers to test their knowledge about the management needs of adult undernourished hospitalized patients. Findings indicated that the knowledge of physicians, med students, dieticians, pharmacists and nurses was poor. Nurses scored significantly lower than all groups except the physicians, and there were no significant differences between the nurses’ scores based on their level of education.

In a descriptive, cross sectional study, the nutritional status of 1,043 elderly residents in long term care hospitals was gathered based on data from a mini nutritional assessment, body mass index, and factors related to nutritional care. Nurses (N = 53) were asked their opinion regarding the nutritional status of these residents. The nurses considered only 15.2% of the residents malnourished, although the nutritional assessment indicated that 56.7% were malnourished. Also, the residents who the nurses reported as malnourished were given fewer nutritional supplements than the residents that the nurses felt were not malnourished (Suominen, Sandelin, Soini, & Pitkala, 2009).

Perry’s (1997) study used semi structured interviews to determine nurses’ attitudes, nutrition knowledge and activities in nurses working four wards in a hospital. Findings indicated widespread deficiencies in nurses’ knowledge. Also, major discrepancies existed between what the nurses said that they thought were important nutritional assessments and interventions and the care the nurses actually provided. In a study using structured interviews to assess the
knowledge and attitudes of nursing staff working in nursing homes, Munch and colleagues (2006) found similar discrepancies in their study between what nurses stated they felt was important nutrition care and what care they actually provided. Findings also indicated that nursing staff had inadequate nutrition knowledge.

Nurses who are responsible for obtaining and recording resident assessment data for the MDS data often must rely on the nursing staff’s verbal reports or documentation to gather resident data; obtaining this information second hand is often necessary, but it increases the possibility of bias and errors in the data collected (Lum, Lin & Kane, 2005). Inaccurate information is not only useless, but likely results in missed opportunities to improve resident’s health. Schnelle and his colleagues (2004) found in their review of the literature that information in the nursing staff’s documentation was “so inaccurate and so severe that even crude judgments about care quality are precluded…and self reported data must be regarded with suspicion” (p. 1382).

Only a few studies are located in the literature that has measured nurse nutrition knowledge. In a study of Canadian community health nurses using the “Nutrition for Nurses,” a 50 item multiple choice questionnaire developed by the authors to assess the nutrition knowledge of community health nurses, was 69% (SD = 8), (Henderson-Sabry, Hadley, & Kirstine, 1987). Lindseth (1994) modified the 50 item “Nutrition for Nurses” questionnaire used in the Canadian study to test nutrition knowledge of 176 RNs working in 39 nursing homes, hospitals, and community/public health agencies. Mean score was 32.5% (SD = 6). Lindseth (1994) tested nursing knowledge scores of RNs caring for geriatric residents in nursing homes and hospital settings in a Midwestern state. Mean score was 64% (SD = 8.8). Using the same tool, Lindseth (1997) assessed the demographic, curricular and instructional variables related to the nutritional
knowledge of graduating nurses (N = 129) from randomly selected baccalaureate, diploma and associated degree programs. The subjects in this study also scored very low, with a mean score of 60% ($SD = 9$). An Australian study using a descriptive cross-sectional design was used to determine nutrition knowledge of RN’s using the “Nutrition for Nurses” questionnaire modified by the authors for Australian nurses working in numerous settings: acute hospitals, community health, rehabilitation, psychiatry, and other areas. The mean nutrition score for the nurses was 60% ($SD = 8.4$), (Schaller & James, 2005). A 50 item multiple choice questionnaire was used to assess nutrition knowledge of nurses caring for elders in nursing homes (Crogan & Shultz, 2000). Mean score for the 35 RN and 9 LPN subjects was 65% ($SD = 11$). A study by Vickstron and Fox (1976) tested the nutrition knowledge of hospital nurses in Nebraska using a 30 item true/false measurement tool. Mean scores in this group was 50%. In a study of 95 geriatric nurses taking a 15 item multiple choice test, the mean score was 60%. Most of the nurses were RNs (N = 85), four were LPNs (Stanek, Powell, & Betts, 1991). Assessment of the nutrition knowledge of 68 adult and family nurse practitioners (Master’s prepared or higher) was conducted by administering a 55 item multiple choice test to the subjects about basic nutrition needs. Items were drawn from the University of Alabama’s School of Medicine Nutrition test bank. Mean score was 66% ($SD = 8$) (Warber & Simone, 2000).

**Level of Education**

Nurses are exposed to nutritional content while in nursing school, although questions remain as to what content should be taught, where it should be placed in the curriculum and the best way to teach nurses nutrition content (Morse & Corcoran-Perry, 1996). The Indiana State Board of Nursing (ISBN) requires instruction of nutrition content in registered nurse programs but does not specify the amount of content and stipulates only that nutrition content is to be
integrated, combined or presented as a separate course (ISBN, 848 LAC, 1-2-16). In a survey of baccalaureate nursing programs, no standardized nutrition course or method for integrating nutrition content into the curriculum was identified (Stotts, Englert, Crocker, Bennum, & Hoppe, 1987). In an earlier study, a mail survey of 176 baccalaureate nursing programs found that 64% had required nutrition courses; the remaining schools reported integrating nutrition content into other courses (Cutler, 1986). According to a more recent report (IOM, 2000), most baccalaureate nursing programs and some diploma and associate degree nursing programs require a 2-3 credit hour course in basic nutrition along with integrating nutrition content throughout the curriculum. Content covered in nursing programs may include: essential nutrition, criteria for adequate diet, nutrition in health promotion, nutrition assessment, ethical, social, and political considerations of nutrition care, drug/nutrient interactions, and nutrition management of selected health problems. Lack of standardized nutrition course requirements for nursing students coupled with nurses’ perceptions that they do not have the education base to provide adequate care indicates that nutritional content delivered in nursing schools may not be sufficient for practicing nurses.

Crogan and Shultz (2000) surveyed LPNs and RNs working in nursing homes to determine nutrition-training issues that could impact resident’s nutrition. Using a 50-item questionnaire, nutrition knowledge of 44 nurses were tested on the areas of nutritional deficiencies in nursing home residents, the effects of aging on nutritional needs, protein-calorie malnutrition, and nutritional assessment. Demographic data provided information about any formal nutrition education, and if the subjects thought that the education was sufficient for current practice. Nurses were asked if they thought a periodic nutrition education program would be helpful, and were asked to provide topics they would be interested in learning about. Most nurses (93%) indicated receiving some nutrition education in nursing school, and 70% of nurses
believed this education was satisfactory for their current practice. More RNs had a nutrition
course than LPNs, 89% compared to 66%, and more RNs reported that the amount of nutrition
education they received was sufficient for practice than the LPNs, 77% compared to 44%.
Nurses’ reports of whether the amount of education received was sufficient did not make a
significant difference in the mean knowledge scores. The mean nutrition score was 65% ($SD =
11$) on the multiple choice item nutrition knowledge questionnaire. Mean scores of the LPNs was
56% ($SD = 11$), compared to the mean scores of the RNs at 68% ($SD = 11$).

Lindseth (1997) tested the nutrition knowledge of graduating nurses from associate,
diploma, and baccalaureate programs and found no differences in the mean scores based on type
of nursing program. Surprisingly, a descriptive cross sectional study (Schaller & James, 2005)
found nurses with a diploma degree scored higher than nurses with a higher degree. These
findings are inconsistent with other studies that have found that higher levels of education
impacts patient outcomes. In an integrative review of the literature conducted by Ridley (2008),
higher RN skill mix and dose decreases adverse patient outcomes, however the author adds that
analysis of patient outcomes based on the level of education of the RN is virtually non-existent.
Few studies have been conducted that investigate patient outcomes based on the level of the RN.
Six studies were located in the literature that found differences in care based on RN education
level: compared to associate degree nurses, baccalaureate prepared nurses have shown to
improve patient survival rates (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Estabrooks,
Midodzi, Cummings, Ricker, & Giovannetti, 2005; Friese, Lake, Aiken, Silber, & Sochalski,
2008; Tourangeau et al, 2007), commit fewer medication errors and procedural violations (Fagin,
2001), and display stronger communication and problem solving skills in acute care settings
(Johnson, 1988).
Educational intervention studies have been shown to increase nurse nutrition knowledge, although results of long-term assessment of knowledge retention were not reported in any of the studies. Crogan and Evans’ (2001) study tested an evidence based nutrition education program for licensed nurses (11 RNs and 1 LPN). Nurses scored 56% on the basic nutritional knowledge pretest and 66% on the posttest. Less experienced nurses had higher scores than the nurses with more years of experience indicating that nutrition knowledge may decrease over time. Also, nurses with more years of experience were more likely to work as charge nurses or as Minimum Data Set (MDS) nurses. Although the education intervention in the study did not greatly improve the nurses’ posttest score, the percentage of residents who lost weight declined from 12% to 8% over the six months following the intervention. Arroyo and her colleagues (2008) administered a 12 session education program to 16 nurses and 28 nursing assistants over a three week period in a nursing home. Findings indicated a significant improvement in nutrition knowledge pre and posttest scores. Cadman and Findlay (1997) had similar findings after practical nurses received practice-based training from a registered dietician. Post intervention knowledge scores increased from 27% to 87%, indicating that nutrition education improves nutrition knowledge. Lindseth’s (1994) descriptive correlational study also indicated a moderate correlation between continuing education programs and nurse nutrition knowledge. Olsson and Bergbom-Engberg (1998) assessed nurses’ knowledge and opinions of at-risk patient’s calorie needs and at-risk patient’s calorie intake before and after a nutrition training and education program. The at-risk patients took in more calories and more supplements after nurses received the training and education program. In addition, nurses’ nutrition knowledge scores increased. Manafi and colleagues found that acute care nurses who received a 30-minute education session and a resource packet
displayed increased nutritional knowledge after the intervention (Manafi, McLeister, Cherry, & Wallis, 2008).

**Age**

There is little in the literature that describes the impact of nurses’ age on resident outcomes. Lindseth’s (1997) study that found that graduating nurses in ASN, diploma, and BSN programs who were over the age of 26 scored higher than graduating nurses aged 18-25. These findings are congruent with a study of Australian nurses who took a 50 item nutrition questionnaire. The descriptive cross sectional study found that nurses who were 36 years or older scored higher than younger nurses.

**Years in Long Term Care**

Benner’s Novice to Expert Model purports that nursing knowledge is the combination of practical experience and evidence from research, and expert nurses gain clinical knowledge through the experience of caring for other patients in similar situations (Benner, Tanner, & Chesla, 2009). Based on this model, nurses’ nutrition knowledge should increase over time. Lindseth’s (1990) study found a small non-significant correlation between nutrition knowledge questionnaire scores in nurses with 6-10 years of experience than nurses with more than 20 years of experience. Lindseth’s (1997) study found no significant differences between education level and nutrition knowledge scores of 129 graduating nurses randomly selected from associate, diploma, and baccalaureate programs. Significant differences were noted, however, between the nursing graduates who had 10 or more years of health related work experience as a nursing assistant or direct patient care position. In contrast, Crogan, Shultz, and Massey’s (2001) study found that educational background had more of an impact on nutrition knowledge than years of experience; RNs scored higher than LPNs on a nutritional competency exam.
Time at the Nursing Home

Staffing levels are known to be important predictors of care quality in nursing homes, and are well documented in the literature, however research exploring the impact of stability on resident outcomes is very limited (Castle, Engberg & Men, 2008; Zimmerman et al., 2005). The US Department of Health and Human Services (2004) reports that evidence-based work force strategies cannot be implemented until more is known about staff longevity and retention, making resident outcome research a priority. Longevity of licensed nursing staff in nursing homes conveys experience and skill regarding the norms and requirements of the nursing home, and these workers are able to pass those skills onto the newer staff. In addition, employees with longevity are more likely to provide consistent care (Castle & Engberg, 2007). No studies were located in the literature that explored staff longevity and UWL in nursing home residents. In a study of more than 6,000 nursing homes, Castle, Engberg, and Men (2008) found that RN stability, defined by RNs working at the facility for more than five years, was significantly correlated with low restraint use. In a 2007 study by the same authors, 14 quality indicators were combined to create one quality index. This study showed that RN stability was not related to quality. Using the MDS to obtain pressure ulcer incidence and social engagement scores, Barry and colleagues (2005) found that nursing homes with higher nurse aid stability had better resident outcomes. In a stratified random sample of 59 nursing homes, infection rates and hospitalization rates for infection were significantly related to RN stability (Zimmerman 2002).

Context

Ownership Status

Two thirds of nursing homes in the United States are for-profit facilities, 27.7% are not-for-profit and 6.5% are public (Harrington, Carrillo, Thollaug, & Summers, 1999). Using quality
indicator data and survey results, quality of care has shown to be superior in not-for-profit nursing homes over for-profit nursing homes in several studies. Harrington and colleagues (2001) analyzed government inspection data on virtually every Medicare and Medicaid reimbursed nursing home in the United States. Researchers controlled various factors that could affect reimbursement: homes with more Medicaid than private pay residents; hospital based nursing homes; skilled nursing homes for Medicare only; and facilities affiliated with a multifacility chain. Findings suggested that not-for-profit facilities delivered higher quality outcomes of care than the for-profit nursing homes, and homes that were part of a chain had the worst quality outcomes. The authors of this study believe the most obvious explanation is that profit seeking diverts money from providing optimal care.

A systematic review and meta-analysis of for-profit and not-for-profit nursing homes investigated specific quality measures (pressure ulcers, restraints, staffing ratios and deficiency citations) and found that not-for-profit nursing homes delivered higher quality of care (Comondore et al., 2009). An analysis of state survey deficiencies of all Medicare and Medicaid nursing homes in the US found that for-profit nursing homes had an average of 5.45 deficiencies, compared with 3.72 citations for not-for-profit nursing homes and 4.21 for government owned nursing homes (Saphir, 1999). Deficiency statistics are similar to Harrington and colleagues (2001) study that found for-profit nursing homes averaged 5.89 deficiencies per home, which was found to be 46.5% higher than not for profit homes and 43% higher than public nursing homes. Decker’s (2008) study investigated at the relationship between quality outcomes and the effects of Medicaid resident census, Medicaid payment, and occupancy. Using RN and restraint use as predictors, the investigator found that restraint use increased and RN staffing decreased as the amount of Medicaid census increased and Medicaid payments decreased. Findings suggest
that performance relates to the allocation of resources, and the poorer performance of for-profit nursing homes in comparison to not-for-profit homes is due to lower occupancy, higher Medicaid census, and lower Medicaid reimbursements in for-profit nursing homes.

A comprehensive systematic review was conducted to analyze the profit status of nursing homes and quality outcomes in the US from 1990-2002. Evidence indicates that systematic differences do exist between for-profit and not-for-profit nursing homes; on average, for-profit homes provide lower quality of care. Using Donabedian’s framework, quality was composed of three interacting elements: structure, process, and outcome. Examples of the elements include staffing (structure), indwelling catheter insertion or inappropriate use of restraints (process), and pressure ulcers (outcomes). Findings indicated that for-profit facilities had poorer outcomes of care than not-for-profit facilities (Hillmer, Wodchis, Gill, Anderson, & Rochon, 2005).

Summary

Healthcare environments are complex systems with a wide variety of people, technology, procedures, regulations and other variables that are interrelated; thus a system’s framework is necessary to explain or describe system issues. The SROM expands existing linear models by looking at relationships as reciprocal, and accommodating complex relationships. The SROM’s core concepts are client, context, action focus and outcome (Brewer, Verran, & Stichler, 2008).

The core construct of client in this study are characteristics of licensed nurses working in nursing homes. Client characteristics examined were: nurse nutrition knowledge, level of education, length of time as a nurse, length of time in long term care, length of time at current facility, and age. Context is the nursing home, variables were ownership status. Outcome was UWL in nursing homes. Action focus was not investigated in this initial descriptive correlational study. It is anticipated that the results from this study will provide important information about
specific nurse characteristics that can be used to develop and test the action focus for future interventional studies.

Causes of UWL in nursing home residents can be divided into two main categories: individual (physical and psychosocial) factors and organizational factors. Inadequate nutrition knowledge is an organizational factor that has been suggested to increase the risk of malnourishment in nursing home residents (Copeman, 2000). Current research indicates that nurses do not have adequate knowledge to meet the nutrition needs of residents in nursing homes (Crogan, Shultz, & Massey, 2001; Lindseth, 1997; Staneck, Powell, & Betts, 1991) and little is known about the relationship between nurse nutrition knowledge and UWL, specifically among licensed nurses (both LPNs and RNs) in nursing homes. No studies were located in the literature that described the relationships between nurse nutrition knowledge, nurse demographic variables, ownership status of the nursing home, and UWL.
CHAPTER 3: METHODOLOGY

Introduction

This chapter describes the revision and testing of the revised nutrition knowledge questionnaire (NKQ-R) used in this study to measure the subjects’ nutrition knowledge and to gather specific demographic variables. This chapter also describes the methodology used in this study, including the design, setting, sample selection, recruitment of subjects, and strategies for data analysis.

Design

A descriptive, correlational, and non-experimental design was used to describe the relationship between nurse nutrition knowledge and unintentional weight loss (UWL) in nursing home residents in Northeast Indiana. Correlation techniques are appropriate to the purpose and design of the study since very little is known about the relationship between nurse nutrition knowledge and UWL loss in nursing home residents. Nurse nutrition knowledge was obtained using the NKQ-R and demographic data were collected using a form developed by the investigator for this study. UWL data was obtained from the Nursing Home Compare Database.

Setting, Sample Selection, and Recruitment of Subjects

Setting

Following approval from the Institutional Review Board at the University of Arizona (APPENDIX A), a random selection process was utilized to contact nursing homes within a 25 mile radius of Fort Wayne, Indiana about participating in this study. Characteristics of each nursing home, such as size, average census, ownership type and UWL data were retrieved from the Nursing Home Compare Database. Nursing home criteria were facilities that were Medicare and Medicaid licensed and provided both intermediate and skilled levels of care.
Names of nursing homes meeting inclusion criteria (N=29) were placed into one of two hats: names of all for-profit nursing homes were placed in one hat and names of all not-for-profit nursing homes were placed in the second hat. Three names were drawn from each hat by the researcher and information regarding the study’s purpose and an invitation to participate was mailed to the Administrator of each nursing home (Appendix B). A follow-up phone call was placed by the researcher to the Administrator one week after the letters were mailed to answer any questions and gain approval for data collection. Arrangements were made at the participating nursing homes for the investigator to attend the next scheduled mandatory staff meeting to recruit subjects. If the selected nursing home administrator declined to participate another name was drawn out of the hat and the next nursing home was contacted. This process continued until a minimum of 84 subjects was recruited. The final sample consisted of three not-for-profit nursing homes and six for-profit nursing homes.

Sample Selection

The sample population should be reflective of the population for which the instrument is intended (Ferketich, 1991). Therefore, licensed nurses working in nursing homes who care for nursing home residents were recruited for this study. A power analysis indicated a minimum of 84 subjects were required ($a = .05, r = .30, power = .95$), (Field, 2005). Inclusion criteria were licensed nurses over the age of 21 who had worked at the nursing home for a minimum of three months.

Recruitment: Subjects

After approval from nursing home administration, arrangements were made for the investigator to attend prescheduled mandatory staff meetings for licensed nurses to administer the questionnaire to subjects. Facilities that conducted two staff meetings on the same day
allowed data collection to occur during each meeting. There were no known risks or adverse side effects associated with this study. Subjects were given a thorough explanation of the study’s purpose and time to read the informed consent and ask questions. It was stressed that the decision not to participate in this study would not impact their employment in any way. Subjects were informed that completing the questionnaire implied consent. All subjects approached agreed to participate. Most questionnaires were completed within 10 minutes; the longest time required by a subject to complete the questionnaire was 25 minutes. A silver dollar coin was given to each subject upon completion of the questionnaire. Questionnaires with an instruction packet and a self addressed stamped envelope were left at each facility for nurses who were unable to complete the questionnaire during the staff meeting but wanted to participate. Eight additional completed questionnaires were returned via the US Postal Service.

**Time Frame and Response Rate**

Data were collected over a five-month period; from late October 2009 to February 2010. Unintentional Weight Loss (UWL) data for the study was the average of unintentional weight loss data reported to Nursing Home Compare from April 2009 to December 2009; resulting in the desired overlap between time of subject testing and actual weight loss occurrence. A total of 101 licensed nurses from nine participating nursing homes took part in this study.

**Research Aims and Strategies for Analysis**

**Research Aims:**

1) To revise the nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised questionnaire.

2) To describe the relationship between nurse nutrition knowledge and UWL in nursing home residents in Northeast Indiana.
2A) To describe the relationship between nurse nutrition knowledge and level of education of nurses working in nursing homes.

2B) To describe the relationship between level of education of nurses and UWL in nursing homes.

2C) To describe the relationship between years of nursing experience and nurse nutrition knowledge.

2D) To describe the relationship between years of nursing experience and UWL in nursing home residents.

Data Cleaning and Missing Values

All data were entered by the investigator into SPSS (PASW) Version 17 for data analysis and inspected and verified by a doctorally prepared researcher. Frequencies were examined for each variable for out of limit responses and corrected when necessary. Questionnaires with missing data were analyzed for patterns. Four questionnaires displayed a random pattern of missing data throughout the dataset; therefore it was appropriate to address missing data by analyzing only the questionnaires with complete data (Munro, 2001).

Content Validity

The procedures used to revise the nutrition knowledge questionnaire consisted of assessing content validity and performing an item analysis of the instrument. Content validity concerns the extent to which a sample of items represent an adequate operational definition of a construct (Polit & Beck, 2006) and is a critical first step in assessing if a new or revised instrument measures the intended construct (Rubio, 2005; Polit, Beck, & Owens, 2007), and particularly for those instruments designed to measure cognition (Waltz, Strickland, & Lentz, 2005).
The original instrument was a 50-item multiple-choice questionnaire developed by Crogan (1998) to measure the nutrition knowledge of licensed nurses working in nursing homes (APPENDIX C). The instrument, based on a review of the literature, measured the following four topical domains: nutritional deficiencies of institutionalized older adults, effects of aging on nutritional needs, protein-calorie malnutrition in older adults, and principles of nutritional assessment (Crogan, Shultz, & Massey, 2001).

Two types of content validity procedures described by Lynn (1986) were used to revise and reduce the number of items: the item content validity index (CVI-I) and scale content validity index (CVI-S). A minimum of 3 to 10 experts is recommended for the CVI-I and a minimum of three experts is recommended for the CVI-S. Experts are utilized in both procedures to provide advice on which items should be revised or discarded, suggest if additional items are needed to cover the domain of interest, and determine if the questions adequately represent the construct (Polit & Beck, 2006). The choice of experts used in the content validity process were appropriate; all were advanced practice nurses or doctorally prepared nurses with a very good working knowledge of the construct (DeVellis, 1991). For the CVI-I, experts were asked to rate each item on a scale of 1-4: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant (Appendix D). Item results were then each dichotomized: questions that received a 1 or 2 were given a zero, and items that scored 3-4 were given 1 point. The CVI-I was computed by totaling all the points for each item. The total number of points earned for each item was then divided by the total number of experts. For example, if an item was marked as quite relevant or highly relevant by 5 of the 6 experts, the item had a total score of 5, which was divided by the number of experts (5/6 = .83). Twenty eight of the 50 items scored at .83 or higher, indicating that at least five of the six experts rated the item as quite relevant or highly
relevant; which met the suggested criteria for item acceptability of .78 or higher with six or more experts (Lynn, 1986). Twenty-two items were scored as not or somewhat relevant and did not meet the recommended acceptable criteria and were eliminated. Item #10, ‘Dietary modifications for a patient on dialysis include?’ was rated below .83 but was felt to be theoretically important by the investigator and was not removed. Item # 44, ‘In the older person, loss of lean body mass and decreasing physical activity leads to?’ scored an acceptable .83 but was removed based on comments from two experts that it was similar to two other questions (items # 23 & 43). Minor wording changes were suggested and made on three items (#16: change the wording from “chronically ill” to “very ill”; #18: define the term “xerostomia” within the question; and #33: add “chronic” in front of the word “constipation”) to improve clarity. After revisions were completed based on the CVI-I, the questionnaire consisted of 28 multiple choice questions (Appendix E).

Next, three content experts (one doctorally prepared nurse and two master’s prepared nurses with significant nursing home experience) were asked to evaluate the revised questionnaire to estimate content validity of the scale (CVI-S). Two of the three experts had participated in the initial evaluation of content validity and one had not. Using a subset of experts from the first panel has distinct advantages; feedback from these experts for a second time may indicate content capability and a strong commitment to participating in the questionnaire revision (Polit, Beck, & Owens, 2007). The experts were given the revised questionnaire and instructed to specifically examine the questionnaire as a comprehensive set of items used to measure qualitative nurse nutrition knowledge within the four domains. The CVI-S was calculated by averaging the proportion of the items rated relevant across the experts (Polit & Beck, 2006). Index results for the three experts were .92, .92 and 1.0 with an average of .94. This exceeds the
standard criterion for acceptability of .80 (Waltz & Bausell, 1981); no further changes based on the CVI-S were suggested by the experts. After careful analysis by the tool’s developer and the investigator, the content in two domains seemed to overlap. For example, question #18, ‘Protein-calorie malnutrition is fairly common in the nursing home. What serum albumin level indicates protein-calorie malnutrition?’ fit appropriately into both the “Protein-calorie malnutrition in older adults” and “Nutritional deficiencies of institutionalized older adults” subscales. It was felt by the tool’s developer and this investigator that theoretically the questions addressed very similar content and the remaining questions could be merged into one subscale. Questions regarding protein calorie malnutrition and nutritional deficiencies were merged into one subscale: Nutritional deficiencies of institutionalized older adults. The NKQ-R total questionnaire and subscale items are presented in Table 1.

**TABLE 1: NKQ-R Items for Total Questionnaire and Three Subscales**

<table>
<thead>
<tr>
<th>Questionnaire Label</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>NKQ-R (Total)</td>
<td>1 to 28</td>
</tr>
<tr>
<td>Effects of aging on nutritional needs</td>
<td>1, 2, 8, 13, 14, 23, 24, 25, 27, 28</td>
</tr>
<tr>
<td>Principles of nutritional assessment</td>
<td>3, 4, 6, 7, 12, 15, 16, 17, 20, 22</td>
</tr>
<tr>
<td>Nutritional deficiencies of institutionalized older adults</td>
<td>5, 9, 10, 11, 18, 19, 21, 26</td>
</tr>
</tbody>
</table>

**Item Analysis**

Further analysis to test the effectiveness of the NKQ-R questionnaire items was conducted using item analysis. Item analysis is a procedure that focuses on the item in a composite questionnaire and is valuable in that problems regarding the performance of the total questionnaire may be better discerned though analysis of each individual item (Ferketich, 1991). Analysis of difficulty and discrimination indices can provide valuable information about the
quality of a multiple choice question (Clifton & Schriner, 2010). Item analysis was conducted to explore the items on the NKQ-R for difficulty (P value), item discrimination, and distracter analysis.

**Difficulty**

P values range from 0-1, with desired values between .30 and .80. P Values that fall below or above the desired values lack the power to discriminate or differentiate between subjects. Values below .30 indicate more difficult questions and values greater than .80 indicate easier questions (Academic Technology Services, 2010). Values were calculated by dividing the number of subjects who answered an item correctly by the number of subject’s answering the item.

**Item Discrimination**

Item discrimination (D) is the correlation coefficient based on the tendency of subjects who selected the correct answer on a particular item to fall into the upper group (27%) of scores on the total questionnaire. Low or negative correlation coefficients indicate that subjects in the lower 27% of the scoring range on the total questionnaire got a particular item correct more often than the subjects who scored in the top 27% of the scoring range. Generally, point biserial scores >.35 are very good, values ranging from .25 to .35 are satisfying to good; values .25 to .15 are mediocre to satisfying; and values less than .15 are bad to mediocre (Ebel & Frisbie, 1991). Item discrimination was calculated by dichotomizing the multiple choice responses (incorrect = 0 and correct = 1) and a point biserial correlation was conducted between item score and total score.

It is not uncommon for items to have conflicting P values and item discrimination values. An item with a low point biserial correlation may have a high P value, which is often due to the wording of the item; a qualitative review should be conducted for wording and content of the
question. Conversely, items with a high biserial correlation and low P value are not worrisome. This indicates that the item has high difficulty but is not problematic (Kohoe, 1995).

**Distracter Analysis**

Distracter analysis was conducted to determine the effectiveness of the item’s incorrect options. Good distracters are invaluable at distinguishing high and low performers on multiple choice questionnaires and provide a very credible and objective picture of the knowledge of the test takers. Each distracter should be chosen by at least one subject or it is not contributing to item discrimination. The amount of subjects choosing a particular distracter is not important unless a particular distracter is chosen more often than the correct response. If only one distracter is chosen then the question is really functioning as a true and false type question (Clifton & Schriner, 2010). Each item was evaluated to determine if all distracters were chosen as an option. A study by Cizek and Day (1994) found a small but non-significant increase in item difficulty, enhancing the effectiveness of the multiple choice test, when items performing as non-distracters were removed from a test. Guidelines for using item analysis to evaluate the NKQ-R were to assess each of the items for: (1) \( P = < .30 \text{ or } > .80 \), (2) point biserial correlations of less than .15, and (3) items in which no distracters were chosen (Kehoe, 1995).

**Strategies to Analyze Aim 2**

To analyze Aim 2 and the sub-aims, univariate descriptive statistics (frequency, percents, means, standard deviations and ranges) were used to describe sample characteristics of subjects in the study. Bivariate statistics were utilized to explore the presence of relationships between nutrition knowledge, selected demographic and contextual characteristics with UWL in nursing homes. Subject responses on the multiple choice NKQ-R were dichotomized as incorrect or correct and coded into SPSS as “0 = incorrect” and “1 = correct.” The Kolmogorov-Smirnov of
test normality was conducted to evaluate for parametric approaches. Data violated parametric assumptions of normality or were not ranked at the interval level or higher, therefore nonparametric methods were appropriate.

Kendall’s tau is used to determine correlation coefficients for non-parametric data when there are large numbers of tied ranks (Field, 2005). Kendall’s tau and Spearman rho are very similar; however Kendall’s tau provides more accurate generalizations about the correlations between concordant and discordant pairs of data (Field, 2005; Critchen, 2001). Kendall’s tau was used to analyze the correlation coefficient of the level of education, NKQ-R scores and UWL. Strength of the correlation coefficient was determined at: $r = .10$ to $.29 =$ small (weak), $r = .03$ to $.49 =$ medium (moderate) $r = .05$ to 1 = large (strong), (Cohen, 1988).

Point biserial ($r_{pb}$) correlation coefficients were used when one of the variables was dichotomous and one was continuous. Point biserial correlations were used to describe the correlations between level of the nurse (LPN or RN) and the NKQ-R scores and UWL. Analysis using point biserial correlation coefficients was also conducted to explore relationships between ownership status of nursing home (for-profit and not-for-profit) and UWL. The Mann-Whitney U test is the nonparametric equivalent of the independent t test and was conducted to determine if there were statistically significant differences between the means of two groups and the independent variable (level of the nurse and the NKQ-R scores and UWL and ownership status of nursing homes and UWL). Assumptions for the Mann-Whitney U test are that data must be ordinal, the sample must be drawn randomly from the population, and mutual dependence is assumed. Data met these assumptions; therefore, analysis using the Mann-Whitney U test was appropriate.
**Measures**

**Demographic Data Sheet**

The demographic data sheet consisted of seven questions that were developed specifically for this study to assess the client characteristics of this population. Subjects were asked to fill in their age and indicate gender and which shift they usually worked. Length of time as a nurse, length of time working in long term care and the length of time working at the current facility were categorized into specific time frames and subjects were asked to mark the appropriate answer. Nursing degrees were categorized into LPN, ASN, Diploma, BSN, MS or MSN or Other. No one answered the “Other” option.

**NKQ-R**

The Nutrition Knowledge Questionnaire-Revised (NKQ-R) is a 28 item multiple choice questionnaire revised for this study measuring three domains of nurse nutrition knowledge: 1) effects of aging on nutritional needs, 2) principles of nutritional assessment, and 3) nutritional deficiencies in institutionalized older adults. The multiple choice questions consisted of one correct answer and three distracters.

**Nursing Home Compare**

The Nursing Home Compare Database was used to collect UWL data reported by the nine nursing homes participating in this study. Weight loss that is 5% of body weight or greater in one month or 10% of body weight or greater in three months is considered unintentional and must be reported quarterly by each nursing home to the MDS Database which is then posted on the Nursing Home Compare Database by The Center for Medicare and Medicaid Services. Residents recently admitted from the home or the hospital are not included in the report for 30 days so that the potential problems that may have been triggered on the MDS stemmed from care
provided by the nursing home and not prior to admission to the nursing home. Because the Center for Medicare and Medicaid Services (http://www.cms.hhs.gov/) defines significant weight loss as 5% or more in 30 days or 10% or more in 60 days (excluding residents with terminal illness), the investigator felt it was appropriate to include nurses in the study who may have only worked at the nursing home for some or most of the time when weight loss data was reported.

**Summary**

This chapter described the revision process of the NKQ-R which was used to gather nutrition knowledge of nurses working in nursing homes. Content validity was conducted in a two step process; estimating a CVI-I and a CVI-S. Results from the CVI on the revised NKQ-R exceeded the standard criterion of acceptability. The NKQ-R consists of three subscales with a total of 28 multiple choice questions with four possible answers, one correct option and three distracters. Subject responses were dichotomized as incorrect or correct and given one point for each correct response. Setting, sample, selection and recruitment of subjects were described. A variety of statistical methods were used to address the aims of this descriptive, correlational, and non-experimental study. The level of significance for all analyses was set up at $p < .05$. Item analysis was conducted on the NKQ-R to assess validity of the tool by evaluating each item independently to determine if each item discriminates in the same manner as the total tool was developed to discriminate (Isaac & Michael, 1995). Univariate and bivariate methods were conducted to explore relationships between nurse nutrition knowledge and UWL. Differences between groups of nurses and ownership status of nursing homes with NKQ-R scores and UWL were analyzed. Chapter 4 provides a detailed description of data analysis.
CHAPTER 4: RESULTS

The purpose of this study was twofold: 1) To revise nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument; and 2) To use the revised instrument to explore the relationship between nurse nutrition knowledge and unintentional weight loss (UWL) in nursing homes located in Northeast Indiana. This chapter describes the time frame, response rate, study setting and sample and the psychometric analysis of the questionnaire. Results of analysis to explore the relationship between nurse nutrition knowledge using the revised questionnaire and UWL in nursing home residents are presented as well as additional analyses between the relationships of important client, contextual and outcome variables.

Time Frame and Response Rate

Data collection began after IRB approval from the University of Arizona. Nursing home administrators within a 25 mile radius of Fort Wayne, Indiana were contacted regarding their interest to participate in this study. Nine of the 29 nursing homes contacted agreed to participate. One nursing home was dropped from analysis after data collection because it was learned that the home was affiliated with a hospital and did not have to report their UWL data to the MDS Database. Data were collected over a five-month period; from late October 2009 to February 2010. Time was allotted by nursing home administrators at the beginning of staff meetings to collect data.

All subjects within the nine nursing homes who were approached by the investigator agreed to participate in the study and completed the NKQ-R. Of the 109 subjects, three subjects were dropped from the hospital affiliated nursing home, four subjects were dropped for missing data, and one subject was dropped because she had indicated on the demographic that she had
been employed at the nursing home for less than three months. Eight additional completed questionnaires were received by mail prior to January 2010. All remaining subjects included in the study were licensed nurses who worked at the nursing home for a minimum of three months. The percentage of subjects from each nursing home participating in the study ranged from 4% to 18%, which represents the nursing home with the smallest census and the nursing home with the largest census respectively.

**Study Setting and Sample**

**Study Setting**

Descriptions of participating nursing homes are presented in Table 2. Six for profit and three not-for-profit facilities were included in this study. All nine facilities are Medicare and Medicaid certified and each provides intermediate and skilled levels of nursing care. The average nursing home facility census in Indiana is 79.3 residents; the average census for each of the nine facilities between April 1, 2009 and December 31, 2009 is included in the table.

**TABLE 2**: Description of Participating Nursing Homes (N=9)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Profit Status</th>
<th>#of Beds</th>
<th>Average Census</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not-for-profit</td>
<td>84</td>
<td>58</td>
<td>7</td>
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<td>2</td>
<td>For-profit</td>
<td>80</td>
<td>31</td>
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<td>3</td>
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<td>88</td>
<td>60</td>
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<td>4</td>
<td>For-profit</td>
<td>96</td>
<td>88</td>
<td>16</td>
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<td>5</td>
<td>Not-for-profit</td>
<td>133</td>
<td>120</td>
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<td>76</td>
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<td>11</td>
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<td>9</td>
<td>For-profit</td>
<td>120</td>
<td>96</td>
<td>13</td>
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</table>
Study Sample

One hundred and one (101) licensed nurses working in nursing homes participated in this study. Table 3 presents a summary of the sample demographic characteristics (age, gender, years of experience and level of education). There were six males (5.9%) and ninety-five females (95.1%). The age of nurses ranged from 24 years old to 65 years old ($M = 43.79$, $SD = 10.79$).

The majority of the subjects (72.3%) in this study were licensed practical nurses, 20 subjects (19.8%) were registered nurses with an associate degree, four subjects (4%) were registered nurses with a diploma degree, three subjects (3%) were registered nurses with a baccalaureate degree, and only one subject (1%) was a registered nurse with a master’s degree.

Over half of the subjects had worked as a nurse for more than ten years (53.5%), while 27% reported working as a nurse for 3 to 10 years, 13% reported working as a nurse for 1 to 3 years, and 7% reported working as a nurse for less than one year. Many of the subjects had significant nursing home experience; 62% of nurses reported working in long term care for more than ten years, 23% for 3 to 10 years, 10% nurses for one to three years and 6% for less than one year. Eighty-four nurses had worked at the facility where they completed the questionnaire for more than one year, 11% worked at the facility for 6-12 months and 6% worked at the facility for 3 to 6 months. None of the nurses reported completing this questionnaire at another facility.
TABLE 3: Description of Subjects’ Various Demographics (N=101)

| Description of the subjects by gender, age, level of education and years of experience broken down by facility are reported in Table 4. The nursing homes in this study indicated a fairly homogeneous structure. The largest percentages of subjects were female with an average age at each facility ranging from 39 to 47. All nursing homes, except facility 1, had a higher LPN to RN participant ratio. The only master’s prepared nurse participating in the study was employed at facility 4. |
### TABLE 4: Description of Subject Demographics by Facility (N=9)

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<th>Facility</th>
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<th>3</th>
<th>4</th>
<th>5</th>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>13</td>
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<td>3-10 years</td>
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<td>0</td>
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<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
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<td>27</td>
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<td>&gt; 10 years</td>
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<td>3</td>
<td>9</td>
<td>7</td>
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<td>&lt; 1year</td>
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<td>1</td>
<td>0</td>
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<tr>
<td>1-3 years</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3-10 years</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>7</td>
<td>4</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>62</td>
</tr>
<tr>
<td>Months at this</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTC setting</td>
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<tr>
<td>3-6</td>
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<td>0</td>
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<td>3</td>
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<td>6</td>
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<td>6-12</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>&gt;12</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>12</td>
<td>8</td>
<td>17</td>
<td>11</td>
<td>8</td>
<td>84</td>
</tr>
</tbody>
</table>
Psychometric Analysis

Research Aim 1

The first aim in this study was to revise the nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument. The original tool was a 50-item multiple-choice questionnaire developed by Crogan (1998) to measure the nutrition knowledge of nurses working in nursing homes within four theoretical subscales: subscale 1) nutritional deficiencies of institutionalized older adults (13 items), 2) effects of aging on nutritional needs (18 items), 3) protein calorie malnutrition in older adults (6 items), and 4) principles of nutrition assessment (13 items). Content validity index to revise and reduce respondent burden was described in chapter three. The revised nutrition knowledge questionnaire (NKQ-R) consists of 28 items with three subscales. All items are multiple choice with four options and only one correct option. This section describes the item analysis of the questionnaire.

Table 5 presents the item analysis of the psychometric properties of the NKQ-R. P values for the NKQ-R ranged from .13 to .98. Five questions were below .30 indicating harder questions and ten were above the recommend .80 indicating easier questions. Point biserial correlations discriminate between high scoring and low scoring subjects. A positive point biserial indicates that subjects who scored higher on the NKQ-R were more likely to get that particular item correct. A negative or very low point biserial correlation indicates that high scoring subjects on the NKQ-R tended to answer the item incorrectly more frequently than the lower scoring subjects. NKQ-R point biserial results ranged from .098 to .46. Six questions fell below .15, indicating that the question had poor discrimination between high and low scoring subjects. Low point biserial correlations can result from any of the following reasons: the answer could have
been marked incorrectly, more than one option may be the correct answer, there may have been more than one correct answer, the subjects may be reading into the answer, the question may have been too confusing, or the item responses may have been too confusing.

Based on the guidelines for using item analysis to improve validity of the NKQ-R described in chapter 3, six items have a point biserial below .15. Although item 19 has a point biserial of .158, it only had one distracter and a P value of 98, indicating it was a problematic question.

**TABLE 5: Item Analysis of NKQ-R**

<table>
<thead>
<tr>
<th>Item</th>
<th>Subscale</th>
<th>P</th>
<th>Point Biserial of Correct Option</th>
<th>N of Subjects per Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>.83</td>
<td>.193</td>
<td>A 83, B 16, C 2, D 0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>.29</td>
<td>.351</td>
<td>A 29, B 18, C 5, D 49</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>.13</td>
<td>.163</td>
<td>A 18, B 67, C 12, D 4</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>.28</td>
<td>.212</td>
<td>A 1, B 56, C 12, D 32</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>.91</td>
<td>.110</td>
<td>A 1, B 2, C 92, D 6</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>.41</td>
<td>.468</td>
<td>A 42, B 13, C 60, D 30</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>.88</td>
<td>.160</td>
<td>A 3, B 89, C 0, D 9</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>.67</td>
<td>.267</td>
<td>A 23, B 68, C 1, D 9</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>.69</td>
<td>.113</td>
<td>A 8, B 4, C 18, D 71</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>.57</td>
<td>.303</td>
<td>A 0, B 57, C 4, D 40</td>
</tr>
</tbody>
</table>
TABLE 5: Item Analysis of NKQ-R - *Continued*

<table>
<thead>
<tr>
<th>Item</th>
<th>Subscale</th>
<th>P</th>
<th>Point Biserial of Correct Option</th>
<th>N of Subjects per Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>3</td>
<td>.90</td>
<td>.234</td>
<td>A  0  6  92  3</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>.76</td>
<td>.093</td>
<td>A  1  6  76  18</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>.75</td>
<td>.204</td>
<td>A  3  9  14  75</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>.21</td>
<td>.219</td>
<td>A  10 1  68  22</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>.79</td>
<td>.232</td>
<td>A  10 81 1  9</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>.52</td>
<td>.244</td>
<td>A  40 52 2  7</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>.45</td>
<td>.193</td>
<td>A  41 14 44 2</td>
</tr>
<tr>
<td>18</td>
<td>3</td>
<td>.20</td>
<td>.212</td>
<td>A  39 10 20 32</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>.98</td>
<td>.158</td>
<td>A  0  1  0  100</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>.69</td>
<td>.300</td>
<td>A  1  3  27  10</td>
</tr>
<tr>
<td>21</td>
<td>3</td>
<td>.42</td>
<td>.098</td>
<td>A  5  27 40 29</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>.66</td>
<td>.421</td>
<td>A  66 1  26  8</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>.82</td>
<td>.263</td>
<td>A  4  5  83  9</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>.90</td>
<td>.303</td>
<td>A  91 9  1  0</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>.47</td>
<td>.178</td>
<td>A  28 47 26 0</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
<td>.84</td>
<td>.215</td>
<td>A  2  8  5  86</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>.95</td>
<td>.139</td>
<td>A  97 3  1  0</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>.95</td>
<td>.091</td>
<td>A  1  1  98  1</td>
</tr>
</tbody>
</table>
Research Aim 2

The second aim of this study was to describe the relationship between nurse nutrition knowledge and UWL in nursing home residents in Northeast Indiana. Continuous data were analyzed for normal distribution using the Kolmogorov-Smirnov (K-S) test. The K-S test scores for the NKQ-R, $D(101) = 0.11$, $p < .05$, scores for subscale 1 (N=10), effects of aging $D(101) = 0.17$, $p < .05$, subscale 2 (N=10), principles of assessment, $D(101) = 0.14$, $p < .05$, subscale 3 (N=8), nutritional deficiencies $D(101) = 0.18$, $p < .05$ and the percentage of UWL $D(101) = 0.15$, $p < .05$ are significant, indicating that the distributions were not normal, therefore nonparametric analysis is appropriate. Kendall’s tau is a non parametric correlation for data with large numbers of tied ranks, making it appropriate to use to analyze the NKQ-R scores and subscale scores with UWL.

Table 6 displays the means, standard deviations and ranges for the combined subject’s scores on the NKQ-R and the three subscales: 1) effects of aging on nutritional needs (10 items), 2) principles of nutritional assessment (10 items), and 3) nutritional deficiencies of institutionalized older adults (8 items).

**TABLE 6:** Means, Standard Deviations, and Ranges for the NKQ-R Scores and Subscale Scores

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total NKQ</td>
<td>64%</td>
<td>10.79</td>
<td>43%-89%</td>
</tr>
<tr>
<td>Effects of aging</td>
<td>69%</td>
<td>1.41</td>
<td>20%-100%</td>
</tr>
<tr>
<td>Principles of nutr assessment</td>
<td>56%</td>
<td>1.7</td>
<td>20%-100%</td>
</tr>
<tr>
<td>Nutri. Deficiencies of older</td>
<td>55%</td>
<td>1.1</td>
<td>38%-100%</td>
</tr>
</tbody>
</table>
The results from the Kendall’s tau correlation coefficient between NKQ-R scores and UWL are presented in Table 7. No relationships were supported between the NKQ-R scores or subscale 1) effects of aging, or subscale 2) principles of assessment with UWL. A small but statistically non-significant positive correlation was noted between subscale 3) nutritional deficiencies and UWL. Increases in scores on subscale 3) nutritional deficiencies correlated with increases in UWL.

**TABLE 7:** Kendall’s tau Correlations of the Total NKQ-R Scores, Subscale Scores, and Unintentional Weight Loss (UWL)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total NKQ</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Effects of aging</td>
<td>0.609**</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Principles of nutri assess</td>
<td>0.629**</td>
<td></td>
<td>0.275**</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>4. Nutri deficic of older adults</td>
<td>0.439**</td>
<td></td>
<td></td>
<td>0.180*</td>
<td>0.123</td>
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<tr>
<td>5. Weight loss</td>
<td>0.054</td>
<td></td>
<td></td>
<td></td>
<td>0.004</td>
</tr>
</tbody>
</table>

Note: **p<.01 level) 2-tailed). *p<.05 level (2 tailed).

**Research Aim 2A**

The purpose of research aim 2A was to describe the relationship between nurse nutrition knowledge and level of education of nurses working in nursing homes in Northeast Indiana.

Descriptive analysis of the means, standard deviations and ranges for the revised NKQ based on level of education is presented in Table 8. Diploma nurses had the lowest score mean (59%), followed by LPNs (62.4%). BSN nurses had the highest overall average score (71%) followed by the ASN nurses (69%). Only one Master’s prepared nurse completed the questionnaire and scored 64%. Further descriptive analysis was conducted on the diploma group
due to the lower scores. All four diploma nurses worked at separate facilities and reported more than ten years of experience in long term care nursing. The average age for the diploma group was 61.5 years of age, which is 17.7 years older than the average age of nurses in this study. However, no conclusions can be drawn from this data because of the small number of subjects in the RN subsamples.

**TABLE 8: Means, Standard Deviations, and Ranges for the NKQ-R Based on Level of Education**

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Mean</th>
<th>SD</th>
<th>Range %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPN (N=73)</td>
<td>62%</td>
<td>10.74</td>
<td>43%-89%</td>
</tr>
<tr>
<td>ASN (N=20)</td>
<td>69%</td>
<td>9.8</td>
<td>46%-86%</td>
</tr>
<tr>
<td>Diploma (N=4)</td>
<td>59%</td>
<td>6.02</td>
<td>54%-68%</td>
</tr>
<tr>
<td>BSN (N=3)</td>
<td>71%</td>
<td>14.50</td>
<td>57%-86%</td>
</tr>
<tr>
<td>MSN (N=1)</td>
<td>64%</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Descriptive analysis of the means, standard deviations and ranges for the NKQ-R subscales based on level of education are presented in Table 9. Analysis of educational level and domain scores indicate that the LPN, ASN, Diploma, and Baccalaureate groups scored highest in subscale (1) effects of aging, and subscale (3) nutritional deficiencies. The LPNs scored an average of 14.5% lower and the ASN group scored 9.5% lower on subscale (2) principles of nutritional assessment, than on the combined averages of subscale (1) effects of aging and subscale and (3) nutritional deficiencies. The Master’s prepared nurse scored the highest on subscale (3) nutritional deficiencies of institutionalized older adults, and scored 60% on subscale (1) effects of aging on nutritional needs, and 60% on subscale (2) principles of nutritional assessment.
TABLE 9: Means, Standard Deviations, and Ranges for the Subscales Based on Level of Education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Mean</th>
<th>SD</th>
<th>Range %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects aging</td>
<td>67%</td>
<td>1.45</td>
<td>20%-100%</td>
</tr>
<tr>
<td>Principles</td>
<td>53%</td>
<td>5.31</td>
<td>20%-100%</td>
</tr>
<tr>
<td>Nutr defic</td>
<td>68%</td>
<td>5.47</td>
<td>30%-80%</td>
</tr>
<tr>
<td>ASN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects aging</td>
<td>74%</td>
<td>1.14</td>
<td>50%-90%</td>
</tr>
<tr>
<td>Principles</td>
<td>63%</td>
<td>1.42</td>
<td>30%-80%</td>
</tr>
<tr>
<td>Nutr defic</td>
<td>71%</td>
<td>1.17</td>
<td>40%-80%</td>
</tr>
<tr>
<td>Diploma</td>
<td></td>
<td></td>
<td>50%-80%</td>
</tr>
<tr>
<td>Effects aging</td>
<td>60%</td>
<td>1.41</td>
<td>50%-70%</td>
</tr>
<tr>
<td>Principles</td>
<td>57%</td>
<td>.95</td>
<td>40%-60%</td>
</tr>
<tr>
<td>Nutr defic</td>
<td>62%</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>BSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects aging</td>
<td>76%</td>
<td>1.52</td>
<td>50%-90%</td>
</tr>
<tr>
<td>Principles</td>
<td>66%</td>
<td>1.52</td>
<td>50%-80%</td>
</tr>
<tr>
<td>Nutr defic</td>
<td>70%</td>
<td>1.15</td>
<td>50%-70%</td>
</tr>
<tr>
<td>MSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effects aging</td>
<td>60%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Principles</td>
<td>60%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Nutr defic</td>
<td>75%</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

A Kendall’s tau correlation coefficient was computed to assess the relationship between
the level of education of the nurse and scores on the NKQ-R and the subscales. Small
statistically significant relationships were noted between level of education and the total score on
the NKQ-R ($\tau = .164, p < .05$) and subscale (2), principles of nutritional assessment ($\tau = .220, p
< .05$). There were no statistically significant relationships between level of education and
subscale (1), effects of aging ($\tau = .107, p = .217$) and subscale (3) nutritional deficiencies ($\tau =$
Higher level of education was correlated with increases in total NKQ-R and subscale (2) principles of nutritional assessment scores.

**LPN and RN groups.** Point biserial correlation coefficients were calculated to describe relationships between the total NKQ-R scores of LPNs and RNs. LPNs were coded as 0 and RNs were coded as 1. A small significant finding was indicated between LPN and RN groups and the NKQ-R scores ($r_{pb} = .186, p < .05$). A Mann-Whitney U test was conducted to determine if the differences between the median NKQ-R scores were significant between LPNs and RNs. On average, LPNs ($Mdn = 64$) had significantly lower scores on the NKQ-R scores than RNs ($Mdn = 68$), $U = 735, p < .05$.

Point biserial correlation coefficients were also calculated on the three NKQ-R subscales to assess relationships between the two groups. Small non-significant relationships were indicated between LPN and RN groups and scores in subscale (1) effects of aging ($r_{pb} = .128, p < .154$). A small statistically significant correlation was noted between LPN and RN groups and subscale (2) principles of nutritional assessment ($r_{pb} = .236, p < .01$). No relationship was indicated between LPN and RN groups and scores in subscale (3) nutritional deficiencies ($r_{pb} = .025, p < .781$). Analysis indicated that the level of the nurse was related to increases in the NKQ-R, subscale (1), effects of aging and subscale (2), principles of nutritional assessment scores. No relationship was indicated between the LPN and RN group and subscale (3) nutritional deficiencies of older adults.

Mann-Whitney U tests were conducted to determine if the differences between the LPN and RN groups and the mean scores in subscales (1) effects of aging, and (2) principles of nutritional assessment were significant. LPNs ($Mdn 7$) did not seem to differ on the NKQ-R scores from RN’s ($Mdn 7$), $U = 838.5, ns$, on subscale 1) effects of aging on nutrition. LPNs
(\textit{Mdn} 5) did have significantly lower scores than RNs (\textit{Mdn} 6) \(U = 675.5, p < .05\) on subscale 2) principles of nutritional assessment.

**Research Aim 2B**

A Kendall’s tau correlation coefficient was conducted to describe the relationship between UWL and level of education of nurses working in nursing homes in Northeast Indiana. No correlation was noted between level of education and UWL (\(\tau = -.005, p < .949\)). A Mann-Whitney U test was performed to determine if difference existed between the means of the LPNs and RNs and UWL. LPNs (\textit{Mdn} = 51) didn’t seem to differ from RN’s (\textit{Mdn} = 50), on the amount of UWL, \(U = 1007, ns\).

**Research Aim 2C**

Kendall’s tau correlation coefficient was conducted to assess the relationships between years of nursing experience, years of experience in long term care and length of time at current facility with total NKQ-R and subscale scores. Years of nursing experience and years working in long term care were categorized into 1 = less than one year, 2 = 1 to 3 years, 3 = 3 to 10 years, and 4 = more than 10 years. Small non-significant correlations were noted between subject’s years of experience and scores on the total NKQ-R (\(\tau = .103, p < .199\)) and subscale (3), nutritional deficiencies (\(\tau = .139, p < .104\)). Years in long term care had a small non-significant correlation with subscale (3) nutritional deficiencies (\(\tau = 121, p < .159\)) and time at current nursing home also had a small non-significant relationship with subscale (3) (\(\tau = 139, p < .118\)).

As expected, years of nursing experience, years in long term care and time at current facility had moderate to strong statistically significant relationships (Table 10). Increases in length of years of experience was correlated with higher NKQ-R scores, and increases in length of years of
experience, time in long term care and time at current nursing were correlated with increased
scores in subscale (3) nutritional deficiencies.

**TABLE 10:** Kendall’s tau of Nursing Experience and NKQ-R and Subscale Scores

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yrs nsg exp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Years in LTC</td>
<td>.609**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Time at current NH</td>
<td>.426**</td>
<td>.436**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total NKQ-R</td>
<td>.103</td>
<td>-.004</td>
<td>.007</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Subscale 1</td>
<td>.072</td>
<td>.001</td>
<td>-.029</td>
<td>.609**</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Effects of aging</td>
<td>.033</td>
<td>-.092</td>
<td>-.061</td>
<td>.629**</td>
<td>.275**</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Subscale 2</td>
<td>.139</td>
<td>.121</td>
<td>.139</td>
<td>.439**</td>
<td>.180*</td>
<td>.123</td>
<td>1</td>
</tr>
<tr>
<td>Principles assess</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscale 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional defic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: **p<.01 level) 2-tailed). *p<.05 level (2 tailed).

**Research Aim 2D**

Kendall’s Tau was conducted to describe the relationship between years of nursing
experience and UWL. No correlation was noted between number of years as a nurse and UWL
(τ= .071, p < .387). Small non-significant relationships were noted between UWL and years
worked in long term care (τ = .133, p < .110) and time at current nursing home (τ = 114, p < .183). Findings indicate that as length years in long term care and length of time at current
facility increased, UWL increased.
Additional Analysis

Age and NKQ-R Scores

Additional analysis was performed using Kendall’s tau to describe the relationship between subject’s age and NKQ-R scores. There were no significant correlations between the NKQ-R and age (τ = -.008, p < .906), between age and subscale (1) effects of aging on nutritional needs (τ = -.048, p < .517), or between age and subscale (2) principles of nutritional assessment (τ = -.038, p < .601). A small non significant positive relationship was noted between age and subscale (3) nutritional deficiencies of institutionalized older adults (τ = .114, p < .132). Findings indicate that as age increased, the scores on subscale (3), nutritional deficiencies of institutionalized older adults also increased, but as age increased the scores on subscale (1) effects of aging on nutritional needs, and (2) principles of nutritional assessment did not increase.

Age and UWL

A Kendall’s tau correlation was conducted to describe the relationship between subject age and UWL. No correlation was noted between age and percent of weight loss (τ = .028, p < .697).

Age and Length of Time as Nurse, Employed in Long Term Care and Time at Current Nursing Home

A Kendall’s tau correlation was conducted to describe age and the following categorical variables: length of time as nurse, length of time employed in long term care and length of time at current nursing home. Moderate positive relationships were demonstrated between subject’s age and length of time worked as a nurse (τ = .472, p <0.01) and between subject’s age and length of time worked in long term care (τ = .266, p < 0.01). A small non-significant relationship was noted between age and length of time worked at current facility (τ = .123, p < .133). This
finding suggests that as age increases so does the time spent working as a nurse in long term care and length of employment as a nurse at the current nursing home.

A point biserial correlation was conducted to assess the relationship between age and NKQ-R scores. Subjects were artificially dichotomized into two groups: age 34 and younger (coded as 0) and age 35 and older (coded as 1). Findings indicate no relationship between the age of subjects and NKQ-R scores ($r_{pb} = -.093$, $p < .276$) and age and subscale (3) nutritional deficiencies ($r_{pb} = .075$, $p < .011$). Small non significant relationships were noted between subscale 1) effects of aging ($r_{pb} = -.109$, $p < .221$) and (2) principles of nutritional assessment ($r_{pb} = -.110$, $p < .212$). In addition, there was no relationship between the two age groups and UWL of weight loss ($r_{pb} = .001$, $p < .991$). Findings indicate that age was correlated with subscale (1) effects of aging and subscale (2) principles of nutritional assessment.

**NKQ-R Scores by Facility**

The means, standard deviations and ranges for the NKQ-R broken down by facility are presented in Table 11. Facility 3 had the lowest mean score at 49%, but also had one of the lowest reported percent of weight loss (4%). All subjects at this facility were LPNs and all four reported working in long term care for longer than 10 years. Facility 5 had the highest mean of scores at 70% and had one of the highest reported percent weight losses in the sample. Percent of unintentional weight loss for each facility is included in Table 11.
### Table 11: Means, Standard Deviations, and Ranges for the NKQ-R Based on Facility

<table>
<thead>
<tr>
<th>Facility</th>
<th>Mean NNK Score</th>
<th>SD</th>
<th>Range</th>
<th>Weight loss %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility 1</td>
<td>59.5%</td>
<td>12.25</td>
<td>46%-75%</td>
<td>5%</td>
</tr>
<tr>
<td>Facility 2</td>
<td>57%</td>
<td>10.42</td>
<td>46%-71%</td>
<td>11%</td>
</tr>
<tr>
<td>Facility 3</td>
<td>49%</td>
<td>2.0</td>
<td>46%-50%</td>
<td>4%</td>
</tr>
<tr>
<td>Facility 4</td>
<td>67.8</td>
<td>11.31</td>
<td>43%-86%</td>
<td>6%</td>
</tr>
<tr>
<td>Facility 5</td>
<td>70%</td>
<td>7.77</td>
<td>60%-86%</td>
<td>8%</td>
</tr>
<tr>
<td>Facility 6</td>
<td>66.6%</td>
<td>9.55</td>
<td>57%-89%</td>
<td>5%</td>
</tr>
<tr>
<td>Facility 7</td>
<td>67.6%</td>
<td>10.04</td>
<td>46%-82%</td>
<td>7%</td>
</tr>
<tr>
<td>Facility 8</td>
<td>57.4%</td>
<td>7.73</td>
<td>43%-68%</td>
<td>10%</td>
</tr>
<tr>
<td>Facility 9</td>
<td>59.7%</td>
<td>9.58</td>
<td>46%-75%</td>
<td>3%</td>
</tr>
</tbody>
</table>

### Ownership Type

Table 12 displays a point biserial correlation of the relationship between ownership type (not-for-profit and for-profit) nursing homes with NKQ-R scores and UWL. Not-for-profit homes were coded as “0” and for-profit homes were coded as ‘1.’ Findings indicate that ownership type was significantly related to NKQ-R and subscale (2) principles of nutritional assessment and to UWL. Findings suggest that nurses working in not-for-profit nursing homes had significantly higher scores on the NKQ-R and subscale 2 scores than nurses working in for-profit nursing homes. Findings also indicate that incidence of UWL was higher in for-profit nursing homes than in the not-for-profit nursing homes in this study.

### Table 12: Point Bi-serial Correlation for Relationships between Ownership Status, NKQ-R Scores, and U WL

<table>
<thead>
<tr>
<th>Scores</th>
<th>Ownership type ($r_{pb}$)</th>
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<tbody>
<tr>
<td>NKQ-R</td>
<td>-.229*</td>
<td>.007</td>
</tr>
<tr>
<td>Effects of aging</td>
<td>-.110</td>
<td>.220</td>
</tr>
<tr>
<td>Principles of nut ass</td>
<td>-.244**</td>
<td>.006</td>
</tr>
<tr>
<td>Nutri. Deficiencies</td>
<td>-.109</td>
<td>.228</td>
</tr>
<tr>
<td>Weight loss</td>
<td>-.259**</td>
<td>.003</td>
</tr>
</tbody>
</table>

Note: **p<.01 level) 2-tailed). *p<.05 level (2 tailed).
Summary

A variety of statistical analysis was used to address the two research aims and the four sub aims of this study. The number of items on the NKQ-R was reduced from 50 items to 28 items to decrease respondent burden. Acceptable content validity was established via computation of item and scale indices. Item analysis was conducted for item difficulty, item discrimination, and distracter analysis on 101 completed NKQ-Rs.

Nonparametric tests were used to analyze the data for research aim 2 and sub aims 2A-2D. Kendall’s tau correlation coefficient was used to describe the relationship between nurse nutrition knowledge and UWL in nursing home residents in Northeast Indiana. No relationships were supported between the NKQ-R scores or subscale (1) effects of aging or subscale (2) principles of assessment with UWL. A small but statistically non-significant positive correlation was noted between subscale (3) nutritional deficiencies and UWL. Results from this analysis should be interpreted with caution due to the poor discriminatory function of 50% of the items in subscale (3) nutritional deficiencies.

Kendall’s tau correlation coefficient was used to address research aim 2A, to describe the relationship between nurse nutrition knowledge and level of education of nurses working in nursing homes. Descriptive statistics (means, standard deviations, and ranges) were used to characterize the sample. Point biserial correlation coefficients were calculated to describe relationships between the total NKQ-R scores of LPNs and RNs. A Mann-Whitney U test was conducted to determine if differences between the median NKQ-R and subscales scores were significant between LPNs and RNs. Higher level of education was significantly correlated with increases in total NKQ-R and subscale (2) principles of nutritional assessment scores.
Kendall’s tau correlation coefficients were used to analyze research sub aim 2B to describe the relationship between UWL and level of education of nurses working in nursing homes. No correlation was noted between level of education and UWL.

Kendall’s tau correlation coefficients were used to analyze research sub aims 2C, to describe the relationship between years of nursing experience and nurse nutrition knowledge. Small non-significant correlations were noted between subject’s years of experience and scores on the total NKQ-R ($\tau = .132$) and subscale (3), nutritional deficiencies ($\tau = .139$). Years in long term care had a small non-significant correlation with subscale (3), nutritional deficiencies ($\tau = .121$) and time at current nursing home also had a small non-significant relationship with subscale 3 ($\tau = .139$).

Kendall’s tau correlation coefficients were used to analyze research sub aim 2D to describe the relationship between years of nursing experience and UWL in nursing home residents. Findings indicate that as length of years in long term care and length of time at current facility increased, UWL increased. These results were not significant.

Further statistical analysis was conducted to explore differences between subject age and NKQ-R scores and subject age and UWL. No correlation was noted between age and UWL. A small, non-significant correlation was noted between age and subscale (3), nutritional deficiencies.

A point biserial correlation was conducted to assess if a relationship existed between subjects under or over the age of 35 and NKQ-R and subscale scores. Findings indicate that age was correlated with subscale (1) effects of aging and (2) principles of nutritional assessment. Nursing home ownership status was assessed to determine if a relationship existed between not-for-profit and for-profit nursing homes with NKQ-R scores and UWL. Findings indicate that
ownership type was significantly related to NKQ-R, and subscale (2) principles of nutritional assessment scores. Ownerships type was also significantly related to incidence of UWL.
CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

Introduction

The purpose of this study was to revise a nurse nutrition questionnaire to reduce respondent burden and to examine the psychometric properties of the revised instrument. The revised instrument was then used to describe the relationship between nurse nutrition knowledge and unintentional weight loss in nursing homes across Northeast Indiana.

The Systems Research Organizing Model provided the framework for this study. The model’s focus is on the system, parts of the system, and the interactions between the parts. Model constructs are congruent with the nursing metaparadigm, qualifying it as an appropriate framework for nursing systems research. The four major constructs of the model are client, context, action focus and outcomes. Three of the models constructs: client, context, and outcome, were utilized to describe specific study variables as conceptualized within the framework. Study findings are presented and addressed in relationship to the literature. Implications for clinical practice and limitations of the study are discussed. Recommendations for further research are then presented.

Research Aim 1

Research Aim 1 was to revise a nutrition knowledge questionnaire to reduce respondent burden and examine the psychometric properties of the revised instrument. Content validity index was performed, followed by a post-administration item analysis of the questionnaire. The NKQ-R is a 28 item multiple choice questionnaire comprised of three subscales: 1) effect of aging on nutritional needs, 2) principles of nutritional assessment, and 3) nutritional deficiencies of institutionalized older adults. The methodology for determining questionnaire validity was described in chapter 3. This section contains the psychometric analysis described in chapter 4.
Research Aim 1: Psychometric Analysis. Content validity, a critical part of measurement for the development or revision of a questionnaire, was conducted to reduce respondent burden and determine if the NKQ-R measured the construct nurse nutrition knowledge. The content validity index for the questionnaire items and for the complete questionnaire used in this study were acceptable. Content validity is based mainly on the judgment and logic of the researcher and is validated by the panel of experts; however, caution must be taken interpreting the results as there are no agreed upon criterion for objectively achieving content validity (Carmine and Zellers, 1979).

Item analysis was conducted on the 101 completed questionnaires. Results revealed a total of six items below the acceptable point biserial of .15, indicating those questions do not adequately discriminate between the subjects who knew the answer and those who did not. Question #19 was slightly above the acceptable biserial at .158; however it demonstrated a very high P value of 98 and had a nonfunctioning distracter response. These items should be evaluated for wording and content, and revised if appropriate.

Research Aim 2

Research Aim 2 was to describe the relationship between nurse nutrition knowledge and UWL in nursing home residents in Northeast Indiana. Scores from the total NKQ-R or the subscales (1) effects of aging, and (2) principles of assessment, are not significantly related to UWL in nursing home residents. However, sample sizes at several of the nursing homes were too small to draw any clear conclusions. A study with more participants from each nursing home may provide different results.

An unexpected finding in the data indicates a small statistically non-significant relationship between UWL and subscale (3) nutritional deficiencies. Theoretically, increased
scores on subscale (3) should not be positively correlated with UWL. Item analysis of the instrument demonstrated that 4 of the 7 problematic scale items were located within subscale (3). This finding indicates that 4 of the 8 items in the subscale did not discriminate effectively; therefore interpretation of the results should be viewed with caution. Also, a small but non-significant correlation was noted between subscale (2) principles of nutritional assessment and subscale (3) nutritional deficiencies. Context of the tool is nurse nutrition knowledge, therefore it would be expected that the subscales would significantly correlate. Further studies are needed to determine tool validity and reliability, particularly in subscale (3).

**Research Aim 2A**

The aim of 2A was to describe the relationship between nurse nutrition knowledge and level of education of nurses working in nursing homes. The mean score for the 101 nurses in this study on the NKQ-R was 64%. This score is similar to results of Crogan and colleagues (2001) study in which 44 nurses scored a mean of 65% on the original 50 item questionnaire. Mean NKQ-R scores were 62% for LPNs and 68% for RNs, again similar to Crogan’s (2001) findings of 56% for LPNs and 68% for RNs. As expected, differences between the LPN and RN groups were significant, $U = 735, p < .05$. Significant differences between LPN and RN nutrition knowledge scores were found as well in Crogan and colleagues (2001) study. The only other study to include LPNs had a very small number of subjects in that group (N=4) and the combined scores of all subjects were reported, acknowledging that there were no differences in scores based on level of education (Stanek, Powell, & Betts, 1991).

Scores for RNs in this study were higher than the scores for LPNs in two subscales: (1) effects of aging and (2) principles of assessment. Information about how often nurses conducted assessments was not gathered for this study, however subscale (2) principles of nutritional
assessment may be higher in the RN group because it is their role to conduct assessments, whereas responsibility to perform assessments is not mentioned in the standards of practice for LPNs (Board of Nursing, N.604, 2006). No differences in scores were noted between LPNs and RNs on subscale (3). It would be expected that RNs would score higher on this subscale than LPNs because of the higher degree. Again, four items in subscale (3) nutritional deficiencies, demonstrated poor item discrimination indicating that lower scoring subjects got the question correct and higher scoring subjects missed the question. This subscale should be evaluated for content and wording and re-tested for validity and reliability.

Few studies in literature have examined nurse nutrition knowledge, especially in nurses working in nursing homes. However, the few nurse nutrition scores reported in the literature are very similar to the scores found in this study. The Nutrition for Nurses Questionnaire developed by Hernderson-Sabry, Hadley, and Kirstine (1987), was used to assess Canadian nurse nutrition knowledge. Mean score was 69%. Lindseth modified the tool for use in the United States and reported a mean score of 64% in her study. The same tool was adapted for an Australian study, and the authors report a mean score of 64% (Schaller & James, 2005). The mean scores reported for a different tool consisting of true/false items about nutrition was 50% (Vickstron & Fox, 1976). Lastly, mean scores for a 15-item multiple choice nutrition tool was 60% (Stanek, Powell, & Betts, 1991). Although different questionnaires were used, mean score statistics are consistent in all studies testing nurse nutrition knowledge. No criterion currently exists for what benchmark nutrition knowledge scores should be for nurses, however scores consistently demonstrate that nurses have a below average scores on nutrition knowledge regardless of the tool used.

Findings from this study indicate that nurse nutrition knowledge is associated with level of education except in diploma nurses. Rank of scores of the nurses based on level of education
were: baccalaureate nurses were highest at 71%, followed by the associate degree prepared nurses at 69%, the master’s prepared nurse at 64%, the LPNs at 62%, and finally the diploma nurses at 59%. Significant relationships were demonstrated between level of education on the total NKQ-R score and level of education and subscale (2) principles of assessment. These results should be viewed with caution due to the low number of RNs in the four educational levels. Higher scores on nutrition knowledge scores in nurses with higher degrees are consistent with findings in the study by Henderson-Sabry and colleagues (1987). In contrast, Lindseth’s (1994, 1997) studies found that level of education was not associated with nurse nutrition knowledge. Schaller and James’ (2005) Australian study found that nurses with a three year degree had significantly higher scores than nurses who held a higher degree; however no explanation is provided as to why that would have occurred.

Diploma nurses had the lowest score mean (59%). The average age for the diploma group was 61.5 years of age, which is 17.7 years older than the average age of nurses in this study. No relationships were found in this study between age and NKQ-R scores. However no conclusions can be drawn from this data because of the small number of subjects in the four RN sub-samples; further study is needed with a larger subsample of RNs.

**Research Aim 2B**

The aim of 2B was to describe the relationship between UWL and level of education of nurses working in nursing homes. No correlation was noted between level of education and UWL. Although the sample size was adequate for this study ($\alpha = .05$, $r = .30$, power = .95) a larger sample of RNs may have provided different results.
Research Aim 2C

Aim 2C was to describe the relationship between years of nursing experience and nurse nutrition knowledge. Sixty-one percent of subjects had significant long term care experience (>10 years) which had a small non-significant correlation with subscale (3) nutritional deficiencies. Eighty three percent of subjects reported working at the current nursing home for more than one year and a small non-significant relationship with subscale (3) nutritional deficiencies, was noted. Fifty three percent of subjects reported being a nurse for longer than 10 years, small non-significant correlations were noted with scores on the total NKQ-R and subscale (3) nutritional deficiencies. The relationship between nurse nutrition knowledge and years of experience, albeit small, is consistent with the research of Schaller and James (2005). In contrast, Crogan and colleagues (2001), Lindseth (1994), and Stanek and colleagues (1991) found no significance between level of experience and nutrition knowledge.

Research Aim 2D

Aim 2D was to describe the relationship between years of nursing experience and UWL in nursing home residents. Data found no significance between years of nursing experience and UWL in nursing home residents, UWL. Small non-significant relationships were noted between UWL and years worked in long term care and time at current nursing home. This finding should be noted with caution due to the low number of subjects at two of the nursing homes that participated in this study (N = 4 @ facility #2, N = 4 @ facility #3).

Additional Analysis

Age and NKQ-R Scores

Nurses over the age of 35 were compared with younger nurses and were found to have slightly higher scores on subscale (1) effects of aging and subscale (2) principles of nutritional
assessment. No correlation or differences were found between nurse age and scores on the total NKQ-R, thus these results are inconclusive. Previous studies (Henderson-Sabry, Hedley, & Kirstine, 1987; Lindseth, 1990; Lindseth, 1997; Schaller & James, 2005) found that nutrition knowledge increased with age. Although Lindseth (1994) doesn’t specifically mention age, findings indicated that nutrition scores for nurses who were out of nursing school for over 20 years scored much lower than nurses who had been out of school between 6-10 years. In contrast, age did not have a relationship with nutrition knowledge score in Stanek and colleagues (1997) study.

Age and UWL

A Kendall’s tau correlation was conducted to describe the relationship between subject age and UWL. No correlation was noted between age and percent of weight loss.

Ownership Type

Analysis of ownership type (for-profit and not-for-profit) indicates that type was significantly related to NKQ-R scores ($r_{pb} = .229, p < .007$), subscale 2) principles of nutritional assessment scores ($r_{pb} = .244, p < .006$) and to UWL ($r_{pb} = .259, p < .003$). Small non-significant correlations were noted between subscales (1) effects of aging, and subscale (3) nutritional deficiencies. Systematic differences exist between nursing homes based on ownership type. Nursing home processes and structure have been shown in previous studies to impact resident outcomes. A large systematic review of nursing homes in the US by Hillmer & colleagues (2005) found that residents in for-profit facilities fared worse on specific quality indicators than did resident in not-for profit facilities. These findings are consistent with several other meta-analysis comparing outcomes between for-profit and not-for-profit nursing homes (Comondore et al., 2009; Harrington, Carrillo, Thollaug, & Summers, 1999; Saphir, 1999).
Limitations

Several threats to internal and external validity limit the generalizability of the results in this study. Data collection for cognitive testing should occur in an environment that is conducive to concentrating on the task and has no interruptions. In this study, data were collected in a dining room or conference room with extraneous noises and occasional interruptions by other subjects or residents. These unexpected events occurred during testing and were out of the control of the investigator. They may have impacted the ability of subjects to focus or think through questions. The second threat to internal validity was the NKQ-R. This study was the first to test and use the NKQ-R, and although it demonstrated acceptable content validity, item analysis identified 7 of the 28 questions may not have effectively assessed nutrition knowledge, lowering the validity and reliability of the entire tool. Although test-retest is usually not appropriate to measure cognition (Waltz, Strickland & Lentz, 2005), and is not recommended for estimating reliability (Carmines & Zeller, 1999), it may have provided useful information about the reliability of the tool, particularly since subscale (3) demonstrated poor discrimination of 50% of the items. Further testing of the NKQ-R is needed to ensure reliability and validity.

Discussion of questions could have occurred between subjects who had taken the NKQ-R at the first meeting and those who took it the second meeting, thus providing the second group information about the contents of the NKQ-R. Similarly, subjects who completed the questionnaire later and returned it in the mail could have looked up questions or had someone else take the NKQ-R for them. Sample size was moderate, and would benefit from having a larger number of subjects from each nursing home, including larger subsets of RNs.

Recruiting nursing homes for this study was challenging. Nineteen of the 29 administrators contacted declined to participate in the study for a number of reasons. Most often
it was due to the expense that would result from administering the questionnaire while the nurses were on the clock. Several administrators reported staff was too busy preparing for upcoming state surveys, two nursing homes were in the process of moving to a new site, and some gave no reason or did not respond to letters or phone calls. Other data collection techniques, such as providing the research packets to the subjects to complete while not clocked in, may be necessary to recruit more nursing homes in future studies. Another option would be to obtain enough funding to reimburse nursing home administration for the time nurses are on the clock participating in the study.

Recommendations

Additional research is needed to further investigate the variables in this study using a larger sample. Validity and reliability of the NKQ-R and the subsets requires further investigation. The SROM should continue to be used as a framework to guide further study and to direct intervention strategies of care for residents living in nursing homes. Examination of relationships between nurse nutrition knowledge and nursing actions should be explored. Qualitative information, such as nurse attitudes about nutrition might provide valuable insight about the scores of the subjects and should be added to the NKQ-R.

Implications for Nursing Research and Practice

Benchmarks for what nurses should know about nutrition in nursing home residents have not been established; and no recommendations for benchmark scores exist, however this study validates previous studies in the literature that nurses score poorly on nutrition related content. Data was not collected in this study regarding the amount of formal or informal collaboration that occurs between the nurse and the dietician or physician, continuing education or in-services that nurses may have had, or other organizational factors that could impact nutrition knowledge.
How nurses obtain nutrition knowledge in addition to the impact of nurse nutrition knowledge on resident outcomes requires further exploration. In addition, the relationship between CNA nutrition knowledge and UWL in nursing home residents requires exploration.

Reciprocal relationships between nurse nutrition knowledge and UWL should be explored. For example, how do nursing assessments and care interventions change when UWL occurs, and are these assessments and interventions appropriate? Are nursing interventions based on the nurses’ nutrition knowledge or merely by following nursing home policy? How do nurses communicate with other nursing home staff regarding the nutritional health of residents?

**Summary**

This study used a descriptive, correlational, and non-experimental design using the SROM as a framework. This study has expanded the body of knowledge about nurse nutrition knowledge and UWL in nursing home residents in Northeast Indiana. The SROM was valuable in framing the variables of interest in the study. As more is learned about nurse nutrition knowledge and weight loss in nursing home residents, the SROM will be an excellent framework for future interventional studies.

Weight loss and malnutrition is a serious problem in nursing homes in the United States, impacting the quality and length of life of residents living in them. Nurses have a responsibility to meet the needs of this population, however this study, like previous studies indicate that nurse nutrition knowledge is poor. It is imperative for the quality of life of nursing home residents that nurse researchers continue to explore this “hidden epidemic” using both qualitative and quantitative methods.
APPENDIX A:

HUMAN SUBJECT PROTECTION PROGRAM – CORRESPONDENCE FORM
Title of Project: The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders

You are being invited to voluntarily participate in the above-titled research study. The purpose of the study is to revise and test the Nutrition Knowledge Questionnaire, then to describe the relationship between questionnaire results and nursing home weight loss data. You are eligible to participate because you are a licensed nurse, have worked in this facility for at least three months, and are over the age of 21.

If you agree to participate, your participation will involve completing one to two questionnaires asking you to provide some demographic data about yourself and answering a multiple choice questionnaire about the nutrition needs of the elderly. The first questionnaire will be completed at the conclusion of a staff meeting or during a lunch or work break. If you prefer you can fill out the questionnaire at a location and time you prefer and return it in the mail with the stamped envelope provided. After several weeks you may be chosen at random and invited to complete a revised questionnaire. If chosen, you will be sent the revised questionnaire in the mail. You will be instructed to complete the questionnaire at a time and location convenient for you and asked to return it in the addressed, stamped envelope provided with the questionnaire. Each questionnaire will take approximately 10-15 minutes. You may choose not to answer some or all of the questions.

Any questions you have will be answered and you may withdraw from the study at any time. There are no known risks from your participation and no direct benefit from your participation is expected. There is no cost to you except for your time and you will receive $1.00 for your participation for each questionnaire.

Only the principal investigator will have access to the information that you provide. In order to maintain your confidentiality, your name will not be revealed in any reports that result from this project. Questionnaire information will be locked in a cabinet in a secure place. You may decide to not begin or to stop the study at any time. Your refusing to participate or your decision to discontinue your participation will have no effect on your involvement with your place of employment. Also any new information discovered about the research will be provided to you. This information could affect your willingness to continue your participation.

You can call the Principal Investigator to tell him/her about a concern or complaint about this research study. The Principal Investigator, Kim Penland, Ph.D. Candidate, can be called at (260)399-7700, ex: 8527. If you have questions about your rights as a research subject you may call the University of Arizona Human Subjects Protection Program office at (520) 626-6721. If you have questions, complaints, or concerns about the research and cannot reach the Principal Investigator; or want to talk to someone other than the Investigator, you may call the University of Arizona Human Subjects Protection Program office. (If out of state use the toll-free number 1-866-278-1455.) If you would like to contact the Human Subjects Protection Program via the web (this can be anonymous), please visit http://www.irb.arizona.edu/contact/.

By participating in the questionnaire(s), you are giving permission for the investigator to use your information for research purposes.
Date: 12/22/09
Investigator: Kim Penland, Doctoral Student
Advisor: Neva Crogan, PhD
Project No./Title: 09-0608-00 The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders
Current Period of Approval: 08/12/09 – no expiration

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<tr>
<td>☑ Amendment</td>
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<tr>
<td>Rejected: no amendment</td>
</tr>
<tr>
<td>☑ Request for Amendment Form – PI Initiated Changes (received 12/21/09)</td>
</tr>
<tr>
<td>☑ Informed consent</td>
</tr>
<tr>
<td>Subject Disclosure Form [v. 12/17/09]</td>
</tr>
<tr>
<td>☑ Recruitment Materials: Administrator letter</td>
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<td>Protocol change [to assist with recruitment subjects will be contacted lunch or work break, to increase the number of facilities participating from 12 to the number required to gather a minimum number of 100 subjects]; revised subject disclosure form [to explain that the questionnaire will be completed during a lunch or work break in addition to a staff meeting], revised administrator letter [as noted above]</td>
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<td>☑ Approved as submitted effective 12/22/09</td>
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<tr>
<td>Additional Determination(s):</td>
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<tr>
<td>• Not Applicable</td>
</tr>
</tbody>
</table>

Elizabeth A. Boyd, Ph.D.
Assistant Vice-President, Research Compliance & Policy
Office for the Responsible Conduct of Research

EAB:mm

Reminder: Continuing Review materials should be submitted 30–45 days prior to the expiration date to obtain project re-approval
• Projects may be concluded or withdrawn at any time using the forms available at www.irb.arizona.edu.
• No changes to a project may be made prior to IRB approval except to eliminate apparent immediate hazard to subjects.
• Original signed consent forms must be stored in the designated departmental location determined by the Department Head.
APPENDIX B:

LETTERS OF PERMISSION
Date: 10-19-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use The Village of Heritage as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 10-22-09 to 10-22-10. We look forward to working with you.

Sincerely,

* Rosemary Hatcher, M.P.H.
The Village of Heritage
11611 Whitton Road
Monroe, IN 46773
Date: 1-27-10

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Provena Sacred Heart as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 1-27-10 to 1-27-11. We look forward to working with you.

Sincerely,

[Signature]

Robin L. Duen
Date: 1-29-10

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Renaissance Village as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 1-29-10 to 1-29-11. We look forward to working with you.

Sincerely,

[Signature]
Date: 12-07-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship Between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Waters of Summit City as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 12-07-09 to 12-07-10. We look forward to working with you.

Sincerely,

[Signature]

Name: [Signature]

Title: [Signature]
Date: 11-11-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled "The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders". Your request to use Ossian Health Care and Rehabilitation Center as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 10-22-09 to 10-22-10. We look forward to working with you.

Sincerely,

Kim Chiecheta RN 100N
Date: 12-07-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship Between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Millers Merry Manor in Garrett as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 12-07-09 to 12-07-10. We look forward to working with you.

Sincerely,

Name  Connie Bell RN
Title  RN DON
Date:

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled "The Relationship Between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders". Your request to use Byron Health Center as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 1-15-10 to 1-15-11. We look forward to working with you.

Sincerely,

Name

Title  Director of Clinical Services
Date:

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled "The Relationship Between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders". Your request to use Kingston Care Center as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 2-11-10 to 2-11-11. We look forward to working with you.

Sincerely,

[Signature]

Name  
[Signature]

Title  
Staff Development Coordinator
Date: 10-19-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Bluffton Regional Medical Care Center as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 10-19-09 to 10-19-10. We look forward to working with you.

Sincerely,

[Signature]
Program Director, CCC
Date: 12-07-09

Name: Kim Penland, MSN, RN

Address: 2701 Spring Street, Fort Wayne, IN 46808

Dear Kim Penland,

I have reviewed your request regarding your study and am pleased to support your research project entitled “The Relationship Between Nurse Nutrition Knowledge and the Prevalence of Weight Loss in Nursing Home Elders”. Your request to use Chalet Village Health and Rehabilitation Center as a research or recruitment site is granted. The research will include attending one monthly nurse staff meeting to contact and recruit nurses to take the nutrition knowledge questionnaire that tests nurse nutrition knowledge. This authorization covers the time period of 12-07-09 to 12-07-10. We look forward to working with you.

Sincerely,

[Signature]

Name: Marlene Wolfe

Title: Administrator
APPENDIX C:

ORIGINAL NUTRITION KNOWLEDGE QUESTIONS
NUTRITION KNOWLEDGE QUESTIONNAIRE

Please circle the response that you feel best answers each question.

1. A nursing home resident with a pressure ulcer requires an increased amount of _______ to promote healing:
   A. Calories and protein
   B. Protein and fiber
   C. Vitamin K and calories
   D. No additional nutrients are needed

2. Which of the following best estimates the amount of fluid a nursing home resident needs:
   A. 30cc/kg/day
   B. 80cc/kg/day
   C. 10cc/kg/day
   D. 100cc/kg/day

3. For a healthy individual, the recommended percent of calories from protein is closest to:
   A. 60%
   B. 30%
   C. 12%
   D. 5%

4. Which of the following nutrients provided the most concentrated source of kcal?
   A. Vitamins
   B. Carbohydrates
   C. Protein
   D. Fat

5. Which of the following is critical for healing pressure ulcers?
   A. Phosphorus
   B. Iodine
   C. Zinc
   D. Magnesium

6. Iron availability is enhanced by consumption of foods containing
   A. Vitamin C
   B. Vitamin D
   C. Vitamin K
   D. Vitamin B-1
7. A low serum Hemoglobin or Hematocrit most likely indicates a deficiency in:
   A. Zinc
   B. Vitamin A
   C. Vitamin K
   D. Iron

8. The most important aspect in successful meal planning for blood glucose control is:
   A. Avoid sugar
   B. Moderated portion sizes
   C. Low fat foods
   D. Low carbohydrate foods

9. The most common end result of high blood pressure is:
   A. Heart attack
   B. Stroke
   C. Diabetes
   D. Cancer

10. Dietary modifications for a patient on dialysis include:
    A. Modify protein intake
    B. Limit Na, K+, Phosphorus
    C. Limit fluids
    D. All of the above

11. Vitamin E is recommended for:
    A. Bone growth
    B. Good teeth
    C. Anemia
    D. Cardiovascular protection

12. When skin is exposed to the sun’s ultraviolet rays, it naturally produces:
    A. Vitamin A
    B. Vitamin D
    C. Vitamin E
    D. Vitamin K

13. With aging, changes in the stomach and intestines can reduce our ability to absorb which nutrient?
    A. Solid fats
    B. Vitamin B-12
    C. Achlorhydria
    D. Vitamin K
14. A decline in cognitive function is associated with aging. If a resident shows declining cognitive function, which of the following vitamins might the resident be deficient in?
   A. B-12  
   B. B-6  
   C. Folate  
   D. Any of the above  

15. You are assisting a stroke resident to relearn self-feeding. You should:
   A. Cut food into bite size pieces  
   B. Introduce soft foods first  
   C. Offer finger foods  
   D. All of the above  

16. When feeding the chronically ill:
   A. Provide large straws for quick consumption of liquid  
   B. Encourage the resident to eat nutrient dense foods first  
   C. Feed the resident prior to napping or resting  
   D. Keep the head of the bed at a 45 degree angle for safety  

17. When feeding a resident with dementia:
   A. Provide music or television for distraction  
   B. Provide liquids first to ensure fluid intake  
   C. Provide major nutrition sources when the resident is most alert  
   D. Avoid snacks between meals  

18. A resident with Xerostomia may benefit from:
   A. Hard candies  
   B. Salty foods  
   C. Spicy foods  
   D. Caffeinated drinks  

19. Individuals living alone may have decreased total plasma carotenoids due to eating which of the following?
   A. Fewer lean meats  
   B. More breads and starchy foods  
   C. Fewer fats  
   D. Fewer fruits and vegetables  

20. The best choice for dietary fiber is:
   A. Tomato without skin  
   B. Banana  
   C. Brand flakes  
   D. Cream of Wheat
21. In normal aging, dietary requirements of the elderly include:
   A. Increased fat intake
   B. Decreased sodium intake
   C. Decreased caloric intake
   D. Increased fiber intake

22. The best way for ensuring that the elderly get sufficient vitamins and minerals is by providing:
   A. Vitamin fortified protein dietary supplements
   B. Vitamins with selenium and zinc
   C. A balanced diet
   D. Daily vitamins

23. The most effective treatment of obesity in the elderly includes:
   A. Restricting all concentrated sweets
   B. Providing a balanced diet based on dietary preferences, lifestyles, and activity level
   C. Providing fat-free desserts
   D. Increasing water and dietary fiber

24. Low serum selenium is associated with:
   A. Atherosclerosis
   B. Cancer
   C. Heart disease
   D. Diabetes

25. Using whole grain instead of enriched groins provides the following nutrients:
   A. Fiber, vitamin D, calcium
   B. Fiber, vitamins, trace minerals
   C. Fiber, vitamin C, copper
   D. Vitamins, trace minerals, iron

26. Mrs. M has Alzheimer’s disease. The nursing assistant assigned to feed her reports that Mrs. M. “spits out everything I give her”. Which item below would you not assess?
   A. Temperature of the food
   B. Mrs. M’s likes and dislikes from dietary assessment
   C. The technique the nursing assistant is using to feed Mrs. M
   D. The amount of time it takes Mrs. M. to eat
   E. How loud the radio is on in Mrs. M’s room

27. What is the most common single nutrient deficiency in the U.S.?
   A. Vitamin C
   B. Iron
   C. Zinc
   D. Vitamin B-12
28. Mr. R. has had a right CVA with left-sided neglect. He is right handed. Speech therapy has determined that Mr. R. can tolerate a mechanical soft diet with honey-thick liquids. Mark, the nursing assistant assigned to assist Mr. R with meals, asks you for direction. Which of the following would you tell Mark to do?

A. Sit on Mr. R’s left side since that side is the one he will neglect and mark will more easily be able to remind him of that side
B. Have Mr. R sit upright in his wheelchair
C. Use a plate with straight sides so Mr. R. can more easily feed himself
D. If Mr. R. starts coughing, quickly give him a drink of water to clear his throat.

29. Mrs. Z tells you she never drinks juice because it gives her an upset stomach. Her intake of other foods is good. As her nurse you would:

A. Ask the physician for a vitamin c supplement order
B. Ask dietary to give Mrs. Z larger portions of yellow vegetables
C. Monitor Mrs. Z’s intake and check if she is eating a variety of foods
D. Offer high-protein snacks

30. Protein-calorie malnutrition is fairly common in the nursing home. What serum albumin level indicates protein-calorie malnutrition?

A. Less than 2.5
B. Less than 4.0
C. Less than 3.5
D. Less than 3.0

31. Which of the following factors contribute to malnutrition in nursing home residents?

A. Depression
B. Poor fitting dentures or no teeth
C. Loss of manual dexterity
D. All of the above

32. Of the following four nutritional risk factors, which one is NOT a risk factor with a CVA?

A. Dysphagia
B. Aspiration pneumonia
C. Cognitive impairment
D. Dementia

33. A resident suffering from constipation would benefit from:

A. Increasing caloric intake
B. Decreasing physical activity
C. Increasing fluid intake
D. Using laxatives
34. Name the most common gastrointestinal problem in the U.S.
   A. Constipation  
   B. Hiatal hernia  
   C. Diverticulitis  
   D. Diarrhea  

35. The most prominent effect of aging on gastrointestinal function involves the:
   A. Esophagus  
   B. Stomach  
   C. Mouth  
   D. Colon  

36. In which stage of swallowing does dysphagia occur?
   A. Pharyngeal  
   B. Esophageal  
   C. Peristaltic  
   D. Oral  

37. Anthropometric assessment includes:
   A. Diet history  
   B. Triceps skin fold  
   C. Hydration status  
   D. Total protein level  

38. The most reliable diagnostic indicator of protein energy malnutrition in an older adult population is:
   A. Low mid-arm circumference  
   B. Edema  
   C. Food frequency questionnaire  
   D. Physical assessment  

39. If nursing was requested to complete a dietary intake assessment on a severely demented resident, the best method would be:
   A. 24-hour food recall  
   B. Food monitor  
   C. Food frequency questionnaire  
   D. Physical assessment  

40. Assessment of older adults presents special challenges to health professionals because evidence may indicate a nutritional problem can also result from non—dietary causes such as:
   A. Dehydration  
   B. Lack of nutritional knowledge  
   C. Frequent use of prescription drugs  
   D. Lack of exercise
41. A resident who is exhibiting edema could be experiencing a possible nutrition deficiency
   A. Zinc
   B. Sodium
   C. Thiamin
   D. Vitamin B-12

42. An older person who demonstrates constant wandering behaviors could be expected to required
   A. More food
   B. Less food
   C. More group activities
   D. Fewer foods containing sugar

43. In older people, a lack of vigorous exercise and excessive food intake may be the cause of:
   A. Decreased body fat and lower weight
   B. Decreased body fat and higher weight
   C. Increased body fat and lower lean body mass
   D. Increased weight and lower body fat

44. In the older person, loss of lean body mass and decreasing physical activity leads to:
   A. A decrease in energy needs
   B. An increase in energy needs
   C. A desire for more sugar containing foods
   D. A desire for foods containing more salt

45. Nutrition counseling should stress:
   A. Selection of nutrition dense foods
   B. Selection of high calorie foods
   C. Avoidance of foods containing calcium
   D. Avoidance of high fat foods

46. Use of aspirin can lead to:
   A. Bruising and bleeding gums
   B. Blurred vision
   C. More stable family life
   D. Depression

47. Malabsorption of phosphorus, iron, and the fat soluble vitamins can be caused by the use of:
   A. Laxatives and antacids
   B. Caffeine
   C. Headache medicines
   D. Over-the-counter cold medicine
48. If an individual has high blood pressure, non drug interventions might include:
   A. Moderate salt reduction and weight loss
   B. Eating bananas every day
   C. Exercising twice a day
   D. Saturated fat

49. If an older person is consuming a poor diet and takes at least three prescription medications, an appropriate intervention would be:
   A. Nutrition counseling
   B. Recommend a vitamin/mineral supplement
   C. Weekly weights
   D. Discontinue all over-the-counter medications.

50. Nutrient intake and metabolic disease should be assessed if an older person:
   A. Has changes in personality
   B. Exhibits signs of disorientation
   C. Exhibits signs of dementia
   D. Any of the above

*You have now completed this Nutrition Knowledge Questionnaire! Thank you for taking part in this study.*
APPENDIX D:

CONTENT VALIDITY INDEX
NUTRITION KNOWLEDGE QUESTIONNAIRE

You have been asked to review this questionnaire to provide information on the tool’s validity and to reduce respondent burden by decreasing any redundant items. Please review each item below for relevancy and redundancy and provide any comments you feel suitable regarding appropriateness and clarity of the item. The four categories used to develop the questions are provided below.

<table>
<thead>
<tr>
<th>Four Nutritional Categories:</th>
<th>Relevancy</th>
</tr>
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<tbody>
<tr>
<td>1. Nutritional deficiencies of institutionalized older adults.</td>
<td>1 = not relevant</td>
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<tr>
<td>2. Effects of aging on nutritional needs.</td>
<td>2 = somewhat relevant</td>
</tr>
<tr>
<td>3. Protein-calorie malnutrition in older adults.</td>
<td>3 = quite relevant</td>
</tr>
<tr>
<td>4. Principles of nutritional assessment.</td>
<td>4 = highly relevant</td>
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<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
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<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Vitamin K and calories</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td>2. Which of the following best estimates the amount of fluid a nursing home resident needs:</td>
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</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>D. 100cc/kg/day</td>
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<td>3. For a healthy individual, the recommended percent of calories from protein is closest to:</td>
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<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>C. 12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>B. Carbohydrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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   - B. Iodine
   - C. Zinc
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   - A. Vitamin C
   - B. Vitamin D
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8. The most important aspect in successful meal planning for blood glucose control is:
   - A. Avoid sugar
   - B. Moderated portion sizes
   - C. Low fat foods
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   - A. Heart attack
   - B. Stroke
   - C. Diabetes
   - D. Cancer

10. Dietary modifications for a patient on dialysis include
    - A. Modify protein intake
    - B. Limit Na, K+, Phosphorus
    - C. Limit fluids
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    C. Brand flakes
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    A. Increased fat intake
    B. Decreased sodium intake
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    D. Increased fiber intake

22. The best way for ensuring that the elderly get sufficient vitamins and minerals is by providing:
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    B. Vitamins with selenium and zinc
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23. The most effective treatment of obesity in the elderly includes:
    A. Restricting all concentrated sweets
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   B. Fiber, vitamins, trace minerals
   C. Fiber, vitamin C, copper
   D. Vitamins, trace minerals, iron

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   A. Vitamin C
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   A. Sit on Mr. R’s left side since that side is the one he will neglect and Mark will more easily be able to remind him of that side
   B. Have Mr. R sit upright in his wheelchair
   C. Use a plate with straight sides so Mr. R. can more easily feed himself
   D. If Mr. R. starts coughing, quickly give him a drink of water to clear his throat.

29. Mrs. Z tells you she never drinks juice because it gives her an upset stomach. Her intake of other foods is good. As her nurse you would:
   A. Ask the physician for a vitamin C supplement order
   B. Ask dietary to give Mrs. Z larger portions of yellow vegetables
   C. Monitor Mrs. Z’s intake and check if she is eating a variety of foods
   D. Offer high-protein snacks
30. Protein-calorie malnutrition is fairly common in the nursing home. What serum albumin level indicates protein-calorie malnutrition?
   - A. Less than 2.5
   - B. Less than 4.0
   - C. Less than 3.5
   - D. Less than 3.0

31. Which of the following factors contribute to malnutrition in nursing home residents?
   - A. Depression
   - B. Poor fitting dentures or no teeth
   - C. Loss of manual dexterity
   - D. All of the above

32. Of the following four nutritional risk factors, which one is NOT a risk factor with a CVA?
   - A. Dysphagia
   - B. Aspiration pneumonia
   - C. Cognitive impairment
   - D. Dementia

33. A resident suffering from constipation would benefit from:
   - A. Increasing caloric intake
   - B. Decreasing physical activity
   - C. Increasing fluid intake
   - D. Using laxatives

34. Name the most common gastrointestinal problem in the U. S.
   - A. Constipation
   - B. Hiatal hernia
   - C. Diverticulitis
   - D. Diarrhea

35. The most prominent effect of aging on gastrointestinal function involves the:
   - A. Esophagus
   - B. Stomach
   - C. Mouth
   - D. Colon

36. In which stage of swallowing does dysphagia occur?
   - A. Pharyngeal
   - B. Esophageal
   - C. Peristaltic
   - D. Oral
37. Anthropometric assessment includes:
   A. Diet history
   B. Triceps skin fold
   C. Hydration status
   D. Total protein level

38. The most reliable diagnostic indicator of protein energy malnutrition in an older adult population is:
   A. Low mid-arm circumference
   B. Edema
   C. Food frequency questionnaire
   D. Physical assessment

39. If nursing was requested to complete a dietary intake assessment on a severely demented resident, the best method would be:
   A. 24-hour food recall
   B. Food monitor
   C. Food frequency questionnaire
   D. Physical assessment

40. Assessment of older adults presents special challenges to health professionals because evidence may indicate a nutritional problem can also result from non—dietary causes such as:
   A. Dehydration
   B. Lack of nutritional knowledge
   C. Frequent use of prescription drugs
   D. Lack of exercise

41. A resident who is exhibiting edema could be experiencing a possible nutrition deficiency in:
   A. Zinc
   B. Sodium
   C. Thiamin
   D. Vitamin B-12

42. An older person who demonstrates constant wandering behaviors could be expected to require:
   A. More food
   B. Less food
   C. More group activities
   D. Fewer foods containing sugar
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<td>43. In older people, a lack of vigorous exercise and excessive food intake may be the cause of:</td>
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<td>A. Decreased body fat and lower weight</td>
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<td>B. Decreased body fat and higher weight</td>
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<td>C. Increased body fat and lower lean body mass</td>
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<td>D. Increased weight and lower body fat</td>
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| 44. In the older person, loss of lean body mass and decreasing physical activity leads to: | 1 | 2 | 3 | 4 |
| A. A decrease in energy needs | Comments: |
| B. An increase in energy needs | |
| C. A desire for more sugar containing foods | |
| D. A desire for foods containing more salt | |

| 45. Nutrition counseling should stress: | 1 | 2 | 3 | 4 |
| A. Selection of nutrition dense foods | Comments: |
| B. Selection of high calorie foods | |
| C. Avoidance of foods containing calcium | |
| D. Avoidance of high fat foods | |

| 46. Use of aspirin can lead to: | 1 | 2 | 3 | 4 |
| A. Bruising and bleeding gums | Comments: |
| B. Blurred vision | |
| C. More stable family life | |
| D. Depression | |

| 47. Malabsorption of phosphorus, iron, and the fat soluble vitamins can be caused by the use of: | 1 | 2 | 3 | 4 |
| A. Laxatives and antacids | Comments: |
| B. Caffeine | |
| C. Headache medicines | |
| D. Over-the-counter cold medicine | |

| 48. If an individual has high blood pressure, non drug interventions might include: | 1 | 2 | 3 | 4 |
| A. Moderate salt reduction and weight loss | Comments: |
| B. Eating bananas every day | |
| C. Exercising twice a day | |
| D. Saturated fat | |
49. If an older person is consuming a poor diet and takes at least three prescription medications, an appropriate intervention would be:
   A. Nutrition counseling
   B. Recommend a vitamin/mineral supplement
   C. Weekly weights
   D. Discontinue all over-the-counter medications

50. Nutrient intake and metabolic disease should be assessed if an older person
   A. Has changes in personality
   B. Exhibits signs of disorientation
   C. Exhibits signs of dementia
   D. Any of the above

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Comments:
APPENDIX E:

NUTRITION KNOWLEDGE QUESTIONNAIRE-REVISED (NKQ-R)
NUTRITION KNOWLEDGE QUESTIONNAIRE

Name of facility ____________________________________________________________

Please circle the response that you feel best answers each question

1. A nursing home resident with a pressure ulcer requires an increased amount of _______ to promote healing:
   A. Calories and protein
   B. Protein and fiber
   C. Vitamin K and calories
   D. No additional nutrients are needed

2. Which of the following best estimates the amount of fluid a nursing home resident needs:
   A. 30cc/kg/day
   B. 80cc/kg/day
   C. 10cc/kg/day
   D. 100cc/kg/day

3. For a healthy individual, the recommended percent of calories from protein is closest to:
   A. 60%
   B. 30%
   C. 12%
   D. 5%

4. Which of the following nutrients provided the most concentrated source of calories?
   A. Vitamins
   B. Carbohydrates
   C. Protein
   D. Fat

5. Which of the following is critical for healing pressure ulcers?
   A. Phosphorus
   B. Iodine
   C. Zinc
   D. Magnesium

6. Iron availability is enhanced by consumption of foods containing
   A. Vitamin C
   B. Vitamin D
   C. Vitamin K
   D. Vitamin B-1
7. When skin is exposed to the sun’s ultraviolet rays, it naturally produces:
   A. Vitamin A
   B. Vitamin D
   C. Vitamin E
   D. Vitamin K

8. With aging, changes in the stomach and intestines can reduce the ability to absorb which nutrient?
   A. Solid fats
   B. Vitamin B-12
   C. Achlorhydria
   D. Vitamin K

9. A decline in cognitive function is associated with aging. If a resident shows declining cognitive function, which of the following vitamins might the resident be deficient in?
   A. B-12
   B. B-6
   C. Folate
   D. Any of the above

10. When assisting a resident who is very ill, the nurse should:
    A. Provide large straws for quick consumption of liquid
    B. Encourage the resident to eat nutrient dense foods first
    C. Feed the resident prior to napping or resting
    D. Keep the head of the bed at a 45 degree angle for safety

11. When feeding a resident with dementia
    A. Provide music or television for distraction
    B. Provide liquids first to ensure fluid intake
    C. Provide major nutrition sources when the resident is most alert
    D. Avoid snacks between meals

12. The best choice for dietary fiber is:
    A. Tomato without skin
    B. Banana
    C. Brand flakes
    D. Cream of Wheat

13. In normal aging, dietary requirements of the elderly include:
    A. Increased fat intake
    B. Decreased sodium intake
    C. Decreased caloric intake
    D. Increased fiber intake
14. The best way for ensuring that the elderly get sufficient vitamins and minerals is by providing:
   A. Vitamin fortified protein dietary supplements
   B. Vitamins with selenium and zinc
   C. A balanced diet
   D. Daily vitamins

15. The most effective treatment of obesity in the elderly includes:
   A. Restricting all concentrated sweets
   B. Providing a balanced diet based on dietary preferences, lifestyles, and activity level
   C. Providing fat-free desserts
   D. Increasing water and dietary fiber

16. Using whole grain instead of enriched grains provides the following nutrients:
   A. Fiber, vitamin D, calcium
   B. Fiber, vitamins, trace minerals
   C. Fiber, vitamin C, copper
   D. Vitamins, trace minerals, iron

17. Mrs. Z tells you she never drinks juice because it gives her an upset stomach. Her intake of other foods is good. As her nurse you would:
   A. Ask the physician for a vitamin C supplement order
   B. Ask dietary to give Mrs. Z larger portions of yellow vegetables
   C. Monitor Mrs. Z’s intake and check if she is eating a variety of foods
   D. Offer high-protein snacks

18. Protein-calorie malnutrition is fairly common in the nursing home. What serum albumin level indicates protein-calorie malnutrition?
   A. Less than 2.5
   B. Less than 4.0
   C. Less than 3.5
   D. Less than 3.0

19. Which of the following factors contribute to malnutrition in nursing home residents?
   A. Depression
   B. Poor fitting dentures or no teeth
   C. Loss of manual dexterity
   D. All of the above

20. The most reliable diagnostic indicator of protein energy malnutrition in an older adult population is:
   A. Low mid-arm circumference
   B. Edema
   C. Poor wound healing
   D. Serum albumin
21. A resident who is exhibiting edema could be experiencing a possible nutrition deficiency in:
   A. Zinc
   B. Sodium
   C. Thiamin
   D. Vitamin B-12

22. An older person who demonstrates constant wandering behaviors could be expected to require:
   A. More calories
   B. Fewer calories
   C. More group activities
   D. Fewer foods containing sugar

23. In older people, a lack of vigorous exercise and excessive food intake may be the cause of:
   A. Decreased body fat and lower weight
   B. Decreased body fat and higher weight
   C. Increased body fat and lower lean body mass
   D. Increased weight and lower body fat

24. Malabsorption of phosphorus, iron, and the fat soluble vitamins can be caused by the use of:
   A. Laxatives and antacids
   B. Caffeine
   C. Headache medicines
   D. Over-the-counter cold medicine

25. If an older person is consuming a poor diet and takes at least three prescription medications, an appropriate intervention would be:
   A. Nutrition counseling
   B. Recommend a vitamin/mineral supplement
   C. Weekly weights
   D. Discontinue all over-the-counter medications.

26. Dietary modifications for a patient on dialysis include
   A. Modify protein intake
   B. Limit Na, K+, Phosphorus
   C. Limit fluids
   D. All of the above

27. A resident with Xerostomia (dry mouth) may benefit from
   A. Hard candies
   B. Salty foods
   C. Spicy foods
   D. Caffeinated drinks
28. A resident suffering from chronic constipation would benefit from:
   A. Increasing caloric intake
   B. Decreasing physical activity
   C. Increasing fluid intake
   D. Using laxatives

**Please answer a few questions about yourself:**

1. What is your age? ________________
2. Are you? (Please circle) Male Female
3. How long have you been a nurse?
   1. Less than one year
   2. One to three years
   3. Three years to ten years
   4. More than ten years
4. How long have you worked in long term care?
   1. Less than one year
   2. One to three years
   3. Three to ten years
   4. More than ten years
5. How long have you worked at this facility?
   1. Less than three months
   2. Three months to six months
   3. Six months to one year
   4. Longer than one year
6. What shift do you usually work?
   1. Day shift
   2. Evening shift
   3. Night shift
   4. Other (please explain) ______________________________________________________
7. Please indicate what is your highest education degree
   1. Licensed Practical Nurse
   2. Associate Degree Nurse
   3. Diploma Nurse
   4. Bachelor of Science in Nursing
   5. Master of Science in Nursing, or Master of Nursing
   6. Other (please specify) ___________________________________________________________________

You have now completed this Nutrition Knowledge Questionnaire!
Thank you for taking part in this study.
REFERENCES


Morris, J., Nonemaker, S., Murphy, K., Hawes, C., Fries, B., & Mor, V. (1997). A commitment to change: Revision of the CMS’s RAI. *Journal of the American Geriatrics Society, 45*(8), 1011-1016.


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