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Implementation of a Transitions of Care Nutrition Intervention for Malnourished Patients

Nina Rocca
n00666278@unf.edu

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By

Nina Rocca, MS, RDN, LDN, FAND

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Dissertation Committee Members

Dr. Lauri Wright
Assistant Professor, Chair and DCN Co-Director, University of North Florida
Email: l.wright@unf.edu

Dr. Andrea Arikawa
Associate Professor, DCN Co-Director, University of North Florida
Email: andrea.arikawa@unf.edu

Dr. Chetan Dodhia
Medical Director Hospitalist Program, Lawrence General Hospital
Clinical Assistant Professor in Medicine, Tufts University School of Medicine
Email: chetan.dodhia@gmail.com

Dr. Sherri Lewis
Program Director for Anne Brezina Dietetic Internship at James A. Haley Veterans Hospital
Email: sherri.lewis@va.gov

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Abstract

The topic of Transitions of Care (TOC) has been investigated by physician and nursing professions for years, while only more recently by nutrition professionals. Registered Dietitians are not always involved in TOC planning. RDs can play an important role in TOC by communicating patients' nutrition information across health care settings, especially for patients with malnutrition. The primary aim was to use a CDC based process evaluation to evaluate if a case management, nursing focused care transitions framework, adapted for a TOC nutrition intervention, can result in a successful intervention implementation. The secondary aim was to use a CDC outcomes evaluation, to evaluate if the number of unplanned hospital readmissions within 30-days from hospital discharge is lower in the TOC nutrition intervention group compared to the comparison group, and if the nutrition status of the intervention participants improved by the end of the 5-week intervention. The primary investigator (PI) compiled retrospect patient data who were admitted to Lawrence General Hospital (LGH) during the time of November 2019 through June 2019. From this data set, the comparison group, the number of malnourished patients, and their readmission percent was calculated. A mixed-methods study design included qualitative, quantitative, and quasi-experimental pre/post intervention methods. Patients who were admitted to LGH during a 6-month period starting from the last week in July 2021, through the last week of January 2022, who agreed to participate, were enrolled in a 5-week TOC nutrition intervention. Due to the small sample size (n=21) of patients enrolled, data was analyzed with caution. There was no difference in hospital readmissions between groups. Nutrition status did improve among participants in the intervention group (n=13). The outcomes support the need to integrate a RD as part of TOC multidisciplinary team, especially for patients with malnutrition to improve health outcomes.

Introduction

Malnutrition is increasing among hospitalized and community dwelling adults.[1] When malnutrition is identified during hospitalization, patients' nutrition status and follow up needs may not be included in Transitions of Care (TOC) planning. Because nutrition professionals are not always included as part of the TOC, the medical team may fail to communicate nutrition recommendations as part of discharge planning. The literature review investigated common transitional care interventions used across healthcare settings to reduce hospital readmission and improve nutrition status. Additional research is needed on the integration of nutrition professionals as part of discharge and transitional care planning to improve health outcomes.

The research mixed-methods study design will encompass both qualitative and quantitative, quasi-experimental pre/post intervention study design methods. The Care Transitions Framework will be used to implement a Transitions of Care Registered Dietitian (TOC RD) intervention. A process evaluation, qualitative measure, will evaluate the success of the implementation process. An outcomes evaluation will evaluate quantitative outcome measures; participants nutrition status using the Patient-Generated Subjective Global Patient Identification Information Assessment (PG-SGA), and the number of unplanned 30-day hospital readmissions. The TOC nutrition intervention will be integrated into the TOC and discharge processes at LGH. Participants will be adult patients (>18-years old) diagnosed with malnutrition during hospitalization. The proposal hypothesizes that integrating an RD as part of the TOC planning team will help to improve nutrition status and lessen unplanned hospital readmissions of hospitalized malnourished patients. Overall support the continuance of care for the malnourished patient from hospital to home.

Chapter 1 – Literature Review

This literature review aims to identify supporting evidence that Registered Dietitians (RDs) are needed as part of the TOC team and will discuss the topics of Transitions of Care (TOC), malnutrition, research review, and conclude with future implications for research.

Transitions of Care Introduction

Defining Transitions of Care

Transitions of care (TOC) is the process of providing a safe plan of care for a patient as they transition between levels of care and different care settings. Hospitals need to improve TOC planning to reduce hospital readmissions; otherwise, they may face penalty under the Affordable Care Act (ACA) and Hospital Readmission Reduction Program (HRRP) through Medicare.[2–5]

In the hospital, TOC begins during admission, changes throughout hospital admission until discharge planning begins, and follows the patient from hospital to home. Specifically, TOC plans are integrative processes that change throughout hospital stay, in discharge planning and during follow-up post-discharge. TOC plans are typically developed by a medical team, implemented in acute hospital care, and further integrated into discharge planning to rehabilitation, home, or other locations.[6–9] The TOC team can include hospital physicians, primary care physicians (PCPs), nurses, case managers, social workers, care coordinators, at times dietitians, and community health professions. Some facilities have established care-coordination teams, discharge liaison-teams, or others to facilitate patient care from the hospital to home.[9,10] However, there are barriers to proper TOC planning that may occur, including poor documentation and communication between healthcare providers, personal or environmental barriers, or poor support at home.[11–13] Thus, inefficient TOC can lead to inconsistent care, hospital readmissions, and poor health outcomes.

The Role of the Multidisciplinary Team in Transitions of Care

The process of TOC from hospital to home involves a multidisciplinary team including hospital physicians, PCPs, TOC pharmacists, nurses, care coordinators, case managers and social workers. A survey found that physicians, nurses, and social workers are often involved in discharge planning while dietitians are not.[14]

As part of the multidisciplinary team, physicians play a role in assessing, diagnosing, and treating individual medical concerns. They are responsible for writing the initial discharge summary, patient medication instructions, and a referral list. PCPs are expected to continue the medical care implemented by the hospital physicians and written in the discharge summary.[15]

Nurses have a unique role in TOC spending most of the day with patients and establish rapport with them during their hospital stay. Nurses bridge communications between the multidisciplinary team and patients. They communicate the plan of care upon admission, discuss daily medications and procedures during hospitalization, and discuss the discharge paperwork with patients prior to them discharging. Nurses may also need to provide nutrition education to patients and caregivers if a dietitian is not consulted prior to discharge. Bedside nurses are responsible for discussing medical concerns prior to discharge, while care coordination nurses follow-up with high-risk patients soon after discharge.[15] Aside from nurses TOC pharmacists help to coordinate hospital medication prescriptions with the patient's pharmacy and address any medication questions or concerns patients have prior to discharging.

Case management is a complex service that integrates specific frameworks into specific organizations TOC planning. Case management frameworks can be adapted to meet the organization's strategic plan.[16] Whichever framework a facility chooses to adapt, it must follow CMS and the Joint Commission on Accreditation of Healthcare Organizations (JACHO) guidelines. Case managers are part of the multidisciplinary TOC team. Case managers are

expected to integrate certain structural elements to coordinate safe and successful TOC. They begin the progress of TOC by identifying patient individual care needs within 24-hours of admission. TOC needs include addressing patients' medical diagnosis, level of care they need, psychosocial needs, spiritual needs, and anticipated discharge needs. Case managers are responsible for facilitating safe patient transitions from the hospital back out into the community, including setting up outpatient PCP or specialist appointments.[2,3,4,17]

Social workers have a dynamic role in transitional care as they communicate with patients and caregivers.[15] They provide community resources to address socioeconomic concerns, like housing or food access, depending on patient needs. Many community programs that help to support food access should be considered as part of TOC. Social workers assist patients in establishing access to community nutrition programs, such as Meals on Wheels (MOW), Supplemental Nutrition Assistant Program (SNAP) benefits, farmer's markets, food-delivery programs, and provide lists of available food banks and soup kitchens. Social workers are a strong part of TOC models. They establish relationships with patients and caregivers as they value autonomy, encourage empowerment, and respect emotional needs. These actions reduce the risk of the patient enduring negative experiences and encourage patients to be involved in the TOC plans.[15]

Integrating dietitians into the TOC role could help to alleviate other staff member's responsibility to provide nutrition information prior to discharge. As the nutrition experts, RDs can address nutrition concerns such as diet education and community food and nutrition resources directly. Unfortunately, RDs are not required to be part of the TOC team and CMS suggests it may be burdensome to require considering the other requirements that are mandated

as part of the process.[18] As mentioned earlier, each facility decides whom to include as part of the discharge planning team.

For decades, research has suggested that nutrition professionals be involved in TOC and discharge planning. A few ways that dietitians can be involved in TOC processes are by participating in discharge rounds, providing nutrition in-services about the role of nutrition in transitional care, and marketing of the RD outpatient services to refer patients to once they are home.[14,19] The RD can integrate some aspects of care management standards of care into their clinical practice. The RD could consider pursuing a certification through the National Academy of Certified Care Managers, Commission for Case Management Certification (CCMC), or the National Association of Professional Geriatric Care Managers to be more equipped to address nutrition needs during discharge planning.[14] The RD can help case management and nursing teams to establish what nutrition information and related care the patient needs when getting discharged. Recent reviews have found that efforts to optimize nutrition during and after hospital stays have benefited patient nutritional status.[20]

Incorporating a TOC RD or Dietetics Technician Registered (DTR), in addition to the acute care clinical RD team, can help to address nutrition needs when transitioning from the hospital to home. Specifically focusing on patients with malnutrition can impact readmission and health outcomes.[1,14,21,22] Researchers have found that utilizing a multidisciplinary team, including a dietitian, as part of TOC planning has been found to improve health outcomes.[10,23–28,29,30,31,32,33] Opportunities where nutrition professions can be integrated as part of the TOC process can further enhance research or patient outcomes.[22]

Transitions of Care, Discharge Planning and the Lack of Nutrition Inclusion

Transitions of care planning and discharge planning are required by CMS and JACHO to prepare patients for a safe transition from the hospital on to the next setting. Discharge planning

is a critical piece in transitional care.[34] Appropriate discharge planning promotes health, while reducing hospital readmissions. Unplanned hospital readmissions are linked to poor discharge planning.[14] Proper discharge planning requires the involvement of the multidisciplinary team and appropriate documenting of the medical care plan to be followed up on by healthcare provers.

There are four primary discharge planning needs to address during discharge, assessment of the patients post-discharge needs, collaboration to determine appropriate disposition, coordination of recourses for care, and patient education.[35] Older JACHO recommendations included six standards (Standard IM.6.10, EP 7) that are required to be a part of discharge planning: reason for hospitalization, significant findings, procedures and treatment provided, the patient's discharge condition, patient and family instructions (as appropriate) and attending physician's signature.[36,37] Although CMS recognizes the importance of high-quality care coordination for patients who are transitioning across multiple settings, most nutrition information identified during hospitalization is not required to be included in the discharge plan, unless it is pertinent to the medical treatment plan. Because CMS does not require nutrition information to be included, the discharge planning team may omit it from the discharge plan.[14,4,38] With hospital nutrition findings being omitted, it is unclear if physicians follow up on nutrition concerns that were identified in the hospital, creating gaps to nutrition care.[20,39]

According to the 2019 CMS final rule, including the patient's diet upon discharge in the discharge plan is required.[18] The specific TOC and discharge planning criteria and management of the care coordination that must be followed, is the responsibility of each facility to decide.[15,18] In the hospital, nutrition findings are required to be documented by the clinical RDs as part of the NCP and are part of patients' plan of care. The nutrition plan identified in the hospital should be integrated in the TOC plan from hospital admission to the outpatient setting for optimal patient

care.[20,39] Nutrition professionals should advocate for both screening for malnutrition risk during hospitalization, and monitoring malnutrition post-discharge.

Insurance Coverage for Transitions of Care

An important, but complex topic to broach is insurance coverage for TOC. Healthcare workers involved in TOC processes are not reimbursed as a fee-for-service system. Fee-for-service refers to when a hospital or providers bill separately for each service provided. Therefore, reimbursement from CMS to cover TOC services for each interdisciplinary staff involved in TOC is limited and can become costly. To improve CMS reimbursement to the hospital for TOC, supporting evidenced is needed to show the positive impact of TOC services on patient outcomes. Evidence will enlighten both public and private payers about the importance of TOC services and the need for compensation to support transitions from hospital to home.[15]

Malnutrition Risk During Transitions of Care

Community-dwelling older adult patients are either at risk for malnutrition or identified with malnutrition during hospitalization. Identifying and integrating effective TOC procedures and nutrition interventions to reduce the risk of malnutrition is needed during and after hospitalization, to support positive health outcomes. A lack of TOC procedures to address malnutrition, may result in hospital re-admissions and poor health outcomes.[1,11,40,41]

Malnutrition

Malnutrition Definition and Prevalence

Malnutrition is defined as an imbalance of macro- and micro- nutrient intake that may impact acute or chronic disease illness and infection.[42] However, the criteria used to identify malnutrition may not be as clear, and the presence of malnutrition may not be obvious. Malnutrition is a global non-discriminatory complex issue that occurs across all ages. Patients with undernutrition, underweight, and overnutrition (diets of poor nutrient quality), with

overweight/obesity, with or without inflammation can fall within the scope of malnutrition.[1,43–48] Malnutrition indicates poor nutrition status. Nutrition status is defined as the patients' health condition as it is influenced by the intake and utilization of nutrients.[49] When research studies investigate nutrition status indicators include weight and nutrient intake, and BMI.[25] These criteria are similar to those used to evaluated for malnutrition. The World Health Organization (WHO) describes malnutrition a preventable and treatable condition. The WHO aims to resolve malnutrition within the 2016 – 2025 nutrition strategy, through global initiatives to increase access to nutrition interventions and healthy diets.[42]

As of 2018, malnutrition has become prevalent across all spectrums of care settings. Depending on the criteria used to identify malnutrition, research has found at least 20-50% of patients to be malnourished in acute care, 14-51% of patients to be malnourished in post-acute care, and 6-30% of patients in community care and increasing among those living in the community.[1] Malnutrition is heightened during hospitalization if it is not identified and treated with the proper nutrition intervention. Malnutrition leads to poor health outcomes, compromised immune function, increased risk of acquiring hospital infections, poor wound healing, functional decline, longer hospital LOS, and higher readmission rates.[50,51] During hospitalization, the healthcare team can help provide early malnutrition screening, effective nutrition interventions and recommend follow up nutrition plants to treat and prevent malnutrition.

Malnutrition Pathophysiology

Malnutrition develops in the setting of different etiologies. Protein Energy Malnutrition (PEM) is common among hospitalized patients, resulting from acute, chronic or social environmental etiologies. PEM is the result of inadequate macro- and micro- nutrient intake when compared to the metabolic needs of the body.[45] The severity of malnutrition may result from the severity of inflammatory and stress-related responses that occur during illness.

Inflammatory and stress-related biological responses promote an increase in energy expenditure, promote muscle catabolism, fat wasting, weight loss and a decreased appetite.[50]

Biological Responses, Hormonal Pathways ("Fed-State", Fasting, Starvation)

Understanding biological pathways that occur after eating, and during times of starvation is necessary to appreciate the changes that occur during illness and promote malnutrition.

"Fed-State"

The "fed-state" refers to the time-period after consuming macro- and micro-nutrients from a meal. After food is consumed, the digestive system breaks down and absorbs both macro- and micro-nutrients signaling hormonal responses. The hormone insulin is released from the pancreas to inhibit enzymes involved in glycolysis (glycogen breakdown) or gluconeogenesis (new glucose formation). Insulin will inhibit hormone-sensitive lipase (HSL). When active HSL signals the release of free fatty acids (FFA) from adipose tissue to the blood. Insulin promotes the uptake of dietary fatty acids and glucose into certain tissue to be stored as energy and stimulates protein synthesis from dietary amino acids. The body stores nutrients to provide a source of energy during times of fasting.[50,52,53]

"Fasting" or Short-Term Starvation

During short-term starvation, like fasting between meals or overnight, blood glucose will decrease, signaling the pancreas to stop releasing insulin and to start releasing glucagon. Glucagon signals glycogen breakdown in the liver to supply glucose to the body. The body will first utilize liver glycogen for energy and blood glucose maintenance. The liver and muscle glycogen supplies up to around 18-24 hours of energy from glycogenolysis (glycogen breakdown).[52,53] If the person continues to "fast" or go a longer period without eating, liver glycogen will be depleted. The body will then break down muscle into amino acids and lactate,

which is used to make glucose for cellular energy. After about 2-weeks the body will switch mechanisms to utilize FFA for energy.[50,52,53]

"Starvation" Prolonged Fasting (More than Two Weeks)

During prolonged fasting or starvation occurring for longer than 2-weeks, the hormone insulin will be inhibited. In the liver the energy supply of glycerol will have been fully consumed during short-term fasting. Therefore, free fatty acids will be used as metabolic fuel. Intracellular hormone-sensitive lipase is activated and sent to the blood stimulating the release of FFA and glycerol from adipose tissue into the blood.[53] FFA will become the main energy source for the body and is processed through beta oxidation to make Acetyl CoA to be used in the Krebs cycle for energy. However, due to a lack of dietary glucose intake during starvation that is required to run the Krebs cycle, the Krebs cycle will slow down, leading to an accumulation of Acetyl CoA. In the liver, Acetyl CoA will be converted to ketone bodies and used as a source of energy for the liver, muscles, central nervous system and brain. Ketone body production will spare the need to breakdown muscle for energy, a process known as keto adaptation. [51,53] Prolonged starvation leads to a depletion in adipose tissue, exhausting the FFA supply. Muscle can no longer be spared, leading to muscle breakdown to supply energy in the form of amino acids and lactic acid to the body. Complete muscle depletion will eventually lead to death.[50,51,53]

Malnutrition Etiology (Acute, Chronic, and Social/Environmental)

There are three primary etiologies, acute illness, chronic illness and social environmental factors, that may promote malnutrition, which stem from the severity of illness-related inflammation. Acute illness has a greater inflammatory response compared to chronic illness, and in social environmental conditions there may not be an inflammatory response.[45]

Acute Illness

During acute illness (infection, trauma or injury, burn, pancreatitis, liver disease, gastrointestinal, pulmonary illness and others) the body responds with a Systematic Inflammatory Response Syndrome (SIRS) and hypermetabolic state, depending on the severity of the illness.[51] The body responds by increasing body temperature, heart rate, respiratory rate and potentially an elevated white blood count, signaling a neuroendocrine and cytokine cascade response, releasing Tumor Necrosis Factor (TNF), Interleukins (IL) IL-1, IL-2 IL-6 that promote inflammation. Cytokines are released into the circulatory system through a compliment system. Within 24 – 48 hours of acute critical illness, hemodynamic instability, decreased heart rate, body temperature, oxygen consumption, elevated glucagon, catecholamine release and FFA mobilization can occur. Over a longer period, biological shifts occur that increase heart rate, oxygen consumption, hormone and catecholamine production, metabolic rate, oxidation of fuel, normal to low blood glucose, increase in lipolysis, protein catabolism and immunosuppression to balance the pro-inflammatory state that alter metabolism and could be harmful.[51]

In the intensive care unit resting metabolic rate could increase from 120% to 150% depending on severity.[51] Although there are calculations to estimate energy needs, indirect calorimetry remains the gold standard for assessing estimated energy needs.[50,51] The acute illness response including increased energy expenditure may remain elevated for three-weeks after a patient recovers from acute illness, due to high circulating catecholamines.[51]

Chronic Illness

During chronic illness, the inflammatory response may not be as severe as in acute illness. A moderate inflammatory state and hypermetabolism will persist over a longer-term duration. Chronic illness such as cancer, chronic inflammation or infection, pancreatic, liver or kidney organ dysfunction, impaired or altered gut health like inflammatory bowel diseases,

malabsorption, chronic pulmonary obstructive disease, and chronic heart failure. There may be a mix of metabolic factors in HIV/AIDS, cancer and chronic liver disease.[50] Chronic illness can last for three months or longer.[45] The processes occurring during both acute and chronic illness may decrease appetite and promote weight loss, contributing to malnutrition.

Social Environmental Factors

Social environmental factors that lead to disordered eating or starvation may contribute to the development of malnutrition. An inflammatory state, like what is seen during acute and chronic illness is not always present.[45] Malnutrition may result from inadequate nutrition intake overtime due to non-adherence to nutrition recommendations to consume a healthy diet. Non-adherence may result from eating disorders and or a lack of finances, social support, telephone access, and transportation to access food.[45] A state of prolonged inadequate nutrient intake will ultimately lead to weight loss and fat and muscle wasting, contributing to malnutrition.

Malnutrition and Obesity

Patients with obesity need to be monitored for the development of malnutrition, especially in the setting of acute illness. BMI alone should not be used as an indicator of malnutrition status without taking the clinical picture into account.[51,54] Obesity is associated with an increased waist circumference and central abdominal adiposity. Central adiposity is active tissue involved in signaling both pro- and anti-inflammatory cytokines, known as obesity-related inflammation.[52] During acute illness patients with obesity are metabolically compromised increasing the risk for developing insulin resistance, hyperglycemia, and other chronic illnesses.[54] Clinical dietitian can establish nutrition interventions to prevent both over-feeding and underfeeding while providing adequate protein and micronutrients.[51,54]

The Effect of Illness on Nutrient Utilization

As the proinflammatory response persists, inflammatory markers (IL-6, TNF) and catabolic stress hormones such as catecholamines (epinephrine, norepinephrine), cortisol, and glucagon continue to circulate, playing an important role in nutrient utilization. Catecholamines and glucagon promote glycogenolysis (glycogen breakdown), gluconeogenesis (creation of new glucose), somatic protein catabolism, and amino acid uptake in the liver. Cortisol enhances skeletal muscle catabolism.[51,52] Stress hormones inhibit insulin and stimulate lipase to release FFA and glycerol from adipose tissue to the blood. However, in illness, FFA utilization and ketone production consumed a large amount of oxygen, oxygen is needed for other pathways, shifting the primary fuel source from fat to carbohydrate and protein.[50,51] The metabolic stress response quickly depletes liver and muscle glycogen, leading to the break-down of somatic muscle to supply fuel for energy demands and cell functioning. Acute-phase protein production in the liver and immune activation also increase during illness.[51]

Metabolic responses to illness promote an altered and increased energy expenditure and energy demand that promotes catabolism. This catabolic response opposes adaptive pathways seen in short-term starvation where cells utilize FFA for energy to protect somatic muscle. A Respiratory Quotient (RQ) can be checked to identify what fuel source the patient may be using during metabolism. During starvation, a RQ of 0.6 – 0.7 indicates cells are using fat for the primary fuel source. During illness, or a hypermetabolic state, a RQ of 0.8 – 0.9 indicates cells are using a mix of energy sources (carbohydrate, fat and protein) for fuel.[50]

Malnutrition, Illness and Acute Phase Proteins

Acute-phase proteins present differently during illness as either positive acute- or negative acute-phase proteins. During illness, in response to inflammation, the liver starts increasing production of cytokines and positive-acute phase proteins (CRP, haptoglobin, ferratin,

ceruloplasmin), while negative-acute phase proteins (albumin, prealbumin, transferrin, retinol binding protein) decrease, depending on the severity of illness and inflammation.[55] A concept called hepatic reprioritizing suggests that the liver shifts to make positive acute-phase proteins, such as albumin, in response to illness.[51,53,56,57] Therefore, prealbumin or albumin may not be the most reflective marker of malnutrition during acute and chronic illness. However, the process may be more complex, other factors can influence the synthesis of acute-phase proteins, especially albumin.[55] Albumin has a half-life of 18- to 21- days and may not be reflective of dietary protein intake.[52,58] Physicians continue to use serum albumin as the prime marker for PEM and although serum biomarkers may be reflective of inflammation status, they should not be used as biomarkers to identify malnutrition. There are currently no biomarkers used to diagnose malnutrition.[55]

The development of edema, results from either inadequate protein intake or illness. If clinical dietitians or physicians identify edema as a criteria for diagnosing malnutrition, all factors that may promote edema must be considered, low albumin from illness being one of them.[52] A primary action of albumin is to maintain osmotic pressure of plasma, promoting intravascular fluid balance. Albumin contributes 75-80% of osmotic pressure. Inadequate circulating albumin and plasma proteins may lead to water going from the plasma to interstitial tissue, or upper and lower extremity edema.[53]

The Effect of Illness and Inflammation on Appetite

The vagus nerve regulates gut physiology and other systems to regulate homeostasis. The vagus nerve is a part of the central and peripheral nervous signaling involved in appetite regulation.[59] The vagus nerve communicates with neurohormones, some that signal satiety, and ghrelin that signals hunger.[59] Vagal sensitivity and signaling, from the body to the brain, may be modulated by both systemic and gut inflammation.[59] The vagus nerve can independently signal

anti-inflammatory macrophage and cytokine production pathways.[52,59] Overall, inflammation and cytokines IL-6 and TNF have an influence on the central nervous system appetite signaling.[57,59,60] Researchers have found inflammation to be associated with a decreased appetite, reduction in nutrient intake, and malnutrition in older adult patients.[61] In illness patients may experience a lack of interest in food, taste change, and early satiety.[50] The exact relationship between inflammation and appetite is complex and a topic that needs further exploration.

Sarcopenia, Cachexia, Frailty and Malnutrition Is There a Difference?

Sarcopenia, cachexia, frailty and malnutrition are common concerns for hospitalized patients, particularly in older adults, as they contribute to poor health outcomes. Sarcopenia can be defined as low muscle mass associated with decreased functioning and muscle strength that occurs as part of the aging process and decreased physical activity.[62] Cachexia can be defined as disease provoked muscle breakdown. Cachexia is the result of muscle wasting due to an increased rate of catabolism associated with cancer and other illness.[63,64] Cachexia results from the release of cytokines in illness either acute (injury, infection, stress, inflammation) or overtime in chronic illness (cancer). The metabolic rate and protein tissue catabolism accelerates during illness facilitating a decreased appetite, decreased nutrient intake, or inadequate intake compared to metabolic demands, leading to malnutrition.[53,63,64,65] Frailty is recognized as the age-related functional decline that contributes to a lack of ability of patients to perform daily living activities.[66] Unintentional weight loss is associated with frailty and physical decline.

Sarcopenia, cachexia, frailty and malnutrition are not always independent and may be happening simultaneously. When dietitians assess for malnutrition, the underlying etiology associated with the conditions of sarcopenia, cachexia and frailty must be considered. Fat and muscle wasting can be appreciated throughout acute or chronic illness, or social environmental etiologies. Patients may experience disease-related malnutrition or social/environmental related

malnutrition. Therefore, American Society on Parenteral and Enteral Nutrition (ASPEN) and Global Leadership Initiative on Malnutrition (GLIM) has developed criteria to identify malnutrition considering the complexity of etiologies.

Malnutrition Criteria (A.S.P.E.N. and G.L.I.M.)

A.S.P.E.N. Criteria

The American Society on Parenteral and Enteral Nutrition (ASPEN) with AND have established guidelines that nutrition professionals, physicians and medical professionals can follow to appropriately identify malnutrition. The dietitian collects data on energy intake history, interpretation of weight loss, physical findings, potential fluid accumulation, and grip strength, during the nutrition assessment. Energy intake is collected from a patient nutrition history and compared to estimated requirements. Interpretations of weight loss is assessed by collecting usual weight history and current weight and calculating weight change percentages. Dietitians use the Nutrition Focused Physical Exam (NFPE) during the nutrition assessment to identify fat and muscle wasting that may be associated with malnutrition. Fluid status is evaluated by looking at excess fluid accumulation or edema. Finally, the dietitian may use a hand grip measuring device, a dynamometer, to assess for grip strength. Readings are compared to normative values to identify a potential loss of strength. To identify severe or chronic malnutrition, at least two of the clinical characteristics, inadequate nutrient intake, weight loss, or physical findings criteria must be identified under the associated etiology (acute, chronic, or social/environmental).[45]

G.L.I.M. Criteria

The Global Leadership Initiative on Malnutrition (GLIM) leadership committee is a large working group of global members. The purpose of the group is to establish a global consensus for the screening, assessing and diagnosing of malnutrition. The establishment of standardized

criteria will support accurate measuring and evaluating of malnutrition prevalence, interventions and outcomes. The GLIM committee considered the previously established ASPEN criteria in the development of the consensus. The GLIM committee established two categories, the phenotypic criteria (weight loss, low body mass index, and reduced muscle mass) and the etiology criteria (reduced nutrient intake, and inflammation related disease burden) that are used to assess for malnutrition. At least one criterion from each category should be present to identify malnutrition. The severity of malnutrition is identified based on etiology. The GLIM guidelines propose four etiologies: (1) chronic disease with inflammation, (2) chronic disease with minimal or no inflammation, (3) acute illness with inflammation, and (4) starvation related to limited food access or social and environmental factors.[67,68] The GLIM leadership committee is working on standardizing malnutrition identification criteria that can be applied to global healthcare.

Micronutrients and Malnutrition

Micronutrient deficiencies are not part of the ASPEN or GLIM criteria used to identify malnutrition. Micronutrient deficiencies may be present in malnourished patients. Physicians can order laboratory assays to assess for micronutrient deficiencies. However, the presence of inflammation may affect micronutrient values that result in lab assays, which may not accurately represent micronutrient status.[69] The dietitian can help physicians identify potential deficiencies when performing the NFPE and further suggest nutrition interventions to prevent deficiencies.

Coding of Malnutrition in the Hospital

When coding for malnutrition there are two primary International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) diagnostic codes that can be applied. Severe malnutrition (E43) is a Major Complication or Comorbidity (MCC), and moderate malnutrition (E44) is a Complication or Comorbidity (CC).[70,71] Hospital reimbursement relies on diagnosis-related group (DRGs) codes. A standardized malnutrition

criterion CMS will use to audit malnutrition diagnosing in the hospital has yet to be approved.[71] In 2009, the ASPEN with the AND established national standardized criteria that healthcare facilities can apply to their malnutrition policies. Each facility or hospital is responsible for establishing the criteria that can be used to identify malnutrition in a malnutrition policy. The AND with ASPEN continue to work with National Center for Health Statistics (NCHS) ICD-10-CM coordination and maintenance committee regarding code descriptors.[72]

Insurance Coverage for Inpatient Dietitians, Malnutrition, and Outpatient Dietitians

The healthcare setting, insurance plan, and patients' medical diagnosis determines health insurance coverage and reimbursement rates for nutrition services across healthcare settings. In the hospital, nutrition services are covered as part of the total patient care cost and not billed as fee-for-service. However, clinical RDs may identify malnutrition through the completion of the nutrition assessment and NFPE. When properly documented by physicians, a malnutrition diagnosis can generate greater reimbursement for patient care. In the outpatient setting, private practice, and home healthcare, RDs bill fee-for-service for nutrition counselling or Medical Nutrition Therapy (MNT).[73] The Academy of Nutrition and Dietetics (AND) offers resources on nutrition policy and reimbursement.[73,74]

Hospitalized patients with disease-related malnutrition tend to have higher healthcare costs and poorer recovery post-discharge.[71] The hospital is responsible for establishing a malnutrition policy that specifies criteria that physicians can follow to properly identify and diagnose malnutrition.[71] The AND have developed screening initiatives to reduce the burden of malnutrition. During hospitalization, physicians are responsible for diagnosing malnutrition and properly coding the ICD-10-CM diagnosis in the medical record, generates insurance reimbursement. The clinical RD is an essential team member who identifies nutrition problems and interventions based on etiology, using the NCP and the NFPE, providing supporting

malnutrition evidence for physicians. Dietitians can further work with physicians who can properly diagnose and treat malnutrition.[75] The clinical RD team can educate hospital leadership, stakeholders, and physician teams on the need for malnutrition processes to improve patient care, supporting the need to integrate more RDs as part of malnutrition initiatives.[75] A TOC RD can further encourage physicians to properly diagnosis malnutrition prior to discharge. The TOC RD can also establish nutrition plans with patients and caregivers that address malnutrition as they transfer from hospital to home.

Reimbursement for outpatient nutrition services depends on the patient's individual insurance plan. Medicare Part B (medical insurance), which covers most older adults, only covers MNT for certain illnesses. These illnesses include diabetes, kidney disease, or having a kidney transplant in the last 36-months, and requires a treating physician referral.[76,77] Malnutrition is not currently a diagnosis that Medicare will provide reimbursement for nutrition services. The lack of reimbursement for out-patient services is a barrier to continue nutrition services from hospital to home for patients with malnutrition.[76] Private payer insurance plans follow different guidelines for nutrition services reimbursement. Private plans may not require a physician referral for nutrition services, allowing direct access to MNT services.[76,77]

Private payer plans may require a physician referral and may limit the number of RD visits covered by insurance. Private payers may offer a disease management program that include RD coverage for existing health conditions. Unfortunately, insurance coverage for nutrition services may be rejected, even when PCPs and RDs recommend it. The option of self-pay for nutrition services is optional but may be costly and unaffordable for certain populations or those with low-income. Aside from RD services, insurance coverage for Oral Nutrition Supplements (ONS) or other supplemental foods may be limited, presenting a challenge for those who cannot

afford supplemental foods. Aside from outpatient nutrition, RDs may provide nutrition home-care services, when hired through home-health companies,[78] as there is limited reimbursement from Medicare to RDs who provide home-healthcare independently.[19]

Overall, adequate insurance coverage for nutrition services during and after hospitalization is needed. The nutrition recommendations dietitians establish during hospitalization should be integrated into TOC planning from hospital to home.[39] Professional nutrition organizations must provide evidence to insurance companies showing that nutrition services support overall health, recovery, malnutrition improvement and hospital readmission prevention, to improve reimbursement for nutrition services across healthcare settings.

The Role of the Interdisciplinary Team in Malnutrition Identification and Documenting

The hospital should utilize a multidisciplinary team approach to assess for malnutrition risk. Physicians, nurses, social workers and RDs may be part of the team. Multiple members of the interdisciplinary team should be able to identify patients at malnutrition risk. Identifying malnutrition risk early on in hospitalization can support health improvement during length of stay.[75] Nurses are one of the first medical professionals to interact with the patient and screen for malnutrition risk during hospital admission. Physicians consult the RDs if they find a patient is at malnutrition risk. Physicians are responsible for documenting the malnutrition diagnosis and intervention as part of the medical record.[71] In addition, social workers may identify patients at malnutrition risk during their assessments when discussing food access, affordability and other nutrition concerns, and inform the clinical RD team of these patients.

Dietitians rely on the malnutrition risk identified by the interdisciplinary team to determine when a patient needs a nutrition assessment. Dietitians also screen patients based on the screening criteria established by the healthcare facility. Patients identified at malnutrition risk will require a nutrition assessment in a timely manner. The dietitian will follow the nutrition care

process steps (1) nutrition assessment, (2) nutrition diagnosis (3) nutrition intervention and (4) monitoring and evaluating, to establish a nutrition plan. During the nutrition assessment the dietitian will obtain anthropometrics, nutrition and weight history, and NFPE findings, that may meet the malnutrition criteria.[45,79,80] The clinical RD team is responsible for communicating these findings to physicians and the interdisciplinary team.[75]

Malnutrition Screening and Quality Improvement Initiatives

Both CMS and JACHO require that nutrition risk screening is completed within 24-hours of hospital admission.[39] Nutrition or malnutrition risk screening does not need to be completed by a dietitian. Based on a survey the AND has found that in over 86% of facilities, nutrition screening is completed by a nurse during the admission assessment.[79,80] A specific tool is not mandated to be used, but must be quick, simple and validated. Each healthcare facility must decide which validated screening tool will be used to initially screen for nutrition risk.[79]

The Malnutrition Screening Tool (MST) is a validated screening tool implemented in the hospital and usually completed by nurses.[81] Nurses ask specific nutrition related questions to identify malnutrition risk. The Mini Nutrition Assessment (MNA), Mini Nutrition assessment-Short Form (MNA-SF) Malnutrition Universal Screening Tool (MUST), Nutrition Risk Screening-2002 (NRS-2002), Subjective Global Assessment (SGA), and Patient Generated Subjective Global Assessment (PG-SGA) are other validated screening tools.[82,83]

Quality Improvement Program (QIP) initiatives such as Malnutrition Quality improvement initiative (MQii) are supported by the AND, ASPEN, and GLIM. The purpose of these initiatives is to consistently identify nutrition risk during hospital admission, assess for malnutrition and implement nutrition interventions to prevent worsening of nutrition status. Identifying and treating malnutrition early in hospital admission improves health outcomes, decreases hospital length of stay as well as healthcare costs.[1,43]

Electronic Clinical Quality Measures (eCQMs) measures screening, assessment, diagnosis, and care plan development data to provide supporting data to CMS, to influence hospital payment and reimbursement. Measure of the implementation, as well as monitoring and evaluating processes around malnutrition and nutrition status during discharge planning is limited. As mentioned earlier financial coverage and requirements for including nutrition professionals during discharge planning is limited. The AND is working closely with CMS to integrate malnutrition measures to be required as part of CMS measures and TOC programs focusing on patients' nutrition and malnutrition status may be warranted. **Figure 1** looks at nutrition measures that have been implemented across healthcare. Nutrition intervention and monitoring is missing as part of TOC.[43]

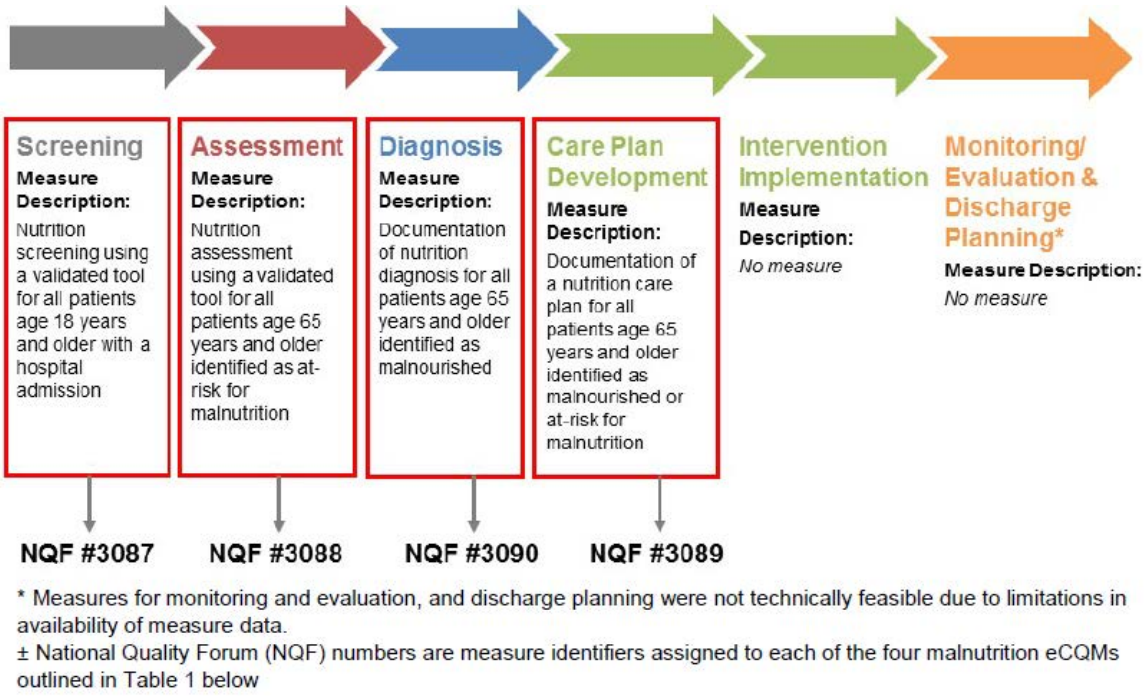

Figure 1 Reproduced with permissions: Academy of Nutrition and Dietetics. Malnutrition Quality Improvement Initiative. Measures Specification Manual, Version 1.2 October 2017. Accessed [May 20, 2020].

Dietitians use standardized language following the nutrition care process terminology when developing nutrition plans that are documented in the electronic medical record. The AND NCP and Health Level Seven (HL7) working groups developed clinical documents through the Consolidated Clinical Document Architecture (C-CDA).[84] The C-CDA contains templates to document NCP findings during hospitalization, that can be shared across healthcare settings, to promote nutrition interoperability and standardization of documenting. The intention of the workgroups is to provide guides for implementing the templates, to promote nutrition interoperability across healthcare settings, by making NCP data available for research, transitions of care, and reimbursement.

Interventions used in Research to Reduce Hospital Readmissions and Improve Nutrition Status

The literature review will investigate interventions that have been implemented across healthcare settings to reduce hospital readmissions and improve the nutrition status of adult patients. The aim is to identify supporting evidence that RDs are needed as part of the TOC team. The primary research studies are within the past 8-years with an exception of two RCTs from 2011.[23,24] The research studies intervention type, and outcome measures will be discussed in this order: (1) TOC nutrition interventions and other nutrition interventions to reduce hospital readmissions, (2) non-nutrition related TOC interventions to reduce hospital readmissions, (3) TOC nutrition interventions and other nutrition interventions to improve nutrition status. The topics of Quality of Life (QOL), social determinants, and the importance of patient-centered care will also be discussed. See **Appendix A** for a Research Summary Table.

TOC Interventions used to Reduce Hospital Readmissions

Globally implemented TOC interventions have both included dietitians and specific nutrition interventions, while other interventions have not.

TOC Interventions with RDs, and Other Nutrition Interventions to Reduce Readmissions

RDs and Nurses Included in Nutrition Screening and Discharge Planning

A 12-week RCT by Beck et al[10], that was discussed in a systematic review by Platzer et al[85] found that older adults at nutrition risk (n=63) had significantly reduced hospitalizations over 6-months in the intervention group that utilized an RD in discharge planning and during follow-up. However, there were no differences in 30-day readmission between groups.

Three Quality Improvement Program (QIP) studies using different study designs found mixed effects on reducing hospital readmissions through TOC nutrition interventions. A QIP study which added follow-up phone calls post-discharge in addition to a hospital QIP saw a relative risk reduction of readmissions.[28] While another QIP study by Sulo et al[30] looked at the implementation of basic MST screening, compared to an enhanced MST screening, and the effect of readmission rates on hospitalized patients (n=203). In the enhanced QIP group, those with a higher MST score (> 2) were prescribed an ONS by a nurse. Those patients were seen by an RD who gave additional recommendations, preferred ONS, nutrition education, and provided nutrition recommendations at discharge. A follow-up phone call was made at week 2, 3, and 4 post discharge by a nurse and automated system, not a personalized call by an RD. The study found a significant relative risk reduction of hospital 30-day readmissions in the enhanced group. Another study found that a nutrition intervention that included RDs providing home visits found to improve hospital readmission.[86]

A retrospect study by Siegel et al[87] completed chart audits to evaluate the effects of a QIP using the MST and early nutrition of ONS initiation by an RD to adult patients (n=20,697) in the

hospital at risk for malnutrition, compared to patients not at malnutrition risk. The study did not find any effect on 30-day re-admission rates between groups.

Nutrition Interventions Led by Nurses, not RDs

The RCT by Terp and colleagues[29] looked at a nutrition intervention for hospitalized patients (n=144) followed post-discharge, compared to a control to assess for readmission rates. The intervention consisted of a nurse providing pre-discharge diet education, an individualized nutrition plan for home, and three follow-up visits at weeks one, four, and eight post-discharge. Although the study found promising results, there were no differences in readmissions between groups. The nutrition intervention was delivered by a nurse not an RD, which may have impacted the delivery of the intervention, which was not measured.

Outpatient Physician and RD Led Programs

A 6-month RCT looked at the effect of three groups, (1) an intensive 4-visit nutritional intervention led by an RD compared to a (2) physician-led standard care group, not including RDs, who provided a nutrition educational booklet, and a (3) standard of care control group, on community dwelling older adults (n=63) with malnutrition risk. The study did not find differences between groups.[23]

Similarly, A RCT study looked at the use of a TOC 3-week follow-up intervention provided by a PCP, or PCP and RD, for older adult patients at malnutrition risk (n=124). The RD provided individualized education, counseling, dietary modification and supplementation. The study unexpectedly found a greater risk for readmission in the intervention group when compared to the control, the opposite of what was hypothesized.[25]

Oral Nutrition Supplement and Meal Delivery Systems Across Care Continuum

The benefit to prescribing ONS to patients, during and after hospitalizations, to improve health outcomes has been evaluated. A systematic review (n=6) found that ONS prescriptions provided post-hospital discharge did not reduce hospital readmission.[26] A retrospect cohort study by Mullen et al[88] looked at the effect of ONS provided to hospitalized patients with malnutrition (n=8,713) on readmission, when compared to a control. Many factors were accounted for. Initially, a difference in readmission rates between groups was not found. When a regression model was used to adjust for social demographic and clinical covariates, the malnourished group was found to have significantly lower rates of readmission. A major limitation is that the groups were not evenly distributed. The group of malnourished adults receiving ONS (n=247) was smaller than the control (n=8,439). Interestingly the study found that only 3.1% of hospitalized malnourished patients received an ONS.

A RCT by Buys et al[27] looked at the use of a nutrition intervention meal-delivery system as part of TOC to improve nutrition status in patients (n=24). The intervention group had significantly higher rates of 30-day readmission rates compared to the control group, the opposite of what was hypothesized. However, this may be explained by factors, such as severity of diagnosis and associated chronic illnesses, not being measured or adjusted for.

Overall, there were minimal findings of effective TOC nutrition interventions that reduced hospital 30-day readmissions. Strengths and limitations of the study designs must be considered. Those studies with positive outcomes support the need to include an RD who can recommend appropriate and nutrition interventions during TOC.

Non-Nutrition Related TOC Interventions to Reduce Readmissions

A RCT by Finlayson et al[89] looked at the effectiveness of TOC interventions provided at home, on unplanned readmissions following hospital admission, of high-risk older adults

(n=222). Participants were randomized into four groups, (1) standard care, (2) nursing visits and telephone follow-ups (3) exercise programs (4) exercise programs and nursing visits with telephone follow-ups, provided to the patient at home. Patients were encouraged to adhere to chronic disease management strategies and hospital discharge instructions. However, nutrition recommendations were not specified. Nutrition status was not assessed as part of baseline measures nor were nutrition recommendations from an RD included as part of the interventions. Although the findings were promising, significantly less readmissions were found in the exercise and nursing group, suggesting multifaceted TOC interventions across hospital and community settings are beneficial, it neglected to include nutrition.

A quasi-experimental study by Low et al[7] had similar findings. A pre/post design was used to evaluate the effectiveness of a transitional home care visit program, providing health education to patients (n=259), by a multi-disciplinary team (not including dietitians) post-discharge to reduce hospital admissions at 3-months and 6-months post-discharge. Patients had a significant 51.6% reduction in readmissions at 3-months, and a significant 52.8% reduction in readmissions at 6-months post-enrollment. A greater effect of the intervention was found during the first 3-months post-discharge, when the intervention was the most intense. A multi-disciplinary team approach is needed in TOC planning to reduce hospital readmissions. Other interventions that included face-to-face visits and phone-calls post-discharge were also found to reduce hospital readmissions.[90,91]

Systematic reviews found that TOC interventions reduced hospital admissions in intervention groups compared to controls. A review by Verhaegh et al[92] found that inpatient to outpatient transitions that included discharge planning by a nurse, communication between the hospital physician and PCP, and providing a home-visit within 3-days post-discharge, was

effective. Another review found interventions that included care coordination by a multi-disciplinary team, and post-discharge phone calls, were associated with significantly reducing rates of readmissions within 30-days.[8] Other reviews found that interventions focusing on health and medication education provided by nurses or transitional coaches, along with either home-visits or follow-up phone-calls from one-to three- months post-discharge found to reduced hospital readmissions in intervention groups when compared to controls.[6,93,94] Two RCTs implemented chronic disease programs, the care transitions innovation (C-TraIn)[11] and the BREATHE program[95] did not find the intervention to be useful in reducing readmission.

Overall, a multidisciplinary team approach should be integrated into TOC and discharge planning to reduce hospital readmission. The TOC interventions focused on individualized discharge planning by physicians, nurses, and other healthcare professionals, who provided phone calls or home visits post-discharge. Immediate care coordination post-discharge reduced all-cause 30-day hospital readmissions. Unfortunately, these interventions did not include nutrition professionals. Integrating dietitians as part of the TOC interdisciplinary team may be worthwhile. None of the intervention studies evaluated nutrition status as an outcome measure.

TOC Interventions with RDs, Other Nutrition Interventions, to Improve Nutrition

Nutrition status is defined as the patient's health condition as it is influenced by the intake and utilization of nutrients.[49] Throughout the research, nutrition status is measured by dietary intake, anthropometrics, weight change, physical findings, and functional status. Although these factors are a part of the ASPEN criteria used to identify malnutrition, research did not specifically follow ASPEN criteria in study protocols. Studies used the SGA, PG-SGA, and MNA tools to evaluate the improvement of nutrition status.

RDs and Multidisciplinary Approach to Nutrition Screening and Discharge planning

A 6-month RCT by Feldblum et al[24] looked at the use of a nutrition intervention provided by an RD during TOC from hospital to home, to improve the nutrition status of patients (n=168). The MNA score was significantly higher in the intervention group compared to the control. A 12-week RCT by Beck et al[10] reviewed in a systematic review by Platzer et al[85] found that patients at nutrition risk (n=63) improved nutrition status when an RD was involved in discharge planning and follow-up, compared to the control. A 3-month intervention study led by an RD, providing post-discharge home visits and individualized nutrition care to community-dwelling participants (n=68), found that the participants MNA scores significantly improved from the beginning to the end of the study.[12] Interventions that include an RDs who provide individualized nutrition recommendations, during and after acute hospitalization, is beneficial.

A retrospect study by Vearing et al[33] looked at the association between nutrition and functional status, measured with MNA scores, before and after implementing a 12-week TOC program. The TOC program offered support from a multidisciplinary team of dietitians, physiotherapists, occupational therapists, social workers, speech pathologists, nurses and psychologists. The MNA scored increased in 64- out of the 79- participants in the study, representing an improvement of nutrition status. These outcomes support the need to include RDs as part of TOC programs.

Other studies found mixed results. A 6-week pilot study by Mudge et al[31] looked at nutrition-focused care provided pre- and post-discharge improve nutrition status of malnourished patients (n=12). Most participants improved there MNA score, while two of the participants scores declines. A prospective study by Young et al[96] found that including an RD in TOC planning pre- and post-discharge, by providing telephone calls to patients within one-week of

discharge for four-weeks post-discharge (The HHOME intervention) compared to usual care, to patients (n=80) at malnutrition risk, did not improve MNA scores.

Nutrition Interventions Led by Nurses, Not RDs

The RCT by Terp and colleagues[29] looked at the effect of nurses providing nutrition interventions to patients (n=144). A positive effect on weight change from baselines to 3-month follow-up was found in the intervention groups. A systematic review by ten Cate et al[97] reviewed studies (n=21) that included nutrition interventions provided by nurses, who recommended ONS, fortified foods, dietary counselling, and nutrition education to patients at home. Results were mixed, suggesting a lack of concrete data to recommend these interventions by nurses, to improve nutrition.[97] A 12-month Transitional Care Model intervention study looked at the nutrition status changes, using an MNA tool, in geriatric patients who had a nutrition intervention composed of 7 home visits and 11 phone calls post-discharge. The intervention was led by a geriatric-experienced care professional. The study found small effects on nutrition status and suggesting having a nutrition expert as part of the intervention may be needed.[98] Overall, TOC interventions that include RD and individualized nutrition care plans, significantly improved nutrition status. These findings support the need to include RDs in discharge planning and TOC programs.

Mixed Nutrition Interventions

Outpatient Physician and RD Led Programs, and Meal Delivery Programs

A 6-month RCT looked found that the use of a physician and RD led intervention with community-dwelling older adults at malnutrition risk (n=63), significantly improved nutrient intake by the end of the study, when compared to other groups.[23] A RCT found that the use of a TOC intervention including a 3-week follow-up by a PCP and RD, with adult patients who were at malnutrition risk (n=124), significantly improved weight and nutrient intake in the

intervention group compared to the control.[25] As part of the intervention, the RD provided individualized education, counseling, dietary modification and ONS recommendations. Interestingly the intervention group had a reduction in the usage of MOW meal delivering services. A RCT by Buys et al[27] found that a meal-delivery program implemented post-discharge for patients (n=24) found improvement of nutrition status compared to the control group.

Oral Nutrition Supplements

A systematic review of RCTs (n=9) looked at the effect of nutrition interventions, (1) dietary counseling focusing on an individualized nutrition care plan, (2) ONS provided, or (3) the combination of dietary counseling and ONS provided, on nutrition status of older adult patients with malnutrition risk, across healthcare settings. A positive intervention effect for weight gain, but not for energy intake, was found in the combined group (3) when compared to the control.[32] Another systematic review (n=6) found that ONS prescription did improve nutrition status.[26]

A retrospective audit by Allmark et al[99] looked at dietary records for community dwelling adults (n=100) who received advice from a RD to consume ONS and fortified foods. Unfortunately, the study did not find that the use of ONS improved weight gain or BMI during the 2-year audit period.

Overall, TOC nutrition interventions and others including nutrition counseling, education, ONS prescription and meal delivery programs, resulted in mixed findings to improve the nutrition status of patients across healthcare settings. Most TOC interventions that included RDs had a positive effect on improving nutrition status.

Concluding Statement on TOC interventions, Readmissions and Nutrition Status

Very few studies have found nutrition interventions across TOC that have been successful in reducing both hospital readmissions and improving nutrition status.[10,85] Research found that the TOC processes including dietitians support the improvement of nutrition status.

TOC planning should focus on the older adult as they may have complex needs that needs addressing, including nutrition status.[1,89,94,100,101] These findings support the need to integrate an RD as part of the TOC team. Further evidence is needed through documenting and monitoring to support the need for TOC nutrition intervention led by an RD in the acute care setting to the home setting, to reduce hospital readmissions, and improve malnutrition status.

Quality of Life

In healthcare research, Quality of Life (QOL) is described as the patient perspective or a subjective evaluation of Health-Related Quality of Life (HR-QOL).[102] Several studies evaluated QOL utilizing different measuring tools, depending on the patient population.[6,10,23,95] A consistent validated QOL measure should be used to measure HR-QOL across the older adult population. When evaluating patients with malnutrition, perspectives of their health including QOL should be considered. Nutrition interventions provided by RDs to community-dwelling older adults, has been found to significantly improved QOL when cognitive and depression related scores were measured between groups.[23] A systematic review found one study to have a significant increase in the QOL measure in the intervention compared to the control group.[6] While the other studies did not find a difference in QOL between groups.[10,95] Overall, there is a need to integrate a multidisciplinary team, including RDs into TOC planning across healthcare settings to improve health outcomes.

Social Determinants Impact on Health

Social determinants are factors that may impact patient health and food access. Primary examples are: housing, access to food, food security, education, literacy, employment, health insurance status, transportation, social support, social norms, attitudes, and culture.[103] There are associations between social determinants and health outcomes that have been found throughout

the research.[23,25,89,104–107] Social determinants should be considered when developing and implementing TOC plans from hospital to home.

Socioeconomics, Housing Instability, and Food Insecurity

Lower social-economic, food-insecure communities have barriers to obtaining proper nutrition, and have significantly higher prevalence of malnutrition.[107] Older adults living at home with limited food access, are at risk of developing malnutrition. The involvement of care takers and utilizing community nutrition resources should be integrated into patient care planning. risk.[13,106] Risk factors that lead to hospital readmission include: living alone, depression, and poor disease-related self-management factors.[23,89] Quality nutrition care and utilizing community nutrition programs, has been found to reduce older adult hospital readmission by 28%.[105,108]

Language and Literacy

Language barriers and literacy levels impact TOC and discharge planning. Patients' primary language and literacy level must be identified during hospital admission. The nutrition and health information provided to patients should be clear and concise, aligning with their primary language and literacy level, to prevent miscommunication. Providing health information that is poorly understood by patients, may increase the risk for hospital readmission.[13,23] When dietitians provide nutrition education it should be simple and consider the patient's primary language, as well as literacy level. Patients should be able to state an understanding of and teach back health concepts to the provider. To address language and literacy concerns when providing diet education, RDs utilize the Nutrition Care Manual (NCM) that provides diet education for certain illnesses appropriate for patients and available in multiple languages.[109]

TOC Plans to Address Individual Nutrition Concerns

As part of the TOC team, RDs can help to address sociodemographic barriers related to food and nutrition. RDs can address concerns by establishing individualized nutrition care plans,

providing social support, and recommending community resources.[23,25,104] The RD can recommend: lists of food banks and soup kitchens, family recipes on a budget, MOW and SNAP benefits, and community health programs, to address food insecurity issues.[22] Integrating RDs into TOC care planning teams, can relieve social workers and case managers from discussing food insecurity concerns, allowing them to focus on other areas.

Patient Perspective and Individualized Care Planning Concerns

Patients need to be involved in decision making, plan of care communications, and be provided with information throughout hospital admission and discharge planning, to allow patients to feel independent and decide how they are able to manage self-care.[110] The most effective health information considers individual literacy levels, provides illustrative medication list, and detailed management recommendations. Plans should also include family or friends to help to support pre- and post-discharge processes.[111] Patients have experience negative perceptions to TOC when there has been poor communication, a lack of understanding, premature discharge planning and poor follow-up by healthcare providers.[106,112,113] Four themes can be followed by TOC planning team TOC, (1) understanding the patients individual needs, (2) including the patient in establishing the plan of care, (3) working with patient caregivers to share power and responsibility, (4) establish a patient-centered plan. The systematic review by Backman et al[114] found that educating patients to self-manage their health was commonly integrated into care transitions interventions. These recommendations can be implemented into TOC planning to promote better healthcare and patient inclusion.[115]

Strategies to Integrate Nutrition Plans into TOC Across Healthcare Settings

The Academy of Nutrition and Dietetics (AND) has identified opportunities to integrate nutrition care into TOC, through a multifaceted approach.[1] When establishing care plans,

healthcare providers must consider both patient related social environmental factors, and system level dimensions that are barriers to optimal patient care. Healthcare facilities should have systems in place to evaluate nutrition screening policies, documenting per the NCP standards, and the monitoring and evaluating of nutrition interventions across healthcare settings. The RDs scope of practice emphasizes the dietitian's responsibility to provide patient-centered nutrition care, shared decision making, and tracking nutrition data in nutrition informatics systems.[22]

Establishing a TOC RD role may be a solution to support the integration of nutrition in TOC planning. The dialogue proceedings by Avalere Health with the AND have established recommendations to properly integrate malnutrition care into TOC processes.[1] Healthcare professionals should identify which community services will be needed post-discharge, and should follow-up with patients within 3 to 4 days post-discharge, to discuss nutritional concerns. The TOC team should communicate patients' nutrition status and plans with the primary healthcare provider, as nutrition status should follow them post-discharge. PCPs should further work with patients to monitor their nutrition status, and PCPs should refer to outpatient nutrition services, as needed. **Figure 2** displays the recommendations to integrate malnutrition care into overall TOC and hospital discharge planning.

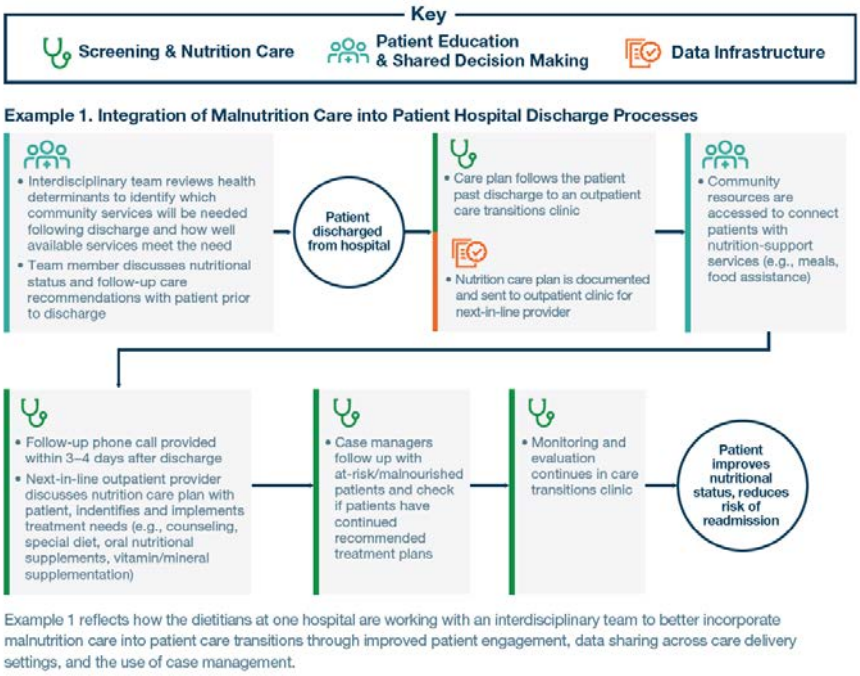

Figure 2 Reproduced with permissions from: Valladares A, Jones K, Mitchell K, et al. Dialogue Proceedings / Advancing Patient-Centered Malnutrition Care Transitions. https://avalere.com/insights/dialogue-proceedings-advancing-patient-centered-malnutrition-care-transitions. Published 2018. [Accessed May 1, 2020]

Final Thoughts

Nutrition professionals, RDs, need to be integrated as part of the TOC planning team to develop patient-centered nutrition plans from hospital to home. Future studies need to evaluate the inclusion of dietitians as part of the TOC team to improve health outcomes, nutrition status, and hospital readmission rates, particularly in patients with malnutrition.

Chapter 2 – Theory

Healthcare professionals have established evidence-based theories that have been used throughout Transitions of Care (TOC) research. Theories used in research serve as a structure for studying problems, developing solutions, and evaluating the success of study outcomes. Researchers and healthcare professionals can translate research findings into real world practice strategies.[116,117] The transitions theory includes many complex models that have been used in implementation research.[118] Implementation science is emerging the field of nutrition and dietetics and should be considered when establishing the best theoretical framework.[119] Out of the different models used in TOC research, constructs from the Transitional Care Model (TCM) and Care Transitions Framework (CTF) were adapted and used to guide the research study.[120,121] These frameworks were chosen as they have been commonly used in implementation research by nursing professionals.[31,96] Constructs from the TCM that nursing and case management roles often follow were adapted and integrated into the TOC nutrition intervention.~~role~~.[122] The CTF provides a clear set of constructs that supports proper implementation of an intervention.

The CDC identifies that establishing a logic model that includes engaging stakeholders, describing the program, and focusing on evaluation designs are essential steps when developing and monitoring programs and processes.[123] Constructs from both the CTF and CDC recommendations to evaluate processes and programs. A process evaluation was used to monitor the implementation process and an outcomes evaluation was used to assess outcomes. Program evaluation tools were created using the CDC program evaluation guidelines to evaluate the success of the implementation process of the TOC nutrition intervention.[124] These tools are described in the Methods Chapter. An outcomes evaluation looked at the outcome measures to

determine if the program was successful. The program is considered successful if participants improved their nutrition status and had fewer unplanned hospital readmissions.

Developing the Intervention

Transitional Care Model

The TCM is an evidence-based advanced practice, nursing led, team-based, care management model. The model includes both in-hospital planning and follow-up care with patients and caregivers, utilizing a patient-centered approach. The TCM has been successfully integrated into the development of interventions to reduce hospital readmissions, healthcare costs and improve patient outcomes.[116,117,125,126] A systematic review by Albert et al[120] and Enderlin et al[125] evaluated TOC models and themes that were used in studies to minimize hospital readmission and improve health outcomes in older adults with chronic illness. The specific constructs from each of these models were considered when deciding which model may be appropriate when developing the TOC nutrition intervention. The TCM framework is the best fit for the study intervention as it focuses on patient care from hospital to home.

Components of TCM primarily focus on nursing care, which will be adjusted to fit a nutrition care intervention.[127] The following TCM constructs will be integrated into the TOC nutrition intervention: involve the interdisciplinary team, maintain relationships, address health risks and symptom management related to nutrition, provide education, promote patient self-management, promote continuity of care from hospital to home, and utilize community resources when needed. The application of these constructs will be evaluated using a checklist completed by the TOC RD during the program implementation (see **Appendix B**).

During a patient's hospitalization, the interdisciplinary team is responsible for identifying and communicating barriers to health outcomes among the team, including the TOC RD. The TOC RD will maintain relationships with patients and families to develop trust and provide

patient-centered nutrition education, while assessing nutrition related health-risks through patient assessments and interviews. Providing patient-centered care by involving patients and caregivers is an important construct to integrate into the TOC interventions.[9,125] The TOC RD will follow a patient-centered care approach addressing patient-specific needs, education and literacy levels. The interdisciplinary team should communicate patient needs and coordinate care from the hospital to the community. The TOC RD will discuss patients' nutrition status with both the inpatient doctors and primary care physicians who can follow patients' nutrition status post-discharge. Other community resources will be coordinated as needed. The TOC RD will provide both inpatient hospital visits and follow-up phone calls post-discharge. The TCM constructs provide a roadmap for establishing a promising TOC nutrition intervention.[96,125,126,127] The primary adjustment made to the model is that medication reconciliation will not be discussed by the TOC RD. To follow up, phone calls were used in place of home visits.

Table 1. Transitional Care Model Constructs – Adapted

Constructs	**Definition**	**How the construct will be met by the intervention**
Utilize the interdisciplinary staff In-hospital Visit	The clinical RDs along with other members of the interdisciplinary team will communicate patients identified with malnutrition to the TOC RD and the following physician.	TOC RD will interview hospitalized patients who meet inclusion criteria during hospitalization prior to discharge.
Maintain Relationships Follow patient-centered care	Establish relationships and involve patients in care plans, develop trusting relationships. Utilize hospital interpreter services to communicate with patients in their standard language.	The TOC RD will meet with and involve patients and families to address nutrition concerns and develop individualized plans.
Discharge planning Assess and manage nutrition concerns	Nutrition needs identified during the standard of care nutrition assessment will be documented. Any recommendations will be documented following the NCP in the nutrition assessment, as part of the EMR. These concerns will be carried through discharge planning.	The TOC RD will determine patient specific nutrition needs identified during admission including malnutrition diagnosis and nutrition recommendations.
Provide written instructions Educate patients and	Educate the patients and caregivers of nutrition concerns curing hospitalization and how this can be addressed at home. Interventions should focus on managed	Considering patients' needs, education and literacy. Follow patient- centered care when devising a nutrition care plan.

caregivers, and promote self-management of care	care of current illness, individual goals, and plan of care.	The TOC RD will provide patient specific diet handouts.
Promote continuity and coordination Follow-up phone calls	An interdisciplinary healthcare team engages patients and families in discharge planning and coordinated care from hospital to home.	The TOC RD will follow- up with the patient with-in 3-days of discharge and for 3 telephone calls thereafter. The TOC RD will communicate with primary care physicians regarding patient's individual nutrition needs. Outpatient dietitian and other referrals.

Case Management and Nutrition Standards of Practice

The case management standards of care align with the RD nutrition standards of care. Both include assessing, implementing an intervention, monitoring and evaluating patients' nutrition related outcomes and providing patient-centered care.[22,127] A difference is that the case management standards of care assess patients' social, financial, or ethical and legal needs during hospitalization and connects them to outpatient providers based on their needs. These needs are not always evaluated by nutrition professionals but may be important factors to consider when planning for the next steps in nutrition care and food access after hospitalization. TOC RDs can provide care during and after hospitalization to address any personal or environmental issues regarding nutrition that may impact health status.[128] The current RD scope of practice focuses on integrating nutrition into TOC to monitor patients across different healthcare settings.[22] Both the case management and nutrition scopes of practice were followed by the TOC RD during the intervention. The approach of connecting patients to outpatient providers regarding patients' nutrition status and other social needs were integrated into the TOC RD role.

Developing the Intervention Implementation Process

Care Transitions Framework

The CTF is a complex adapted framework developed to guide complex system interventions aiming to improve care transitions. The framework has been adapted from the

Consolidated Framework for Implementation Research (CFIR) and the Process of Redesign for efficiency and cost reduction framework.[129] The CTF provides a clear set of constructs that should be followed to support a successful implementation of interventions that aim to improve transition of care and discharge planning from the acute care setting to the outpatient setting to reduce hospital readmissions and health outcomes.[120,121,129] Programs and interventions that support the older adult through transitions across different settings has increased as the aging population needs additional support and patient-centered care.[121,126] The CTF aims to guide research and provide a framework to easily measure the success or failure of an intervention and if the outcomes from the intervention are as expected.[129]

A qualitative study by Hung et al[121] looked at the constructs of the CTF to guide the analysis of an intervention developed to aid transitions of older adults when discharging from the hospital back to the community. The use of the CTF in the proposed study design supports transitions from hospital to home of malnourished adults. Following constructs helps to measure the success of interventions. If the study design does not follow specific constructs, it could shift the way the intervention was intended to be implemented. Using an appropriate model in research and practice can be the first step to supporting patient outcomes and quality of care.[125]

The CTF constructs will be considered when establishing the intervention with the goal of successfully implementing the nutrition case management focused TOC RD role. The CTF focuses on eight domains which are subdivided into constructs. The framework guidelines recommend choosing constructs that relate to certain features or characteristics of the intervention and to the specific outcomes.[34] The eight domains are (1) intervention characteristics, (2) external context, (3) organizational characteristics, (4) characteristics and roles of providers, (5) characteristics and roles of patients and caregivers, (6) process of

implementations (7) measures of implementations, and (8) outcomes. The external context construct is unique to the CTF as it encompasses multiple settings that may be involved in transitions of care from hospital to home.[129] **Figure 3** is a visual representation of the Care Transition Framework. **Table 2** describes the definitions for each of these CTF domains and the application of these domains to the research study.

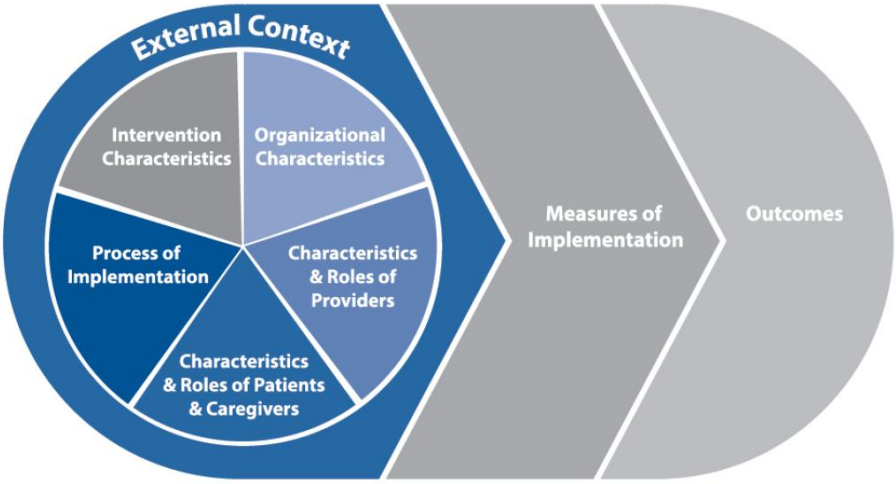

Figure 3 Reproduced with permissions from: Smith LR, Ashok M, Morss S, Wines RC, Teixeira-Poit S. Contextual frameworks for research on the implementation of complex system interventions. Methods Research Report. Agency for Healthcare Research and Quality.

Table 2. Definitions of the Care Transitions Framework Domains and Constructs

Domain	Definition	Framework questions to guide how the construct will be met by the intervention
Intervention Characteristics	The characteristics and features of the intervention being implemented in a particular organization(s), including core activities or components (the essential and indispensable elements of the intervention itself).	**What is the intervention designed to achieve? Who is the intended target group?** The goal is to implement a TOC RD role integrated into patient care to improve nutrition status and reduce readmission among older adult patients diagnosed with malnutrition during their hospital stay. **What are the features of the intervention?** Constructs from the Transitions of Care Model: utilize the interdisciplinary team, provide in-hospital visits, maintain relationships, patient-centered care, discharge planning, assess patient nutrition needs, provide writing instructions for those needs, educate and promote self-management of care, promote continuity and coordination, and provide follow-up phone calls.

External Context	The economic, political, and social context within which an organization or organizations reside and that may affect the implementation process. (Technological environment, population needs and resources, community resources)	**What components of the environment may impact the implementation?** Externally, the city of Lawrence has a high population of low-income residents. Parts of the town are considered food desserts, impacting food availability and access. The barriers to food access could limit the intake of adequate, nutrient rich food. Access to community health programs may also be limited. The TOC RD will identify these individual concerns and make recommendations that can help optimize healthy food access at home.
Organizational Characteristics	Tangible and intangible manifestations of characteristics of the organizations involved in the intervention, - structural characteristics, networks and communications, - IT systems - patient-caregiver centeredness are other components, - organizations involved in the care transitions, - Community organizations	**Which organizations are directly involved in the intervention?** • Lawrence General Hospital Physicians and interdisciplinary staff **Which components of structure and process within and between these organizations will impact the implementation?** The TOC RD will directly contact PCPs and community programs. The accessibility to these organizations between care will impact the success of continuance of care post-discharge. The TOC RD will confirm the patient's PCP with them directly.
Characteristics and Roles of Providers	Attributes of the individuals who are engaged in the provision of care or treatment. They may or may not be directly involved in the intervention and/or implementation process.	**Which organizations are directly involved in the intervention?** • Lawrence General Hospital Physicians and interdisciplinary staff • Community outreach programs • Primary Care physicians • Outpatient Dietitians **Which components of structure and process withing and between these organizations will impact the implementation?** The TOC RD will bridge communications with the hospitalists and primary care physicians regarding a patient's nutrition status post-discharge to continue nutrition care. The PCPs involvement in the program could impact the intervention. PCPs should be informed of the program goals and aims.
Characteristics and Roles of Patients and Caregivers	Attributes (individual mindsets, norms, interests, and affiliations) of the individuals and caregivers who are the recipients of care or treatment in the given	**What characteristics of individuals engaged in the provision of care, treatment, or transition support will impact the implementation success and outcomes? What roles to the patients and caregivers have?**

	intervention setting. Knowledge, beliefs, stage of change, patient's needs, literacy level, caregiver needs, literacy level, other personal traits like language, are constructs to be considered.	The roles of the TOC RD will provide patient-centered, individualized nutrition counseling aligning with the patient's needs, expectations, primary language and literacy level. The role of the patients, family, and caregivers is to express concerns, understanding, or lack thereof when presented with nutrition information. Adequate time will be provided to spend educating the patient and caregivers on diet education and individualized needs.
Process of Implementation	Processes (including planning, engaging, and reflecting) to achieve individual- and organizational-level use of the intervention as designed.	**What implementation process will be applied to achieve individual and organizational-level use of the intervention?** The process of implementing a TOC RD will be a new integration at Lawrence General Hospital. **What roles will providers, and teams carry out?** The TOC RD will report to the clinical nutrition manager, the transitions of care director, and hospitalist director as needed. The TOC RD will work directly with the care coordinators, case management and social work team.
Measures of Implementation	Measurement should involve not just the number and type of interactions with patients and caregivers or between providers, but the content and quality of those interactions. Acceptability, adaptability, replicability, sustainability, feasibility and fidelity are constructs to consider.[130] Measurements can look at the success of intervention implementation as it was intended or patient outcome measures to measure success of an intervention.	**What attributes of the implementation process demonstrate it was carried out well and it can be replicate, scaled and sustained?** The TOC RD will follow **predetermined checklists** for each visit, that can be replicated, scaled and adjusted as needed. The TOC RD will consistently be following standards of practice ensures content quality of the intervention interactions with patients. - Inpatient visits were complete. - All patient information was appropriately gathered. - Education and handouts were provided. - Follow-up phone calls were complete and addressed patient concerns. To evaluate the program effectiveness an evaluation tool was created based off the CDC evaluation framework. The evaluation will be applied during, and after the intervention to address any concerns.
Outcomes	Patient-centered measures, processes of care, quality of care, clinical outcomes, cost effects/ impacts, value are all constructs to consider.	**What specific measurable outcomes will result from the intervention?** A successful intervention should result in improved outcomes, nutrition status and lesser hospital readmissions.

Developing the Process Evaluation and Outcomes Evaluation

The evaluation plan for this study encompassed constructs from the CTF along with adapting the program evaluation guidelines established by the CDC. The CDC program evaluation is a reputable approach for process evaluation that has been utilized in the public health research.[131] Tools are publicly sourced on the CDC website to be used by health professionals. The evaluation process includes six primary steps that align with the CMF. First, establishing and engaging stakeholders who are important for implementing and supporting the program. Second, creating a logic model to describe the program, activities inputs and outputs, and outcomes. The logic model identifies the needs of the community, the program goals, the approach of establishing the program and specific inputs or activities of the program that support achieving desired outputs and outcomes. Constructs within the logic model align with constructs from both the TCF and CTF previously discussed. Third, develop process evaluation tools that focus on specific activities, measures and outcomes. The process evaluation tools were carefully designed to include aspects from all the models discussed, TCF, CTF, and the CDC. The steps of engaging stakeholders, creating a logic model, and evaluation tools are discussed in detail in the Methods chapter. The outcomes from these tools were compiled and are discussed in the Results Chapter. The intervention components, planned interventions activities, and actual activities carried out were compared and discussed in the Results chapter.

The fifth step is to gather data by utilizing the measurement tools for the process evaluation, a similar construct to the CMF to measure the implementation process. The sixth step is to evaluate the data using an outcomes evaluation that aligns with the construct in the CMF to evaluate outcomes. Mixed methods were used to evaluate if the intervention was carried out as intended, if the constructs from the TCM were met when adapted for a TOC nutrition

intervention, and if the intervention was successful. Further Quantitative measures were used to evaluate the hospital readmission numbers and nutrition status outcomes. The seventh step recommended by the CDC is to disseminate results, which are presented in the final discussion, conclusion and practice recommendations.

The standards of a successful program evaluation, utility, feasibility, propriety, and accuracy, must be considered when developing an evaluation plan.[123,124] Focusing on these constructs when developing evaluation plans helps the primary investigator to focus the evaluation on certain activities and outcomes. The utility aspect of the program looks at who needs the information from the evaluation and how will it be used. When new programs result in positive outcomes, outcomes can be shared with leadership and stakeholders who can support integrating these new programs. Completing a process evaluation of the implementation of a program helps to determine if a program has been accurately implemented the way it was intended.[132] The process evaluation will be feasible as it will take place during a time that does not interfere with patient interactions and should not take extra time or have any financial impact. The primary investigator must establish and complete both a process and outcomes evaluation to help identify links between the intervention that drive short-term and long-term outcomes.[133,134] Evaluating the implementation process allows the primary investigator to recognize and adjust situations to ensure the program is implemented as intended, further supporting desired outcomes. A process evaluation tool is a successful method to collect information on the process of the implementation that can be used to reflect upon the success of the implementation.

An outcomes evaluation looks at if the intervention implemented was successful.[132,134] An outcome evaluation was completed by using tools to collect and organize data specific to the

outcomes measured and statistically evaluate these outcomes. Outcomes data is generally collected pre- and post-intervention to assess for changes. Outcomes can also be evaluated by comparing an intervention group to a comparison group to assess for differences. Using the most appropriate tools for collecting data in a time-sensitive manner is an essential part of the evaluation and information dissemination.

Conceptual Framework

Figure 5 is a visual representation of the Transitions of Care Intervention Framework.

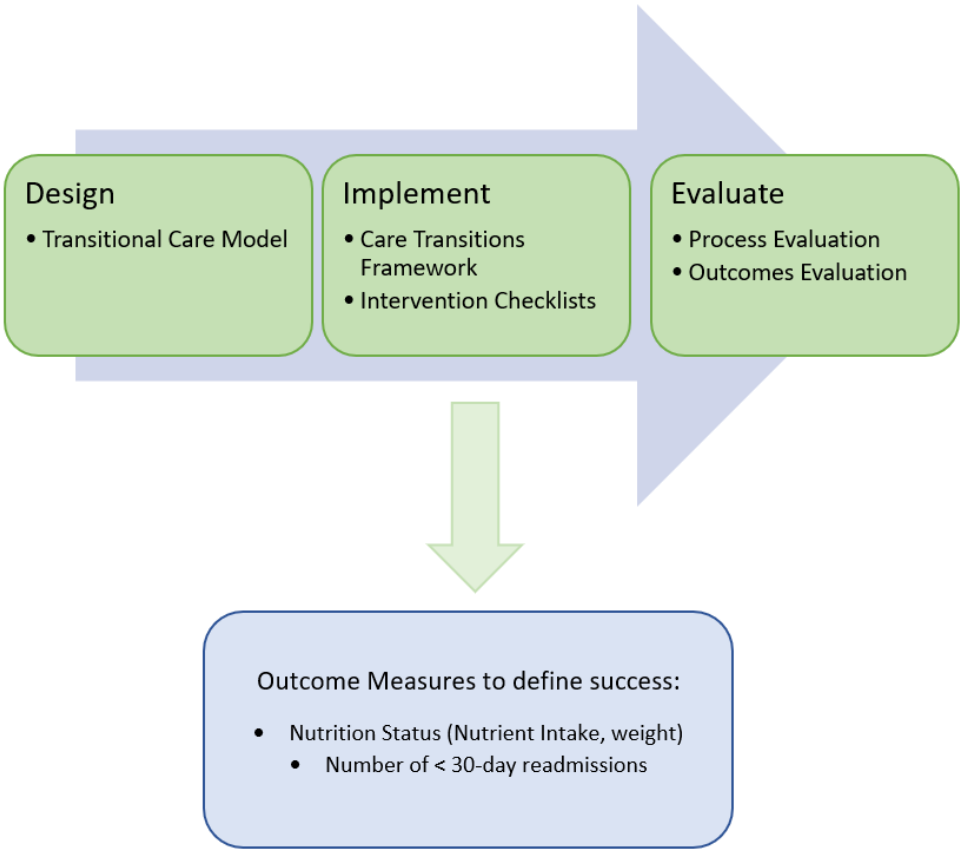

Figure 4 Theory Conceptual Framework

Theoretical Framework Summary

In summary, the theoretic framework presents a structure for the implementation of the TOC nutrition intervention. Implementation science focuses on integrating research findings and

evidence-based practice into routine practice or standard of care, to improve health outcomes. Implementation research may be more likely to succeed if there are specific theories, models and frameworks that are followed.[122,129,135] The framework begins with focusing on constructs from the Transitions of Care Model that have been integrated into the intervention. The Care Transitions Framework domains were used to guide the implementation process of the intervention. While the CDC program evaluation framework was used to establish the process evaluation that will be used to monitor and evaluate the implementation of the program. While the improvement of specific measures the patient's nutrition status and hospital readmission numbers, will demonstrate the success of the intervention. The goal of the TOC nutrition intervention is to support a patients nutrition status when they discharge from the hospital to home, improving health outcomes. Aside from the theoretical framework aligning with the research proposal, choosing an appropriate study design that will support answering the research questions is key. A mixed- methods approach that includes both a qualitative and or descriptive research approach and quasi-experimental study design will align with the framework.

Chapter 3 – Methods

Methods Introduction/Background

Malnutrition is prevalent among hospitalized patients and can impact health, recovery, functional status, quality-of life, wellbeing, hospital length-of-stay, readmissions, and healthcare costs. Initiatives to screen for malnutrition early on in hospital admission are common. Multiple screening tools have been validated and implemented in hospital screening practices.[83] Lawrence General Hospital (LGH) uses the Malnutrition Screening Tool (MST) to screen for malnutrition risk. The MST score is completed by nurses within the first 24-hours of admission, prompting a referral to the clinical Registered Dietitian (RD) team, allowing them to prioritize patient screening. The Clinical RDs further complete nutrition assessments for patients at malnutrition risk and establish appropriate nutrition interventions.[22] Patients with malnutrition are monitored closely during hospitalization. However, malnutrition status and the nutrition interventions established during hospitalization are often absent from Transitions of Care (TOC) planning.[1]

Including nutrition professionals and nutrition information are not required to be a part of TOC planning, per the Centers for Medicare & Medicaid Services (CMS). A lack of TOC procedures to address malnutrition may result in hospital readmissions and poor health outcomes.[1,11,40,41] At LGH, a process to screen for malnutrition risk upon admission, and throughout hospitalization is in place, but no systems are in place to monitor nutrition status across healthcare settings, when discharging from hospital to home. Dietitians are not included as part of the TOC interdisciplinary team to ensure that nutrition information is integrated into TOC planning, especially for patients with malnutrition. If malnutrition is unaddressed, it could worsen and negatively affect health outcomes. A solution to address the problem could be to integrate a TOC RD role and implement a TOC nutrition intervention to reinforce nutrition

recommendations identified during hospitalization. The significance of the study was to show the benefits of including an RD as part of the TOC team by providing a nutrition intervention that supported patients' overall health and nutrition. The TOC RD bridged the gap between following patients' nutrition status during hospitalization and once they were home.

Study Aims

The primary aim of this study was to utilize a process evaluation to determine if the Transitional Care Model (TCM) and Care Transition Framework (CTF), used in nursing and case management interventions, can be adapted to develop and implement a successful TOC nutrition intervention. Process evaluation tools monitored the implementation inputs and outputs of the intervention. A qualitative and/or descriptive research approach was used to summarize the findings from the process evaluation tools. The secondary aim was to utilize an outcomes evaluation to determine if the TOC nutrition intervention, adapted from a case management TOC framework, was successful. The outcomes evaluation included quantitative measures that looked at less than 30-days unplanned hospital readmissions and changes in participants' nutrition status over the course of a 5-week TOC RD nutrition intervention. The intervention was deemed successful if nutrition status improves among participants and if participants' hospital readmissions were lower than the comparison group. The outcomes support the need to integrate an RD as part of TOC multidisciplinary team planning for patients with malnutrition.

Research Question(s)

The research questions are: (1) Using a process evaluation, can a case management, nursing focused care transitions framework, adapted for a TOC nutrition intervention, result in a successful intervention implementation? (2) Using an outcomes evaluation, is the number of unplanned hospital readmissions within 30-days from hospital discharge lower in the TOC

nutrition intervention group compared to a comparison group and does the nutrition status of the intervention participants improve by the end of 5-weeks?

Study Hypotheses

The study hypotheses are that a case management approach can be adapted for a TOC nutrition intervention, and that the 5-week TOC nutrition intervention group will have lower readmissions and improved nutrition status.

Null hypotheses H_0:

1. (Aim 1) The implementation of a TOC nutrition intervention following a care transitions framework was not successful.
2. (Aim 2) No differences were found between the number of readmissions in the TOC nutrition intervention group compared to the comparison group. No differences were found in nutrition status (weight and nutrition intake scores) in the TOC nutrition intervention participants before and after the 5-week intervention.

Alternative hypotheses H_1:

1. (Aim 1) A TOC nutrition intervention developed using the Transitional Care Model (TCM) and Care Transition Framework (CTF), was found to be successful following a process evaluation.
2. (Aim 2) A difference in the number of readmissions in the TOC nutrition intervention group was found compared to the comparison group. Nutrition status among participants improved by the end of the 5-week intervention, following an outcomes evaluation.

Study Design

To address the research questions, a 6-month mixed-methods study was designed. The protocol included two parts, a process evaluation approach, and an outcomes evaluation

approach via a quantitative quasi-experimental study design to implement a 5-week TOC nutrition intervention led by a TOC RD. The two-part evaluation was strategically designed following the CDC process evaluation to better link the progress of the intervention to outcomes.[133] The TOC RD is a clinical RD at LGH and the primary investigator (PI) who implemented the TOC nutrition intervention, completed the process and outcomes evaluation, and produced a statistical analysis with help from the research committee.

Part 1: Process Evaluation

As discussed in the Theory Chapter, the Process Evaluation was developed following the CTF constructs in conjunction with the CDC process evaluation guidelines. The first three steps of the CDC recommendations were followed to create the process evaluation.[123] The first step was to engage stakeholders. The second step was to describe the program by creating a logic model to establish which inputs and outputs needed to be monitored, in turn, guiding the process evaluation development. The third step was to develop the process evaluation to measure the intervention activities, inputs and outputs identified in the logic model. From there, the TOC nutrition intervention was designed using the TCM constructs as a foundation.

CDC Step One: Engage Stakeholders

Engaging stakeholders was an important step to ensure successful implementation of the overall study. Stakeholders needed to be reached and engaged in the study to support a successful implementation process. Considering the Organizational Characteristics and the Characteristics and Roles of Providers CTF constructs, the LGH hospital leadership team first needed to be involved with approving the study as it included hospitalized patients. The following leadership team members involved were Medical Staff President, Chief of Medical Affairs, Chief Compliance and Privacy Officer, Chief Operations Officer, Director of Population Health and Community Development, Assistant Director of Integrative Care, Senior Director of

Support Services, Director of Food and Nutrition, and Clinical Nutrition Manager, among others. Secondly, the LGH interdisciplinary team, including physicians, nurses, case managers/care coordinators, and clinical RDs, were engaged as they helped with participant enrollment over 6-months. Falling into the External Context construct in CMF, the third team engaged was comprised of the population health and community development team and the transitional care team, along with community food program leaders and outpatient Primary Care Physician (PCP) Groups. Research had looked at the importance of engaging stakeholders in healthcare to better identify and treat patients in the hospital and in the community who are at risk for malnutrition.[136] **Table 3** lists the engagement initiatives that were carried out prior to and during the implementation of the study.

Table 3. Engage Stakeholders: LGH Leadership Team, Medical Team, Community Leaders

Activity	**Activity Goal**	**Outcome**
Hospital Qualitative Project: Focus Groups and Staff Interviews (Summer 2020)	Identify gaps in communication among staff, missing nutrition information in patients discharge paperwork (TOC Director & team)	Identified gaps that led to Clinical Informatic projects
Work with the Clinical Informatics Team (Summer 2020)	Integrate a Transitions of Care box into the nutrition assessment and discharge paperwork	Clinical RDs can document recommendations that print on patients' discharge instructions
Work with the Clinical Informatics Team (Fall 2020)	Implement a special patient risk indicator "Malnutrition Risk"	Risk indicator added. Trigger an email to the TOC RD if the patient is readmitted
Malnutrition Audit of patient data collected (May 2019 – November 2019)	Establish the number (%) of unplanned hospital readmissions in < 30 days from discharge among malnourished patients	This readmission number (%) was used to develop the Predicted Sample Size needed for the study proposal.

Grand Rounds Project Proposal (January 2021)	Inform the medical team of gaps in communication and documenting among malnourished patients, readmission rates	There were 11 participants who attended. Minimal questions or interaction from the audience.
IRB packet for UNF and LGH (January – May 2021)	Work with the Chief Medical Officer, Chief Compliance & Privacy Officer	Hospital Letter of Support finalized (June 9, 2021) UNF IRB Approval (July 27, 2021)
Contact the Interpreter Services Team (May 26, 2021)	Translate the patient consent form, debrief document into Spanish versions	Completed and added to the IRB package (June 2, 2021)
Begin implementing the 6-month intervention	Proposed: May 1, 2021 – November 30, 2021 (6-months)	Actual Date: July 27, 2021 – January 31, 2022 (6-months)
Situation, Background, Assessment, Recommendation (SBAR) (July 2021) **(See Appendix K)**	Information sheet for hospital staff regarding the Malnutrition study and medical staff roles	Completed and approved by clinical nutrition and nurse managers
Email nursing leadership Request for them to email the SBAR to nurse managers (July and October 2021)	Gain engagement from nursing to help enroll participants, complete the consent form, facilitate communication	Minimal feedback or discussion from nursing, unclear if it was sent to nurse managers, it was not sent out to all hospital employees.
Email requesting to join nursing managers daily rounds (July 2021)	Describe the study to nursing managers and nurses on the hospital units	No email response back from nurse managers. Attempted to hang the SBAR at the nurse's station on each unit.
Implementation of the TOC Nutrition Intervention	Start visiting and enrolling patients who qualified for the study	Poor enrollment (See Process evaluation)
Emailed the Assistant Director of integrative care to attend a meeting to communicate with nurse managers from (July 2021)	RD to attend a daily updating meeting with nurse managers and care coordinators to explain the study	Presented a "5-minute meeting on Zoom" to discuss the SBAR to nurse managers. Minimal nursing engagement. (August 16, 2021)

Engaged in conversation with floor nurses and physicians	Discussed with floor nurses and doctors about the study as I was providing patient care	RNs showed interest in the study. Most nurses helped sign the consent for when asked.
Verbal communication with the CM team and nurses	Enhance communication related to hospital discharge planning including the TOD RD	Text care coordinators CM team, called or discussed face-to-face about discharging.
Consent Form Modification (September 2021)	Primary investigator adjusted the consent form to include a bullet point introduction that could easily be signed	Hospital Approval 10/8/2021 IRB Approval
Hospital on Code Red November 2021	Hospital on Code Red	Limited nursing staff to patient ratio. Impacting the recruitment and communication.
Hospital events (December 2021)	Hospital on Code Red Emergency Management Planning	See above. Expedited discharge planning CM and nursing unable to provide optimal communication to the TOC RD.
Hospital events (January 2021)	Hospital on Code Red Emergency Management Planning Helping Hands initiated	See above. See above. All clinical RDs to manage critical care. All hospital staff RDs to help in nursing aid type positions.
Data collection period ended (January 31, 2022)	Finalize all phone call follow-ups, attempt to contact participants who were readmitted to complete the post-intervention.	Final number of participants enrolled (n=21), final number of participants to complete the intervention (n=13)
IRB Amendment to include hospital Staff interviews in the qualitative writeup (January 22, 2022)	Include hospital Staff interviews in the qualitative writeup to help identify the barriers to successful implementation	IRB Amendment approved (February 24, 2022)

CDC Step Two: Logic Model

The logic model encompassed several constructs from the TCM, CTF, and CDC guidelines. To develop the logic model, the CDC recommends identifying the needs of the community and the target audience that need to be addressed in program planning. The needs of the community were that hospitalized malnourished patients need support when discharging home. The intervention goal was to lessen unplanned hospital readmission and improve nutrition status. Further, the activities (inputs) should align to support an individualized nutrition plan during transitions of care, while the process evaluation tools (outputs) measure desired outcomes. **Figure 5** is a visual representation of the Logic Model.

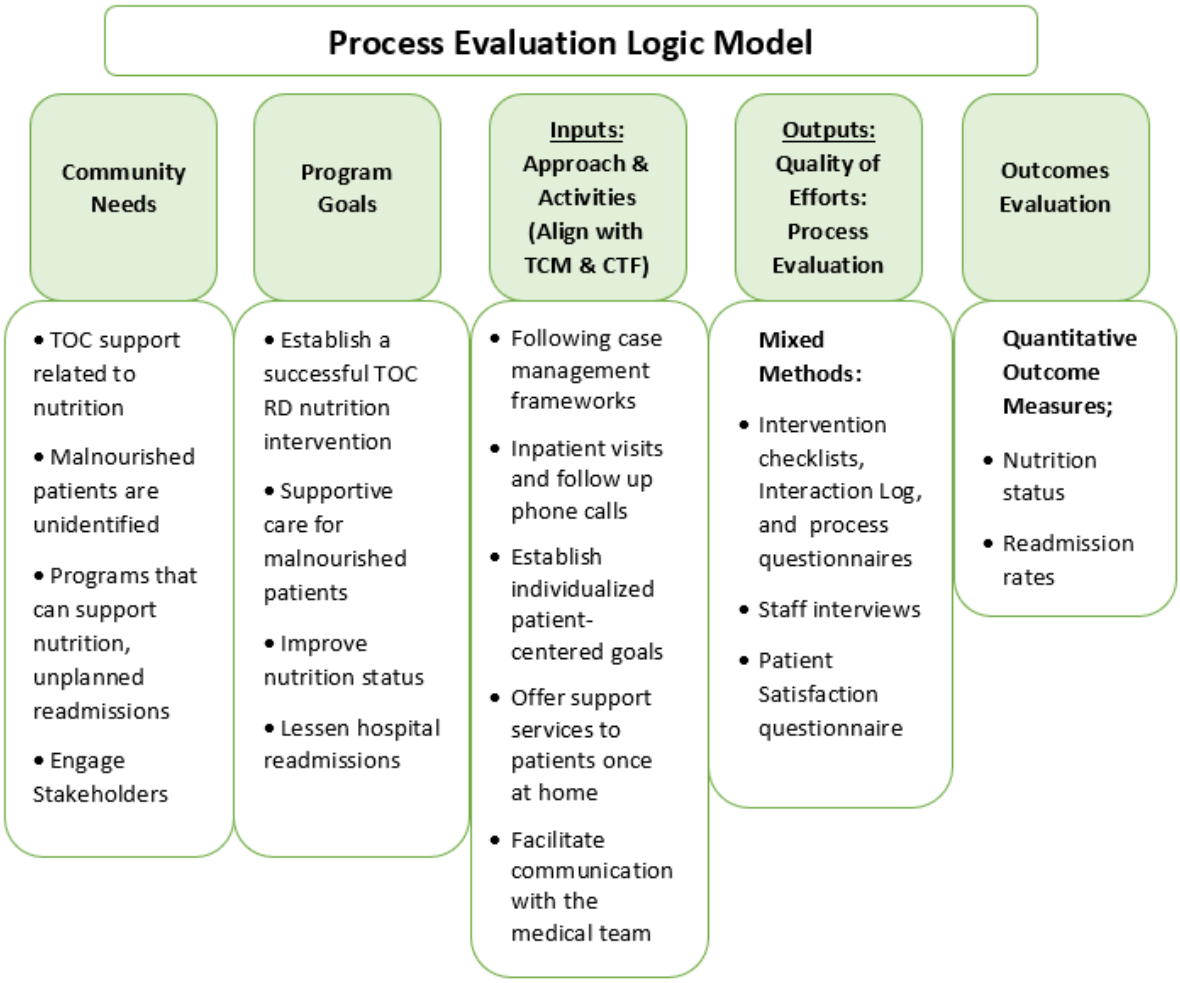

Figure 5 Process Evaluation Logic Model

CDC Step 3: Develop the Process Evaluation Measures

Three measurement tools were designed as part of the process evaluation. The tools included an (1) interaction activity checklist, (2) an interaction time log, and (3) a process evaluation questionnaire. Each tool was completed during each interaction, which is useful to identify immediate barriers that can be addressed and corrected to support the success of the program. Additionally, a qualitative research method, thematic analysis was used to present findings from six staff interviews that were conducted to identify barriers to a successful implementation of the study. A participant questionnaire was created to assess patient satisfaction, as well.[137] See **Appendix B** for the Process Evaluation Tools.

To answer the first research question, if a case management intervention framework can be adapted for a 5-week TOC nutrition intervention, a process evaluation was conducted. A descriptive design was utilized to disseminate the process evaluation findings in a subjective manner. The descriptive approach supported the primary investigator in determining if a case management framework can successfully be adapted for a nutrition intervention. The process evaluation measures have been created to closely evaluate whether TOC nutrition intervention activities are followed. These specific activities align with the TMF constructs that have been used in case management and nursing program development. Refer to the theory section for a detailed description of these constructs. The use of process evaluations has been successfully used to evaluate and improve the implementation of public health interventions.[133] Utilizing these methods yielded a naturalistic approach to organize data that can be shared with leaders and stakeholders regarding the success or challenges during the implementation process and how they may have impacted outcome measures.[137]

Table 4 describes the design of the implementation process following the CTF constructs, the intervention activities following the TCM constructs, and overall process measures that will be used to evaluate both the implementation process of the intervention itself an overall implementation of the study.

Table 4. Implementation process following the CTF and TCM constructs

CTF Construct	Specific construct factors to consider	Integrate Constructs from the TCM into the intervention – Activities	Process Measures of Implementation
External Context	Consider participants, social environmental, financial, community needs **CDC Step 1: Engage Stakeholders**	Patient-centered care, promote continuity of care, follow up phone calls. Intervention includes asking about food insecurity and providing community resources. Support good nutrition at home. Asks about transportation concerns.	Interactions Activities Checklist Process Questionnaire Patient Surveys
Intervention Characteristics	Core activities and components of the intervention **CDC Step 3: Process Evaluation Development (Input)** **CDC Standards:** Utility, Feasibility, Propriety, Accuracy	Provide supportive care for malnourished patients. Intervention activities include in-hospital visits, patient-centered care, manage nutrition concerns, personalized nutrition plans, education and written instruction, promote continuity, follow up phone calls. Mirror case management interventions and constructs.	Inpatient participant Interviews Interactions Activities Checklist Process Questionnaire Patient Surveys Interaction Log
Organization Characteristics	Consider communications with staff, phone, email, text. Documenting in the EMR. TOC leaders to support with coordinating with community organizations prior to	Communicate with the interdisciplinary staff. RNs and CMs to coordinate discharge planning and TOC nutrition visits. Interpreter services help translate.	Inpatient participant Interviews Interactions Activities Checklist Process Questionnaire

	discharge. **CDC Step 1: Engage Stakeholders**	Include participants and caregivers in discharge planning. Consent form. Discharge Planning & Documentation	Staff Interviews
Characteristics and roles of providers, medical team	Physicians, Social Work, Case Management, Nurses, Dietitian **CDC Step 1: Engage Stakeholders**	Dietitians to screen for and identify malnourished patients. RNs help sign the consent form. Use Interdisciplinary Staff facilitate discharge planning and the TOC RD interview. Discharge Planning & Documentation Facilitate communication with PCPs, community programs	Interactions Activities Checklist Process Questionnaire Staff Interviews
Characteristics and roles of participants	Mindsets, knowledge and beliefs, religion, traditions, lingual and literacy **CDC Step 3: Process Evaluation Development (Outputs)**	Participants need to have interest in the study and consent. Focus on goal setting in individualized nutrition recommendations. Provide education of interest. Consider language and literacy. Answer to and participate in the follow up phone calls.	Interactions Activities Checklist Process Questionnaire Patient Surveys Interaction Log
Process of Implementation	Engaging stakeholders, Logic Model, Process Outcomes evaluations Achieve individual and organizational use of the intervention as designed.	Process evaluating, outcomes evaluating Utilize interdisciplinary staff, maintain relationships, promote continuity of care and coordination, communication	Inpatient participant Interviews Interactions Activities Checklist Process Questionnaire Staff Interviews Interaction Log

Measures of Implementation **Process Evaluation**	Number and type of interactions, quality of interactions. Measurements can look at the success of intervention implementation as intended or patient outcome measures to measure success of an intervention. Process Evaluation following the CDC Guidelines to create **specific measuring tools** for the process evaluation. **CDC: Standards** Utility, Feasibility, Propriety, Accuracy	**What attributes of the implementation process demonstrate it was conducted well and it can be replicate, scaled and sustained?** The TOC RD will follow **predetermined checklists** for each visit, which can be replicated, scaled and adjusted as needed. - Participants consent to the process. - Inpatient visits were complete. - All patient information was appropriately gathered (PG-SGA). - Education and handouts were provided (NCM). - Follow-up phone calls were complete and addressed patient concerns. The TOC RD will follow the standards of practice to ensure content quality of the interactions with patients.	Inpatient participant Interviews Interactions Activities Checklist Process Evaluation Questionnaire Staff Interviews Patient Surveys Interaction Log
Outcomes Evaluation	Patient-Centered measures **CDC: Collect information and data and analyze**	Patient-Centered care	Demographics Unplanned readmissions < 30 days **Nutrition Status:** Weight Change PG-SGA scores

Part 2: Outcomes Evaluation

To answer the second research question, if the outcomes hospital readmission and nutrition status improve after the 5-week TOC nutrition intervention, a quantitative, quasi-experimental study design was used. Quasi-experimental designs have been used in previous implementation research to evaluate the use of interventions to improve health outcomes.[135] The outcomes evaluation looked at long-term quantitative measurable outcomes that supported the primary investigator in linking the outcomes to the success of the intervention.[133] Positive outcomes will indicate success and that the intervention did what it was designed to do, reduce hospital readmissions and improve nutrition status.

Study Participants

Settings & Location

Lawrence General Hospital (LGH) is a community hospital with about 180-beds, located in the center of Essex County in Massachusetts. Lawrence is a high poverty, ethnically diverse community and food-desert city outside of Boston, MA.[138] Other surrounding towns where LGH patients reside include Andover, North Andover, Haverhill and Methuen, among others. The LGH hospital population includes patients across different life-stages including maternity, newborn babies, medical-surgery, cardiac and the critically ill in the intensive care unit. Malnutrition is most prevalent in the older adult population >65 years old.

Participants

The population of interest is adults (≥18-years old) who were admitted to LGH and identified with malnutrition. Demographics and descriptive data were collected from the patients' medical records who met study inclusion criteria. Additionally, six hospital staff including RNs, Clinical RDs, and clinical care coordinators/case management team members

were included in the study and interviewed as part of the process evaluation. The hospital staff were invited to participate in an interview if they were involved in the study.

Participant Eligibility Criteria

The clinical RD established a protocol to decide which patients should be included. Clinical judgment was used when determining the inclusion and exclusion criteria that was used for both the comparison group and the experimental group. Patients with multiple hospital admissions were only included once, during the first admission within the 6-month time frame.

Inclusion

The nutrition intervention participants included in the study were patients identified with malnutrition during hospitalization at LGH who meet the following inclusion criteria:

- Adults greater than or equal to 18-years old.
- Patients diagnosed with moderate or severe malnutrition during hospitalization.
- Those who signed the consent form.
- Those discharged home with services or caregivers; home can include independent or assisted living facilities.
- Patients with hearing or vision impairment that have help at home.
- English and Spanish speaking.
- Those with the ability to answer and use the phone.
- Those who weighed on the body weight scale provided.

Exclusion

Participants who were excluded from the study are:

- Those who did not give consent.

- Patients with terminal illness (i.e., discharging home with hospice, palliative care or care and comfort).
- Those who were discharged to a short-term nursing facility, nursing home, rehab, or institutionalized.
- Those with psychiatric illness, suicidal ideation, or substance abuse who were institutionalized.
- Any patient who left against hospital medical advice (AMA).
- Those who were unable to participate in follow-up phone calls.

Sample Size

The approach to establish the most appropriate sample size for a transitions of care study varies across the literature. The prevalence of malnourished patients in hospitals across Essex County is unclear. The hospital readmission rates of patients with malnutrition at LGH have not been determined. The readmission rates among malnourished patients in Essex County are unclear. According to the Commonwealth of Massachusetts Executive Office of Elder Affairs 2018 Commission on Malnutrition Prevention Report,[139] the odds of readmission are higher in patients with malnutrition in Boston hospitals, but the prevalence has yet to be determined. With both the prevalence of malnutrition and the readmission rates among hospitalized patients in Massachusetts being unclear, determining the most appropriate sample size for this study was a challenge. The primary goal of the study was to show an improvement of the readmission rate for malnourished patients at LGH. According to the leadership team, any improvement in lowering unplanned hospital readmissions suggests clinical relevance to support improving Medicare reimbursement rates.[5] Therefore, a predetermined sample size was established by calculating the readmission rate among a comparison group (n=137). Patient data was collected

from chart reviews of patients who were hospitalized with malnutrition from May, 2019 to November, 2019. Patients who followed similar inclusion criteria as the intervention group were included in the comparison group. Patients who had an unplanned readmission either to the Emergency Department (ED) or to the hospital within 30 days from discharge were counted as a hospital readmission. The comparison group (n=137) had 47 patients (34.3%) readmitted. The unplanned all-cause hospital 30-day readmissions prevalence (%) from the comparison group was used to estimate the most appropriate sample size to achieve 80% power. A power analysis of 80%, with 5% error, is needed to detect a difference between groups. The sample size was determined using a 2-sample, 1-sided calculator. The sample size (comparison group) is 137, using a power of 80%, Type 1 error rate of 5%, Group A proportion of .65 and Group B proportion of 0.85, with a sampling ratio of 1:1. A sample size range to achieve 90% power would be to include 155 participants, 80% power would be 112 participants, and a 60% power of 85 participants.[140] The goal sample size was to include at least 120 participants could achieve 80% power. Unfortunately, the sample size was not met by the end of the study, which will be further described in the Discussions chapter.

Recruitment

Recruitment began when the study was approved by IRB on July 27, 2021 and went through January 31, 2022. A convenient sample approach was used to recruit participants who met specific inclusion criteria. To determine if participants met criteria, a series of steps were followed during clinical practice. The Malnutrition Screening Tool (MST) score, nursing referrals, and physician nutrition consults triggered the clinical RDs to assess for malnutrition risk. At LGH, the Clinical RD team utilized standards of care, which included the Nutrition Care Process (NCP) and American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines, to complete nutrition assessments, including a Nutrition Focused Physical Exam (NFPE) to

identify malnutrition criteria. The Clinical RDs documented their findings on a Health Insurance Portability and Accountability Act (HIPAA) compliant Excel sheet for chart auditing and monitoring by the malnutrition champion team. The TOC RD reviewed the encrypted Excel file each day to look for new patients who met the inclusion criteria. When they did, the TOC RD attempted to visit the patient and enroll them in the study. To reduce bias, the clinical RDs completed most of the initial nutrition assessments which included the identification of malnutrition criteria, while the PI completed the TOC nutrition intervention. **Figure 6** displays the timeline that planned out how many participants needed to be enrolled each week to meet the predicted sample size.

	Week 1	7/27 - 8/7	1+2																			
	Week 2	8/8 - 8/14		1+2																		
	Week 3	8/15 - 8/21	3		1+2																	
	Week 4	8/22 - 8/28		3		1+2																
	Week 5	8/29 - 9/4	4		3		1+2															
	Week 6	9/5 - 9/11		4		3		1+2														
	Week 7	9/12 - 9/18			4		3		1+2													
	Week 8	9/19 - 9/25				4		3		1+2												
	Week 9	9/26 - 10/2					4		3		1+2											
	Week 10	10/3 - 10/9						4		3		1+2										
	Week 11	10/10 - 10/16							4		3		1+2									
	Week 12	10/17 - 10/23								4		3		1+2								
	Week 13	10/24 - 10/30									4		3		1+2							
	Week 14	10/31 - 11/6										4		3		1+2						
	Week 15	11/7 - 11/13											4		3		1+2					
	Week 16	11/14 - 11/20												4		3		1+2				
	Week 17	11/21 - 11/27													4		3		1+2			
	Week 18	11/28 - 12/4														4		3		1+2		
	Week 19	12/5 - 12/11															4		3		1+2		
	Week 20	12/12 - 12/18																4		3		1+2	
	Week 21	12/19 - 12/25																	4		3		1+2
	Week 22	12/26 - 1/1																		4		3	
	Week 23	1/2 - 1/8																			4		3
	Week 24	1/9 - 1/15																				4	
	Week 25	1/16 - 1/22																					4
	Week 26	1/23 - 1/29																					

Figure 6 Recruitment Timeline

The TOC Nutrition Intervention

The TOC nutrition intervention was developed based on case management and Transitions of Care Model (TCM) constructs previously described in the Theory Chapter. The TOC RD position is a new role created for the study and was integrated as part of the LGH clinical RD team. The TOC role mirrors a case management approach to address malnourished patients prior to hospital discharge. The primary investigator is a clinical RD at LGH who took on the TOC RD role and led the TOC nutrition intervention. Once the TOC RD identified a patient who met inclusion criteria, they visited the patient and reviewed the study details and consent form. If the patient agreed to participate, the patient and a witness, who could be either a nurse or dietitian, signed the consent form, and a copy was provided for the patient. The TOC RD further completed the TOC nutrition intervention with the participant.

The intervention consisted of a 5-week time frame for each participant, implemented over the course of 6 months. The intervention included a total of four interactions during and after hospitalization over the 5-week time frame: (1) an initial interview during hospitalization that included several activities, (2) a phone call during the first week post-discharge, (3) a phone call during the third week post-discharge, and (4) a final phone call during the fifth week post-discharge. The phone call questionnaire was modified, with permission from the LGH care coordinator nursing team, to address nutrition concerns. If the patient spoke Spanish, the hospital Interpreter Services team assisted in translating the initial interview, and the hospital approved AMN Language Services was used for follow-up phone calls. In the hospital, if the patient was diagnosed with COVID-19, the TOC RD used appropriate hospital Personal Protective Equipment (PPE) and followed infectious disease control guidelines for patient visits. The intervention was further completed by phone after the patient agreed to participate.

Interaction #1 - Initial Pre-Discharge Interview During Hospitalization

The first interaction of the intervention was a pre-discharge interview. Following informed consent, the TOC RD collected patient data including demographics, food access concerns, and completed the intervention activities checklist. Refer to **Appendix B** for the Process Evaluation Tools: Intervention Activities Checklist. The TOC RD took each participant's weight using a brand-new standing scale that was calibrated at the bedside and provided to the patient to take home. The TOC RD used Page 1 from the Patient-Generated Subjective Global Assessment (PG-SGA)[141] to collect self-reported data; recent weight change, height, food intake in the past month, current symptoms that could affect appetite, and the patient's level of function. Each area of Page 1 was scored, and a total score was generated. Page 2 was not completed. After the data were collected, the TOC RD addressed the patient's nutrition concerns and provided appropriate education (see section below). The TOC RD documented the interaction in the participants' medical records. The TOC RD communicated patient needs with physicians, nurses, primary care physicians (PCPs), and community programs as appropriate. The TOC RD entered the information collected in the interview into a secure data tracking spreadsheet that was stored on a secured LGH hospital computer system hard drive. All patient sensitive data were removed before coding and inputting into the SPSS data analysis program.

Educational Materials Used in the Intervention

The TOC RD provided a folder to each participant with the education material that the patient was interested in discussing. Examples of the nutrition education sources that can be provided to the patient include disease-specific handouts from the Nutrition Care Manual (NCM),[109] USDA ChooseMyPlate.gov,[142] or the Canadian Malnutrition Task Force,[143] which have all been approved for use by the hospital. If appropriate, the TOC RD attempted to continue any nutrition education the patient had with the clinical RD during hospitalization while

addressing new concerns that came up. The nutrition education and counseling followed a food-first approach. Studies have found when healthcare staff take an individualized, food-first approach and suggest oral nutrition supplements (ONS) if necessary, nutrition status improves.[12,24,144] Additionally, an ONS order form was provided to the participant to take to their PCP if they felt a need to continue an ONS at home. The TOC RD provided a list of community resources including local food banks, soup kitchens, and elder services information when needed. An instructional handout regarding how to properly use the standing scale at home was also provided. Refer to **Appendix H** for participant handouts.

Phone-call Interactions #2 through #4

Interaction #2 was a follow-up phone call to the patient within 3 days post-discharge. Interaction #3 was a follow-up phone call during week 3 post-discharge. Interaction #4 was the final post-discharge follow-up phone call during week 5 post-discharge, and completed Page 1 of the PG-SGA[141] post intervention with the patient and collected the patient's self-reported weight taken on the scale that was provided to them. See **Appendix B** for the process evaluation activity checklists the TOC RD followed during each interaction.

Data Collection

Process Evaluation

To address the primary aim, if the intervention implementation was successful, a process evaluation comprised of three tools was utilized to evaluate the implementation process: (1) an intervention checklist, (2) interaction log, and (3) process evaluation questionnaire. These tools were completed by the TOC RD during each patient interaction (see **Appendix B**). The interaction checklists contain specific activities that the TOC RD must follow to fulfill the desired TCM and CTF constructs described in the Theory chapter. The interaction log tracked

the time spent during each interaction and if the participants answered follow-up phone calls. At the end of each interaction, a process evaluation questionnaire was completed to identify potential barriers that occurred as the intervention was implemented with participants. The questions were: (1) Describe any staff related or operational related barriers, (2) Did the nursing staff assist with the intervention or show interest? (3) Were interpreter services available when needed? (4) What went well? (5) What did not go well? and (6) How can the process be improved? The questionnaire was designed to evaluate the intervention process following the CDC process evaluation guidelines.[123,133] The process evaluation tools provided subjective data that was used to summarize the implementation process in a narrative format in the results.

Participant Satisfaction

The primary investigator created a patient questionnaire to obtain participants' feedback. The survey was asked during the final phone call of the 5-week intervention. Participants were also asked to provide feedback by answering questions and using the Likert scale, from 0 (poor) to 10 (excellent) to rate the program. The questionnaire was not tested for validity in advance, which would be beneficial in future studies.

Staff Interviews

Staff interviews were conducted to help identify patient recruitment barriers. Staff interviews are part of the measuring tools that align with the theory constructs organizational characteristics and roles of the providers to engage stakeholders, involve interdisciplinary staff, and facilitate communication. The staff interview was developed with the help of the DCN committee (see **Appendix C and D).** The participants included two registered dietitians, two case management team members, and two registered nurses. All the participants had a role in the implementation or recruitment process. Six participants were included to reach the goal of saturation, which is defined as the point that no new codes are established.[145,146]

Outcomes Evaluation

To address the second aim, an outcome evaluation was used to evaluate hospital readmission differences between the comparison group (n=137) and the intervention group (n=21) and changes in nutrition status of participants (n=13) in the nutrition intervention. The TOC RD stored all the patient data collected during the intervention in an encrypted Excel sheet. Patient identifiers were removed from all patient data, and unique identifiers were assigned. The data was coded and uploaded into SPSS. To minimize bias and reduce human error in data collection, the primary investigator followed specific data collection instructions that had been agreed upon by the research committee and closely follow the CDC evaluation guidelines.

Outcome Measure: Unplanned 30-day Hospital Readmission Numbers

A 30-day unplanned readmission is defined as a visit to the Emergency Department (ED), under observation in the ED, or admitted to a hospital within 30 days from hospital discharge.[147,148] Hospital readmission rates are monitored by CMS, and healthcare programs are established to reduce avoidable readmissions and healthcare costs. Establishing a program that can help to reduce unplanned readmissions supports CMS initiatives. Currently, the readmission rate for patients with malnutrition in Massachusetts is unknown, making it difficult to establish an appropriate sample size that would be needed to show a significant reduction in readmissions.[139] The number of unplanned 30-day hospital readmissions will be counted according to CMS guidelines, in both the comparison and intervention group. Other studies have also looked at readmissions improvements in intervention groups.[29,34]

As mentioned above, an encrypted Excel sheet was used to collect readmission data for both the comparison and intervention group. The comparison group consisted of patient data from chart reviews as previously discussed. The TOC RD collected retrospective patient data, demographics, malnutrition information, readmission data, and medical diagnoses from patients'

medical records who were admitted to LGH with malnutrition from May, 2019, to November, 2019. The patients included in the comparison group data set followed the same inclusion criteria as the intervention group, further reducing potential bias in chart selection. Once the comparison group was compiled, if patients repeated in the data set (more than one admission), only the first admission information was included. During coding, a number 1 represented yes, a patient had an unplanned ED visit or was readmitted to the hospital within 30-days post discharge. A number 0 represented no readmission. Readmissions were measured as a dichotomous, nominal variable, (yes=1, no=0) and recorded as a count and a percentage.

To determine hospital readmissions in the intervention group, the TOC RD documented any unplanned visits to the LGH ED or hospital admission during the 5-week intervention. The TOC RD asked participants if they were readmitted to the hospital during the intervention. The TOC RD further completed a chart review to confirm hospital readmissions that occurred. Readmissions were coded the same way as the comparison group. If more than one readmission occurred during the 5-week intervention, only one visit was recorded as 1.

Outcome Measure: Nutrition Status (Nutrition Intake and Weight)

The validated assessment tool, the Patient Generated Subjective Global Assessment (PG-SGA) was used to obtain nutrition status data.[141,149] The TOC RD completed Page 1 of the assessment with each participant during the initial interaction and again at the end of the 5-week intervention. Reviewing this form with the participants helped to establish personalized nutrition strategies they could apply once they got home to improve their nutrition status. The pre- and post-intervention PG-SGA data was analyzed for differences (see **Appendix H**).

Page 1 is comprised of five major sections, with each section having a score that adds up to a total score. In section 1, (box 1), the TOC RD recorded the patient's weight and scored the

weight history. To obtain the patient's weight, the TOC RD provided a standing scale and instructional handout regarding the scale (see **Appendix H**). The scale was calibrated with the patient, and the TOC RD taught the patient how to take their standing weight. Their standing weight was then recorded. The patient was asked to weigh themselves at home at the end of the 5-week intervention and self-report their weight to the TOC RD. Human error may occur when asking participants to take their own weight. The patient's weight in pounds was measured as numerical, scale data. To score weight change reported during question one (box 1), a score of 1 represented a decrease in weight, while a score of 0 represented no weight change or an increase in weight. The weight score was measured as categorical, nominal data.

In section 2, (box 2), the TOD RD asked participants about their food intake pattern, then recorded and scored the data. The food intake score variable is a ratio or scale measure ranging from 0 to 14 points. The TOD RD asked the participants about symptoms in section 3, (box 3), activities and function patterns in section 4, (box 4), and further recorded and scored the data. The scores from section 1 through 4 were totaled for a final PG-SGA score. The score variable is measured as ratio or scale data ranging from 0 to 33 points. All boxes were completed to guide a patient-centered intervention and education. However, only the scores from sections 1 and 2 and the final score were compared pre- and post-intervention and used to answer the second research question. Human error may occur as the data collected using the PG-SGA were self-reported and subjective. The TOC RD followed a consistent script when interviewing participants to reduce the risk of participants misunderstanding questions or reporting inaccurate information.

Data Analysis

The process evaluation was used to answer the primary research question. The data collected from the evaluation tools were summarized and described in a narrative format in the

Results chapter by the primary investigator. A qualitative thematical analysis was used to describe the participant's feedback survey, while the quantitative measure, Likert scale average was also used to describe data. The primary investigator transcribed the six staff interviews and identified themes. Afterwards, a code book was developed, and the transcriptions were coded following a qualitative thematic analysis method to consistently interpret interviewees' feedback.[145,146] The codebook can be found in **Appendix E**. A second coder was included. A second reviewer supports consistency in the transcription and coding process, while reducing bias.[145,146] The PI reached out to a recent graduate of the Doctorate in Clinical Nutrition program who was experienced in qualitative data analysis, specifically transcription coding. Once both the PI and the second coder reviewed the transcripts and coded the data, they met in a meeting over Zoom to discuss discrepancies identified during coding. Two new themes "Scope of Practice" and "Electronic data communication" were identified and agreed upon.

Descriptive statistics were used to describe patient demographics in each group. Crosstabulation was used to separate the categorical data per group. Demographic data collected included patients' age in years, gender, marital status, smoking status, employment status, insurance class, residential town, primary language, ethnicity, race, malnutrition severity and etiology, and food access. Additionally, the patients' chief complaint at hospital admission, the primary and secondary admission diagnosis, and the primary and secondary discharge diagnosis were collected. For the patients in group 3 and 4 who were readmitted, their chief complaint, primary, and secondary medical diagnoses documented during hospital admission were collected. A range from one to over twenty medical diagnoses were assigned to each patient.

Patient data was separated into four groups, (1) the comparison group (n=137), (2) the patients who met criteria in the study but were not enrolled (n=54), (3) the participants who were

enrolled in the study but did not complete the intervention (n=8), and (4) the participants who were enrolled in the study and completed the intervention (n=13). Statistical analysis looked at pre and post differences in weight and the PG-SGA scores among the participants in group 3 (n=13). Missing data was not found, and no patient entries needed to be omitted from the sample size. However, due to the small sample size, the scale data did not follow normal distribution and nonparametric tests were used.

The PI used an outcome evaluation that addresses the secondary aim of the study, to analyze if there were lower hospital readmissions in the intervention group and if nutrition status improved. Appropriate statistical analysis was chosen. Unplanned all-cause hospital 30-day readmissions were recorded for all groups. A Chi-squared test was run to analyze the differences between group 1, and combined data from groups 3 and 4. Nutrition Status (weight and food intake patterns) pre- and post-intervention data were compared. Due to the small sample size, a non-parametric *t*-test for two dependent groups was used. The Wilcoxon signed-ranked test was run to look at the differences in weight in pounds, food intake score, and total scores from the PG-SGA data collected before and after the intervention. The Z scores were based on positive ranks. SPSS Software was used for the data analysis. All p-values $< .05$ were taken as statistically significant, and all analyses were performed using IBM SPSS version 28.0 (IBM Corp., Armonk, NY). **Table 5** discusses the primary outcome measures, variables, data measures, and statistical tests that were used. **Figure 7** is a screen shot from SPSS as an example for how the data was recorded and coded.

Table 5. Primary Outcome Measures, Variables, Data Measures and Statistical Tests

Primary Outcome Measures	Variables	Data Measures	Statistical Tests via SPSS software
Readmission Rate Dichotomous variables Yes= 1 No = 0	**Group:** Comparison (n=137) Participants enrolled (n=21)	Nominal	Chi-squared
Nutrition Status	**Group:** Participants who complete the study (n=13)		
	Weight in pounds Pre/Post	Weight in pounds, (Scale/Interval data)	Wilcoxon signed rank test
	Food Intake Pre/Post	Food intake #2 score, on the PG-SGA (Sale/Ratio Data)	
PG-SGA Score	Total Score Pre/Post	Total Score PG-SGA Page 1 (Scale/Ratio Data)	

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ID	String	7	0	Designated ID	None	None	7	Left	Nominal	Input
2	Group	String	2	0	Group	{1, Baseline...	None	6	Left	Nominal	Input
3	Age	Numeric	3	0	Age (#years)	None	None	8	Left	Scale	Input
4	AgeGroup	Numeric	8	2	Age Groups	{1.00, Youn...	None	9	Right	Nominal	Input
5	Gender	String	6	0	Sex/Gender	{0, Unidentif...	None	7	Left	Nominal	Input
6	Marital_Stat...	String	17	0	Marital Status	{0, Single}...	None	7	Left	Nominal	Input
7	Smoking_St...	String	16	0	Legal: Smoking...	{0, Never S...	None	8	Left	Nominal	Input
8	Employmen...	String	18	0	Employment st...	{0, Unemplo...	None	11	Left	Nominal	Input
9	Insurance	String	38	0	Insurance: Fina...	{0, Uninsure...	None	10	Left	Nominal	Input
10	Residential	String	14	0	Residential Sta...	{0, Other}...	None	10	Left	Nominal	Input
11	Language	String	7	0	Language	{1, English}...	None	9	Left	Nominal	Input
12	Ethnicity	String	27	0	Ethnicity	{1, America...	None	8	Left	Nominal	Input
13	Race	String	30	0	Race	{1, White}...	None	6	Left	Nominal	Input
14	Malnutrition...	String	8	0	Malnutrition Se...	{1, Severe}...	None	10	Left	Nominal	Input
15	Etiology	String	20	0	Etiology (Acut...	{0, Social/E...	None	8	Left	Nominal	Input
16	CODE_AD...	String	2	0	CODE_ADMIT_...	{0, None}...	None	6	Left	Nominal	Input
17	ADMIT_DXC...	String	100	0	Primary ADMIT...	None	None	29	Left	Nominal	Input
18	CODE_AD...	String	2	0	CODE_ADMIT_...	{0, None}...	None	17	Left	Nominal	Input
19	ADMIT_Pri...	String	100	0	Primary ADMIT...	None	None	35	Left	Nominal	Input
20	CODE_AD...	String	2	0	CODE_ADMIT_...	{0, None}...	None	6	Left	Nominal	Input
21	ADMIT_Sec...	String	100	0	Secondary AD...	None	None	50	Left	Nominal	Input
22	ADMIT_DX#	Numeric	3	0	# ADMIT DXs	None	None	9	Left	Scale	Input
23	CODE_DC_...	String	2	0	CODE_DC_Pri...	{0, None}...	None	8	Left	Nominal	Input
24	DC_Primary...	String	100	0	Primary DC DX ...	None	None	48	Left	Nominal	Input
25	CODE_DC_...	String	2	0	CODE_DC_Se...	{0, None}...	None	8	Left	Nominal	Input
26	DC_Second...	String	100	0	Secondary DC ...	None	None	40	Left	Nominal	Input
27	DC_DX#	Numeric	3	0	# DC DXs	None	None	8	Left	Scale	Input
28	LOS#Days	Numeric	5	0	Number of Leng...	None	None	10	Left	Scale	Input

Figure 7 SPSS Screen Shot of the Data collection

Chapter 4 - Results

As previously discussed, a mixed-methods study, including a 5-week Transitions of Care (TOC) nutrition intervention, was implemented at Lawrence General Hospital (LGH) during the last week in July, 2021, through the end of January, 2022. The purpose of this research was to determine if TOC models used in previous research can be adapted to create TOC nutrition interventions that can help to reduce hospital readmissions and improve nutrition status. To answer the research questions, the primary investigator (PI) analyzed the process and outcomes evaluation data findings. The research questions are: (1) Using a process evaluation, can a case management, nursing focused care transitions framework, adapted for a TOC nutrition intervention, result in a successful intervention implementation? (2) Using an outcomes evaluation, is the number of unplanned hospital readmissions within 30-days from hospital discharge lower in the intervention group compared to a comparison group, and does the nutrition status of the intervention participants improve by the end of 5-weeks? This chapter will include the recruitment results, patient demographics among groups, the process evaluation, the patient satisfaction survey and the staff interview findings. Further, the outcomes evaluation reveals if hospital readmissions were less in the intervention group when compared to the comparison group and if participants' nutrition status improved.

Participants and Recruitment

Figure 8 displays participant enrollment, the 54 patients who were identified with malnutrition during hospital admission and were found to meet criteria. From the 54 participants who met inclusion criteria, 27 were visited by the PI, and 21 of those patients consented to the study and enrolled, while 6 patients did not consent. Of the 21 that consented, 13 participants completed the intervention, while 8 did not. Several reasons that the participants did not

complete the intervention included; 1) one passed away before discharging from the hospital, 2) one withdrew from the study, 3) one did not answer the follow-up calls, and 4) five were readmitted to the hospital or went to rehab or could not be contacted to finish the interactions despite multiple attempts to reach them (see **Appendix J**). The majority of patients were enrolled during the months of August and October of 2021.

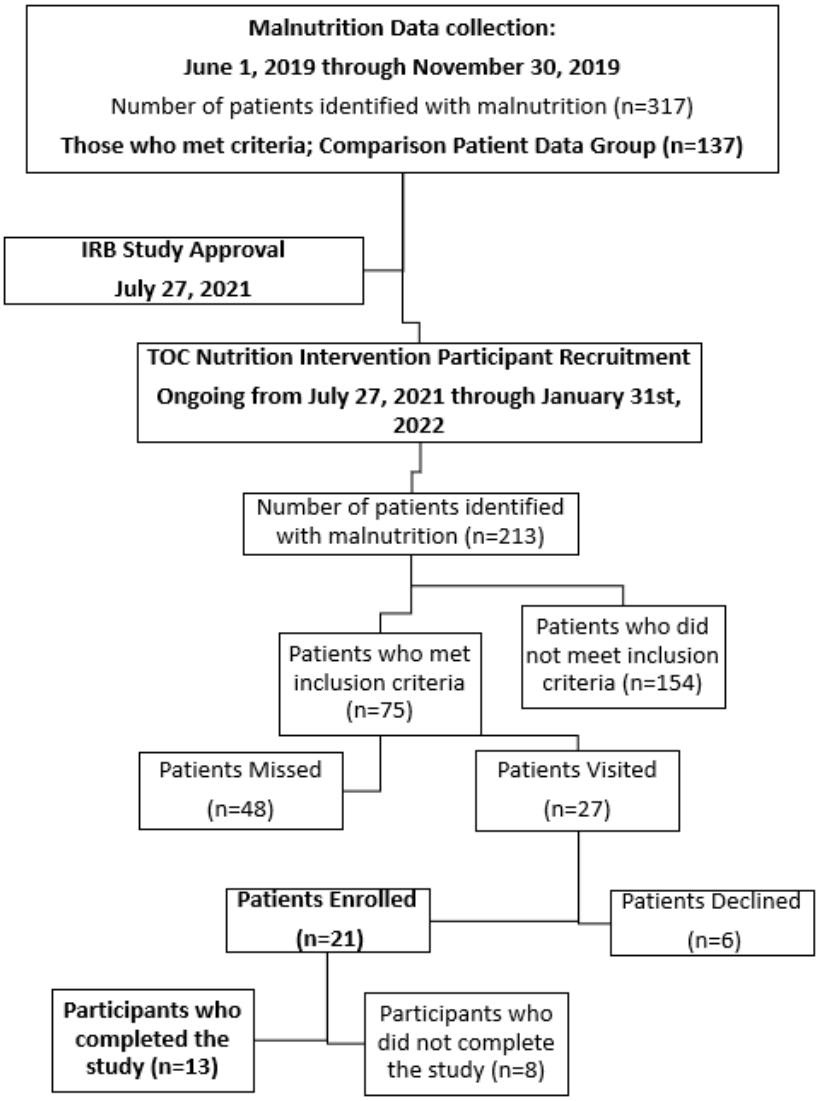

Figure 8 Participant Enrollment Flowchart

Patient Group Descriptions – Descriptive Data

As described in the Methods Chapter, patient data was collected from the Lawrence General Hospital (LGH) Electronic Medical Record (EMR), Meditech, over 6-months, from June 2019, through the end of November 2019, and labeled group (1) the comparison group (n=137). Once the study protocol was approved by the UNF IRB on July 27, 2021, the TOC RD and LGH staff began recruiting and enrolling participants in the study. Patient data was collected for all patients who qualified for the study during the 6-month period, starting the last week in July 2021, through the end of January, 2022 (n=75). To best represent the descriptive data and data analysis outcomes, patient data was further separated into groups, group (2), patients who met criteria for the study but were not enrolled (n=54), group (3) patients who were enrolled in the study but did not complete the intervention (n=8), and group (4) patients who were enrolled in the study and completed the intervention (n=13). In total, four groups represented the data.

Demographics of Groups

Descriptive statistics describes the percentage for each demographic age, gender, marital status, smoking status, employment status, insurance payer, residential town, ethnicity, race, primary language, malnutrition severity and malnutrition etiology. Common medical diagnoses were also collected, including the admitting chief complaint, primary and secondary admitting diagnoses, and the discharge primary and secondary diagnoses. Refer to **Table 6**. Additionally, the readmission chief complaint and the readmission primary and secondary medical diagnoses were collected for those patients who were readmitted in less than 30-days from discharge.

Age

The ages in all groups ranged from 18 – 94 years old, with a mean age of 67 years old. The average age for group 1 (n=137) was 66.7 (SD 15.3), median 69 years old, and the average

age for those who qualified for the study (n=75) was 67.6 (SD 15.2), median 68 years old. No missing data was found. The Pearson Chi-Square found no difference between the average age (p= .610). Age was grouped into age ranges; younger adults (18-34 years-old), adults (35 – 44 years old), middle-aged adults (45 – 64 years old), older adults (65-84 years old), or elderly (>85 years old). The Pearson Chi-Square found no difference between groups (p = .528). In group 1 (n=137), 71 out of 137 patients (51.8%) fell within the older adult group. In group 2 (n=54), interestingly, 23 out of 54 patients (42.6%) fell within the middle-aged adult group. In group 3 (n=8), 3 out of 8 patients (37.5%) fell within the older adult group. In group 4 (n=13), 7 out of 13 patients (53.8%) fell within the older adult group.

Gender

Two categories represented gender, male or female. None of the patients identified as another gender. Group 1 (n=137) consisted of 65 females (47.4%) and 72 males (52.6%). Group 2 (n=54) consisted of 24 females (44.4%), and 30 males (55.6%). Group 3 (n=8) consisted of 3 females (37.5%) and 5 males (62.5%). Group 4 (n=13) consisted of 8 females (61.5%) and 5 males (38.5%). Interestingly, more females (8, 61.5%) completed the study, compared to men (5, 38.5%). However, for all participants who met inclusion criteria (n=75), more men (40, 53%) than women (35, 47%) met criteria for the study.

Marital Status

Five categories represented marital status, (1) single, (2) married, (3) legally separated or divorced, (4) widow or widower, or (5) unknown status. Group 1 (n=137) were close to equal in number with 46 participants (33.6%) reported being single, and 45 patients (32.8%) reported being married. Group 2 (n=54) were mostly married (n=22, 40.7%). Group 3 (n=8) were mostly married (n=5, 62.5%). Group 4 (n=13) were mostly legally separated or divorced (n=5, 38.5%).

Smoking Status

Four categories represented smoking status, (1) never smoker, (2) smoker, (3) former smoker, or (4) unknown. In the comparison patient data group (n=137), smoking status split among never smoker (n=43, 31.4%), smoker (n=43, 31.4%), and former smoker (n=42, 30.7%), while nine patients (6.6%) had unknown status. Group 2 (n=54) included those who were never a smoker (n=22, 40.7%) and those who were former smokers (n=23, 42.6%), with a low percent of those who currently smoke (n=9, 16.7%). Most of the participants in group 3 (n=8), were former smokers (n=5, 62.5%). Most of group 4 (n=13) never smoked (n=8, 61.5%).

Employment Status

Five categories represented employment status, (1) Unemployed, (2) Part-time, (3) Full-time, (4) Retired, (5) Disabled, or (6) Unknown. The most common employment status in group 1 (n=137) was retired (46 participants, 48.9%). In group 2 (n=54), the most common employment status was disabled (22 participants, 40.7%). In group 3 (n=8), the most common employment status was disabled, with (5 participants, 62.5%). In group 4 (n=13), the employment status was equal between disabled and unknown (4 participants, 30.8% each).

Insurance Financial Class

Nine categories represented insurance class, (1) uninsured, (2) Medicare, (3) Medicaid, (4) ACO, (5) Connector Care, (6) Other government, (7) commercial care, (8) private pay, or (9) self-pay. None of the patients were documented as uninsured. Medicare was the most common insurance class across all groups.

Residential Town

Eight categories represented residential towns, (1) other, (2) Lawrence, (3) Methuen, (4) Haverhill, (5) North Andover, (6) Andover, (7) Lowell, or (8) New Hampshire. New Hampshire

(NH) is a separate state from Massachusetts, but only 15 miles away. Many patients come to LGH from NH and were not excluded from the study. The highest population of participants across all groups resided in Lawrence.

Language, Ethnicity and Race

The most common language among all groups was English; however, Spanish is common. LGH has a diverse patient population. Eight categories represented ethnicities: (1) American, (2) African American, (3) Puerto Rican, (4) Dominican, (5) European, (6) Asian, (7) Vietnamese, or (8) other. American and Dominican were the two most common ethnicities in all groups. Four categories represented race, (1) White, (2) Black/African American, (3) Hispanic, or (4) other. The most common race among groups was white, except for group 4 (n=13), with (6, 53.8%) reporting other, while (7, 46.2%) reported white.

Malnutrition Severity and Etiology Among Patients

Malnutrition criteria in the LGH policy follows the ASPEN guidelines. Depending on the criteria that patients meet, malnutrition severity is either severe or moderate. When looking at group 1, the comparison patient data group (n=137), pre-pandemic (May 2019 – November 2019), the percent of patients who were diagnosed with moderate malnutrition (54%) was more commonly identified than severe malnutrition (46%). However, post-pandemic (July 2021 – January 2022), for patients who qualified for the study (n=75), severe malnutrition (60%) was more common than moderate malnutrition (40%). Further, regarding malnutrition etiology, (1) Social/Environmental, (2) Acute Illness, and (3) Chronic Illness, most patients met criteria for Chronic Illness etiology, except for those participants in group 4, those who completed the study (n=13); 53.8% met criteria for acute illness etiology.

Table 6. Demographic Data for All Groups

Group Demographic Categories	Group #1 Comparison Group (n=137)	Group #2 Met criteria, not included (n=54)	Group #3 Included, not completed (n=8)	Group #4 Included, Completed (n=13)
		Groups #2, 3, 4 combined (n=75)		
Mean Age (years)	66.7	67.6		
Median	69	68		
Standard Deviation	15.3	15.2		
Age bracket				
Young Adults [18 – 34]	7 (5.1 %)	2 (3.7 %)	0	0
Adults [35 – 44]	3 (2.2 %)	2 (3.7 %)	1 (12.5 %)	1 (7.7%)
Middle-aged [45 – 64]	42 (30.7 %)	**23 (42.6 %)**	2 (25 %)	4 (30.8 %)
Older Adults [65 – 84]	**71 (51.8 %)**	19 (35.2 %)	**3 (37.5 %)**	**7 (53.8 %)**
Elderly [> 84]	14 (10.2 %)	8 (14.8 %)	2 (25 %)	1 (7.7 %)
Gender				
Female	65 (47.4 %)	24 (44.4 %)	3 (37.5 %)	**8 (61.5 %)**
Male	**72 (52.6 %)**	**30 (55.6 %)**	**5 (38.5 %)**	5 (38.5 %)
Marital Status				
Single	**46 (33.6 %)**	19 (35.2 %)	2 (25 %)	4 (30.8 %)
Married	45 (32.8 %)	**22 (40.7 %)**	**5 (62.5 %)**	3 (23.1 %)
Divorced	24 (17.5 %)	4 (7.4 %)	1 (12.5 %)	**5 (38.5 %)**
Widow/Widower	21 (15.3 %)	9 (16.7 %)	0	1 (7.7 %)
Unknown	1 (0.7 %)	0	0	0
Smoking Status				
Never smoker	**43 (31.4 %)**	22 (40.7 %)	2 (25 %)	**8 (61.5 %)**
Smoker	**43 (31.4%)**	9 (16.7%)	0	0
Former Smoker	42 (30.7 %)	**23 (42.6 %)**	**5 (62.5 %)**	3 (23.1 %)
Unknown	9 (6.6 %)	0	1 (12.5 %)	2 (15.4 %)
Employment Status				
Unemployed	**46 (33.6 %)**	**16 (29.6 %)**	2 (25 %)	2 (15.4 %)
Part-time	1 (0.7 %)	**0**	0	0
Full-time	12 (8.8 %)	2 (3.7 %)	1 (12.5 %)	2 (15.4 %)
Retired	**67 (48.9 %)**	**22 (40.7 %)**	**5 (62.5 %)**	**4 (30.8 %)**
Disabled	10 (7.3 %)	10 (18.5 %)	0	**4 (30.8 %)**
Unknown	1 (0.7 %)	4 (7.4 %)	0	**1 (7.7 %)**
Insurance Class				
Uninsured	0	0	0	0
Medicare	**86 (62.8 %)**	**31 (57.4 %)**	**5 (62.5 %)**	**9 (69.2 %)**
Medicaid	7 (5.1 %)	7 (5.15 %)	0	1 (7.7 %)
ACO	16 (11.7 %)	6 (11.1 %)	2 (25 %)	2 (15.3 %)
Connector Care	3 (2.2 %)	1 (1.9 %)	0	0
Other government	2 (1.5 %)	0	0	0

Commercial	12 (8.8 %)		6 (11.1 %)	1 (12.5 %)	1 (7.7 %)
Private	6 (4.4 %)		3 (5.6 %)	0	0
Self-Pay	5 (3.6 %)		0	0	0
Residential Town					
Other	4 (2.9 %)		2 (3.7 %)	1 (12.5 %)	2 (15.4 %)
Lawrence	**74 (54 %)**		**24 (44.4 %)**	**2 (25 %)**	**6 (46.2 %)**
Methuen	19 (13.9 %)		4 (7.4 %)	1 (12.5 %)	1 (7.7 %)
Haverhill	13 (9.5 %)		5 (9.3 %)	1 (12.5 %)	2 (15.4 %)
North Andover	9 (6.6 %)		8 (14.8 %)	1 (12.5 %)	1 (7.7 %)
Andover	9 (6.6 %)		3 (5.6 %)	1 (12.5 %)	1 (7.7 %)
Lowell	1 (0.7 %)		0	0	0
New Hampshire	8 (5.8 %)		8 (14.8%)	1 (12.5%)	0
Language					
English	**89 (65 %)**		**40 (74.1 %)**	**8 (100 %)**	**9 (69.2 %)**
Spanish	47 (34.3 %)		14 (25.9 %)	0	4 (30.8 %)
Ethnicity					
American	**73 (53.3 %)**		**35 (64.8 %)**	**7 (87.5 %)**	**6 (46.2 %)**
African American	3 (2.2 %)		0	1 (12.5 %)	0
Puerto Rican	25 (18.2 %)		2 (3.7 %)	0	2 (15.4 %)
Dominican	**28 (20.4 %)**		**14 (25.9 %)**	**0**	**3 (23.1 %)**
European	1 (0.7 %)		1 (1.9 %)	0	0
Asian	2 (1.5 %)		0	0	0
Vietnamese	1 (0.7 %)		0	0	1 (7.7 %)
Other	4 (2.9 %)		2 (3.7 %)	0	1 (7.7 %)
Race					
White	**70 (51.5 %)**		**35 (64.8 %)**	**7 (87.5 %)**	6 (46.2 %)
Black/African American	5 (3.6 %)		1 (1.9 %)	1 (12.5 %)	0
Hispanic	23 (16.8 %)		0	0	0
Other	39 (28.5 %)		18 (33.3 %)	0	**7 (53.8 %)**
Malnutrition Severity					
Severe	63 (46 %)	**45 (60 %)**	***34 (63 %)***	***5 (62.5 %)***	*6 (46.2 %)*
Moderate	**74 (54 %)**	30 (40 %)	*20 (37 %)*	*3 (37.5 %)*	***7 (53.8 %)***
Malnutrition Etiology					
Social/ Environmental	24 (17.5 %)	3 (4 %)	*2 (3.7 %)*	*0*	*1 (7.7 %)*
Acute illness	46 (33.6 %)	29 (38.7 %)	*20 (37 %)*	*2 (25 %)*	***7 (53.8 %)***
Chronic illness	**67 (48.9 %)**	**43 (57.3 %)**	***32 (59.3 %)***	***6 (75 %)***	*5 (38.5 %)*

*Bold indicated the highest percentage in the group

Nutrition Intervention Findings; Food Access

The TOC RD completed a series of checklists during each interaction with participants during the initial interview and follow ups. During each interaction the TOC RD asked if they have trouble shopping, cooking, or preparing meals, and 8 out of the 21 (38%) reported yes to at

least one. Most participants reported trouble with food access due to weakness, while some reported having limited access to food stamps, food banks, and meal delivery programs.

Common Medical Diagnoses Among Malnourished Patients

Descriptive data represents the most common hospital admissions "chief complaint", the patients' admission primary and secondary diagnosis, and the patients' discharge primary and secondary diagnosis in all groups. **Table 7** describes the common chief complaints and diagnoses. Among all groups, the most common chief complaint was gastrointestinal (GI) disturbances, respiratory symptoms or general medicine concerns. Among all groups, the most common primary and secondary diagnoses at admission fell into the categories of GI illness, respiratory illnesses, cardiac illness and general medicine. The PI used Pearson Chi-square to look at associations between malnutrition severity and etiology and all the above diagnoses categories. No significant associations were found due to many diagnoses categories containing less than 5 values. A Fisher's Exact Test was not run. Reorganizing diagnoses categories to encompass more diagnoses, may yield more reliable statistical test outcomes.

Readmitted Participants: "Chief Complaint", Primary and Secondary Diagnoses

For those patients who were readmitted to the hospital less than 30 days from hospital discharge, the most common hospital readmission chief complaint, primary diagnoses, and secondary diagnoses are shown in **Table 7**. The most common readmission chief complaint in group 1 (n=137) and group 3 (n=8), was respiratory symptoms. In group 2 (n=54), the two most common were respiratory symptoms and GI disturbances equally. In group 4 (n=13), one participant was readmitted to the ED due to urology concerns. The most common primary diagnoses were GI disturbances, cardiac illness, respiratory illness, trauma, and altered mental status. The most common secondary diagnoses were renal disease or dehydration and altered

serum lab issues. Malnutrition was not one of the common diagnoses assigned to patients by physicians, despite the patients meeting the malnutrition diagnosis criteria during hospitalization.

Table 7. Common Hospital Diagnosis Categories Among All Groups

	Group 1: Comparison Group (n=137)	**Group 2: Met criteria (n=54)**	**Group 3: Included, not completed (n=8)**	**Group 4: Included, Completed (n=13)**
Admission "Chief Complaint"	GI disturbances 35 (25.5%)	Respiratory Symptoms 13 (24%)	General Medicine 3 (37.5%)	GI disturbances 4 (30.8%)
Admission Primary Diagnosis /illness	GI disturbances 28 (20.4%)	GI disturbances 9 (16.7%) Respiratory 9 (16.7%)	Cardiac 2 (25%)	GI disturbances 3 (23.1%) Respiratory 3 (23.1%)
Admission Secondary diagnosis /illness	Cardiac 15 (10.9%)	Cardiac 5 (9.3%)	Cardiac 2 (25%)	Cardiac 2 (15.4%) GI Disturbances 2 (15.4%)
Discharge Primary Diagnosis /illness	GI disturbances 26 (19%)	Cardiac 8 (14.8%)	Neurological/ Dysphagia 2 (25%)	GI disturbances 3 (23.1%) Respiratory 3 (23.1%)
Discharge Secondary Diagnosis /illness	Cardiac 18 (13%)	Cardiac 6 (11%)	Dehydration/ Altered Labs 3 (37.5%)	Respiratory 2 (15.4%)
For patients Readmitted	**Group 1: Comparison Group (n=137)**	**Group 2: Met criteria (n=54)**	**Group 3: Included, not completed (n=8)**	**Group 4: Included, Completed (n=13)**
Readmitted	**48 (35%)**	**18 (33.3%)**	**5 (62.5%)**	**1 (7.7%)**
not readmitted = 0	*89 (65%)*	*36 (66.7%)*	*3 (37.5%)*	*12 (92.3%)*
Readmission "Chief Complaint"	Respiratory Symptoms 13 (27%)	GI disturbances 3 (16.6%) Respiratory Symptoms 3 (16.6%)	Respiratory Symptoms 2 (40%)	Urology Symptoms 1 (100%)
Readmission Primary Diagnosis /illness	GI Disturbances 7 (14.5%)	GI disturbances, Cardiac, Respiratory, Trauma, Altered Mental Status 2 (11.1% each)	5 different diagnoses	Urology 1 (100%)

Readmission Secondary diagnosis /illness	Heart Failure 3 (6.25%) Renal Illnesses 3 (6.25%)	Renal illnesses 3 (16.6%) Dehydration/ Altered labs 3 (16.6%)	5 different diagnoses	No secondary diagnosis

Process Evaluation:

As discussed throughout the Theory and Methods chapters, three measurement tools were designed for the process evaluation (see **Appendix B**). Measures included (1) an intervention activity checklist, (2) an interaction log, (3) a process evaluation questionnaire that was completed by the PI during each participant interaction. Overall, the implementation of the intervention was successfully implemented as most of the checklist activities were completed during each interaction. The TOC RD provided specific interventions to participants based on their individual needs. During the intervention the TOC RD provided nutrition education, oral nutrition supplement recommendations, addressed food access concerns, and called physicians when appropriate. The most common nutrition education was the high calorie and high protein handout. The most common intervention at follow up were to help make phone calls to set up community referrals and other medical appointments. At each follow up, participants (n=21) were asked if they followed the nutrition recommendations discussed at hospital discharge. During the first week post-discharge 16 of the 21 participants (76%) self-reported yes, while 5 did not respond, were readmitted, or were excluded. During the third week post-discharge 12 of the 16 participants (75%) reported yes, 1 reported no, and 3 did not compete the intervention.

The implementation process resulted in a small number of participants being enrolled in the study (n=21). The enrollment number did not meet the estimated sample size (n=120) necessary to support strong data analysis. Data analysis should be interpreted with caution. **Table 8** discusses how the TCM constructs were integrated into the intervention and some of the

barriers that occurred with implementation. The primary barriers were found within the organization characteristics and the roles of the providers and medical team, and poor communication. Refer to **Appendix B** to review the completed interventions activities checklist.

Table 8. TCM constructs and the TOC Nutrition Intervention

TCM Constructs	**Integration into the TOC Nutrition intervention Activities on the checklist**	**Process Measure**	**Level of achievement / Success and Barriers**
Assessment	Follow standards of care Initial Interview **Interaction #1:** Activity #1 Chart Review **Follow up calls #2, #3, and #4:** Activity #1	Intervention Checklist Interaction Log	Clinical recommendations are not consistently applicable when going home. The TOC provided an individualized patient-centered plan during the interactions.
Patient-Centered Care	Provide patient centered care and include them in decision making **Interaction #1:** Activity #3 through #9 **Follow up calls #2, #3:** Activity #2 through #8 **Final Phone call #4:** Activity #2 through #10	Intervention Checklist Process Questionnaire Patient Survey	Nutrition education materials chosen for the intervention were led by patients interests and goals. Participants were included in goal setting and establishing their individualized plan. They were encouraged to be open about medical or community needs they may have.
Educate Patients and Caregivers	Education and individualized nutrition plan **Interaction #1:** Provide Activity #6 **Follow up calls #2, #3:** Activity #2 **Final Phone call #4:** Activity #5	Intervention Checklist Process Questionnaire Patient Survey	Education materials were chosen and reviewed with participants and caregivers as they desired. Literacy and language considered.

Follow-up Phone Calls	The TOC RD will provide Phone call #1 within 3-days of discharge, Phone call #2 during week 3, and phone call #3 during week 5 post-discharge.	Intervention Checklist Process Questionnaire Interaction Log	The TOC RD was successful in providing initial phone-calls within 1-week from discharge (not consistently within 3-days). The follow-up phone calls were often delayed when referring to the interaction log.
Use Interdisciplinary Staff	Physicians, Social Work/Case Management, Nurses, TOC team **Interaction #1:** Activity #2, #9 **Follow up calls #2, #3:** Activity #3, #4 **Final Phone call #4:** Activity #6, #7, #8, #11	Engaged Stakeholders Intervention Checklist Process Questionnaire	Hospital leadership was engaged during the start of the project. During the implementation process it was difficult to engage physicians and nursing leadership.
Discharge Planning & Documentation	Communicate needs with the Case management team and Interdisciplinary team **Interaction #1:** Activity #2, #7 through #10 **Follow up calls #2, #3:** Activity #3, #4, #5 #8, #9 **Final Phone call #4:** Activity #11, #12	Engaged Stakeholders Intervention Checklist Process Questionnaire	Communication with the nursing and case management staff faced challenges. The TOC RD took approaches to improve communications. (SBAR, face to face discussions, calls, texts)
Maintain Relationships & Foster Communication	Communicate with the TOC team, PCPs and Social/Community services **Interaction #1:** Activity #2, #9, #10 **Follow up calls #2, #3:** Activity #3, #4, #5, #6, #8 **Final Phone call #4:** Activity #6, #7, #8, #11	Engaged Stakeholders Intervention Checklist Process Questionnaire Staff Interviews	Communicating with the discharging team, nurses and case managers was an ongoing challenge. Communications with PCPs and community programs was often successful but took many calls, which is time consuming.

Interaction Log

The PI tracked the participants' appointment attendance and duration on the interaction log. The average time spent on each interaction was as follows: Interaction #1 was an average of 45 minutes spent with the patient; interactions #2 and #3 were by phone and were 15 minutes on average; interaction #4 by phone was an average of 25 minutes. Interaction #1 the initial interview included (n=21) participants, for phone call #2, 16 out of 21 (76%) of participants answered the phone call, for phone call #3, 12 out of 21 (57%) of participants answered the phone call, and for phone call #4, 13 out of 21 (62%) completed the final interview. Refer to **Appendix B** for the completed interaction log.

Primary Investigator Process Evaluation Questionnaire

A process evaluation questionnaire was completed at the end of the initial interview and each of the follow-up phone calls with participants (see **Appendix B**). Question one was to describe any staff related or operational related barriers. During the initial inpatient interview, challenges emerged with obtaining interpreter services and keeping them for the time frame needed to complete the intervention. Interpreter services reported translating "takes too long" and on multiple occasions did not have the time needed. Moreover, the interviews were often rushed because the nursing staff was trying to discharge patients quickly. Other barriers included interruptions from the transitions of care pharmacist, physicians and nurses. In addition, patients were overwhelmed by the consent form process. They would either refuse to participate because they thought it would interfere with them discharging, or they would ask for a revisit later, which became very time consuming. The COVID-19 precautions at LGH also limited the time spent with the participants. The primary barriers faced during the phone-call interviews included limitations to make phone calls in a busy office environment, time to coordinating interpreter

services causing delay, and a lack of time for the TOC RD make morning phone calls due to meetings or other clinical responsibilities.

Question two asked if the nursing staff helped with the initial interview and if they showed an interest. Nursing staff were needed to help sign as a witness for the consent form. Nurses served as a witness to 14 of the 21 participant consent forms, while dietitians helped to sign the other 7 consent forms. Only 4 of the 14 nurses were interested in the study and helpful with the intervention and reported that the program “is good” and “important”. The others were very busy and did not offer feedback. Question three asked if interpreter services were available when needed, which was discussed above. Of the 21 participants, 4 were Spanish speaking and required an interpreter. They were available but had limitations on the time they could spend and often reported it “takes too long”. The AMN language services were available for the follow up phone calls. Question four asked the PI to record what went well. Overall, the patients and families were grateful to have the RD visit them, despite being rushed. Patients were often involved and appreciative. Building rapport prior to filling out the consent form helped establish a smoother interaction with patients. Question five asked the PI to record what did not go well. Similar to the barriers discussed under question one, the primary issues were an overall lack of time, lack of time with interpreter services, phone calls were not always answered by patients during the scheduled times, the TOC RD was not always able to make the calls during scheduled times due to clinical responsibilities, multiple visits and calls to participants were often required, which became time consuming. Having staff help with taking patients’ weights would have saved time. Other issues include office distraction, interruptions from staff during interviews, and some patients minimally interacted or showed resistance. Question six asked how the process can be improved, which will be reviewed in the Discussion chapter.

Patient Satisfaction

During the final follow up phone-call, three questions were asked to the participants who completed the intervention (n=13), (1) how has the program helped you? (2) can you tell me if you expected to gain other information from the program? and (3) a Likert Scale question; from a scale of 1 – 10 (1 being poor, 10 being good) how satisfied are you with the program? Some of the feedback from participants was that the program offered support and accountability, helped them with setting up appointments and community resources, increased awareness and knowledge of nutrition, and "it was helpful to have nutrition things explained to my understanding and useful to have handouts." Feedback regarding what participants expected to gain from the program included that Ensure should be covered, meal delivery programs (other than Meals on Wheels) should be available, more information about nutrition and exercise, more recipes and how to prepare simple meals for one person, and low-cost meal ideas. The average Likert Scale score was 9 out of 10, indicating the participants were satisfied with the program. A few of the positive comments included, "it was nice to have support," they "recommended this program to everyone," they "wondered if the program can be shared with their community," they reported "the RD to be very professional, genuine and diligent." A lower score of 5 was given by one participant who remarked, "The program is a work in progress, I know how to eat healthy now, but I do not want to. I appreciated the program and not being pushed." A lower score of 7 was given by one participant who remarked, "I wanted to gain weight and I didn't, but you did a professional job." Others suggested providing more phone-calls in the morning. The questionnaire used was not validated with other patients prior to the study, which is a limitation. Additionally, during the final interaction, participants were asked if they would like a referral to have outpatient nutrition counselling following this intervention, only 4 out of the 13 participants (31%) who completed the study were interested in a referral.

Staff Interviews

Six staff interviews were conducted to help identify barriers during the study. Fourteen unique codes were established for the codebook, resulting in seven overall themes (see **Appendix E**). **Table 9** describes each code, the code type and a quote from the interview that supported that code. The main themes were (1) a lack of communication regarding the SBAR notification from the nurse managers to the nursing staff (SBAR, RN-RNCOM), (2) staff needed more communication regarding the study and the malnutrition policy via flyers, face-to-face conversations, and emails (CUMMUNICATE, ALL STAFF, MD-COM), (3) a broad sense that clear documentation and communication are needed in the electronic medical record (EMR) regarding discharge planning, such as, having nutrition as part of the EMR discharging order set to enhance communication between the staff and the dietitians (DOMCUMENT, eCOM, RN-RDCOM), (4) the time of patients' attention and learning span needs to be considered as 45-minutes was a long time (PATIENT), (5) all staff was in a rush to complete nursing interventions with patients, and a lack of time often caused nutrition to get pushed aside (ALL STAFF, TIME, SCOPE), (6) the pandemic created many barriers among all staff, including lack of time, limits on face-to-face meetings among patients and staff, a constant state of feeling overwhelmed and rushed (PANDEMIC), and lastly, (7) the staff identifies that nutrition is important and malnutrition needs to be considered in hospital admission screening and discharge planning, but whose role it is to do these things is unclear. Therefore, the RD team needs to continue to educate staff regarding their role in the malnutrition policy. (SCOPE, MALNSCREEN).

Table 9. Qualitative Staff Interview Codes, Type, and Quotes

Code	Code Type	Example from the data (Quotes)	What other codes intersect?
SBAR	Deductive	"No, I was not aware that there was a study	RN-RNCOM

		going on or where to find the SBAR" - RN **"**we usually get an email with a link to the new policy and procedures, I did not get any email, as far as I am aware" – RN	ALL STAFF
RN-RNCOM	Inductive	**"**RN managers to discuss with RNs at morning meetings"**-** RD "if you did discuss it with the manager then it should have been, you know, the manager's job to communicate the study more with the staff"- RN	
RN-RDCOM	Inductive	**"**clear communication from maybe a case manager or a nurse if we briefed them beforehand that we needed to speak to the patient" – RD	eCOM CM-RDCOM
CM-RDCOM	Inductive	"consistent meetings with case mangers and being more present with them could have helped" – RD	COMMUNICATE
MD-COM	Inductive	"An email that could have gone out weekly for the MDs or a flyer in the office to facilitate the study, weekly or monthly meetings would have been good to keep the information fresh and remind them" – RD	
MALNSCREEN	Inductive	"collaboratively we could look at BMI on admission" – CM	SCOPE
DOCUMENT	Inductive	"I know that was another challenge getting the MDs to document and code for malnutrition" - RD	eCOM SCOPE
COMMUNICATE	Inductive	"we are always walking around and I feel like the more visuals there are, the more people can remember things like that." – RN "reviewing maybe every couple of months what our malnutrition process is might be helpful." – RD "more talk in rounds, definitely, just getting you guys actively involved in rounds I think would be a huge part of it as well" - RN	ALL STAFF SCOPE
eCOM	Inductive	"if there was something in the patients' discharge record, being a part of some sort of order set would have helped" – RD "if there was more clear communication, maybe on our EMR about someone's discharge plan probably would have been helpful" – RD "Something that can make it transparent they are in a study in MEDITCH EMR, like a	COMMUNICATE DOCUMENT SCOPE RN-RDCOM

		malnutrition indicator or something" – CM "I think, maybe there should be a dietitian section, you know that alerts us, that hey this person was marked as malnourished, have you discussed with the dietitians further? I think a nutrition part of our discharge planning would be beneficial. " – RN	
TIME	Inductive	"another barrier is making time to see the patient" – RD "we keep just trying to push them out push them out, it's not surprising you would come and find them gone" CM "we are being told you know, that we need to get the patient out as fast as we can, as early as we can" – RN "if you can shorten it to 30 minutes, I think that may be a little bit more realistic"– RN "as long as we know we can get you scheduled in and you can see the patient before they go home" - RN	ALL STAFF PANDEMIC RN-RDCOM
PATIENT	Inductive	"Sometimes patients aren't ready to digest new information especially when it's related to discharge, but it might give you like, kind of like gage should I see the patient sooner." – CM "not all patients have that amount of, uhm the ability to sit and listen that long. Sometimes they need their brains me shut down after maybe 15 minutes of learning" – RN	TIME
PANDEMIC	Inductive	"nurses didn't really have the time to you know, give us a call, even though you know they might have had the best intentions to but it's just probably a matter of how, how overwhelming the pandemic was" – RD "you know with the pandemic, it was just an unprecedented time with so many patients, on code RED for so long. It was just, in many aspects in our world, COVID was a huge barrier to healthcare in general, so I think that you know, plaid a really big part." - RD "with what the hospital was going through in everybody being maxed out to their capacity"- CM	TIME ALL STAFF

		"People in general, are trying to go into the rooms, you know less rooms, see less patients and that's really put a damper on really good care" – CM	
ALL STAFF	Inductive	"meet, on a monthly basis with the dietitian, doctor, nurse manager or in a CCM or case managers, just to have those key players to help with discharge planning" - RD	COMMUNICATE
SCOPE	Inductive	"collaboratively we could look at BMI on admission and get the doctors involved too" – CM "I think a nutrition part of our discharge planning would be beneficial" -RN "Prioritizing patients who are malnourished, that tends to get, ah kind of get pushed to the side when it should not be." – RN "Sometimes nutrition is not addressed where it definitely should be... and I think a lot of that is that we are being told you know, that we need to get the patient out as fast as we can, as early as we can." – RN "I think, yeah, if you guys just had a different way in the system. I was thinking even in our nursing documentation, we have a nursing worklist that pops up that we have to do, you know. All these interventions per day on the patient. If one of those was even a nutrition uhm, tool, or communication tool. You know "did you talk to the dietitian today regarding this patient". I think that will get you guys more involved with patients' cases". – RN	ALL STAFF TIME eCOM

Outcomes Evaluation:

Readmission Data

In group 1, the comparison group (n=137), the number of malnourished patients readmitted in < 30 days was 48 patients (35%), which is higher than the readmission rate of the combined participants in groups 3 and 4, those who were enrolled in the study (n=21), 6 patients

(28.5%). However, no significant difference was found in hospital readmissions when comparing the two groups (p =.561). Due to the large difference in sample sizes, these findings should be interpreted with caution. When considering clinical significance, the intervention may have helped reduce the hospital readmission number among the 13 participants who completed the study as there was only one participant who experienced an ED admission. Refer to **Table 9.**

Table 10. Readmission Data

Readmission Status	***Group 1: Comparison Group***	***Groups 3 and 4: All patients enrolled in the study***	
(n=)	**(n=137)**	**(n=21)**	***p*-value**
Readmitted < 30 days (Yes)	**48 (35%)**	**6 (28.5%)**	**.561**
Not readmitted	89 (65%)	15 (71.5%)	

*p-value based on Pearson Chi-Square

Average Hospital Length of Stay and Days from Discharge to Readmission

The average Length of Stay (LOS) for group 1, the comparison group (n=137), was six days. For group 2, the patients who met criteria in the study but were not enrolled (n=54), the average LOS was 8 days. For group 3, the participants who were enrolled in the study but did not complete the intervention (n=8), the average LOS was 12 days. For group 4, the participants who were enrolled in the study and completed the intervention (n=13), the average LOS was 7 days. The average number of days from hospital discharge to hospital readmission for each group was 11 days for group 1 (n=137) and group 2 (n=54), 8 days for group 3 (n=8), and 19 days for the one participant in group 4 (n=13) who was readmitted to the ED.

Body Weight Change and Nutrition Status

The pre- and post- weight and nutrition status was compared among the participants who enrolled and completed the TOC nutrition intervention in group 4 (n=13). Due to the small sample size, a non-parametric test for two dependent groups, the Wilcoxon signed-ranked test, analyzed the differences in data. The participant's body weight was measured using a digital standing scale, and their nutrition status was measured using the standardized patient-reported Scored Patient-Generated Subjective Global Assessment (PG-SGA) tool, as previously discussed in the Method chapter. Refer to **Appendix H** to view Page 1 of the PG-SGA.

Body Weight Change

The average pre-intervention weight was 138.5 pounds, and the average post-intervention weight was 137.5 pounds, a difference of 0.88 pounds. The participants' weight in pounds were not significantly different after the intervention (*mdn* = 141.4, IQR = 60.75) than before the intervention (*mdn* = 142.1, IRQ 50.80), z = -.594, p = .552, r = - .165.

Box number one on the PG-SGA scored the patient-reported weight change in the past two weeks. A number 1 codes for decreased weight, and a number 0 codes for no change or increased weight. Descriptive crosstabs determined pre/post percentages. The patients who completed the intervention (n=13) self-reported more of an increase or no change to their weight (n=9, 69%) from two weeks before the intervention to the last two weeks of the intervention, when compared to the percentage of those who lost weight (n=4, 31%).

Food Intake

Box number two on the PG-SGA scored patient-reported food intake over the past month. A high score indicated poor food intake. The goal was that this score would decrease. The participants' food intake score was significantly lower after the intervention (*mdn* = 0, IQR=1.50) than before the intervention (*mdn* = 2, IQR = 7), z = -2.524, p = .012 r = -0.70,

indicative of an improvement in self-reported food intake from the beginning of the intervention to the end of the intervention.

Symptoms

Box number 3 on the PG-SGA scored patient-reported symptoms over the past two weeks. The range of the score could fall from 0 to 24. A higher score indicated more symptoms that could impact eating. The goal was that the score would decrease over time. The participants' symptoms scores were significantly lower after the intervention (*mdn* = 3, IQR = 6) than before the intervention (*mdn* = 8, IQR = 9), z = -2.280, p = .023, r = -0.632.

Physical Function

Box number 4 on the PG-SGA scored patient-reported activities and function abilities. The range of the score could fall from 0 to 34. A higher score indicated limited function. The goal was that participants' activity and function ability score would decrease. The activities and function score weights were not different after the intervention (*mdn* = 0, IQR = 1) than before the intervention (*mdn* = 1, IQR = 2.50), z = -1.554, p = .12, r = -0.431.

The PG-SGA Page 1 total score was significantly lower after the intervention (*mdn* = 5, IQR = 6) than before the intervention (*mdn* = 14, IQR = 14.50) z = -2.591, p = .010, r = -0.791, indicative of an improvement among the TOC nutrition intervention participants.

Table 11. Nutrition Status Data

Variable	Pre-Intervention Median (IQR) (n=13)	Post-Intervention Median (IQR) (n=13)	Statistical Output Two-sided *p* value*	Effect size
Weight (pounds)	142.1 (50.80)	141.4 (60.75)	.552	-.17
Food Intake Score Range 0 – 14	2 (7)	0 (1.50)	.012	-.70
Total PGSGA Score Range 0 - 33	14 (14.50)	5 (6)	.010	-.72
**p* value based on Wilcoxon Signed Ranks Test, positive ranks				

Chapter 5: Discussion

A 5-week Transitions of Care (TOC) nutrition intervention implemented by a dietitian benefited participants (n=13) who completed the intervention at Lawrence General Hospital (LGH). This mixed methods study utilized a process evaluation and outcomes evaluation to determine if adapting and integrating constructs from nursing related transitions of care interventions leads to a successful nutrition intervention, improved hospital readmissions, and nutrition status. Integrating case management and nursing constructs from the Transitions of Care Model (TCF) and the Care Transitions Framework (CTF) may be beneficial when developing nutrition interventions that focus on TOC from the hospital to home. Although readmission rates were lower in those who participated in the study, the difference when compared to the comparison group, did not reach a significance. Statistical analysis revealed significant improvements in participants' nutrition status when using the Scored Patient-Generated Subjective Global Assessment (PG-SGA). Unfortunately, a major limitation to the study was the small sample size, indicating that results need to be interpreted with caution. The study may lack power to find significant relationships among outcomes. The estimate was that 120 participants should be included in the study, while only 75 patients could have potentially included, and only 21 patients of that 75 were enrolled. Other limitations included changes in the hospital procedures during the COVID-19 pandemic, the lack of knowledge among staff regarding the study and their role, limitations on communication, a lack of time, and low participation from patients.

The age of the participants enrolled in the intervention (n=21) was on average greater than 65 years old. Similar to other malnutrition studies, older adults are included as they are at higher risk for malnutrition. Interestingly, more females (8, 61.5%) completed the study,

compared to men (5, 38.5%). However, more men (40, 53%) than women (35, 47%) were among the patients who met inclusion criteria (n=75), indicating that strategies for including and retaining men in interventions may need to be considered. Smoking is associated with poor health outcomes, but limited data exists on the association between smokers and malnutrition risk. Out of the eight participants who did not complete the intervention, five (62.5%) were former smokers, while eight of the thirteen (61.5%) participants who completed the intervention never smoked. Looking at malnutrition, those who did not complete the study (n=8) met criteria for severe acute malnutrition, of chronic etiology, while the group who completed the intervention (n=13) met criteria for moderate malnutrition, of the acute etiology. The severity of malnutrition and the associated illness may be why they were readmitted back to the hospital.

Food access was addressed and 38% of participants reported having difficulty shopping, cooking or preparing meals. Addressing food access during the intervention helped the TOC RD identify gaps in food access. From there, the TOC RD made referrals or phone calls to community programs that could help support food access and affordability, such as Meals on Wheels or Elder Services, when appropriate. Addressing food access is an important service that needs to be provided to patients, to prevent worsening of patients' malnutrition. A validated social determinants questionnaire would be a useful tool to identify poor food access. A Social Determinants questionnaire was in the process of being approved at the hospital during the study.

Medical diagnoses were collected for all patients. A range from one to over twenty medical diagnoses were assigned to patients during their hospital admission. The hospital admission and discharge diagnoses were often the same. However, an additional diagnosis, dysphagia, was seen in the discharge diagnosis list, but not in the admissions diagnosis list. Indicating that certain diagnosis, like dysphagia, may be identified during hospitalization.

Supporting evidence that a TOC RD is needed to look at discharging diagnoses when evaluating for malnutrition risk prior to hospital discharge. The most common class of chief complaints found among all patients readmitted to the hospital (72 out of 212) were respiratory symptoms and gastrointestinal disturbances. The malnutrition diagnosis was often left out of diagnoses lists, despite the patients meeting malnutrition during hospitalization. Indicating that ongoing in-services regarding malnutrition are needed for the physician staff.

To address the first research question, the PI utilized a process evaluation following the CDC guidelines to evaluate if the implementation process was successful. Developing a process evaluation was not a common strategy seen in the TOC literature but is often used in community nutrition program evaluations.[150] Research suggests that pairing process evaluations with TOC interventions is needed to improve future interventions.[151] The process evaluation included an intervention checklist, interaction log, and process evaluation questionnaire. The intervention checklist aligns with TCM constructs and followed a patient centered approach. The interaction log revealed that most of the follow-up phone calls were met by participants. However, one participant did not answer interaction phone-calls #2 and #3 but fully answered the interaction #4 phone-call. Five out of the eight participants who did not complete the study were readmitted and unable to complete the final interaction call #4 due to being hospitalized long-term or in a rehabilitation center. The study by Lago[86] found home visits post-discharge may be more appropriate than phone-calls alone, to check-in on malnourished patients.

Overall, the intervention was successfully implemented on an individual basis, as most of the checklist activities were completed during each interaction with participants. However, due to multiple barriers and small sample size, the PI found it challenging to conclude that the implementation process of the study over the course of 6-months was successful. During the

interactions the most common interventions were diet education surrounding high calorie and high protein intake in addition to providing referrals to community nutrition programs. Interestingly, out of the 21-participants enrolled, 13 of the participants completed the study, all of whom reported following the nutrition recommendations during week three post-discharge, while one was not compliant. The one non-compliant participant was also the person who was readmitted. Oral nutrition supplement intake was not measured directly in this study and could be considered for future research. During the final interview, participants were asked if they would like a referral for outpatient nutrition counselling. Only 4 out of the 13 participants (31%) who completed the study were interested in a referral. Outpatient nutrition therapy should be encouraged when appropriate.

To identify additional barriers to the implementation process, staff interviews were conducted with six hospital employees, two from case management, two registered nurses, and two clinical dietitians. Several themes emerged from the interviews that were previously discussed. Interestingly, two new themes emerged when the two independent coders discussed coding discrepancies. During the interviews, an underlying theme was present: staff were aware that nutrition was important, but they do not know whose job it is to do the tasks involved with malnutrition screening, identifying, and treating. The umbrella code used for these statements was called “scope of practice” (SCOPE). The second theme developed from the overlap between communication and documentation, labeled “electronic communications” (eCOM). Electronic communications are needed to improve malnutrition processes and communication within discharge planning. Malnutrition status needs to be clearly labelled in patients’ charts, and nutrition interventions need to be integrated as part of the discharge process in the Electronic Medical Record (EMR). Study participants should have had a clear label in their EMR to

acknowledge they were in a study to improve communication among staff. The TOC RD should have been notified by the RN prior to the patient discharging home. Having an electronic communication such as a consult or order on the nurse's checklist to contact the TOC RD would enhance communication during the discharge process. These findings are consistent with other studies that have looked at staff perspectives on transitions of care. Researchers found that enhanced communications to bridge gaps between systems was a theme identified by staff that is important for safe transitions of care,[152] as well as to spread awareness for identifying malnutrition and the role the interdisciplinary team can play.[153,154] This study adds to the body of literature that education and communication are needed for staff to be more knowledgeable and aware of the processes and their role in identifying and treating malnutrition.

To address the second research question, the PI utilized an outcomes evaluation to look at hospital readmissions and nutrition status among intervention participants. The outcome evaluation revealed that readmissions were not significantly lower; however, participants who completed the intervention had a stable weight and improved their nutrition status, further supporting the success of the intervention, despite barriers. In addition, patients were satisfied with the intervention. This study found no significant difference in hospital readmissions between the comparison and intervention groups. However, the methods used to determine readmission rates and the barriers to obtaining an adequate sample size pose major limitations on successful outcomes. Although Pearson Chi-Square has resulted in significantly lower readmission rates in some studies,[28,89,90] other study findings were not significant.[10,25,27,29] Similar to this study, samples sizes were small. The study by Beck et al[10] used Hospital Patient Registers and Electronic Patient Journals to collect hospital readmissions data, similar to the methods used in the study by Lago.[86] The study by Lago[86] used a hospital business intelligence

tool to collect patients with malnutrition data and calculate hospital readmission rates. Unfortunately, the business analytics program at LGH did not have that capability. At LGH, the PI had to figure out a unique method to determine the readmission rate among hospitalized patients with malnutrition, which may not have been the most accurate method. Logistic Regression may be a better approach to analyze data and factor in covariates such as age, gender or hospital diagnosis that may have an impact, other than the intervention, on readmission rates. Some studies found improvements in hospital readmission rates, especially when regression models were used in statistical analysis,[88] while others did not.[95,155] Methods for analyzing hospital readmissions is complex and may need to be standardized. The information provided in this dissertation may be further analyzed to evaluate certain health factors associated with hospital readmissions to support future interventions that may help prevent unplanned hospital readmissions or used in future publications. For example, a data set can be created for those who were not included in the study and readmitted within 30-days from discharge (n=191). Logistic regression can be run to analyze for health patterns among patients who are readmitted.

The participants' weight did not change from the beginning to the end of the intervention. The goal was for the weight to increase or stay the same, as weight loss is an ASPEN criterion of malnutrition. Strategies that can be used to prevent further weight loss in malnourished patients may be clinically useful. These findings were similar to studies that implemented similar individualized nutrition interventions that included RD visits in the hospital and after hospital discharge.[10,23,25,24,29] This study focused on inpatient hospital visits and phone-calls made at home, primarily due to the COVID-19 pandemic and healthcare restrictions, while other studies found improved nutrition status when nutrition interventions were provided in the home.[12,24,86] Future research may want to consider adding more home-visits as part of their TOC nutrition

interventions. Other modalities such as virtual telehealth visits that include visual assessments may be considered as part of future research. Although BMI was not a primary outcome used to answer the research question, the participants' average BMI was 23.6, normal weight. BMI was not assessed pre- and post-intervention. The ASPEN guidelines do not include BMI as an indicator of malnutrition. This study further supports that BMI may not be a primary indicator of malnutrition status.

The PI utilized the Patient Generated Subjective Global Assessment (PG-SGA) to assess nutrition status. Studies continue to test the accuracy and use of the PG-SGA in patients with malnutrition.[156] The PI found using the PG-SGA that the participant-reported reported food intake score did significantly improve from the beginning to the end of the study (n=13, p=.012). Although looking at symptoms and the activities and function category from the PG-SGA does not directly pertain to the research questions, the significant difference among patients' symptoms from the beginning to the end of the study is important to consider as they may impact appetite. A limitation is that the data was subjective and patient-reported, which may have influenced the data collected. Symptoms were reported to be significantly worse for participants at the beginning of the study when compared to the end of the 5-week TOC nutrition intervention (n=13, p= 0.023), indicating an improvement in symptoms. Further research may want to consider looking into correlations between the severity of patients' symptoms and their impact on appetite and food intake, especially since poor appetite may be a symptom of malnutrition. The total score of the PG-SGA improved by the end of the intervention (p=.010). Other studies that found improvements in nutrition status used the Mini-Nutrition Assessment (MNA), another validated tool to identify malnutrition risk.[12,24,31,33] However, PG-SGA includes individualized

questions related to food intake; therefore, it was the chosen method for assessing nutrition status pre- and post- hospitalization for this study.

Limitations

Several limitations must be considered. First, there was a lower number of patients identified with malnutrition from the start of the program to the end date, when compared to previous years. Even if all the patients who met criteria during the study period (n=75) were included, the sample size would not have reached the predicted number (n=120) that was determined based on 2019 patient data. The number of patients identified with malnutrition during 2021 were lower than the number of patients identified in 2019. As seen in the **Figure 8**, 54 patients were identified with malnutrition during hospital admission and were found to meet criteria during the last week in July 2021, through the end of January 2022. That is 83 patients less than what was found in the comparison patient data group (n=137) during 2019, supporting evidence that there were not enough patients to reach the estimated sample size. **Figure 9** shows the percent of malnourished patients identified during 2019 – 2022, the number of patients identified with malnutrition is 40% lower in July 2021, compared to July 2019, 30% lower in August 2021, compared to August 2019, 35% lower in September 2021 compared to September 2019, 34% lower in October 2021, compared to October 2019, 19% lower in November 2021 compared to November 2019, 35% lower in December 2021, compared to December 2019, and 35% lower in January 2021, compared to January 2019.

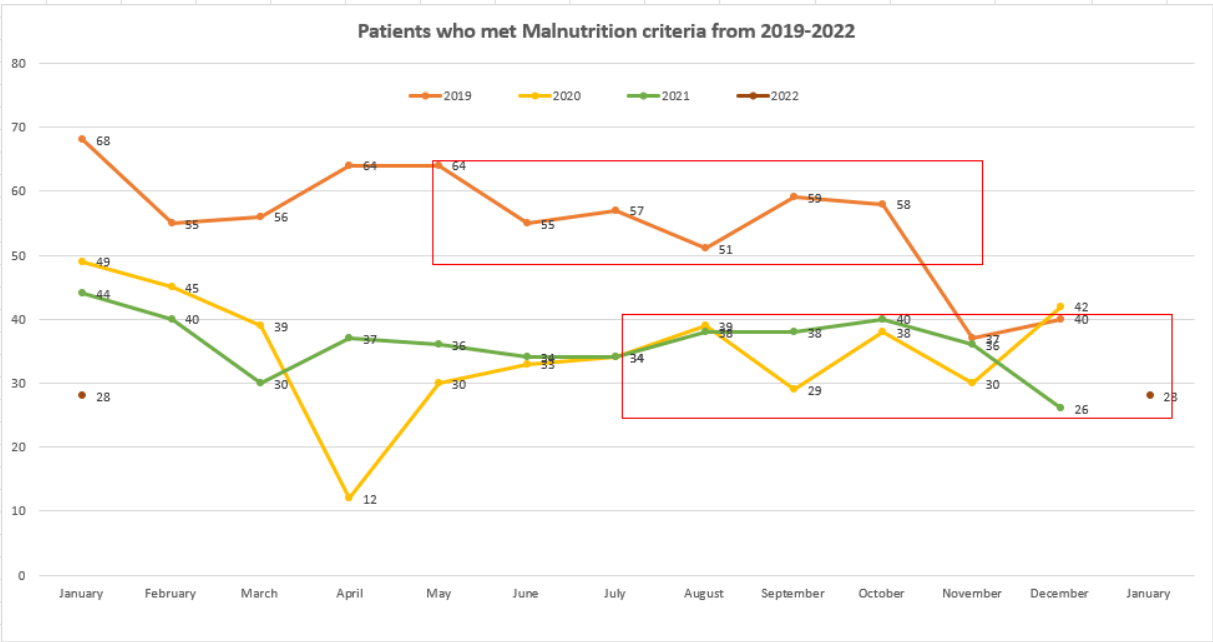

Figure 9 Malnutrition Patient Numbers Trends

Second, there was a change in hospital policy and procedures during the COVID-19 pandemic. The LGH infectious disease management policies impacted inpatient nutrition care, similarly to other hospitals.[157] Specifically, a surge occurred during the months of November 2021, December 2021, and January 2022, which was a major barrier to enrolling patients in the study. Unfortunately, these were the last three months of the study. In November 2021, the hospital went into "Code Red" and during December 2021, the hospital continued in "Code Red" and went into Emergency Management Planning (EMP). During this time, patient discharge rounds also changed, and dietitians were not included in rounds. Nursing and case management staff needed to expedite discharge planning. The patients were discharged quickly, resulting in poor communication among staff and the inability for the TOC RD to visit patients prior to discharge. During January 2022, the hospital continued in "Code Red" in EMP, and a new initiative called "Helping Hands" was implemented. During "Helping Hands", the medical team was requested to take on other positions, like nursing aids, to help with staff shortages. The

clinical dietitians, including the primary investigator, opted into these roles, and prioritized visiting patients at higher risk, especially those who required nutrition support. See **Appendix** I for the hospital support letter regarding the hospital circumstances. See **Appendix J** for the Recruitment and Enrolment tracking.

Third, other barriers included a lack of engagement from stakeholders during the pandemic as previously discussed, a lack of knowledge among staff regarding the study and their role, limitations on communication, a lack of time, and some of the participants showed resistance to signing the consent form and lacked interest in enrolling. These barriers were addressed during the implementation process as the PI continually tried to enhance communications with the hospital staff using text messages, emails, and face-to-face conversations. Flyers and communication from the nursing managers would have been helpful to provide additional information to nurses regarding the purpose of the study and the role they play. Future studies need to consider the best way to focus on organizational characteristics and to engage stakeholders. Future studies should include more efficient modalities to communicate discharge plans with dietitians. Modalities could include electronic communications such as consults being generated to the TOC RD at discharge and having nutrition follow-up as part of the discharge order set in the worklists. To enhance the participants' interest in the study, the PI attempted to visit the participants on multiple occasions to build rapport and to address the consent form on a personal level, rather than "for the study". The consent form was adjusted to a bullet point list mid-way through the study to help engage and not intimidate participants. Future studies should consider optimal strategies to engage patients. This study adds to the body of literature evaluating TOC nutrition interventions led by RDs and their impact on hospital readmissions and nutrition status. This study contributes useful information regarding hospital

staff perspectives on the process of malnutrition identifying and treating in the hospital. This study also adds value to the field of nutrition that has been looking at changes in practice since the COVID-19 pandemic started in 2020, as the prevalence of malnutrition among patients with COVID-19 is of concern.[158]

Strengths and Weaknesses of the Research Design

Several strengths and weaknesses must be considered when using a mixed-methods study design. The CDC process evaluation is a common approach used to evaluate programs throughout nutrition research. The design provided a dynamic perspective to evaluate the intervention implementation using a process evaluation and outcomes evaluation. Combining approaches of both qualitative and quantitative design leads to complementary findings. A qualitative approach may help to identify deeper descriptions of phenomena that may further be supported by quantitative measurable data outcomes. Components from each perspective can support future program replication and implementation.[137] When applying the quasi-experimental study design, strengths include a less expensive approach when compared to a Randomized Controlled Trial, useful when randomization may not be possible or is unethical, and quasi-experimental designs often include population-levels of participants rather than individual levels.[159] Weaknesses include the lack of randomization in the study design, which may limit the internal and external validity of the study, concluding cause and effect is limited, and biases may limit internal validity, such as selection bias or if there are baseline differences between groups.[159] To overcome this bias, strict inclusion criteria was established. As mentioned, the implementation process resulted in a small number of participants enrolled in the study (n=21), which did not meet the estimated sample size (n=120) necessary to support a strong data analysis. Data analysis should be interpreted with caution. The population of malnourished

patients from a community hospital may not be generalizable to the general hospital patient population. Only readmission to and from LGH were counted, which could have excluded readmissions to other hospitals. Overall, the implementation of the study faced many challenges. When reflecting on the framework, more attention should be spent on engaging stakeholders and communicating with all the hospital staff. Engaging stakeholders is essential to identifying and treating malnutrition in hospitalized and community-dwelling patients.[136]

Future Practice Recommendations

The process evaluation questionnaire provided insight into the successes and barriers to the implementation process. Question six from the primary investigator's process evaluations asked what primary issues could be improved. Improvement in communication is needed regarding the SBAR information discussed with the nursing staff, and additional flyers, emails, and notifications to all the hospital staff could have been posted. Additionally, if this program were to be implemented in the future, the TOC RD position should be independent from the clinical RD role. A Spanish speaking RD may be useful to have, depending on the community the intervention takes place in. Furthermore, malnutrition champion groups should be created among hospitals, have consistent meetings, and communicate with staff to improve malnutrition diagnosing and treating. Implementing nutrition informatics projects to create direct consults for the TOC RD prior to discharge or including nutrition as part of the discharge order set is something hospitals should consider, especially if a TOC RD role will be integrated into standards of care. Consent form processes need to be clear, but not overwhelming. Integrating home visits as part of interventions should be considered as part of future TOC nutrition interventions to improve outcomes.[86,90] Home visits are useful to provide individualized MNT counselling,[160] which aligns with the need for patient-centered care across healthcare settings to

improve nutrition care. Exciting opportunities to integrate nutrition professionals and nutrition programs in transitions of care exist and should be investigated. The framework created in for study can be used as a framework in the development of new TOC nutrition interventions in the hospital to support patients when discharging from the hospital to home.

Chapter 6: Conclusion

In this mixed-methods study, a 5-week TOC nutrition intervention implemented by a dietitian at a small community hospital benefited participants (n=13) who completed the intervention. Although the study found no differences in unplanned 30-day hospital readmissions between the comparison group and the intervention group, nutrition status, specifically food intake, improved. However, due to the small sample size, data should be interpreted with caution. A similar study with a larger sample size may support more powerful outcomes. Overall, in-person interviews and follow-up phone calls post discharge were valued by participants. Interestingly, the study identified confusion among the hospital staff when it came to whose role it is to identify, document, and treat malnutrition, an ongoing concern among healthcare staff that needs to be addressed. Nutrition professionals need to continue to educate other medical professionals about the important role nutrition has in health and the role each professional plays in identifying and treating malnutrition. Additionally, many barriers and challenges were faced during the implementation process of the study, especially among the organizational characteristics and medical staff roles in the hospital. In addition, the COVID-19 pandemic resulted in many changes in hospital procedures. Properly engaging stakeholders and hospital staff who are needed for a smooth implementation process is necessary for new nutrition programs in the hospital. Continued efforts need to be made in the field of nutrition and dietetics to overcome these barriers. Further research is needed to evaluate nutrition programs and their role in reducing hospital readmissions. The methods used to evaluate readmissions and disseminate information also need to be carefully chosen. This study further adds to the literature and supports the need to integrate dietitians into TOC roles, especially for those patients identified with malnutrition.

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Abbreviations

TOC	Transitions of Care
RD	Registered Dietitian (will use RD consistently)
DTR	Dietetics technicians registered
RD	Registered Dietitian
LOS	Length of Stay
HCC	Healthcare Costs
QOL	Quality of Life
RCT	Randomized controlled trial
ACA	Affordable Care Act
HRRP	Hospital Readmission Reduction Program
PCP	Primary Care Physician
CMS	Centers for Medicare and Medicaid Services
JACHO	The Joint Commission
MOW	Meals on Wheels
SNAP	Supplemental Nutrition Assistance Program
DTR	Dietetics technicians registered
MNT	Medical Nutrition Therapy
AND	Academy of Nutrition and Dietetics

ONS	Oral Nutrition Supplement
PPE	Personal Protective equipment
COVID-19	Coronavirus 2019
NCP	Nutrition Care Process
QOL	Quality of Life
WHO	The World Health Organization
PEM	Protein Energy Malnutrition
FFA	Free Fatty Acids
REE	Resting Energy Expenditure
SIRS	Systematic Inflammatory Response Syndrome
TNF-a	Tumor Necrosis Factor
IL	Interleukins
CRP	C-reactive Protein
RQ	Respiratory Quotient
ASPEN	American Society on Parenteral and Enteral Nutrition
NFPE	Nutrition Focused Physical Exam
NCHS	National Center for Health Statistics
MST	Malnutrition Screening Tool
MNA	Mini Nutrition Assessment
MNA-SF	Mini Nutrition Assessment-Short Form
MUST	Malnutrition universal screening tool
NRS-2002	Nutrition Risk Screening-2002
SGA	Subjective Global Assessment
PG-SGA	Patient Generated Subjective Global Assessment
QIP	Quality Improvement Program
MQii	Malnutrition Quality Improvement Initiative
GLIM	Global Leadership Initiative on Malnutrition
eCQMs	Electronic Clinical Quality Measures
HR-QOL	Health-Related Quality of Life
CTF	Care Transitions Framework
TCM	Transitional Care Model
SBAR	Situation, Background, Assessment, Recommendations

Appendix A. Research Summary Table

Nutrition Interventions					
Author	**Year**	**Study Type (n=#)**	**Intervention evaluating RDs as part of TOC**	**Reduced 30-day Readmits**	**Improved Nutrition Status**
Endevelt	2011	RCT (n=63)	Three groups (1) Dietetic Intervention treatment, an intensive nutritional intervention (4 visits) led by an RD compared to a (2) physician-led standard care group, with an educational booklet regarding dietary requirements and recommendations for older adults (> 75 years old), and (3) standard care control group. Using MNA.	NO	YES
Beck	2012	RCT (n=124)	Older adults' patients (> 65-years old) discharged from the hospital were follow-up visits at home either by PCPs compared to follow-up by PCPs and RD.	NO	YES
Beck	2015	RCT (n=63)	RD added to the Liaison-Team for discharge planning, proving patient education, who followed-up with older adult patients (> 70-years old) post-discharge, compared to standard of care.	Mixed	YES
Platzer	2020	Systematic Review (n=9)	Looked at interventions to improve health outcomes such as readmission and nutrition status of patients (> 60-years old). *One positive study out of nine was found.(Beck, 2015)*	NO	YES
Terp	2018	RCT (n=144)	RD prepared a nutrition plan for d/c, food + ONS. Follow-up visits by a healthcare assistance were delivered at week 1,4 and 8 after discharge to monitor nutrition intake and identify barriers to recommended intake. Using NRS-2002 screening tool. In older adults (> 65-years old)	NO	YES
tenCate	2020	Systematic Review (n=21)	Nutrition interventions: ONS prescriptions, food and fluid fortification or enrichment recommendations, dietary counselling (in person, by	N/A	NO

			telephone, or during home visits), and nutrition education delivered to older adult patients (> 70-years old, by nurses, during TOC.		
Feldblum	2011	RCT (n=259)	Individualized nutrition plan established by an RD in the hospital and follow-up provided at home by the RD for patients (> 65-years old), to improve nutrition using MNA.	N/A	YES
Mudge	2012	Pilot (n=12)	An interdisciplinary discharge team (specialist discharge planning nurse and accredited practicing dietitian) provided nutrition-focused education, advice, service coordination and follow-up (home visits and telephone) for 6-weeks following hospitalization of malnourished older adults (> 65-years old), HHOME intervention, using MNA.	N/A	Mixed
Hamirudin	2017	RCT (n=68)	RD who provided home visits and individualized nutrition improve nutrition status of older adults (> 65-yearls old).	N/A	YES
Young	2018	QIP Prospective Intervention (n=80)	Hospital to Home Outreach for Malnourished Elders (HHOME) program + RD discharge planning, follow-up phone call within one-week post-discharge of malnourished patients (> 65-years old), nutrition status using MNA.	N/A	NO
Vearing	2019	Retrospect (n=79)	A 12-week TOC program offered support from a multidisciplinary team, of dietitians, physiotherapists, occupational therapists, social workers, speech pathologists, nurses and psychologists to improve nutrition using MNA in older adult patients (> 65-years old.	N/A	YES
Buys	2017	RCT (n=24)	The provision of nutrition education and home-delivered meals compared to nutrition education and usual care in older	NO	YES

			adults (> 65-years old) at risk for malnutrition.		
Beck, Holst	2012	Systematic Review (n=6)	The use of ONS in older adults (> 65-years old) at risk or with malnutrition post-discharge.	NO	YES
Sriram	2017	QIP Observational (n=1,269)	Early nutrition intervention for adult (> 18-years old) hospitalized patients by an RD, ONS prescription + coupons, follow-up phone calls post-discharge by RNs.	YES	N/A
Siegel	2018	Retrospect (n=20,697)	Early nutrition intervention ONS based on MST score to reduce hospital admission in adults (> 18-years old).	NO	N/A
Mullin	2019	Retrospect (n=8,713)	When covariates were controlled for ONS prescribed to malnourished patients (> 18-years old) (using criteria similar to ASPEN to identify malnutrition) had lower readmissions rates compared to those who did not receive a ONS.	Mixed	N/A
Reinders	2019	Systematic Review (n=9)	Dietary counseling or dietary in combinations with ONS prescription to improve nutrition status in patients (> 55-years old)	N/A	YES
Allmark	2020	Retrospect Audit (n=100)	Retrospective audit of dietetic records, for those community-dwelling adults (>65-years old) who received dietary counseling for food fortification and ONS prescriptions to improve nutrition status; weight, BMI, MUST, handgrip strength.	N/A	NO
Sulo	2020	QIP Observational (n=203)	Early nutrition intervention in the hospital by an RD, ONS prescription + ONS sent home with the patient (>65-years old), and followed-up on.	YES	N/A
Chareh	2021	Secondary Analysis of the TIGER study	A 12-month Transitional Care Model intervention study looked at the nutrition status changes, using an MNA tool, in geriatric patients who had a nutrition intervention composed of 7 home visits and 11 phone calls	N/A	Minimal

			post-discharge. Nutrition experts as part of the intervention may be needed.		
Non-Nutrition Interventions					
Author	**Year**	**Study Type**	**Intervention**	**Reduced Readmits**	**Improved Nutrition Status**
Englander	2014	RCT (n=382)	The Care Transitions Innovations (C-TraIn) for hospitalized low-income adults.	NO	N/A
Verhaegh	2014	Systematic Review (n=26)	Discharge planning by an RN, communication between the hospital and PCP and a home-visit within three days post-discharge in older adult (>60 years old).	YES	N/A
Kim	2015	Systematic Review (n=9)	The interventions in most studies focused on health and medication education provided by nurses or transitional coaches, along with either home-visits or follow-up phone-calls from one to three months post-discharge in patients (> 65-years old).	YES	N/A
Low	2015	Intervention (n=259)	A transitional home care visit program proving health education to patients by a multi-disciplinary team (not including dietitians) post-discharge of older patients most > 65-years old.	YES	N/A
Kansagara	2016	Systematic Review (n=17)	Most interventions included individually structured discharge plans that included hospital to home care plans and follow-up for patients most > 65-years old.	YES	N/A
Finlayson	2018	RCT (n=222)	An exercise program with nursing follow-up and phone calls, patients (> 65-years old).	YES	N/A
Aboumatar	2019	RCT (n=203)	A patient-centered, hospital-initiated with follow-ups post-discharge, 3-month program that combines transition support and chronic disease self-management (the BREATHE Program) for patients with COPD, average age > 60-years old.	NO	N/A
Conroy	2020	Systematic Umbrella Review	Studies that included discharge planning and TOC for older adults (> 65-years old).	YES	N/A

		(n=29)			
Facchinetti	2020	Systematic Review (n=30)	Continuity of care interventions provided by any healthcare professional during and after hospital discharge for patients (> 65-years old). Of these the most frequent interventions were: home visit (65%), self-management (45%), informational booklet (30%), patient hotline (25%), and liaison with healthcare provider (25%).	YES	N/A
Ohuabunwa	2021	A Cohort Study (n=154)	Care-coordination intervention through predischarge interdisciplinary team meetings, home visits, phone calls to help with PCP appointments, transportation, medication and self-management education.	YES	N/A

Appendix B. Process Evaluation Tools

Process Evaluation Tool #1: Intervention Activities Checklists

Interaction #1. Pre-Discharge Interview, Intervention Activities Checklist

Unique Patient Identifier _____
DATE:_____ Start TIME: _____ End TIME: _____

☐ **Add to interaction Log**

Primary Investigator to collect from medical record > Enter into the encrypted Excel sheet

Activities:

1. **<u>Chart Reviewed to meet inclusion criteria</u>**

☐ Discharge Plan _____
☐ Admission Date_____ Discharge Date_____
☐ Age_____
☐ Education/Literacy/Language _____
☐ Review Clinical RD Nutrition Assessment record (Date_____)
☐ Malnutrition Severity □ E44, □ E43 and etiology □ Acute □ Chronic □ Social/Env
☐ Diet _____
☐ Clinical RD Recommendations_____
☐ Add the chief complaint, admissions diagnoses, discharge diagnoses

2. **<u>Coordinate Care and sign consent form</u>**

☐ Coordinate with the RD, RN or CM/CCC as needed to sign as a consent witness
☐ Request an Interpreter Services appointment if needed
☐ Consent form discussed and signed with the participant
☐ Make (2) copies of consent form; (1) for the patent, (1) paper chart *with patient label
☐ Provide all handouts in a folder for the participant

3. <u>Discuss Food Access:</u>
☐ Who do you live with? □ Alone □ With family □ Care giver □ Other_____
☐ Are they present for the interview? Yes_____ No_____
☐ Trouble shopping, cooking or preparing meals? □ Yes □ No □ Other_____

4. <u>Standing Scale Weight</u>
☐ Standing scale calibrated with the patient (2 weights taken for consistency)
☐ Written instructions provided (Etekcity handout)
☐ Measure weight _____ kg _____ pounds

5. <u>Participant Self-reported PRE PG-SGA (Page 1 only)</u>
□ Answer Questions 1-4 following the script and score appropriately
□ Record weight from the standing scale
☐ Confirm height in feet' inches" _____
☐ Calculate BMI kg/m2 _____ Range _____

6. <u>Provide Education and individualized nutrition plan</u>
☐ Education NCM standardized handout provided and nutrition goal set if desired
☐ Provide a copy of the nutrition supplement order form (for PCPs)

7. <u>Follow up Calls</u>
☐ Schedule follow up calls
☐ Schedule the follow-up phone call, best phone number: _____
Date:_____ (Within 3-days D/C) Time: _____

8. <u>Offer community Support</u>
☐ Provide a list of food banks, soup kitchens, other community resources_____

9. <u>Coordinate with the medical staff as needed (Internal and External)</u>
☐ PCP_____ Phone:_____
☐ Not provided by the patient / request not to call their PCP
☐ Did the patient need additional services?
☐ Contact the PCP to discuss nutrition, contacted Community Programs, other
_____

10. <u>Documentation:</u>
☐ Document in the EMR Interaction #1 (Notes > Nutrition Note)

☐ Document any goals in EMR (Worklist> Nutrition Assessment > TOC note)
☐ Document the answers in the encrypted Excel sheet

Process Evaluation Questionnaire:
☐ Describe any staff related or operational related barriers:
☐ Did the nursing staff help to coordination the TOC RD initial interview?
☐ When you inform the staff of the program, do they staff find the program useful?
☐ Were interpreter services available?
☐ What went well?
☐ What did not go well?
☐ How can the process be improved?

Interaction #2. Phone call within 3-days (Week 1) Intervention Activities Checklist

Adapted: Discharge Phone Call (Patient at home, with services or self-care) with permission from case management at LGH

Unique Identifier _____
DATE:_____ Start TIME: _____ End TIME: _____

☐ **Add to interaction Log**

Primary Investigator to complete with participant
Introduction: "Hi, my name is _____ the TOC RD from LGH who met with you prior to discharge. I would like to ask you a few questions about your nutrition is that OK?"

1. **Readmission Data**

☐ Primary Investigator to collect from medical record
☐ Was the patient readmitted to the hospital within 30-days? _____
☐ IF YES, document the chief complaint, and ED or admissions diagnoses.
☐ Confirm with the patient if they had gone to the ED or been readmitted to the hospital since being discharged home _____

2. **Personalized Nutrition Plan follow up:**

☐ Are you following the dietary recommendations we discussed at discharge? Yes ___ No____ Comment_____
☐ Do you have any questions about nutrition or the diet you are on? Yes ___ No____ Comment_____
☐ Do you have any questions about the nutrition education handouts? Yes ___ No____ Comment_____

3. **Medications concerns**

☐ Do you have any concerns about medications or prescriptions that I can talk to your nurse or doctor about? Yes ___ No____ Comment_____

4. **Discharge Instructions Concerns**

☐ Do you have any questions about your discharge instructions? "I will answer those questions to my best ability. If they are out of my scope (medicals, blood work, test results) I will have someone who knows that information and get back to you".

☐ Inform the TOC Team

5. **Appointments**

☐ Have you met with your PCP yet? Yes ___ No____ Comment_____

☐ If no, what are the barriers? _____

☐ Do you need assistance getting this appointment made? Yes ___ No____ Comment_____

☐ Do you have transportation to the appointment? Yes ___ No____ Comment_____

6. **Food Access/Security:**

☐ Have there been any changes made to your access to food, shopping, cooking, preparation? Yes ___ No____ Comment_____

☐ Have there been any changes in being able to afford food? Yes ___ No____ Comment_____

☐ Do you need information of local food banks or soup kitchens? Yes ___ No____ Comment_____

☐ Do you have transportation to the store? Yes ___ No____ Comment_____

* TOC RD may need to help contact community programs or provide additional handouts

Notes:

7. **Patient Satisfaction: *(if applicable)***

☐ How has the program helped you?

☐ Was there any other information you expected to gain from the program?

8. **Follow up phone call appointment (within 14 days from today, week 3 post-discharge)**

☐ "Let's book that next follow-up phone call, is the number I called still the best phone number: Yes__ No _____

☐ Date:_____ (Within 7-days from today) Time: _____

☐ "You can expect to hear from me then. Thank you and have a good day."

9. **Documentation:**

☐ Document in the EMR Interaction #2 (Notes > Nutrition Note)

☐ Document the answers in the encrypted Excel sheet

Process Evaluation Questionnaire:

☐ Describe any staff related or operational related barriers:

☐ Were interpreter services available?
☐ What went well?
☐ What did not go well?
☐ How can the process be improved?

Interaction #3. Phone call (Week 3) Intervention Activities Checklist

Adapted: Discharge Phone Call (Patient at home, with services or self-care) with permission from case management at LGH

Unique Identifier _____
DATE:_____ Start TIME: _____ End TIME: _____

☐ **Add to interaction Log**

Primary Investigator to complete with participant
Introduction: "Hi, my name is _____ the TOC RD from LGH who met with you prior to discharge. I would like to ask you a few questions about your nutrition is that OK?"

1. **Readmission Data**

☐ Primary Investigator to collect from medical record
☐ Was the patient readmitted to the hospital within 30-days? _____
☐ IF YES, document the chief complaint, and ED or admissions diagnoses.
☐ Confirm with the patient if they had gone to the ED or been readmitted to the hospital since being discharged home _____

2. **Personalized Nutrition Plan follow up:**

☐ Are you following the dietary recommendations we discussed at discharge? Yes ___ No____ Comment_____
☐ Do you have any questions about nutrition or the diet you are on? Yes ___ No____ Comment_____
☐ Do you have any questions about the nutrition education handouts? Yes ___ No____ Comment_____

3. **Medications concerns**

☐ Do you have any concerns about medications or prescriptions that I can talk to your nurse or doctor about? Yes ___ No____ Comment_____

4. **Discharge Instructions Concerns**

☐ Do you have any questions about your discharge instructions? "I will answer those questions to my best ability. If they are out of my scope (medicals, blood work, test results) I will have someone who knows that information and get back to you".
☐ Inform the TOC Team.

5. Appointments

☐ Have you met with your PCP yet? Yes ___ No____ Comment_____

☐ If no, what are the barriers? _____

☐ Do you need assistance getting this appointment made? Yes ___ No____ Comment_____

☐ Do you have transportation to the appointment? Yes ___ No____ Comment_____

6. Food Access/Security:

☐ Have there been any changes made to your access to food, shopping, cooking, preparation? Yes ___ No____ Comment_____

☐ Have there been any changes in being able to afford food? Yes ___ No____ Comment_____

☐ Do you need information of local food banks or soup kitchens? Yes ___ No____ Comment_____

☐ Do you have transportation to the store? Yes ___ No____ Comment_____

* TOC RD may need to help contact community programs or provide additional handouts

Notes:

7. Patient Satisfaction: *(if applicable)*

☐ How has the program helped you?

☐ Was there any other information you expected to gain from the program?

8. Follow up phone call appointment (within 14 days from today, week 5 post-discharge)

☐ "Let's book that next follow-up phone call, is the number I called still the best phone number: Yes__ No _____

☐ Date:_____ (Within 7-days from today) Time: _____

☐ "You can expect to hear from me then. Thank you and have a good day."

9. Documentation:

☐ Document in the EMR Interaction #3 (Notes > Nutrition Note)

☐ Document the answers in the encrypted Excel sheet

Process Evaluation Questionnaire:

☐ Describe any staff related or operational related barriers:

☐ Were interpreter services available?

☐ What went well?

☐ What did not go well?

☐ How can the process be improved?

Interaction #4. Phone call (Week 5) Intervention Activities Checklist

Unique Identifier _____
DATE:_____ Start TIME: _____ End TIME: _____
☐ **Add to interaction Log**

Primary Investigator to complete with participant
Introduction: "Hi, my name is _____ the TOC RD from LGH who met with you prior to discharge. I would like to ask you a few questions about your nutrition is that OK?"

1. **Discuss Readmission Data:**

☐ Primary Investigator to collect from medical record
☐ Was the patient readmitted to the hospital within 30-days? _____
☐ IF YES, document the chief complaint, and ED or admissions diagnosis.
☐ Confirm with the patient if they had gone to the ED or been readmitted to the hospital since being discharged home _____

2. **Discuss Food Access:**

☐ Who do you live with? □ Alone □ With family □ Care giver □ Other_____
☐ Are they present for the interview? Yes_____ No_____

3. **Standing Scale Weight:**

☐ Ask participant to measure their weight using the Etekcity Body Weight scale provided
☐ Measure weight _____ kg _____ pounds

4. **Participant Self-reported POST PG-SGA (Page 1 only)**

☐ Answer Questions 1-4 following the script and score appropriately
☐ Record patient reported weight from the standing scale

5. **Provide Education and individualized nutrition plan**

☐ Do you have any questions about the nutrition education handouts? Yes ___ No____ Comment_____
☐ Would they like any additional handouts mailed to them

6. **Outpatient Nutrition Referral**

☐ "Would you like to see an outpatient dietitian going forward"?
☐ Nutrition referral? Yes_____ no _____ Comment _____
☐ May I contact the PCP for update and to request referral _____

7. **Offer community Support**

☐ Provide a list of food banks, soup kitchens, other community resources

8. **Medications concerns**

□ Do you have any other health questions since being discharged from the hospital? "I will answer those questions to my best ability. If they are out of my scope (medicals, blood work, test results) I will have someone who knows that information and get back to you".
□ Inform the TOC Team.

9. Debrief:

☐ Debrief Reviewed with the patient (See Debriefing attachment and script)
☐ Debrief preference (Verbal, mailed, or emailed) _____

10. Patient Satisfaction:

□ On a scale of 1 – 10, 1 being poor, 10 being good - how satisfied are you with the program?
□ How has the program helped you?
□ Was there any other information you expected to gain from the program?
□ Is there any feedback or comments you would like to provide? Yes_____ No _____
□ Comment(s) _____

11. Coordinate with the medical staff as needed (Internal and External)

☐ Contact the PCP to discuss nutrition, contacted Community Programs, other _____

12. Documentation:

☐ Document in the encrypted data collection sheet
☐ Document in the EMR Interaction #4 (Notes > Nutrition Note)

Process Evaluation Questionnaire:

☐ Describe any staff related or operational related barriers:
☐ Were interpreter services available?
☐ What went well?
☐ What did not go well?
☐ How can the process be improved?

Process Evaluation: Completed Intervention Activities Checklist

Process Evaluation Tool #1: Intervention Activities Checklist				
Description: Intervention activities, barriers and Solutions found when implementing the 5-week TOC nutrition intervention with malnourished participants (n=21)				
Intervention Component – Patient Interactions	**Planned Intervention Activity**	**Actual Activity**	**Barrier(s)**	**Solution(s)**
Study time frame 6-months. TOC nutrition intervention time frame	May 1, 2021 – November 30, 2021 5-weeks per patient	July 27, 2021 – January 31, 2021 5-weeks for most patients	Hospital approval was delayed, IRB Approval pending the hospital support letter.	Emailed hospital leadership staff weekly, Dr. Dodhia got involved
Intervention Checklist **Interaction #1 Initial Interview**				
Recruit patients	Clinical RDs to document and communicate patients with malnutrition criteria on a spreadsheet for the TOC RD to review every day.	Clinical RDs to communicate most patients who meet malnutrition criteria on a spreadsheet. The TOC RD reviewed this multiple times a day.	Rare minor miscommunications, RDs were good about letting me know as soon as they identified someone	Continuous documenting on the spreadsheet.
Chart Review	TOC RD to review the medical record for inclusion criteria. Write-down the clinical RDs recommendations to include in the TOC personalized nutrition plan.	Inclusion criteria was easy to identify, the discharge plan was not. Recommendations related to their acute plan (a tube feed) changed, which they were not going home on.	Missing clear and timely documentation of discharge planning Change of nutrition recommendation due to clinical changes	Improve discharge planning documentation. A plan was developed usually during the PGSGA (See below under PG-SGA)
Determine the discharge plan with the medical staff	Review the case management notes for discharge planning to determine if they qualify.	Patients qualify for the study if they are discharging home, the TOC RD was often unaware of the discharge plan	Miss communication among the medical team, RD finding out the discharge plan too late, often missing patients who would have	The case management team revealed there was a spreadsheet being used (RDs did not have

			qualified. November – January accelerated discharge planning in place at LGH.	access) shared with the TOD RD after the study.
Recruitment patient visit	Visit the patient as soon as the discharge plan was clear (discharging home) and they qualified for the study	Visits were rushed or missed. Patients were hard to visit for the time needed to build rapport and describe the study	medical staff visiting, test and procedures or simply he patient not being "up to it" Unable to visit the patients before discharge- lack of time, multiple patients leaving, scheduling commitments, Pandemic *see description for recruitment details, Interpreter services	Multiple visits attempt to capture the patient at a convenient time. Advanced notice to the TOC RD to see them with enough time. Discussed with RN team.
Consent Form Review	During the recruitment visit, build rapport and review the consent form, TOC RD to offer to come back (in about an hour) when they had a chance to review it.	Visit the patient to discuss the study usually with the medical staff (when they were available to serve as a witness) further causing a forced or rushed environment	Patients refused for several reasons	Adapted the consent form mid-way through the study for it to be easier to present and understand – Approved by IRB
Consent form signed with a witness	Patient and witness to sign the consent form.	A witness was available to sign as intended	Challenging to align the time to have the witness available and complete the intervention in time before discharge	Informed nurses earlier, I will need the RNs help, call me directly. Many did not call back.
Copy of consent form	Made a copy for the patient and placed in the medical record	Copies were made as intended	Minimal barriers	No changes made
Present the Scale, Provide written instruction, Take their weight	Present the body weight scale the patient keeps, and provide a copy of the instructions,	The scale was presented as intended All patients were	Minimal barriers	No changes made

	take their standing scale weight	able to take their weight before and after		
Food Access Questions	Ask who they live with, if they have access to food, trouble coking, shopping, or preparing meals	Patients answered these questions with out difficulty	Minimal barriers	No changes made
Provide the Meals and Food Bank Handout	Offer food resources handout	Offered the handout as anticipated	Many participants did not feel the need to take this handout, they knew about food banks, or they lived elsewhere. Others needed help.	Investigated food banks in another town for one patient. Set up Meals on Wheels , meal program referrals.
Obtain PCP information	Obtain the patient's PCP information	Obtained information for some	Some patients did not want me contacting them, did not have one, or did not share the information.	Reiterate the importance of communication food and nutrition status with providers
Complete the PRE PG-SGA	Complete all 4 sections	Complete all 4 sections	Manny of the questions would prompt discussion, explanation, seeking further advice, this step took additional time	Opportunity for educating and goal setting. Similar approach to motivational interviewing. The primary investigator took notes on the PGSGA for record and documented in the spreadsheet.
Nutrition Education & Individualized plan	Discuss the nutrition education the patient was interested in	Often declined, or already received by the Clinical RD during admission	Lack of interest Already heard it Lack of time to review the handouts in depth	Discussed patient concerns, referred to the handouts provided to set goals
Goal Setting	RD to document the goal in the patient's chart that will print in their discharge packet to take	RD hand wrote the goal during the meeting on the handout provided	Discharge packets were often already printed by nursing by the time the RD completed the intervention	RD hand wrote the goal during the meeting on the handout provided to the patient.

	home			
Set an appointment date	To retain the patient the RD set the first phone call date and time and wrote it on their handout.	Patients would often request a random call in the next week after they have appointments and schedules figured out	The RD would miss the 3-day window because the patient did not have an appointment and would not answer (3 out of 13 patients)	Encouraged the importance of establishing a first phone call appointment
Document in the medical record	Documented the interaction in the patient's EMR under "Notes".	Documented as anticipated	No barriers	No changes made
Interaction #2 Phone Call	Call the patient within 3 days from discharge	Call the patient within the 1st week of discharge	Adequate time, time management. Patients scheduling, RDs scheduling, meetings, caught up recruiting or providing the intervention to other patients.	Better time management to fit everything into the schedule. Phone calls made from home, not the hospital if needed.
Interaction #2 Phone Call	Call within the 3rd week from discharge	Most calls were made within the third week	Some patients did not answer which pushed out the phone calls	Attempted to call multiple times
Confirm readmission	Confirm if the patient was readmitted < 30 days	Confirmed as anticipated	One person went to the ED but did not tell the primary investigator.	Chart reviews in addition to confirmation with patients.
Follow up on goals set	Are they following up on the goals set at the hospital	Discussed as anticipated	No barriers to answering this question	No changes made
Nutrition Education	Do they have any questions about the nutrition handouts sent home	Discussed as anticipated	No barriers	Additional handouts were mailed to the patient if they had requests
Address medication and medical concerns	Do you have any concerns about medications or prescriptions that I can talk to your nurse or doctor about	Discussed as anticipated	No barriers	No changes made
Involve integrative care	Contact the TOC pharmacist with concerns	Contacted the TIC pharmacist who did not get back to me but weeks later	Medical staff are busy	Continue to call and email staff

Address medical concerns	Do you have any questions about your discharge instructions I can direct to the medical team	Discussed as anticipated	No barriers	No changes made
Involve the medical team	Contact the MD or PCP with concerns	Contacted and left messages	Many MDs had RNs returning calls	No changes made
Confirm appointments	Have they met with their PCP? If no, what are the barriers? Do they need assistance getting appointments? Do they have transportation	Many patients needed help here	Patients need help getting to appointments, trouble getting through to doctor's offices	Helped to make phone calls and set up appointments. Could not help setup transportation
Confirm food access and security	Changes to food access, affordability, do they need additional resources, do they have transportation	Discussed as anticipated	No barriers	No changes made
Book next appointment	Schedule a time and date for the final intervention	Scheduled dates and time as anticipated	Those who do not book or answer at appointments	Multiple calls made, accommodated participant availability, RD moved other commitments
Document in the medical record	Documented the interaction in the patient's EMR under "Notes".	Documented as anticipated	No barriers	No changes made
Interaction #4 - Final Phone call	Call within the 5th week from discharge	Calls were made during the 6th or 7th week	Limited patient availability, no answers, holidays, RD scheduling	Multiple calls made, accommodated participant availability, RD moved other commitments
PG-SGA	Complete all four sections	Complete all four sections	Manny of the questions would prompt discussion, explanation, seeking further advice	Addressed patients concerns as needed
Confirm food	Changes to food	Discussed as	No barriers	No changes

access and security	access, affordability, do they need additional resources, do they have transportation	anticipated		made
Nutrition Education	Provide final nutrition education via discussion or mailed	Provide final nutrition education via discussion or mailed	Some patients were resisted and preferred to search on the internet	Recommended reliable websites
Outpatient nutrition referral	Ask the patient if they would like a referral Provide contact number or facilitate the appointment	Asked the patient if they would like a referral Information was provided or the appropriate referral was made	No barriers to this step	Offered contact numbers for those who want to call
Address medical concerns	Do you have any questions about your discharge instructions I can direct to the medical team	Discussed as anticipated	No barriers	No changes made
Involve the medical team	Contact the MD or PCP with concerns	Contacted and left messages	Many MDs had RNs returning calls	No changes made
Patient Survey	Ask the program feedback questions, Sale of 1 – 10	Discussed as anticipated	No barriers	No changes made
Debrief Letter	Read the debrief with the patient Offer to mail a letter or email them	Discussed as anticipated	No barriers	No changes made
Document in the medical record	Documented the interaction in the patient's EMR under "Notes".	Documented as anticipated	No barriers	No changes made

Process Evaluation Tool#2: Interaction Log

PID	D/C interview Date #1	Time Frame	Time (minutes)	D/C Date	Follow up #2 phone call (within 1 week post-d/c DATE & TIME	TIME Frame	TIME (minutes)	Follow up #3 phone call (within 3 weeks post-d/c DATE & TIME	TIME Frame	TIME (minutes)	Final phone call #4 (week 5) DATE	TIME Frame	Time (minutes)
PID1	7/29/2021 *with interpreter	2:30 -3:10	40		8/4/21, 8/11/21	unavailable until 5:10 - call lasted 10 mins disconnected, because it was not a good time for Cinthia. 8/11 called back (20 minutes est) to finish the initial interview	20	8/19/2021	6 PM requested call back at 6:20, call lasted until 6:35 and we were disconnected, no answer at call back (40 mins total)	40	No answer on 9/9 and again on 9/8, answer and interview complete on 9/15/21	5:00 - 5:40	40
PID6	8/8/2021	~ 10:30 - 11:15	45		8/11/2021	letter with food bank info and additional diet education, took an additional 15 minutes	20	8/25/2021	1:15 - 1:25 PM	10	9/8/2021	2:45 - 3:00	15
PID7	8/9/2021	~ 11: 45 - 12:30	45		8/13/2021	~ 11:04 - 11:15	10	8/25/2021	11:05 - 11:25	20	9/7/2021	11:05 - 11:15	10
PID8	8/16/2021 *with interpreter	~ 2:45 - 3:30	45		8/19/2021	12:00 - 12:15	15	8/30/2021 w/ interpreter services AMN	12:05 -12:25	20	9/15/21 W/interpreter services AMN	12:05 - 12:30	25
PID9	8/18/2021	11:30 - 12:15	45		8/20/2021	11:15 - 11:30	15	9/1/2021	11:15 - 11:25	10	9/27/2021	12:00 - 12:15	10 or 15
PID10	8/19/2021	12:45 - 1:15	45		8/23/2021	2:00 - 2:15	15	8/30/2021	2:00				
PID12	8/23/2021	12:10 - 12:30	20		8/26 & 8/30	2:45 PM no answer, 9:30 AM no answer. 12:30 PM asked to reschedule to 8/31 afternoon. 12:20 - 12:25 PM.	5	9/7/2021	12:20 - 12:25	5	9/21/2021	12:30 - 12:40	10
PID13	8/23/2021	3:45- 4:00	45		8/26/2021	2:05:00 PM - 2:21	15	9/1/2021	~ 2:00 - 2:10	10	9/21/2021	2:00 - 2:20	20
PID14	8/28/2019	12:00 - 1:00	60		9/1/2021, 9/3, 9/8 no answer	11/15/21 no answer again							
PID15	8/28/2021	11:05 - 11:55	50		8/31 no answer, 9/1 no answer, 9/3	11:10 - 11:25	15	Readmitted - attempted to call pt 11/15/21 to obtain final data set, the pt was unable to answer					
PID22	9/8/2021	12:10 - 12:40	30		EXPIRED								
PID23	9/23/2021	11:10 - 12:00	50		9/27/2021	2:40 - 3:00	20	10/6/2021	10:15 - 10:25	10	10/20/2021	1:18 - 1:55	35
PID29	10/8/2021	2:25 - 3:30	55		10/15/2021	9:30 - 9:35	5-10 mins	10/25/2021	2:25 - 2:35	5- 10 mins	11/5/2021	11:05-11:25	20
PID33	10/13/2021	10:35-11:00	30		Attempted x 3 10/20, 10/25, no answer			missed			11/15/2021	2:50:00 AM-3:25 call, 3:40 paperwork and calls	50
PID34	10/13/2021	11:20 - 11:40	20		Health decline D/C to rehab, not home - readmit 11/15 does not meet criteria								
PID36	10/14/2002	10:15 - 11:00	45		Unsafe d/c home 10/25, admitted 10/27 - no chance to call - transferred to another tertiary care facility - unable to follow up to complete data set								
PID38	10/18/2021	12:54 - 1:20	25		10/21/2021	3:00 - 3:05	5	Readmitted 10/25 before #3 call - called 11/15/21 for final data; unable to talk, feeling unwell					
PID39	11/4/2021	12:51 - 1:30	45		12-Nov	2:15-2:20	5	11/17/2021 *need to recall	10:10- 10:12	2	12/20/2021	3:40 - 4:00	20
PID40	10/27/2021	3:20 - 4:10	30		11/3/2021	2:00 - 2:25	25	11/10/2021	10:23 -10:45	20	11/26/2021	3:00 - 3:32	32
PID42	10/29/2021	9:30- 10:15	45		11/6/2021	9:30:00 AM -9:38	10	11/12/2021	2:40-2:50	10	12/7/2021	11:40 - 11:55	15
PID44	11/4/2021	12:05 - 12:35	30		15-Nov	1:45 - 2:05	20	READMITTED 11/19					

Process Evaluation Tool #3: Process Evaluation Questionnaire

Process Evaluation Questionnaire:

- ☐ Describe any staff related or operational related barriers:
- ☐ Were interpreter services available?
- ☐ What went well?
- ☐ What did not go well?
- ☐ How can the process be improved?

Appendix C. Participant Consent Form (Staff)

Lawrence General Hospital Health Care Workers: Informed Consent Form Document

Hi, my name is Nina Rocca I am a clinical dietitian at Lawrence General Hospital (LGH) and a doctoral candidate for the Doctorate in Clinical Nutrition program at the University of North Florida. LGH has been supporting a mix-methods doctoral project that focuses on a transitions of care nutrition intervention that may support malnourished patients admitted to the hospital, who are discharged home.

Interview Purpose: As part of the qualitative piece of this study I will be interviewing the staff at LGH to help identify any barriers to the implementation of the study and enrolling patients.

Participants: I am looking for LGH health care workers who have had a role in the malnutrition study working directly with patients or being involved in patient's discharge planning, such as registered nurses, clinical care coodinators, case managers, and registered dietitians.

Procedures: If you choose to participate, you will be asked to participate in an interview conducted by the primary investigator. The interview will take approximately 15 – 20 minutes of your time. We will practice social distancing and COVID-19 precautions as the interview will be condicted via Zoom. Participation is vouluntary and there are no penalties if you decide not to participate, choose not to answer a certain question, or withdraw your particiaption from the study. There are no perceivable risks to participating in this interivew. The information collected is confidential and will be used to improve practices at LGH. Information will be included in the final discussion of the research paper. None of your personal information will be used in the write-up, only your job title (nurse, case manager, dietitian). Your choice to participate or not participate in the interview will not have any impact on your position at LGH. All interview information and consent forms will be stored in a locked cabinet in the locked office. You will receive a copy of this consent form.

Compensation: Once the interview is complete you will receive a ten-dollar credit towards the Starbucks coffee shop at the Merrimack Café on the second floor at LGH. (The credit is not an official Starbucks giftcard).

If you have questions about your rights as a research participant or if you would like to contact someone about this research, please contact the chair of the UNF Institutional Review board by calling (904) 620-2498 or emailing irb@unf.edu. You may also report any concerns to the physician overseeing the study Dr. Eduardo Haddad.

Thank You for considering participation in the study.

Sincerely,

Nina

Contacts:

Nina G Rocca, RD	Eduardo D. Haddad, MD
Phone:	Phone:
Email:	Email:

_____, (Print Name) verbally attested that She/He is at least 18 years of age and agrees to take part in this research study.

Primary Investigator Printed Name: _____

Signature: _____ Date: _____

Appendix D. Staff Interview Questionnaire

Lawrence General Hospital: Health Care Workers Interview Questionnaire

Purpose: The purpose of this interview is to gather information from the hospital staff that can help to improve processes. A transition of care malnutrition study was implemented at the hospital starting in summer of 2021. Very few patients were included in the study. My goal is to identify barriers that have prevented including more patients in the study who were at risk. This information can help to improve the future process of seeing malnourished patients prior to discharging from the hospital to home.

1. A Malnutrition Study SBAR was discussed with the nursing managers and should have been shared with staff. Can you tell me about the SBAR?

2. What could have helped the staff to know more about the study and the process with patients?

3. The dietitian would try to see patients prior to discharge by speaking with the case manager or nurse about their plan. The patient would often be discharged prior to the dietitian seeing them to discuss transitions of care. Can you describe an easier way to involve the dietitian prior to discharge, to support them in talking to the patient before discharge?

4. What could have helped improve communication about patient's discharge planning between you, or other staff and the dietitian?

5. The transitions of care intervention takes about 45 minutes per patient. Can you tell me about any barriers in the discharge process that could inhibit the intervention? Can you tell me about any suggestions that may help to facilitate the intervention?

6. From your perspective, what are the barriers to having the dietitian see the patient before discharging?

7. Do you have any suggestions for how the medical team can be more involved with malnutrition and treating malnourished patients?

Thank you for your time. This concludes the interview.

Appendix E. Qualitative Staff Interviews Codebook

Code	Mnemonic Code	Definition
Staff communication regarding the study	SBAR	The SBAR tool was created to inform the nurses and medical staff about the study. The purpose of the deductive code was to identify if the SBAR was appropriate communicated with the staff
Nurse to Nurse Communication	RN-RNCOM	Discussion that related to communication among nurses and nurse managers
Nurse and Dietitian communication	RN-RDCOM	Discussion that related communication among nurses and dietitians
Care coordinators/ Case management communication	CM-RDCOM	Discussion that related communication among case managers and dietitians
MD communications	MD-COM	Discussion that related communication with MDs
Malnutrition Screening	MALNSCREEN	Discussion that pertains to screening process for malnourished patients
Documentation	DOCUMENT	Any discussion related to documenting in the Electronic Medical System Electronic communications Communication being done through the documenting
Electronic or written communications	COMMUNICATE	Communication suggestions; emails, discussions/ meetings, flyers, rounds
Communications using the EMR	eCOM	Areas to document in the EMR that an enhance communication among staff ****New code identified*** ***Often connected with the documentation and communication codes***
Time Management	TIME	Discussion that related to time spent or scheduling, admitting and discharging and the intervention
Patient Concerns	PATIENT	Learning concerns, interest, information pertaining to patient perspective & experience
Pandemic Concerns	PANDEMIC	Pandemic related concerns, COVID, discharging challenges, visiting patient challenges, communication challenges – related to the pandemic ***Crossed with many codes***
Comments pertaining to all staff	ALL STAFF	When comments were related to all staff not only one discipline, or a specific discipline to discipline comment
Scope of practice	SCOPE	When the staff would question or suggest actions that could improve identifying or treating malnutrition, but it was unclear by who or how, this code was assigned *****New code identified***

Appendix F. Participant Consent Form (Patients)

Informed Consent Summary and Signature Authorization for Nutritional Study Participation

- Nina Rocca dietitian at Lawrence General Hospital and student at the University of North Florida.
- She developed a nutrition program to help patients with Malnutrition.
- You meet criteria to be included in this program if you are interested in participating
- Participation includes:
    - Participating in a nutrition interview with Nina before you are discharged and reviewing nutrition handouts
    - Taking your weight on a standing scale
    - 3 brief follow-up phone call for 3 – 4 weeks after you are discharged to check-in
- A standing scale will be provided to you at no cost and does not need to be returned
- Participating in the program is free and does not impact any of your medical care.
- Nina keeps your information secure and following HIPPA guidelines.
- Dr. Eduardo Haddad, is the physician who is overseeing the project and can be contacted with any concerns.
- A detailed copy of the Informed Consent has been added to your medical record and is available to you at any time; copy to be provided upon discharge, if not requested prior to discharge.

Thank you for your consideration.

Sincerely,

Nina G Rocca MS, RD, LDN

Contacts:

Nina G Rocca, RD	Eduardo D. Haddad, MD
Phone:	Phone:
Email:	Email:

I (print name)_____ attest that I am at least 18 years of age and agree to take part in this research study.

Signature: _____ Date: _____ Time: _____

Witness Name: _____Credentials:_____

Date: _____ Time: _____

If you have questions about your rights as a research participant or if you would like to contact someone about a research-related injury, please contact the chair of the UNF Institutional Review board by calling (904) 620-2498 or emailing irb@unf.edu.

Informed Consent Detailed Information

Hello, my name is Nina Rocca and I am a doctoral student at the University of North Florida and Registered Dietitian at Lawrence General Hospital. I am the primary investigator conducting a research study on patients older than 18 years-old, with malnutrition, who are being discharged home. The project aim is to improve communication with the patient's Primary Care Physician (PCP) regarding their nutrition status, and nutrition follow-up post-discharge. The goal of the project is to reduce hospital readmissions, that are otherwise preventable, and to improve patient's nutrition status like their weight and eating patterns.

If you take part in this study, you will interview with me about your nutrition prior to discharge and participate in three interview phone calls to your home or cell phone after you have been discharged from the hospital. You will receive a scale to take home. We will take your weight during hospitalization and then you will take the scale home with you so you can take your weight again during the last interview call. We expect that the participation in this study will take about 5 weeks, with each interview phone calls taking less than 15 minutes each. Your information will be kept confidential and follow HIPPA compliance. Only authorized personal will have access to the information shared in this study.

Obtaining a scale and nutrition education and follow-up is a direct benefit to participating in this study, as this service is not yet offered to all hospitalized patients. There is no direct compensation or payment, however. Other professionals may benefit from the findings of this study and use the findings to improve the field of nutrition and dietetics.

Participation in the study is completely voluntary, and you can drop out of the program during any time. Your care at Lawrence General Hospital, future referrals or outpatient care will not be affected if you choose not to participate or if you drop out of the study. There are no penalties to deciding not to participate, not answer any questions or withdraw your participation. Additionally, there are no foreseeable risks for participating in this study.

If you have any questions or concerns about this project, please feel free to reach out to myself or Dr. Eduardo Haddad, Chief of Medical Affairs who has been approved by the LGH Medical Executive Committee to provide oversight of the research. A copy of this form will be provided to you.

Patient Opt-Out: Complete by the primary investigator, *only if the patient ops-out*

I am choosing to stop participating in the study. My information will no longer be used in the study. I will no longer be contacted by the primary investigator. Choosing to opt out will not affect the care I receive at Lawrence General Hospital or any future referrals and care. Verbal via phone □ YES □ NO

Signature: _____ Date: _____ Time: _____

Appendix G. Participants Debrief Handout (Patients)

Transitions of Care Nutrition Program - Debriefing Letter

Dear Participant,

The last phone follow-up you had with the transitions of care dietitians was the final interaction we will have regarding the transitions of care study you originally consented to.

What was tested? Your nutrition status was evaluated during this study by measuring your body weight and conducting patient interviews to collect data over the 5-week intervention time-period. The primary investigator will be looking at changes in your weight, food intake pattern and other health related questions. Changes from before to after the study will be assessed.

Primary aims of the study: The two primary aims of the study were to assess if a case management role can be adapted to focus on nutrition and second, to assess if nutrition outcomes improved and hospital readmissions were lower over the time of the intervention, compared to another patient group.

Why was this study important? Previous studies have investigated the importance of including nutrition as part of transitions of care to improve patient's health and reduce hospital readmissions. This study further investigated the importance of integrating nutrition information as part of transitions of care to improve patient's health outcomes and to reduce hospital readmission. The goal is to further help patients, especially those with malnutrition, to improve their overall health and decrease disease risk.

What if you want to know about the outcomes of the study? If you are interested in learning more about the outcomes of this study, you can directly contact the primary investigator for the final research report.

Contact information:

Nina G Rocca
Clinical Dietitians
Lawrence General Hospital
1-978-683-4000 Extension x2588

This study was conducted by the primary investigator Nina G Rocca MS, RDN, LDN with support from the dissertation committee, specific contact information is available upon request.

If you have questions or concerns about your rights as a participant in this study, please contact the UNF IRB at 1-904-620-2498.

Thank you for your participation in this study.

Appendix H. Participant Handouts

Etekcity© Body Weight Scale Instructions

ETEKCITY

Digital Body Weight Scale
EB4074C

QUICK START GUIDE

SPECIFICATIONS

Weight Capacity	400 lb / 180 kg
Increments	0.2 lb / 0.1 kg
Weight Units	lb / kg
Platform	Tempered glass
Dimensions	11.8 x 11.8 x 0.95 in / 30 x 30 x 2.4 cm
Battery	2 x 1.5V AAA batteries
Auto-Off	15 seconds

PACKAGE CONTENTS

1 x Digital Body Weight Scale
2 x 1.5V AAA Batteries (Pre-Installed)
1 x Measuring Tape
1 x Quick Start Guide

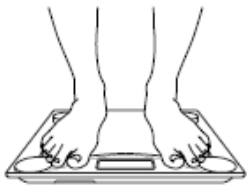
USING YOUR SCALE

Note: *Before first use, remove the plastic strip from the battery compartment.*

1. Place scale on a hard, flat surface (not a carpet or mat).
2. Step onto the scale. The scale will automatically turn on and start measuring your weight.
3. Stand on the scale until the digits on the display flash 3 times, showing your final measurement.

TIPS

- To switch between pounds (lb) and kilograms (kg), press the unit switching button on the underside of the scale.
- If your scale has been moved or flipped upside down, it will need to be calibrated.
    1. Step on the scale until digits appear on the display, then step off.
    2. The scale will show "[" while calibrating, then "0.0" when complete.



ONLINE MANUAL

Need more help? Scan here to view the manual for more information.

You can also type the following link in a web browser:
www.etekcity.com/support/manual/model/eb4074c

WARRANTY

Etekcity Corporation warrants all products to be of the highest quality in material, craftsmanship, and service, effective from the date of purchase to the end of the warranty period. Warranty lengths may vary between product categories.

Scan the QR code to register your product and extend your 1-year warranty by an additional year.

CUSTOMER SUPPORT

Etekcity Corporation
1202 N. Miller St., Suite A
Anaheim, CA 92806

Email: support@etekcity.com
Toll-Free: (855) 686-3835

Support Hours
Monday-Friday
9:00 am-5:00 pm PST/PDT

*Please have your invoice and order ID ready before contacting Customer Support.

Scored Patient Generated Subjective Global Assessment (PG-SGA) (Page 1)

Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History: Boxes 1 - 4 are designed to be completed by the patient.
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

Patient Identification Information

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____ pounds
I am about _____ feet _____ inches tall

One month ago I weighed about _____ pounds
Six months ago I weighed about _____ pounds

During the past two weeks my weight has:

☐ decreased (1) ☐ not changed (0) ☐ increased (0)

Box 1 ☐

2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as

- ☐ unchanged (0)
- ☐ more than usual (0)
- ☐ less than usual (1)

I am now taking

- ☐ *normal food* but less than normal amount (1)
- ☐ little solid food (2)
- ☐ only liquids (3)
- ☐ only nutritional supplements (3)
- ☐ very little of anything (4)
- ☐ only tube feedings or only nutrition by vein (0)

Box 2 ☐

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)

- ☐ no problems eating (0)
- ☐ no appetite, just did not feel like eating (3)
- ☐ nausea (1)
- ☐ constipation (1)
- ☐ mouth sores (2)
- ☐ things taste funny or have no taste (1)
- ☐ problems swallowing (2)
- ☐ pain; where? (3) _____
- ☐ other (1)** _____
- ☐ vomiting (3)
- ☐ diarrhea (3)
- ☐ dry mouth (1)
- ☐ smells bother me (1)
- ☐ feel full quickly (1)
- ☐ fatigue (1)

**Examples: depression, money, or dental problems

Box 3 ☐

4. Activities and Function:
Over the past month, I would generally rate my activity as:

- ☐ normal with no limitations (0)
- ☐ not my normal self, but able to be up and about with fairly normal activities (1)
- ☐ not feeling up to most things, but in bed or chair less than half the day (2)
- ☐ able to do little activity and spend most of the day in bed or chair (3)
- ☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.

Additive Score of Boxes 1-4 ☐ **A**

email: faithotterymdphd@gmail.com or info@pt-global.org

Education Material: Nutrition Care Manual© Sample Handout

Academy of Nutrition and Dietetics

Client Name_____ Date_____

RDN/NDTR _____

Email_____ Phone _____

High-Calorie, High Protein Nutrition Therapy

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

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

Tips

Try to eat at least 6 meals and snacks each day

- Extra meals and snacks can help you get enough calories and protein.
- You may want to try high-calorie supplement drinks (made at home or bought at a store) periodically between meals to get more calories each day.
    - If you buy the drink at the store, read the label to look for products with 200-400 calories per serving.
    - If you make the drink at home, you can increase calories by adding protein ingredients such as nonfat milk, low-fat yogurt, nonfat milk powder, or protein powder.
- Enjoy snacks such as milkshakes, smoothies, pudding, ice cream, or custard.

Eat More Fat

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

Choose High-Protein Foods

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

Shopping Tips

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

Cooking Tips

- Make a high-protein milk recipe like the one below. The recipe can be prepared in advance and stored in the refrigerator until you are ready to drink it. Use this high-protein milk in recipes that call for milk or drink it as a beverage.
    - 1 cup whole milk
    - ¼ cup nonfat dry milk powder
- Add cheese sauce, butter, and sour cream to vegetable and potato dishes.
- Get extra calories by adding condensed milk, cream, butter, nut butters, and sweetener to hot cereals, mashed potato, pudding, and soups. Examples:
    - Prepare oatmeal with condensed milk, butter/nut butter, and brown sugar
    - Prepare mashed potatoes with cream, butter, and cheese
    - Prepare soup with cream and extra butter, or puree the soup with cream to make a bisque
    - Add cream to pudding mix or use pudding dry mix in cakes/baked goods
- Serve items with extra sauces. These contain additional calories:

Abbott© Supplemental Nutrition Order Form (For PCPs)

Abbott Nutrition®
PATIENT ASSISTANCE PROGRAM APPLICATION

Abbott Nutrition Patient Assistance Program
610 Crescent Executive Court, Suite 200, Lake Mary, FL 32746

Phone: 866-801-5657 **Fax:** 866-734-7353
Hours: Monday through Friday, 9:00am – 5:00pm ET

Abbott

APPLICATION CHECKLIST (Application will be delayed if all information is not received)

- ☐ **Prescriber AND Patient signature required**
- ☐ All information in required fields
- ☐ Proof of Income (includes, but not limited to: most recent copies of either 1040 form, W2, Paystub, SSA 1099 from previous year, Unemployment award letter)

PRESCRIBER INFORMATION (required)

Prescriber Name:		Specialty:	
Prescriber Address:	City:	State:	Zip Code:
Facility Name:		Contact Name:	
Phone #:		Fax #:	
Prescriber NPI# :		Prescriber Tax ID#:	

PATIENT INFORMATION (required)

Patient Name:	Date of Birth:	Caregiver Name:	
Phone#:	US Resident? ☐ Yes ☐ No	Gender ☐ M ☐ F	
Patient Address:	City:	State :	Zip Code:

PATIENT INSURANCE INFORMATION (Attach a copy of insurance cards, if available). CHECK HERE IF UNINSURED ☐

Primary Insurance:	Policy#:	Group #:	
Policy Holder's Name:	Policy Holder's Date of Birth:	Payer Phone #:	
Member ID#:	Group#:	PBM BIN#:	PCN#:
Secondary Insurance:	Policy#:	Group #:	
Policy Holder's Name:	Policy Holder's Date of Birth:	Payer Phone #:	

ADMINISTRATION METHOD AND QUANTITY (required)

◯ Tube or ◯ Oral Estimated Caloric Need of Patient (Daily): _____ % of Caloric Need to be Met by Product: _____%

DIAGNOSIS (required)

ICD 10 Diagnosis Code(s): _____ ICD 10 Description: _____

Please provide both a primary diagnosis code (i.e. Z91.011, K90.0, etc.) & the associated code description (i.e. Allergy to milk products, Celiac disease, etc.) that requires the need for nutrition therapy.

PRODUCT REQUESTED (required)

☐ Ensure Original	☐ PediaSure Peptide 1.0 Cal	☐ PediSure Harvest	☐ Ketonex-2	☐ EleCare
☐ Ensure Plus	☐ PediaSure Peptide 1.5 Cal	☐ Pulmocare	☐ Phenex-1	☐ EleCare Jr.
☐ Glucerna Shake	☐ Vital Peptide 1.5 Cal	☐ Suplena	☐ Phenex-2	☐ TwoCal
☐ Glucerna 1.0 Cal	☐ Vital 1.0 Cal	☐ Calcilo XD	☐ Pro-Phree	☐ Hi Cal
☐ Glucerna 1.2 Cal	☐ Vital 1.5 Cal	☐ Cyclinex-1	☐ Propimex-1	☐ Perative
☐ Glucerna 1.5 Cal	☐ Vital AF 1.2 Cal	☐ Cyclinex-2	☐ Propimex-2	☐ Promote
☐ Jevity 1.0 Cal	☐ Vital High Protein	☐ Glutarex-1	☐ ProViMin	☐ Promote with Fiber
☐ Jevity 1.2 Cal	☐ PediaSure Shake	☐ Glutarex-2	☐ RCF	
☐ Jevity 1.5 Cal	☐ PediaSure with Fiber	☐ Hominex-1	☐ Tyrex-1	
☐ Nepro with Carb Steady	☐ PediaSure 1.5 Cal	☐ Hominex-2	☐ Tyrex-2	
☐ Osmolite 1.0 Cal	☐ PediaSure 1.5 Cal w/ Fiber	☐ I-Valex-1	☐ Similac PM 60/40	
☐ Osmolite 1.2 Cal	☐ PediaSure Enteral 1.0 Cal	☐ I-Valex-2	☐ Pivot 1.5 Cal	
☐ Osmolite 1.5 Cal	☐ PediaSure Enteral 1.0 Cal w/ Fiber	☐ Ketonex-1		

Page 1 of 2

Abbott Nutrition®
PATIENT ASSISTANCE PROGRAM APPLICATION

Abbott Nutrition Patient Assistance Program
610 Crescent Executive Court, Suite 200, Lake Mary, FL 32746
Phone: 866-801-5657 **Fax:** 866-734-7353
Hours: Monday through Friday, 9:00am – 5:00pm ET

Abbott

PRESCRIBING CLINICIAN CERTIFICATION AND CONSENT (required)

1. **Authorization for Release of Health Information: By signing this form, I represent to the Abbott Nutrition Patient Assistance Program that I have obtained all necessary Federal and state authorizations and consents from my patient to allow me to release health information to the Abbott Nutrition Patient Assistance Program and its contracted third parties.**
2. **Physician/Care Coordinator Verification:** I verify that the information provided is current, complete and accurate to the best of my knowledge and certify that I am authorized to receive medications at the shipping location identified in this application. I verify that my State License is currently in good standing. I further certify that I will notify the Abbott Nutrition Patient Assistance Program (the "Program") in writing immediately if the status of my State License Number registration changes. If this applicant is eligible for the Program assistance, I understand that the Program will send the nutrition product directly to the patient's home unless I request that it be sent to my office for dispensing to the patient. The Program reserves the right to request additional information if needed and to change or discontinue the assistance at any time, without notice. By signing this form, I certify that I am prescribing the aforementioned medication for an individual participating in the Program. I acknowledge that I shall not seek reimbursement for any medication dispensed hereunder from any government program or third party insurer. I also understand that the applicant's acceptance by the Program is not made in exchange for any explicit or implicit agreement or understanding that Abbott Product will be used, purchased, leased, ordered, prescribed, recommended, or arranged for or provided formulary or other preferential or qualifying status. I understand that I may not delegate signature authority. I certify that treatment with this medication is medically necessary.

Prescribing Clinician Name (print):

Prescribing Clinician Signature (no stamped signatures): Date:

Notice to Health Care Providers and Insurers: This form of authorization may not comply with all applicable Federal and state laws governing disclosure of the applicant's information to the Program and its contracted third parties. The Program urges all entities disclosing information about the applicant to consult with legal counsel prior to relying on this form.

PATIENT CONSENT (certification and authorization to disclose information) (required)

Patient Name: Date of Birth:

Patient's Total Annual Household Income: $ Household Size (including patient):

(Attach the most current copies of income documentation for you and all dependent persons. See list of documents above in the Application Checklist Section.) OR check the box below to see if your income verification can be obtained electronically.

☐ I understand that that I am providing 'written instructions' to Abbott's PAP Administrator under the Fair Credit Reporting Act authorizing Abbott's PAP Administrator to obtain information from my credit profile or other information from Experian Health. I authorize Abbott's PAP Administrator to obtain such information solely to determine if I am financially eligible for the Abbott Nutrition Patient Assistance Program.

I understand that any assistance in the form of product at no cost is contingent upon my ability to meet the eligibility criteria for the Abbott Nutrition Patient Assistance Program ("Program"). In the event that I am eligible for patient assistance, I acknowledge that this assistance is temporary and that I may be asked to reapply at designated intervals by the Program. I also understand that the Program assistance may change or be discontinued at any time without any notice to me. I agree that I will not seek reimbursement for any products dispensed under the Program from any government program or third party insurer. I certify that the information I have provided in this form is accurate and complete. I understand that by completing this form I am not guaranteed eligibility to receive the product from the Program. I agree that I will notify the Program if my insurance or financial situation changes. The Program will use my information for purposes of determining patient assistance eligibility. I understand that I need to give my authorization to take part in the Program (should I qualify). I know I may cancel this authorization at any time by writing to the Abbott Nutrition Patient Assistance Program at 610 Crescent Executive Court, Suite 200, Lake Mary, FL 32746. If I cancel this Authorization, I can no longer participate in the Program. This authorization shall be valid for 10 years from the date of the signature on this form. I authorize the Program to share my information with Abbott for the following purposes: (i) to determine eligibility for the Program, (ii) to account for my withdrawal if I decide to stop participating in the Program, (iii) to administer and maintain high quality service, and (iv) as otherwise required or permitted by law. I agree that the Abbott Nutrition Patient Assistance Program does not have any liability in providing Program services to me.

Patient Name (print): Date of Birth:

Patient Signature: Date:

PERSONAL REPRESENTATIVE AUTHORIZATION (If applicable)

Note: If the Applicant is unable to sign, is under the age of 18, or has designated signature authority, the Applicant's Personal Representative may sign this Form. However, only certain individuals may qualify as the Applicant's Personal Representative for purposes of this Authorization. An Applicant's Representative must have the requisite knowledge and information regarding the Applicant's financial and health care status to verify that all responses provided are accurate. State law may prescribe who can be a Personal Representative for purposes of this Authorization. A person or entity in the supply chain of the product to be received through the Program, including a health care provider or pharmacy receiving the medicines at no cost, may not be named a Personal Representative. If Applicant's Personal Representative is a consumer assistance or charitable organization, please list name of entity and purpose of entity under Relationship.

Patient Representative Name (print): Relationship to Patient:

Patient's Representative Signature: Date:

Community Resources Handout (Paged 1 Shared, *original handout is 4 pages*)

Greater Lawrence COVID-19 Resources

(Information as of 11/2020 in Bold)

General:

Massachusetts 211 phone number - 24/7 information and referral line for COVID-19 questions. Available in over 140 languages. Dial 2-1-1 or use online access.

City's COVID Mobile Testing Unit-Tracker - **Behind the Everett Mill / across from Lawrence General on the Canal Street side**

FoodSource Hotline - Call 800-645-8333 for food support resources in your neighborhood.

Meal Centers:

Cor Unum Meal Center
191 Salem Street
Contact: 978-688-8900
Updates can be found on Cor Unum's Facebook Page
Provides to-go meals daily.
Hours: Breakfast - 6-8AM, Dinner - 4:30-6:30PM

Lazarus House
412 Hampshire Street
Contact: 978-269-5280
Breakfast & Lunch "Meals to Go"
7 Days/Week Now Through April
Hours: Breakfast 8:30-9:30AM, Lunch 11:30-1PM

House of Mercy
85 Bay State Rd
978-655-8141
Meals To-Go & Pantry Items all day, every day

Children's Meals:

Lawrence Public Schools
Contact: 978-975-2762
Breakfast/Lunch "Grab & Go"
Hours: 11AM - 2PM

At the following schools:

- **Arlington - 150 Arlington St.**
- **Frost**
- **Hennessey**
- **Guilmette - 80 Bodwell St.**
- **Lawlor**
- **Lawrence High - 70-71 North Parish Rd.**
- **Leahy**
- **North Common**
- **Oliver Partnership**
- **Parthum - 255 East Haverhill St.**
- **So. Lawrence East**
- **Wetherbee - 75 Newton St.**

Boys & Girls Club of Lawrence
136 Water Street Contact: 978-683-2747
Updates can be found on Boys & Girls Club Facebook Page
"To-Go" Dinners

Outpatient Nutrition Referral Information Sheet

Lawrence General Hospital

Dietitian Services Available

Nutrition counseling available for medical conditions including:

- Weight loss
- Diabetes
- High cholesterol
- High blood pressure
- Weight gain
- Food allergies

Schedule An Appointment!

Andover Medical Center
Monday – Friday
323 Lowell Street
Andover, MA 01810

Marston Medical Center
Mondays Only
25 Marston Street, Suite 106
Lawrence, MA 01841

A referral from your doctor is required.
Call **978-946-8450** to schedule an appointment.
lawrencegeneral.org/weightloss

Follow our page:
Weight Management & Bariatrics at Lawrence General

So good. So caring. So close.

Appendix I. Supporting Letter from LGH and IRB

Lawrence General Hospital Letter of Support

Lawrence General Hospital
So good. So caring. So close.

June 18, 2021

Dr. Jennifer Wesely, Chair of the UNF Institutional Review Board
University of North Florida
Office of Research and Sponsored Programs
Skinner-Hall South Building 4, Room 2901
1 UNF Drive
Jacksonville, FL 32224

Dear Dr., Wesely:

This letter is to inform you that I have reviewed the proposed research study of Nina Rocca for the project of, "Nutritional Integration in Transitions of Care" and give the formal approval of the Lawrence General hospital for this study to be conducted onsite at our facility. This project was sponsored by Chetan Dodhia, MD and also approved by our Medical Staff Executive Committee (MEC).

The proposed study is looking to provide safe transitions across levels of care and different healthcare settings, reduce the hospital re-admissions due to nutritional issues & barriers, improve health outcomes of our patients, provide nutritional screening at admission and monitor throughout the inpatient stay and ultimately provide a pathway for a transitional discharge care plan, with post-discharge follow-up.

Please feel free to contact me at (978) 946-8111 should you need any additional information or have questions in the future. We are excited to have Nina conducting this research in collaboration with our tam to provide benefits to our patients and improve our documentation processes and care planning as an outcome of this successful study.

Sincerely,

Maria V. Palumbo, RHIA
Chief Compliance & Privacy Officer

IRB Initial Approval Memo Decision Letter

UNF
UNIVERSITY of NORTH FLORIDA.

Office of Research and Sponsored Programs
1 UNF Drive
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

DATE: July 28, 2021

UNF IRB Number: 1743156-1
Approval Date: 07-28-2021
Processed on behalf of UNF's IRB EE-S.

TO: Ms. Nina Rocca

VIA: Dr. Andrea Arikawa
Nutrition & Dietetics

FROM: Dr. Jennifer Wesely, Chairperson
On behalf of the UNF Institutional Review Board

RE: Review of New Project by the UNF Institutional Review Board
IRB#1743156-1 "Integration of a Dietitian in Transitions of Care for the Hospitalized Malnourished Adult"

This is to advise you that your study, "Integration of a Dietitian in Transitions of Care for the Hospitalized Malnourished Adult," underwent "Expedited" review on behalf of the UNF Institutional Review Board and has been approved under categories 4 and 7.

This approval applies to your study in the form and content as submitted to the IRB for review. Any modifications to the approved procedures or documents must be submitted to the IRB for review prior to implementation, including personnel changes. To submit an amendment to your approved protocol, please complete an Amendment Request Document and upload it along with any updated materials affected by the changes via a new package in IRBNet. For additional guidance on submitting an amendment, please contact an IRB administrator.

Please be advised that any subject complaints, unanticipated problems, or adverse events that occur are to be reported to the IRB as soon as practicable, but no later than 3 business days following the occurrence. Please use the Event Report Form to submit information about such events.

Upon completion of this study, please submit a Closing Report Form within a new package in IRBNet. Please maintain copies of all research-related materials for a minimum of 3 years following study closure. These records include the IRB-approved protocol, approval memo, questionnaires, survey instruments, consent forms, and all IRB correspondence.

Should you have questions regarding this determination, please contact the Research Integrity unit of the Office of Research and Sponsored Programs by emailing IRB@unf.edu or calling (904) 620-2455.

IRB Amendment #1 Approval Memo Decision Letter

UNF
UNIVERSITY of NORTH FLORIDA.

Office of Research and Sponsored Programs
1 UNF Drive
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

UNF IRB Number: 1743156-2
Amendment Approval: 11-01-2021
Processed on behalf of UNF's IRB

DATE: November 12, 2021

TO: Ms. Nina Rocca

VIA: Dr. Andrea Arikawa
Nutrition & Dietetics

FROM: Dr. Jennifer Wesely, Chairperson
On behalf of the UNF Institutional Review Board

RE: Amendment review by the UNF Institutional Review Board
IRB#1743156-2 "Integration of a Dietitian in Transitions of Care for the Hospitalized Malnourished Adult"

This to advise you that the proposed modifications to your above referenced "Expedited" Categories 4 and 7 study were reviewed and approved on behalf of the UNF Institutional Review Board to include the following:

- Update Informed Consent Form
- Update IRB documents to reflect amendment

When you are ready to close your study, please complete a Closing Report Form.

This approval applies to your study in the form and content as submitted to the IRB for review. Any modifications to the approved procedures or documents must be submitted to the IRB for review prior to implementation, including personnel changes. To submit an amendment to your approved protocol, please complete an Amendment Request Document and upload it along with any updated materials affected by the changes via a new package in IRBNet. For additional guidance on submitting an amendment, please contact an IRB administrator.

IRB Amendment #2 Approval Memo Decision Letter

UNF
UNIVERSITY of NORTH FLORIDA.

Office of Research and Sponsored Programs
1 UNF Drive
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

UNF IRB Number: 1743156-3
Amendment Approval: 02-24-2022
Processed on behalf of UNF's IRB

DATE: March 4, 2022

TO: Ms. Nina Rocca

VIA: Dr. Andrea Arikawa
Nutrition & Dietetics

FROM: Dr. Jennifer Wesely, Chairperson
On behalf of the UNF Institutional Review Board

RE: Amendment review by the UNF Institutional Review Board
IRB#1743156-3 "Integration of a Dietitian in Transitions of Care for the Hospitalized Malnourished Adult"

This to advise you that the proposed modifications to your above referenced "Expedited" Categories 4 and 7 study were reviewed and approved on behalf of the UNF Institutional Review Board to include the following:

- New group of participants: health care workers such as Registered Nurses, Case Management or Clinical Care Coordinators, and Registered Dietitians
- Informed Consent Form (health care workers)
- New study procedure: interviews via Zoom for health care workers
- New study material: interview questions
- Update IRB documents to reflect amendment

When you are ready to close your study, please complete a **Closing Report Form**.

Support Letter Regarding the Hospital State and Participant Enrollment

Lawrence General Hospital

Lawrence General Hospital
1 General Street
Lawrence, MA 01842
March 1, 2022

To Whom It May Concern,

I am writing this letter on behalf of the Clinical Nutrition Department of Lawrence General Hospital and the Nutritional Services leadership team in support of the *Malnutrition and Transitions of Care* research project conducted by Nina Rocca at Lawrence General Hospital.

The intervention portion of the study was approved in July 2021 and was slated to run through January 2022. However, during this time we had an unanticipatedly low volume of patients who met our criteria for malnutrition compared to similar timeframes from years prior to the COVID-19 pandemic.

The surge of COVID-19 in Lawrence, Massachusetts from November 2021 through February 2022 was a tremendous factor in the ability to identify and treat the malnourished population at our hospital. From early November 2021, the hospital was in a status of "Code Red", and December 2021 through early February 2022 it increased to the "Emergency Management Plan", which occurs when we have exceeded 25 patients admitted through the Emergency Center with no inpatient bed available. During this timeframe our region had no ICU bed capacity, no staffing capacity and limited availability to transfer. Lawrence General Hospital initiated a "Helping Hands" program, which distributed staff to other areas around the hospital to help with patient throughput.

Unfortunately for Ms. Rocca, this surge occurred during the last three months of her study. As a result of the capacity issues, the Registered Dietitians were instructed to prioritize all patients receiving nutrition support and were frequently asked to step in as Nursing Aides on the inpatient floors. Similarly, interdisciplinary rounds were streamlined and the RD's had limited communication with the Case Managers. This created a scenario where many of our malnourished patients were not captured, and an intervention was able to be completed prior to discharge.

We firmly believe that Ms. Rocca's intervention is beneficial to our malnourished patient population, and we continue to support her in her efforts to address this concern, however we were not able to provide the level of clinical support we had initial deemed possible because of the unpredictable and unprecedented nature of the pandemic. Please reach out to me for any questions or concerns.

Sincerely,

Joanne Brown, RD, LDN
Clinical Nutrition Manager
978-683-4000 x2565

Appendix J. Recruitment and Enrollment Tracking

Recruitment and Enrollment Descriptions						
Month	**Met malnutrition criteria**			**Met study criteria**	**Included**	**Reasons for not including**
	'19	**'20**	**'21**			
July *Study approved 7/27/2021	57	34	35	4 out of 7 patients identified with malnutrition met criteria since the **start date**	**1 included/ enrolled** **Total full data set: 1**	• 2 were discharged during hours the RD was not working, D/C plan was unclear • 1 did not consent
August (Month 1)	56	39	38	12 out of 36 patients identified, met criteria (2 duplicates that did not meet either admission) **Home - 12** **Did not meet criteria:** SNF /Rehab / LTC– 15 Hospice/Exp - 7 AMA - 2 Surgery - 1 Acute Care tx – 1	**9 included/enrolled** • 1 was readmitted mid-way through • 1 withdrew 2/2 going to palliative care • 1 never answered the phone – presume they gave LGH an inaccurate phone number **Total full data sets: 6**	• 1 did not consent • 2 d/c afterhours and d/c plan was unclear
September (Month 2)	59	29	38	10 out of 38 patients met criteria (no duplicates) **Home - 11** **Did not meet criteria:** Readmit/previously included - 1 SNF /Rehab / LTC– 14 Hospice/Exp - 8 AMA - 3 Acute Care tx – 2	**2 included/enrolled** • 1 patient was included, planned to d/c the next day, took a turn for the worse, ended up staying for the month, expired • 1 consented and included **Total full data set: 1**	**9 not enrolled** • 2 did not consent • 4 disposition change • 3 time/schedule constraints • 1 previously included

October (Month 3)	58	38	40	15 out of 40 patients met criteria (3 duplicates) Home (included), readmitted Home (missed), exp SNF – both admits **Home – 16** *(1 originally home changed to SNF, was already included)* **Did not meet criteria (26):** SNF /Rehab / LTC– 20 Hospice/Exp - 4 Readmit/previously included – 2	**7 included/enrolled** 1 changed from home to SNF – did not complete the full intervention 2 readmitted during the intervention 4 – completed the intervention **Total full data sets: 4**	**8 not included** 1 Did not consent 7 - Early d/c, late D/C, same day d/c - unclear dispo /time/schedule – weekend and after hour d/c'd
November (Month 4) 10th- 22nd CODE RED	37	30	36	10 out of 36 patients (1 duplicate – included, then readmitted) **Home – 10** **Did not meet criteria (26):** Hospice – 6 Exp – 5 SNF /Rehab / LTC– 11 Language barrier 2 Readmit/previously included - 1 Out of state - 1	**2 included/ enrolled** 1 Full data set was not complete, the patient was readmitted. **Total full data sets: 2**	9 missed - disposition

December (Month 5) December 6th CODE RED / EMP	40	42	26	9 out of 26 patients met criteria (1 duplicate – missed both visits – d/c'd home) **Home – 9** **Did not meet criteria:** Hospice – 2 Exp – 4 SNF /Rehab / LTC– 7 Readmit/previously included - 1 Homeless/Psych - 3	None enrolled	7 missed – disposition 1 declined 1 unable to interview, no interpreter – Language barrier
January (Month 6) January 9th CODE RED / EMP Helping Hands – *All staff to take alternate position in the hospital to help nurses*	68	49 (2020) 44 (2021)	28 (2022)	13 out of 28 met criteria – (no duplicates) **Home – 13** **Did not meet criteria:** Hospice – 4 Exp - 3 SNF/LTC/Rehab – 4 Acute – 1 Homeless/psych – 2 Pending d/c to a facility 1/31 – 1	None enrolled	13 missed – disposition ***unclear d/c plans during Emergency Management Planning. Often patients were sent home despite recommendation for rehab or another facility.***
Total enrolled (n=21) Complete data sets (n=13, 1 readmitted but completed the final interview) Not completed (n=8) Readmitted (5) and did not complete the final interview, *1 expired, enrolled but had a disposition change and was readmitted, 1 withdrew, 1 no answer*						

Appendix K. Situation, Background, Assessment, Recommendations (SBAR)

Transitions of Care Malnutrition Study

S	**SITUATION** **Starting in August 2021 LGH Nina Rocca, MS, RD, LDN will be conducting a research study with malnourished patients at LGH over the course of the next 6 months.**
B	**BACKGROUND** Malnutrition affects patients who are hospitalized. Patient's nutrition status often goes overlooked during the transitions of care process. The dietitian will formulate a personalized nutrition plan for those who are malnourished and fits the study's criteria, prior to discharge. The goal is that establishing a personalized nutrition plan along with close follow-up post-discharge will improve nutrition status and reduce readmission rates.
A	**ASSESSMENT** - Nursing staff will screen patients for malnutrition risk as part of their nursing assessment standard of care that include the MST (Malnutrition Screening Tool) score. - Dietitians will complete nutrition assessments and establish plans for patients who are found to meet the criteria for malnutrition - The Transitions of Care Dietitian will follow-up with the patient introduce the study, obtain permission, and have the consent form filled out by the nursing team and patient. - The Transitions of Care Dietitian will provide follow-up phone calls to the patient post-discharge.
R	**RECOMMENDATION** Nursing and physician staff will be informed of the study details and what is expected of them during the study time frame. Dietitians, nurses, physicians will be expected to be witnesses to the consent form when the TOC RD is filling this information out with patients.