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## **NUTRIC: Enhancing Surgical Intensive Care Unit Patient Nutrition Consultations**

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**NUTRIC: Enhancing Surgical Intensive Care Unit Patient Nutrition Consultations**

A DNP Project Submitted to the  
Graduate Faculty  
of Jacksonville State University  
in Partial Fulfillment of the  
Requirements for the Degree of  
Doctor of Nursing Practice

By  
Misty W. Armstrong

Jacksonville, Alabama

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August 2, 2024

## Abstract

**Background:** Daily nutritional screenings in the critical care population can identify patients in need of nutritional modifications during hospital admission. Inadequate nutritional assessments of critically ill patients lead to poor outcomes. Daily nutritional assessments result in the early identification of patients at risk for nutritional compromise compared to weekly assessments.

**Purpose:** The purpose of this project was to incorporate a daily nutritional assessment using the Nutrition Risk in the Critically Ill (NUTRIC) scores for patients in a surgical intensive care unit to identify patients in need of a referral to a registered dietitian.

**Methods:** The method for this project used secondary data from the surgical intensive care patient to calculate daily NUTRIC scores. Patients scoring five or greater were considered high risk for unmet nutritional needs. These patients required nutritional consultations by the registered dietitian.

**Results:** The current policy identified 0.29 patients per day or one patient every 3.5 days requiring a nutrition consult by the registered dietitian. Using NUTRIC scores, the number of patients requiring consultations by the registered dietitian increased to 0.57 patients per day or a patient every 1.75 days. Overall, NUTRIC scoring resulted in an increase in dietary referrals of 96.6% in the surgical intensive care patient.

**Conclusions:** Daily NUTRIC scores identified more at-risk for unmet nutritional needs patients than the facilities' weekly nutritional assessments in the critical care population thereby increasing registered dietitian consultations.

**Keywords:** malnutrition, NUTRIC scores, nutritional assessment tool, registered dietitian, critical care, surgical intensive care unit

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## **NUTRIC: Enhancing Surgical Intensive Care Unit Patient Nutrition Consultations**

### **Introduction**

The United States (U.S.) reports five million intensive care unit (ICU) patient admissions yearly with increased morbidity and mortality linked to inadequate nutrition (SCCM, 2023). Inadequate nutrition leads to catabolism, deconditioning, and an increase in infections and length of stay (Cass & Charlton, 2022; Park et al., 2023; Singer, 2019). Inadequate nutrition occurs in 13 to 78% of patients with patients losing 10-25% of their protein stores by day ten (Domenech-Briz et al., 2023; Eslamian et al., 2019). More than 40% of admitted patients do not receive nutrition on the first day (Bendavid et al., 2017). An Iranian study found 55% of hospitals did not refer patients to the registered dietitian (RD) resulting in 37% of ICU patients not receiving appropriate enteral nutrition (Mirzaei Dahka et al., 2023). Tailored goals that avoid under- or over-feeding can improve adequate consumption of macro and micronutrients improving patient outcomes (Bendavid et al., 2017).

### **Background**

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) first developed guidelines on nutrition standards of care in 1995 recommending nutrition screenings and patient monitoring (Dougherty et al., 1995). This recommendation by JCAHO shifted previous years' emphasis on structure and process assessment to a delivery model centered on fostering an interdisciplinary approach to delivering quality patient care and evolving into the new healthcare standard (Dougherty et al., 1995).

Two decades after the JCAHO recommendations, 37% of patients underwent nutrition screenings on admission; however, dietitians performed only 49% of these screenings (Patel et al., 2014). In 2017, nutritional screenings improved with 89.98% of patients receiving nutrition

screenings (Sherry et al., 2017). Of those patients screened, only 65% were identified as being at-risk for inadequate nutrition and were followed by the dietitian (Sherry et al., 2017). While facility-specific nutritional tools, or non-validated tools, captured more dietary referrals, validated tools like Mini Nutritional Assessment or Malnutrition Universal Screening Tool identified more patients at-risk for inadequate nutrition patients (Sherry et al., 2017). Along with initial nutritional assessments, more frequent screenings of patient populations, such as the critically ill, became a topic of concern in the clinical setting (Heyland et al., 2011). The unique needs of the critically ill patient prompted the development of specialized nutritional assessment tools (Heyland et al., 2011).

This Southeastern U.S. regional referral center completed non-validated nutritional assessments within 48 hours of admission to the surgical ICU. The initial four-question high-risk identifier captured patients with a five-day history of a poor appetite, severe food allergy, a one-month 10-pound unintentional weight loss, and/or a Braden score of less than 10. Braden scores indicate protection from pressure injury with nutrition as a scoring component (Wenzel & Whitaker, 2021). The RD performed comprehensive assessments for the remaining patients by gathering data from the history and physical, laboratory and diagnostic values, intake, allergies, intolerances, ethnic or cultural impacts, and discharge planning. Patients scores are classified as high, moderate, or low in determining dietary follow-up. Components affecting point allocation include age, recent surgeries, barriers to nutrition like impaired swallowing or poor dentition, and diarrhea. The RD assessed patients with high scores (7-8 points) including ICU patients within 48 hours, then completed weekly assessments. Moderate scores (4-6 points) are screened every 7-10 days and low scores (0-3 points) are screened monthly. Currently, ICU patients do not receive daily nutritional assessments.



### **Problem Identification**

The unit's strengths include an electronic medical system (EMR) and a dietary department. A weakness of the unit is that dietitians work remotely and are not physically present in the ICU. During a quality improvement presentation, stakeholders identified nutrition deficiencies as a concern. Upon review of the patient's laboratory findings, daily weights, and overall deconditioned state, the stakeholders desired additional measures to support patients who were missing their nutritional goals.

The identified problem is weekly instead of daily nutritional assessments for ICU patients. During June, July, and August 2023, this 20-bed surgical intensive care unit (SICU) facility reported nutrition consultations to the RD in 13-22% of patients each month. This averages 0.7 patients per day requiring a nutrition consult. Daily assessments identify patients sooner than the current policy. Daily assessments allow for individualized care and prediction of complications or mortality from inadequate protein consumption (Derouin et al., 2021). The RD is a key team member in improving the timely delivery of nutrition support for critically ill patients which is traditionally managed by physicians and nurses (Terblanche, 2019).

### **Problem Statement and PICOT Question**

Acutely ill patients are susceptible to sudden changes in their clinical presentation and nutritional tools allow for the early identification of these changes. This facility's practice of weekly assessments instead of daily assessments in acutely ill patients was an identified clinical problem. Daily assessments using tools like Nutrition Risk in the Critically Ill (NUTRIC) scores, an ICU-specific nutrition scoring calculator, help capture nutritional deficits sooner prompting intervention from the team. The PICOT question formulated for this project is In adult patients in

a surgical intensive care unit, does calculating a daily NUTRIC score increase consultations with a dietician compared to current practice over eight weeks?

### **Review of Literature**

Patients have many barriers to receiving the necessary caloric intake. To explore this topic, this author searched the EBSCO, PubMed, and CINAHL databases using the keywords nutrition, NUTRIC score, malnutrition, ICU, RD, and critical care to identify nutrition studies. In reviewing the literature, themes emerged including malnutrition, metabolic state related to infection and disease, the RD role, and the need for frequent nutrition assessments. The primary themes reviewed include malnutrition, stress and metabolic state, the role of the RD, and nutritional assessments. Thirty-five articles were retrieved including three systematic reviews, two national surveys, six cohorts, eight retrospective studies, one case study, one critical appraisal, one longitudinal study, one mixed-method study, three prospective observational studies, one cross-sectional survey, and eight journal articles.

### **Malnutrition of the Hospitalized Patient**

Malnutrition, defined by the Academy of Nutrition and Dietetics (AND) and American Society for Parenteral and Enteral Nutrition (ASPEN), is having two or more of the following: insufficient energy or intake; weight, muscle, or subcutaneous fat loss; fluid accumulation; or decreased functional status (White et al., 2012). Malnourished patients are associated with adverse outcomes like prolonged admissions, mortality, and infection (Lee & Heyland, 2019). One-third of patients present with some degree of malnutrition further deteriorated by hospitalization; a risk factor for nosocomial infection and readmission (Narayan et al., 2020). Studies regarding malnutrition in hospitalized patients are easily located, but evidence regarding malnutrition acquired during hospitalization is less concrete (Cass & Charlton, 2022).

Institution-level factors like poor physician communication, inappropriate nil-by-mouth orders, and unclear dietetic instruction on discharge contribute to malnutrition in 76% of patients (Chambers et al., 2019). Nutrition is a low clinical priority, easily disregarded due to competing clinical priorities (Langley-Evans, 2021). Developing hospital-acquired malnutrition increases daily by 0.6% while admitted (Woodward et al., 2020).

Malnutrition is more prevalent than reported (Tobert et al., 2018). Body mass index (BMI) is often used to identify malnourished patients, but BMI measurements do not delineate between body fat, fat-free mass, or fluid changes like ascites (Correia, 2018).

### **Stress and Metabolic Demand of the Acute Patient**

Critically ill patients have severe catabolic stress and inflammation from stress-related hormones and cytokine release (Hill et al., 1997). Often, these patients are admitted with nutritional deficits (Preiser et al., 2021). ICU patients often present with mechanical ventilation or neurological alterations thereby creating barriers to obtaining essential information like food intake, anthropometric data, and gastrointestinal alterations (Oliveira et al., 2019).

These patients are at further risk of depleting nutrition due to hypermetabolism, increased protein catabolism, lipolysis, and hyperglycemia with insulin resistance (Ferreira et al., 2023). In 80% of patients, protein and energy goals were not met when initiated longer than 48 hours after admission (Osooli et al., 2019).

### **The Role of the Registered Dietitian**

Nutrition assessment and management are complex. The RD is an excellent resource for providing advice to the multi-professional team and for formulating nutrition protocols for patients in the ICU (Derouin et al., 2021; Terblanche, 2019). Daily assessments by an RD can expedite nutrition orders during rounds, improve handover reports, enhance multidisciplinary

team meetings, and reduce the incidence of malnutrition (Kalin et al., 2023; Terblanche, 2019). Patients are at a 12 % increased risk of 30-day readmission or 15% mortality when the RD is not involved in their care throughout their admission (Mogensen et al., 2017).

### **Nutrition Assessments in the Critically Ill**

Guidance on nutritional assessments is not standardized or consistent (Domenech-Briz et al., 2022). Facilities use various tools like the Mini Nutritional Assessment which can underestimate an ICU patient's nutritional needs (Domenech-Briz et al., 2022). ASPEN recommends valid, reliable, sensitive, and specific high-risk nutritional screenings within 24-48 hours while the European Society for Clinical Nutrition and Metabolism (ESPEN) recommends ICU patients be screened once admitted beyond 48 hours (Lin et al., 2021; Narayan et al., 2020). Screening tools should include traditional nutrition parameters like food intake, and a BMI score, but also consider metabolic state (Zhang et al., 2020). Assessment tools specific for the critically ill include the Subjective Global Assessment (SGA), Nutrition Risk Screening 2002 (NRS 2002), the Malnutrition Universal Screening Tool (MUST), and the Nutrition risk in the Critically ill score (NUTRIC), or modified NUTRIC (mNUTRIC) which eliminates interleukin-6 blood levels, an inflammatory marker (Domenech-Briz et al., 2022). Assessment tools improved a patient's prognosis when individualized nutrition therapy was provided. This resulted in a decrease in mortality risk (Domenech-Briz et al., 2022). For every 1.62 high-risk patients, one death could be avoided by combining mNUTRIC and SGA scores (Domenech-Briz et al., 2022).

NUTRIC scores, validated by Heyland et al., are specifically designed for ICU patients (Reis et al., 2019). Low nutritional risk scores were directly correlated with shorter hospital stays (Ferreira et al., 2023). Daily assessments using NUTRIC scores help identify critically ill patients at risk for poor outcomes (Eslamian et al., 2019). High NUTRIC scores were related to

mortality in 34.2% of patients, with a 90.5% sensitivity and 62.3% specificity indicator (Gonzalez et al., 2019; Jung et al., 2018; Lin et al., 2021). In surgical patients admitted to the SICU, high mNUTRIC scores were associated with 30-day mortality but scores did not influence operative infections, days on the ventilator, wound complications, or postoperative leaks (Jung et al., 2018).

### **Theoretical Framework**

The theoretical framework, Neuman's System Model, evaluates systems and environmental stressors (Zaccagnini & Pechacek, 2021). In the 1970s, Betty Neuman developed this theory focused on aiding the body in maintaining wellness through three types of prevention (Zaccagnini & Pechacek, 2021). Primary prevention reduces risk factors before they are experienced by patients (Zaccagnini & Pechacek, 2021). Tertiary prevention maintains wellness after a patient has recovered from a stressful event (Zaccagnini & Pechacek, 2021). Secondary prevention occurs in response to a stressor requiring intervening to strengthen a patient's internal resistance (Ahmadi & Sadeghi, 2017; Zaccagnini & Pechacek, 2021). Secondary prevention areas of impact include intolerant activity, poor appetite, improper nutrition, sleep disturbances, deconditioning, and stress or anxiety from family separation (Ahmadi & Sadeghi, 2017).

Acutely ill patients fall into the secondary prevention category. Inpatient stressors jeopardize the patient's internal resistance to health (Zaccagnini & Pechacek, 2021). Inadequate nutrition upsets a patient's protective coping (Ahmadi & Sadeghi, 2017). Closely monitored nutrition can positively impact critical illness by providing adequate calories to battle stress, combat illness, and restore the body's balance.

### **Quality Improvement Methodology**

The methodology for this Doctor of Nursing Practice (DNP) project is the Plan, Do, Study, Act (PDSA) cycle. PDSA cycles identify specific processes that need to be solved (Abuzied et al., 2023). PDSA cycles test change by planning, implementing, evaluating, and acting on results (Abuzied et al., 2023). This four-step process allows for a systematic approach to change within the unit with frequent evaluations.

The planning phase evaluates current practices regarding nutrition screenings, qualifying patients, and identified themes practiced in the unit. Recognizing current practices related to subgroups of patients based on diagnosis can help pinpoint areas of concern before implementation. The *do* phase involves daily assessment scoring. This data was recorded and trended. In the *study* phase, the data collected was compared to the current practice data. Eventually, this information was shared with the key stakeholders in the unit for the *act* phase allowing for potential process improvement changes related to nutritional practices.

### **Project Design**

This project implementation occurred in the SICU over eight weeks during February and March 2024 and included patients admitted to the unit while excluding anyone under 18 years of age or pregnant. Financial resources were not needed for this project. The project was a two-phase process. Phase one began with providing education on NUTRIC scoring, reviewing current policy practices, and reviewing RD data. Next, project goals were reviewed. This was followed by educating unit staff on the benefits of daily assessments as advised by the Society of Critical Care Medicine (Society of Critical Care Medicine, 2023).

The second phase involved identifying patients who met the inclusion criteria. Secondary data including the patient's past medical history, admission criteria, diagnostics, and laboratory

values were collected from the EMR and used to calculate NUTRIC scores. The project received approval from the educational Institutional Review Board (see Appendix A) after completing the required protection of human subject training (see Appendix B). Configured scores were recorded, trended, and tracked in an electronic spreadsheet for eight weeks. After eight weeks, NUTRIC scores identifying at-risk patients were compared against the current facility practices.

### **Project Results and Evaluation**

This project evaluated patients' RD nutrition consults. In a two month period, twelve percent of the unit's patients were scored with daily NUTRIC scores. Patients who were unable to be scored by NUTRIC scores had limitations including not meeting eligible criteria, inpatient admissions extending beyond the beginning of NUTRIC score implementation, transfers from outside facilities with limited outside hospital records, and the main barrier was patients without the necessary secondary data needed to calculate NUTRIC. In eight weeks, 0.29 patients per day or one patient every 3.5 days required nutrition consults. Using the NUTRIC tool, nutrition consults by the RD increased to 0.57 patients per day or a patient every 1.75 days. In the study group, 7.14% of patients were referred to the RD using the facility's non-validated nutritional tool while 14.2% were referred when NUTRIC scores were incorporated. Overall, NUTRIC scores increased the number of patient referrals to the RD by 96.6%. Daily NUTRIC scores increased RD consultations in SICU patients.

### **Conclusion**

Daily NUTRIC scores increased RD referrals compared to the current facility practices in the SICU patient. Before the project's implementation, data revealed an average of 0.7 daily patient referrals to the RD over 90 days. RD consults increased by 0.28 patients per day using NUTRIC scoring.

This project was limited by only including eligible SICU patients within a defined data collection timeframe. Another unforeseen challenge was missing laboratory values necessary for NUTRIC score calculations such as total bilirubin levels and partial pressure of oxygen (PaO<sub>2</sub>) levels.

This project has sustainability if NUTRIC calculations are incorporated into an electronic format such as an EMR, as manual NUTRIC calculations are resource-intensive. Required values necessary for NUTRIC scores should be standard orders in the SICU patient. The project showed that daily NUTRIC scores performed on the critically ill patient are useful in predicting energy requirements thus improving nutrition and allowing for earlier initiation (Domenech-Briz et al., 2023). NUTRIC scores help meet a daily nutritional evaluation assessment in the critically ill, a recommendation by ASPEN. and the Society of Critical Care Medicine (Lin et al. 2021).



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## Appendix A

### JSU IRB Approval Letter



**Institutional Review Board for the Protection of Human Subjects in Research**

203 Angle Hall  
700 Pelham Road North  
Jacksonville, AL 36265-1602

December 11, 2023

Misty Armstrong  
Jacksonville State University  
Jacksonville, AL 36265

Dear Misty:

Your protocol for the project titled "NUTRIC: Enhancing Surgical Intensive Care Unit Patient Nutrition Consultations" protocol number 12112023-02, has been approved by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB).

If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Sarah Donley'.

Sarah Donley  
Human Protections Administrator, Institutional Review Board



## Appendix B

### CITI Training



Completion Date 29-Aug-2023  
Expiration Date 29-Aug-2026  
Record ID 57917095

This is to certify that:

**Misty Armstrong**

Has completed the following CITI Program course:

Not valid for renewal of  
certification through CME.

**Social and Behavioral Responsible Conduct of Research**  
(Curriculum Group)

**Social and Behavioral Responsible Conduct of Research**  
(Course Learner Group)

**1 - RCR**  
(Stage)

Under requirements set by:

**Jacksonville State University**



101 NE 3rd Avenue, Suite 320  
Fort Lauderdale, FL 33301 US  
[www.citiprogram.org](http://www.citiprogram.org)

Verify at [www.citiprogram.org/verify/?wadb8f3a5-1366-41fa-bbbc-074eb86c7b0e-57917095](http://www.citiprogram.org/verify/?wadb8f3a5-1366-41fa-bbbc-074eb86c7b0e-57917095)