

**Improving the Administration of Protein Supplements
in the Medical Intensive Care Unit**

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Abstract

Problem: An academic medical center reported that only 37% of inpatients in the Medical Intensive Care Unit (MICU) receive the ordered amount of protein supplements as part of their enteral nutrition. This is not enough to meet the protein needs for these patients. An increase in a patient's daily protein intake is associated with improved wound healing, reduced hospital length of stay, reduced infection complications, decreased mortality and improved long-term quality of life. The unit did not have a standardized protocol for protein supplement administration or documentation. **Purpose:** The purpose of this quality improvement (QI) project in the MICU is to increase the documentation of protein supplement administration through the implementation of a standardized process for protein supplement administration. **Methods:** As part of the project, a standardized schedule was created for protein supplement administration, which was provided to nursing staff. MICU nursing staff also received education regarding the importance of protein supplements and the importance of the required documentation following administration. Amount of protein supplement administration were collected via chart review, using the REDCap data collection tool. **Results:** 77 patients were included in the pre-implementation audit and 318 patients were included in the post-implementation audit. When comparing the documented administration to the number of protein supplements that are ordered, the average administration rate for the MICU following the QI project implementation is 73.6%, which is higher than the pre-implementation rate of 37%. **Conclusions:** The findings of this QI project would suggest an increase in the rate of protein supplement administration and documentation through the use of a standardized schedule for administration and the education of bedside MICU nursing regarding the importance of protein supplements for adult critically ill patients.

Improving the Administration of Protein Supplements in the Medical Intensive Care Unit

Patients admitted to the MICU often have multiple complex medical problems that are present on admission to the hospital, which may increase dramatically due to their acute medical diagnosis. These patients can be malnourished on admission due to their current disease state or are unable to eat enough food to provide their bodies with the adequate nutrition necessary during a critical illness. Although the Medical Intensive Care Unit (MICU) healthcare team recognizes nutrition as an important component of a patient's care, it is often not made a priority due to the numerous other life-saving interventions patients require. The MICU Registered Dietitian-Nutritionists (RDN) are specifically trained to care for critically ill patients. Within three days of meeting criteria, patients will receive a comprehensive nutrition assessment. The RDN provides nutrition recommendations for patients based on their nutritional assessment, the patients' comorbidities and weight trends on admission. Patients who are unable to take food by mouth will be ordered enteral nutrition, which usually includes continuous enteral tube feeding and protein supplementation.

Only an estimated 40% of the ordered protein supplements are given to patients throughout the entire organization. The administration rate for protein supplements within the MICU is even lower, with an administration rate of 37%. Protein supplements are ordered as number of packets per day based on a protein intake goal level determined by the RDN to ensure their protein needs are met. Protein is the most important macronutrient for critically ill patients as it is responsible for maintaining lean body mass, supporting the functions of the immune system and aiding with wound healing (McClave et al., 2016). The increase of a patient's daily protein intake to thirty grams each day, or a twenty-five percent increase in calorie and protein

intake, is associated with decreased mortality and reduced infection complications (Heyland et al., 2018).

The root cause for the inadequate administration of protein supplementation is multifactorial as it is related to a lack of a standardized process for the ordering of protein supplements, incomplete documentation of administration and limited staff education regarding the importance of protein administration (Figure 1). Although patients are ordered a specific number of protein supplements per day by the RDN, it is not standardized to be given at certain times of the day and can vary drastically between patients. The documentation for the administration of protein supplements is inconsistent between nurses, making it challenging to evaluate if a patient is receiving adequate nutrition. Nursing staff do not receive education about the importance of nutrition for critically ill patients and may not recognize the possible long-term consequences if patients are consistently not meeting their nutritional goals. The purpose of this Doctor of Nursing Practice (DNP) project was to improve the rate and the documentation of protein supplementation administration in the MICU, with the outcome goal of increasing the documentation of protein supplement administration by at least 50% compared to pre-implementation data.

Available Knowledge

An evidence review was completed (Table 1 and Table 2) to examine the impact of protein supplementation on adult critically ill patients admitted to the hospital. Fetterplace et al. (2018) completed a RCT examining the implementation of a high-protein based enteral nutrition formula and protein supplements compared to the unit standard of practice in an adult medical-surgical ICU. Patients in the intervention group received a statistically significant increased amount of protein and energy per day, had less muscle loss at discharge and fewer patients were

considered malnourished when discharged from the ICU (Fetterplace et al., 2018). Nicolo et al. (2016) completed a retrospective observational study for adult patients admitted to ICUs that assessed the level of protein intake compared to the prescribed protein goal. The study found that patients who received at least 80% of their prescribed protein intake had an increased 60-day survival rate and shorter time to discharge (Nicolo et al., 2016). Weijjs et al. (2019) completed a retrospective single center observational study that examined outcomes for adult ICU patients who received more than one gram per kilogram per day of protein delivery compared to the control group, who received less than one gram per kilogram per day of protein. Patients in the intervention group had a statistically significant decreased hospital length of stay and a decreased odds of mortality in the three months after discharge (Weijjs et al., 2019).

Compher et al. (2017) used a prospective observational cohort study for adult mechanically ventilated ICU patients to assess if clinical outcomes varied based on protein or energy intake for patients admitted to the ICU. The study found that increased nutritional intake was associated with decreased mortality and quicker time to discharge alive for patients who were considered high risk (Compher et al., 2017). Yeh et al. (2018) completed a case control retrospective study with adult surgical ICU patients to examine the impact of nutritional deficits for patients at day three and day seven of ICU admission for patients with shorter ICU length of stay (less than fourteen days) and patients with longer ICU length of stay (greater than fourteen days). Energy and protein deficits were found not to be related to clinical outcomes for patients with shorter ICU length of stay; however early protein deficits were associated with worse clinical outcomes for patients with longer ICU length of stay (Yeh et al., 2018). Mitchell et al. (2018) evaluated the implementation of a high-protein enteral nutrition formula, protein supplementation and a multivitamin protocol for adult patients admitted to a tertiary hospital

ICU. Following the implementation of a practice change, an increased number of patients received the appropriate amount of ordered protein change (Mitchell et al., 2018). The six studies that were examined showed consistent evidence to support the clinical practice change of improving the rate of protein supplementation to match the ordered amount.

Rationale

The Knowledge to Action framework was used to execute this project. This particular framework synthesizes available research and examines specific unit-based barriers prior to the project implementation (Graham et al., 2006). The cyclical process of this framework was the key to the implementation as continued education for staff and evaluation of outcomes were critical for its success. Each phase of the framework is impacted by the phase before, allowing the researcher the opportunity to rethink the strategies for implementation to improve the comprehension of knowledge (Graham et al., 2006). As the project was implemented, it was important to recognize that unexpected site-specific barriers may likely come up that must be addressed to ensure the success of the project. This framework emphasizes that both local or institution-based, and external or literature-based knowledge are important parts of each phase of action (Graham et al., 2006). Combining the input from the current research recommendations with potential barriers that exist in the unit of implementation was important to ensure the longevity and sustainability of the practice change.

Methods

The RDN created, evaluated and modified individualized nutrition plans of care to achieve intake of estimated protein and energy goals for all MICU patients. It was the responsibility of the bedside nurse to ensure the patient received their ordered tube feedings and protein supplementations each day. Protein supplements are ordered by a number of packets per

day, but were not on a standardized schedule or ordered at a consistent frequency. Prior to the project implementation, the bedside nurses would administer the protein supplements during various times, increasing the likelihood that the patient was not consistently receiving the full number of ordered protein supplement packets each day. The documentation of the protein supplements within the EHR was also inconsistent between nursing staff, making it challenging for the RDN to evaluate if a patient was receiving adequate protein intake. Because there are life-threatening emergencies that occur throughout the day, bedside nurses may overlook the administration of the protein supplement and not consider it to be a priority. The tube feeding and protein supplements are delivered by a nutrition technician daily to the unit to ensure adequate stock of supplies. To improve the amount of protein supplementation documented by the MICU bedside nurses, an intervention must be carried out. All patients who are ordered protein supplementation were included in the study. To ensure no eligible patient is excluded, the project lead utilized the charge RN and unit-based RDN to identify all patients in the unit who are ordered protein supplements. Figure 2 outlines the desired process map.

The first part of the intervention included the standardization of the protein supplement administration times. This involved the collaboration with the clinical site representative (CSR) and project sponsor to determine the best strategy for administration. These standardized times were based on common medication administration times to improve administration rate. The schedule for administration was posted prior to the start of implementation around the unit including on all the computers in the patient rooms and at the nursing stations outside the patient rooms.

The second part of the intervention included education for bedside nurses to ensure they understood the research evidence that explains why MICU patients need to meet their ordered

protein goals and how to properly document the administration. Education also included how the administration of the protein supplements should be documented in the Epic system flowsheet. These education sessions occurred in the week prior to the implementation to ensure staff understanding. About 80% of MICU nursing staff attended the in-person education sessions (out of a total of 120 nursing staff). An online module was also required for all nursing staff to complete and handouts (Figure 3) were distributed throughout the unit, both of which outlined the same objectives as the in-person sessions. The importance of nutrition for patients admitted to the MICU as part of new nurse orientation and annual unit-based education is an essential component of the sustainability plan. By improving education regarding protein supplement administration, nursing became aware of the significance and were encouraged to discuss barriers to administration during daily interdisciplinary rounds. The GANTT chart (Table 3) outlined the timeframe for implementation.

The outcome goal for the intervention was to improve the documentation of protein supplement administration during the implementation period (September-December 2022) as compared to the pre-implementation data (September-December 2021). The pre-implementation data was obtained from chart audits from patients who were admitted during that timeframe and were ordered protein supplementation. The post-implementation data was obtained directly from chart audits completed by the project lead. The data from these audits came directly from the medical record, so the results have high levels of reliability and validity. The number of protein supplement packets documented was divided by the number of protein supplement packets ordered, which determined the percentage of protein supplementations documented compared to the order. An increased percentage of documented protein supplements after implementation compared to previous data would suggest that the intervention was successful.

The original data collection plan was to use an Epic report that showed the patients in the MICU who were ordered protein supplements, the number of packets they were ordered to receive per day and the number of packets that were documented per day. The Epic report build was delayed several times and was unable to be used for data collection. To collect data, the project lead conducted biweekly chart audits from a list of current patients who had active enteral nutrition orders from the RDN or the MICU charge nurse. The project lead evaluated how many protein supplements were documented each day compared to how many protein supplements were ordered in the Electronic Health Record (EHR). The data collection system calculates the administration rate as a percentage, which is the number of documented protein supplements per day divided by the number of ordered protein supplements.

Ethical considerations for the project were important to consider throughout the planning and implementation stages of the project. Patients were deidentified to protect confidentiality and to ensure HIPAA rules were followed. The expertise of the CSR, the DNP faculty and the site sponsor was critical to ensure the project's IRB determination and to confirm the project is ethically appropriate. The project lead obtained the appropriate IRB approval prior to the start of the implementation phase.

Results

A total of 77 patients were audited and included in the pre-implementation data. A total of 318 patients were audited and included in the post-implementation data. A Run Chart (Figure 4) was created to analyze the collected data using weekly data trends using the pre-implementation data and data from the fourteen weeks of implementation data. There were no astronomical data points noted in the Run Chart. An average of 73.6% of ordered protein supplements were administered and documented per order during the 14-week implementation

period. Week 3 had the lowest percentage of documentation, after which staff received follow-up education. Week 10 had the highest percentage of documentation, which was communicated to nursing staff during project update.

The obtained quantitative data was utilized to calculate the changes in percentage of protein supplementation documentation between the pre-implementation and post-implementation. The data analytic strategy aligns with the project aims of identifying if the implementation of education sessions for nursing staff and the standardization of protein supplement administration impacted the amount of documented protein supplements. Normal variation in the data can occur based on the number of patients ordered protein supplements, knowledge of nursing staff about the implementation and overall acuity of patient. When drastic variations in data occurred week to week, the project lead performed reeducation to nursing staff to ensure understanding of the project and encourage compliance with standardized schedule.

During the implementation phase, the project structure goals that were met include increasing the knowledge of nursing staff regarding protein supplement administration through education sessions and the standardization of administration times for protein supplements. The process goal of the standardization of administration times for protein supplements was met during the implementation phase of the project and was communicated with nursing staff during education sessions. The process goal of utilizing education sessions to educate nursing staff about the project was met during the two unit-based education sessions and the required online module. Based on the most recent data, the outcome goal of increasing the documentation of protein supplement administration by at least 50% compared to pre-implementation was met, as documentation was increased by 99%. To ensure sustainability of the project, project champions on the unit from both dayshift and nightshift were identified as unit resources, who plan to

remain working on the unit after the project implementation phase. There were no unintended consequences such as unexpected benefits, facilitators, problems or costs encountered during the implementation phase. The delays associated with the Epic report build was an unexpected problem not anticipated by project lead during the project planning stage.

Discussion

Key findings from the project concluded that the implementation of a standardized schedule for protein supplement administration combined with unit-based education regarding the importance of protein for critically ill patients and correct documentation following administration improved unit compliance with protein supplement administration. This project had a significant impact on patients admitted to the MICU who were ordered protein supplements. A financial analysis of the project impact could not be performed, as rates of pressure injuries and other complications related to poor protein intake could not be directly correlated as numerous confounding factors can impact pressure injury development. Additional studies regarding this topic and the potential financial implications will have to be considered for future research. The project did not have a direct impact on the organization system overall, as the project was implemented on an individual unit. Because of the overall success of the project, additional Intensive Care Units within the organization should consider implementing a similar project to increase their rate of protein supplement administration.

This project had similar findings to other six publications that were examined during the evidence review process. Mitchell et al. (2018) implemented a protocol of high-protein enteral nutrition formula, protein supplementation and multivitamin administration, which increased the number of patients who received an appropriate amount of protein. Fetterplace et al. (2018) implemented a protocol which included the administration of high-protein based enteral nutrition

and protein supplements compared to the prior unit standard of practice. This study also found that a standardized protocol statistically increased the amount of protein and energy intake for patients per day. The studies performed by Nicolo et al (2016) and Weijs et al. (2019) examined a patient's protein intake and measured different patient outcomes, including 60-day survival rate and hospital length of stay, which were not assessed during this study. These outcome measurements could be areas for future study within this organization to directly assess the impact of increasing protein intake compared to direct patient outcomes.

Efforts were made by the project lead to decrease bias of the results and improve overall internal validity. However, challenges outside of the control of the project lead may have impacted the precision of the study results. The original plan for data collection was to utilize a report from Epic to track how many protein supplements a patient was ordered and how many were documented as administered. The build of the Epic report was delayed greater than one year, thus the project lead had to perform manual chart audits to collect data. This likely led to a decreased number of included participants in the study due to the time-consuming nature required for data collection. The project lead, CSR and DNP faculty all contacted the builders of the Epic report, but were unsuccessful with expediting the build of the report.

Conclusion

In conclusion, this project proved to be a valuable part of improving health care delivery and patient outcomes through the increased rate of protein supplement administration. The education sessions for nursing staff emphasized the importance of nutrition for critically ill patients and complications that may arise with inadequate protein intake. The knowledge gained during these education sessions as well as the standardized protein supplement administration schedule improved the rate of protein supplementation administration during the implementation

phase. To continue the success of the project, adopting a sustainability plan will be critical. This includes the utilization of the unit-based champions who were identified prior to project implementation to encourage nursing staff to follow the protein supplement administration schedule and reinforce correct documentation techniques. Newly hired nursing staff will also receive education on the importance of protein for critically ill patients as well as the protein supplement administration schedule and how to correctly document the protein supplement administration.

Implications for practice suggest that increased rates of protein supplement administration and documentation were achieved through the standardization of protein supplement administration times and unit-based education sessions to reinforce the importance of nutrition for ICU patients. Future initiatives could include the implementation of this QI project to other Intensive Care Units within the same medical system as the MICU, given the overall success of the project. Other ICUs within the organization have similar workflow to the MICU, so a similar standardized schedule could be implemented within these units too. Because the organization as a whole continues to be challenged by adequate administration and documentation of protein supplements as evidenced by a 40% administration rate throughout the organization, other ICUs would likely benefit from this QI project implementation. The dissemination of the project to organization wide committees to discuss the success of implementation will increase awareness to other potential ICUs for possible implementation.

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