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Review

Identification, Prevention and Management of Malnutrition in the Critically Ill Patients

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Abstract

Proper nutrition is essential for enhancing healthcare outcomes. Elevated rates of malnutrition are present in hospitalized patients. Malnutrition and unmet nutritional needs increase morbidity and mortality, lower quality of life, lengthen the time spent on mechanical ventilation, and lengthen hospital stays, all of which raise the expense of medical treatment. Patients who are critically ill need specific care to minimize muscle wasting, avoid overfeeding, and prevent complications from nutritional therapy. The purpose of this research is to review the available information about identification, prevention, and management of malnutrition in the critically ill patients. To identify patients who are more likely to experience complications from malnutrition, nutritional status is evaluated. Various assessment methods and tools are present to identify malnutrition in critically ill patients. Effective targeting of appropriate nutrient levels, and prompt initiation of nutritional support, among other measures can reduce the risk of malnutrition. Ideally, enteral nutrition should be started after initial 24 to 48 hours. Parenteral nutrition may be employed if the nutritional need is not properly supplied by enteral nutrition even after seven days following intensive care admission. In patients receiving nutrition therapy, electrolytes should be carefully assessed. Even if 50% to 60% of nutritional requirements are not successfully met during 72 hours of oral nutrition support then tube feeding should be considered. Further clinical research can be beneficial in determining the effectiveness and outcomes of nutritional therapy in malnourished critically ill patients.

Keywords: *critical, ill, malnutrition, patient, health outcome*

Introduction

A double burden of malnutrition has been produced by the quadruple burden of perinatal and maternal illnesses, communicable and non-communicable diseases, and injury-related disorders. Because of the modern treatments for various diseases, people are living longer. However, many of them are either chronically underweight or overweight, making them more susceptible to sudden sickness. This is a genuine and escalating global health threat that calls for immediate nutrition interventions and strains acute care resources, which include critical care. Malnutrition affects 30% to 50% of hospitalized patients with acute illnesses, and the proportion may be higher in critically ill patients. It is linked to an increased risk of morbidity and complications, higher healthcare expenditures, and an increased risk of mortality in long-term (1). Malnutrition refers to a condition in which a person is either under-nourished due to insufficient intake or impaired utilization or over-nourished due to excessive calorie intake and/or insufficient physical activity in terms of macronutrient components or specific micronutrient requirements that are important to tissues (2).

Critically ill patients need sufficient nutritional support to meet their energy needs both during and after their time in the intensive care unit (ICU), in order to defend against severe catabolism and avoid considerable deconditioning. ICU patients frequently have a chronic critical disease that increases their energy use, causes proteolysis, and results in muscle loss. Under or overfeeding, both of which are linked to worse results, can be prevented by careful supplementation and adjustment of calorie and protein intake. Oral intake should be carefully assessed after being removed from the ventilator or during non-invasive ventilation, and in the event of severe dysphagia, should be avoided and replaced with enteral or parenteral nourishment. The effectiveness of long-term rehabilitation continues to depend on proper nutrition after a patient is moved from the ICU to the ward, and continuing attention on adequate nutritional supplementation in the ward is required to prevent a suboptimal nutritional status (3).

The American Society for Parenteral and Enteral Nutrition has defined nutrition assessment as the process of determining a patient's nutritional status through the use of clinical and nutritional history, anthropometric measurements, physical examinations, and laboratory data. This comprehensive approach to nutrition evaluation, which takes into account dietary history, clinical state, and social background, acknowledges the critical link between nutritional status and illness severity. Patients who are at nutritional risk; patients who either have existing malnutrition or have the potential to develop it are identified through nutritional assessment. The optimum strategy involves using multiple measures to screen individuals because no single parameter can be a reliable indicator of malnourishment (4-6). Hospital malnutrition can be prevented and treated, and this presents a great potential to optimize patient care in general, improve clinical results, and cut expenses. Early nutrition management can lower death rates, readmission rates, complication rates, hospital stay times, and cost of treatment (7). The purpose of this research is to review the available information about identification, prevention and management of malnutrition in the critically ill patients**.**

Methodology

This study is based on a comprehensive literature search conducted on August 30, 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information about identification, prevention and management of malnutrition in the critically ill patients**.** There were no restrictions on date, language, participant age, or type of publication.

Discussion

Since many severely ill patients are unable to meet their own nutritional needs, providing artificial nutrition to them is critical. Total parenteral feeding and enteral nutrition (EN) administration are routine procedures in intensive care units. despite this, many patients continue to be underfed or even malnourished. Patients can become or continue to be undernourished for a variety of reasons, from physiological to iatrogenic. Prompt and adequate nutritional support must be given in order to reduce the catabolic condition that develops as a result of the hypermetabolism associated with critical illness. To provide the greatest care for patients, it is essential that everyone in the multidisciplinary team work with critically ill patients understands the value of nutrition and the harmful consequences of malnutrition (8).

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Identification and diagnosis of malnutrition

Patients who are undernourished exhibit worse clinical outcomes than their well-fed counterparts. There is disagreement about the optimal method to detect or identify these patients, particularly in the ICU, despite the fact that nutrition screening is the initial step in nutrition management. Since 1995, simple to more complicated tools have been created, validated, and used with patients in both inpatient and outpatient settings. The majority of traditional nutrition risk screening measures include elements like body mass index, weight loss, and oral intake. Patients and families frequently struggle to provide reliable histories of intake and/or weight because of the nature of critical illness. Additionally, the influence of the patient's disease severity, any administered life-sustaining medicines, as well as their medical and nutritional history, makes the complexity of nutrition risk in the ICU even greater (9). To determine a patient's nutritional status, a range of scores and techniques are available, including assessments of nutrition-related variables, dietary intake, and energy expenditure. Body mass index, physical examination, anthropometric data, and some biochemical indicators, such as blood levels of albumin and prealbumin, are frequently employed to assess nutritional status in the context of nutrition-related issues. Low concentrations of these biochemical markers, however, show the underlying illness's nutritional status as well as continuous physiological stress. It should be remembered that not all critically ill individuals run the risk of experiencing negative nutritional-related outcomes. The Nutrition Risk in the Critically Ill Score is used to identify the critically ill patients who are at a high risk for malnutrition (10).

A proper nutritional history should evaluate comorbidities, gastrointestinal system functionality, changes in weight or eating habits previous to hospitalization, and ICU course. The physical examination should check for sarcopenia, temporal wasting, nutritional deficiencies, fluid status, and the existence of drains or non-healing wounds that could be causing nitrogen losses. Critically ill patients' nutritional condition is not directly reflected by biochemical data, which includes the measurement of electrolytes and visceral proteins such as albumin, prealbumin, transferrin, and retinol binding protein, which are useful markers of inflammation and disease status. Other methods to assess nutritional status include bioelectrical impedance, muscle function tests, creatinine-height index, anthropometric measurements, and body composition analyses, although these are typically labour-intensive and unfeasible. Systems of scoring are useful for categorizing patient risk and assessing the overall severity of the condition. The Subjective Global Assessment (SGA) and the Nutritional Risk Screening are the best screening instruments. Four questions about body mass index, recent weight loss, dietary intake, and sickness severity are part of the Nutritional Risk Screening. With the physical examination, comorbidities, weight, food history, and functional capacity included, the SGA is an alternate tool that has been shown to be helpful and repeatable in patients who are on mechanical ventilation (11).

Lambell et al. stated that malnutrition in critically ill patients can be difficult to diagnose. Diagnostic tools, like the frequently used SGA and criteria outlined in the most recent Global Leadership Initiative in Malnutrition recommendations, heavily rely on collecting precise anthropometrical data, weight and diet history, and the estimation of muscle mass, all of which are challenging to obtain in the acute early phase of ICU admission. It is difficult to draw conclusions about how nutrition therapy may alter outcomes in this vulnerable category because body mass index is a poor substitute for measuring malnutrition and frequently used nutrition risk scores have not been thoroughly validated. To diagnose malnutrition, clinicians should, if possible, combine their clinical judgment with the most recent Global Leadership Initiative in Malnutrition criteria or local hospital recommendations. It is better to advocate early low dose nutrition therapy in the acute early phase, a moderate to advance during the acute late phase, and cautious monitoring for refeeding syndrome in severely ill patients (12).

Prevention and management of malnutrition

Mehta et al. recommended that at the time of admission, a nutrition assessment should be performed on all critically ill patients. It is essential to keep an eye out for indicators of malnutrition, such as cachexia, edema, muscle atrophy, and a body mass index below 20 kg/m2, and EN should be started as once, ideally within the first 24-48 hours. Parenteral nutrition (PN) may be used if the nutritional need is not sufficiently satisfied by EN even after seven days following ICU admission. Electrolytes should be closely evaluated in patients receiving nutrition therapy and should be viewed as therapeutic benefits rather than just supporting or complementary. Daily evaluation of drug-nutrient interactions is required. If even 50% to 60% of nutritional goals are not effectively fulfilled after 72 hours of oral nutrition

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support, tube feeding should be considered (13). Hill stated that the predominant use of EN in the critically ill patient who is unable to maintain adequate oral intake is consistently advised by the most recent international nutrition guidelines. The physiological benefits of EN, the idea that use it or lose it, the negative impacts of PN in past decades, and enhanced cost effectiveness all have contributed to this widespread preference. However, due to frequent delays for operations and/or gastrointestinal discomfort, EN alone is frequently insufficient to reach calorie and protein targets, especially in the acute period of critical illness. There is global agreement among specialists about a cautious, tailored approach with trophic feeding in high-risk patients without unequivocal contraindication accompanied by a ramp-up strategy until the goal is attained, even though clear benefits for the best nutritional path are absent (14).

Total parenteral nutrition is important for patients whose gastrointestinal systems are not working. For the majority of patients with a normal body mass index, 25 kcal/kg of average body weight is sufficient. This objective is comparable to that determined by the Harris-Benedict equation. Refeeding syndrome, which is characterized by electrolyte abnormalities including hypokalaemia, hypophosphatemia, and hypomagnesaemia, congestive heart failure, and volume overload, may result from overeating in people with body mass index below 19, where it can also cause weight gain. It is possible to alter the content of total parenteral nutrition, and particularly carbohydrates overfeeding, to prevent general overfeeding (15). Patients of cardiac disease can suffer two types of malnutrition; cardiac cachexia, which manifests in persistent congestive heart failure, and malnutrition brought on by the consequences of cardiac surgery or any other sort of surgery in these patients. An appropriate nutritional status can be maintained in critically ill cardiac patients with stable hemodynamic by providing nutritional support of 20–25 kcal/kg/day. A daily protein intake of 1.2–1.5 g/kg is recommended. Regular polymeric or high protein formulas should be utilized, with sodium and volume restrictions according to the patient's clinical condition and prior nutritional status. Through conversion to glutamate, glutamine serves as the primary energy source for myocytes and, in dire circumstances, also shields the myocardial cell from ischemia. The use of fish oil containing 1 g of omega-3 per day can help individuals with chronic heart failure avoid hospitalization for cardiovascular events and prevent sudden death when treating acute coronary syndrome (16).

Preiser et al. recommended that within 48 hours of admission, low-dose enteral feeding can be started safely, even while using low or moderate doses of vasopressors as part of the treatment. When EN is expected for 4 weeks, a percutaneous approach should be employed. Before 4-7 days, energy supply should not be matched to energy expenditure, and the use of energy-dense formulas should be limited to patients who cannot tolerate full-volume, isocaloric EN or who need fluid restriction. While a protein target of greater than 1.2 g/kg/day could be taken into consideration during the rehabilitation phase, low-dose protein maximum up to 0.8 g/kg/day can be given during the early stages of critical illness. The prevalence of refeeding syndrome should be monitored daily by measuring plasma phosphate, and a phosphate loss of 30% should be treated with high-dose thiamine and a reduction in the rate of enteral feeding (17). Events happening before, during, and after the ICU stay is probably significant to the overall recovery trajectory; therefore, nutrition for the critically sick patient should not be evaluated in isolation time periods. It is critical to look into how diet affects clinical and functional outcomes across hospitalization and to use interventions in ways that are biologically likely to have an impact. Individualized nutrition plans, longer-lasting therapies, oral nutrition assistance, and the use of newly developed bedside body composition tools to detect patients at nutritional risk are all areas that hold promise for the future of critical care nutrition (18).

The majority of patients should get early EN, with a weekly increase in dose that is gradually introduced. In patients with severe shock, delayed EN is necessary. Recent studies indicate that PN may begin if appropriate EN cannot be provided within the first week of a critical illness because it appears to be just as effective as EN. It has been suggested to consume a lot of protein. However, it is uncertain when is the best. Critically ill individuals should not typically get immuno-nutrition. Monitoring for metabolic abnormalities should be done in patients receiving artificial feeding. Numerous unsolved problems still need to be addressed by other research with sufficient power (19). Well-established literature is present regarding identification, prevention and management of malnutrition in critically ill patients although clinical studies and trials are limited further research can contribute to detailed study of malnutrition and effectiveness of the practical implications of management guidelines present.

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Conclusion

Patients in the medical ICU frequently suffer from malnutrition, which leads to higher morbidity and fatality rates. In order to reduce the effects of malnutrition on patients and the healthcare system, adequate and early nutritional screening and assessment must be performed as soon as a patient is admitted.

Disclosure

Conflict of interest

There is no conflict of interest

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Data availability

Data that support the findings of this study are embedded within the manuscript.

Author contribution

All authors contributed to conceptualizing, data drafting, collection and final writing of the manuscript.

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