



The use of nutritional screening tools in the intensive therapy unit

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ABSTRACT

Patients requiring advanced organ support are often malnourished. A rapid, simple and reasonably accurate method of identifying malnutrition is through the use of a screening tool. Indeed, a nutritional screen is required to complete a full holistic clinical assessment. Organizations such as ESPEN (the European Society for Parenteral and Enteral Nutrition) recommend standardization of nutritional screening (i.e. use of a single tool across a region).

Many tools for nutritional screening have been developed. None have been fully validated for use in the intensive therapy unit (ITU). Moreover, most of these tools consider all critically ill patients to be malnourished or at high risk of malnutrition. However, not all patients in the ITU will benefit from nutritional interventions. For this reason, the Nutrition Risk in Critically ill (NUTRIC) score was developed specifically for patients in ITU. However a recent analysis of the PermiT trial failed to demonstrate any benefit on outcomes associated with the use of the NUTRIC Score. Recommendations on use of a tool for nutritional screening can, therefore, only be based on expert opinion. Those ITUs awaiting a validated tool should adopt a pragmatic approach to identify patients at risk of malnutrition.

For those ITUs that are using a tool for screening it is best if this is used at first contact with the patient by a healthcare professional (e.g. a nurse or a doctor) who is not a specialist in nutrition. Subsequently, recurrent, sequential screening can plot the trajectory of a patient's nutritional status along the timeline of their admission to hospital. This can be continued after step down from ITU to the ward and discharge home. This simple sequential assessment can inform past, present and/or future risk of malnutrition.

The subsequent prevention and treatment of malnutrition depend on the management after screening. Thus a support structure for nutritional interventions (e.g. measurement tools, documentation, follow-up plans) is as important as the tools themselves.

Key words: Nutritional screening tools; Malnutrition; Critical Care

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INTRODUCTION

Malnutrition is associated with morbidity, mortality, prolonged hospital admission and, so, increased cost of healthcare.^{1,2} The 'Global Leadership Initiative on Malnutrition' recommends a two-stage approach to the diagnosis of malnutrition.³ The first step requires the use of a validated screening tool to identify patients 'at risk'. The second step involves specialist

assessment for the diagnosis of malnutrition and the grading of its severity.³

It has been estimated that up to 60% of patients in the hospitals are malnourished.¹⁻³ Almost all patients admitted to an intensive therapy unit (ITU) are at risk of malnutrition.⁴ Screening this cohort for malnutrition is therefore important. It is crucial to identify and refer patients who are malnourished,

or at risk of malnutrition for detailed specialist assessment and treatment.

Many ITUs have unit-based dieticians who review patients to provide a nutritional support as required. However, detailed nutritional assessment by a specialist (i.e. dietician or nutritional support team) is time consuming, expensive and often unnecessary. A nutrition *screening* tool can be administered rapidly by clinical or non-clinical healthcare professionals. It should be performed, usually on first contact with a patient, to identify those patients at risk of malnutrition and consider the potential benefit of nutritional support as well as risk of refeeding syndrome.

The aim of this review is to consider the use of nutritional screening tools in routine ITU practice. It does not fully discuss nutritional *assessment* [i.e. a detailed investigation of nutritional status by a specialist in nutrition]. However, it will consider some aspects of nutritional *assessment* as screening tools include a range of factors that affect nutritional status.

NUTRITIONAL SCREENING

A holistic approach to healthcare must include nutritional screening. So organizations that accredit healthcare facilities (e.g. the Joint Commission of North America) usually mandate that nutritional screening is performed routinely as part of an admission procedure. This screening process must include an evidence-based assessment that determines clinical risks and guides management.

Nutritional screening should routinely be performed at first contact with patients^{1,3,4} and at any subsequent transition of care (i.e. from ward to ITU and vice versa).^{1,3,4} A local infrastructure should support screening and rescreening as required.⁴ This infrastructure should accommodate referrals, documentation, record-keeping as well as a regular audit to monitor practice.^{3,4} Resources for locally agreed care plans and rescreening those at ongoing risk must be available.^{3,4}

A Timeline of Nutritional Status

Screening can provide a timeline of a patient's nutritional status i.e. an overview of a patient's past, present and future nutrition status and risk of malnutrition. A screening tool will initially establish chronic or current energy status, e.g. body mass index (BMI; weight / height²). The use of BMI is often criticized as age, gender and disease state are not accounted for. However, BMI is the most appropriate index of body composition to measure current protein-energy status.^{5,6} It is easy to calculate, applicable to all adults and is internationally recognized. There are clear inverse relationships

between clinical risk and BMI. However, if height or weight cannot be measured or estimated accurately the value of the BMI is compromised. The use of surrogate measures, such as ulna length, arm span, knee height or demispan should then be considered.

The patient's recent past (i.e. 3-6 months before admission) is assessed by reports of intake and estimation of unintended changes in weight (gain or loss). Even if weight loss is excessive (i.e. > 10 % usual weight) a detailed diet history is not taken during screening. Taking a diet history is time-consuming and requires the analytical skills of a specialist. Negative energy balance may result in loss of muscle mass. This can be masked by edema. If this is suspected alternative measures must be used, e.g. bioimpedance analysis.^{7,8}

Determining future risk of malnutrition is the most important, yet challenging role of nutritional screening. This predictive approach must consider the patient's current nutrition status in the context of their disease state and its metabolic demand, management and treatment. This is crucial because the future is the stage where active nutritional intervention and/or close monitoring can influence clinical outcome and, in some cases, is life-saving. For example, nutritional intervention is essential for patients who are unconscious and unable to eat, and for patients with gastrointestinal conditions that compromise nutrient absorption. In such situations, referral for nutritional support is indicated to consider the risk of deterioration and develop a strategy for intervention.^{3,4,9}

After screening, if causes of malnutrition are found and are treatable, they should be addressed, unless nutritional support is not a clinical priority (e.g. terminally ill patients).¹⁰ Decisions about nutritional support should be made by the full ITU team who should take a holistic multidisciplinary approach to patient management.⁴

Constituents of a Nutrition Screening Tool

Nutrition screening must assess dietary, physical, anthropometric, psychological, social and clinical factors.^{11,12} Every variable in the screening tool must be justified by an evidence-based association with a specific risk factor or outcome.¹² The extent to which malnutrition is prevented or treated will depend on the subsequent management of these factors after detection by the screening tool.

Dietary factors include the adequacy of current nutrient intake, recent changes and the recognition of factors that impair nutrient intake or availability (e.g. reduced appetite, disease, dysphagia, etc.).^{11,12}

Physical considerations include the occurrence or presence of muscle wasting, edema, or pressure ulcers. These result from inadequate intake and cause

relative nutrient insufficiency as requirements are increased.^{11,12}

Anthropometric measurements are very important. These substantially increase the validity of a screening tool. Measurements included in screening tools should be simple, accurate and rapid. However, it is vital to have contingency plans for patients in whom these measurements cannot be made.^{11,12}

Pathology affects nutrient requirements. For example, metabolic demands are affected by burns, gastrointestinal disease, and diseases which affect utilization of nutrients (e.g. diabetes) or pharmacotherapy that will interact with nutrient absorption or metabolism.⁴

A screening tool should indicate if any of the factors described above require further assessment by a specialist.

Nutrition screening tools are often presented as a proforma questionnaire. The most common analytical approach is to assign a scoring system to each variable, and the total score derived from this will determine current state or risk of developing malnutrition. Efficacy and validity of the chosen tools will be revealed through retrospective evaluation of the clinical outcomes and of the rates of identifying malnutrition.

Characteristics of an effective nutritional screening tool

In critically ill patients, malnutrition is usually due to micronutrient deficiency or undernutrition.⁴ However, the frequency of obesity due to excessive calorie intake with or without micronutrient deficiency is on an increase.¹³ It is therefore, important that a nutrition screening tool used in the ITU is able to detect each of these forms of malnutrition.

Furthermore, to allow comparative sequential assessment at transitions of care the nutritional screening tool used in ITU should also be applicable to many other healthcare settings. Simplicity and ease-of-use are important. This is so that any healthcare professional can administer the tool and obtain meaningful, accurate and reproducible results.

It is important to identify patients who are not malnourished but are at risk.³ Malnutrition can still develop, whilst patients are in hospital, unless all patients are screened and this cohort is identified and treated.³ It is important to refer this cohort for specialist assessment and intervention before malnutrition manifests clinically. A sensitive tool that is easily administered should identify subjects who require special diets, feeding routes, monitoring and/or consultation before malnutrition manifests clinically.

Logistical consideration of the available resources,

patient populations and the time when tools are administered are also important. As screening must be performed by non-specialists; tools which detect malnutrition rapidly (i.e. within 5 minutes), simply (i.e. few calculations) and inexpensively (i.e. no or few measurements and investigations) are required.^{14,15} Yet these same tools must still accurately represent patients' nutritional status.^{14,15} The equipment needed to administer the screening tool must be readily available (e.g. scales, stadiometers).

The characteristics of successful screening tools are: practicality, reliability, clear indications for use, links to further care plans, ease-of-use by a multidisciplinary group and applicability to many patients and settings.^{11,12} An ideal tool will also indicate frequency of rescreening, need for further assessment, and need for associated monitoring and treatment.

The impact of screening will greatly depend on the resources available, and the knowledge and skills of those healthcare professionals performing the screening. The most successful tools were developed through an evidence-based approach and independently peer reviewed.

Application of nutritional screening tools in the intensive therapy unit today

Nutritional screening tools are administered as a questionnaire or proforma, which ideally should be administered and analyzed by dietitians. However, circumstances dictate that others, such as nursing staff, will be required to administer and interpret screening. Several tools are currently used in clinical practice. Some of these are original, and some are modified versions of previous tools. Existing tools are often modified to improve statistical credibility, or to adapt tools for a wider range of practitioners or settings.

It is difficult to make accurate anthropometric measurements in ITU.⁴ Local policies often adapt the application of screening tools to locally available resources. This may involve specialist training or the development or validation of alternative measurements. For example, if patients cannot be weighed on standing or sitting scales, weigh beds may be used. However, the use of new policies or adaptations of existing protocols require validation and specialized training for staff to develop the necessary expertise.⁴

The decisions made by clinicians and clinical policy makers should be based on tools which have a good evidence base. As part of the scientific peer-review process these tools should have been validated in the settings and populations in which they are to be used. A lack of validation can result in incorrect classification of patients, mistimed intervention,

wrong intervention and wasted resources.

Once validated and in use, retrospective studies will often relate tool variables to specific outcomes or indicate the efficiency of the tool.^{11,16,17} Tools that have been validated and currently are in widespread use include the Subjective Global Assessment (SGA), the Malnutrition Screening Tool (MST) and the Short Nutritional Assessment Questionnaire® (SNAQ®).^{11,16,17} These tools consider all critically ill patients to be at high nutrition risk. However, not all patients in the intensive therapy unit (ITU) will respond to nutritional interventions in a predictable manner. For this reason, the Nutrition Risk in Critically ill (NUTRIC) score was specifically developed for patients in ITU.¹⁸

Applications to the intensive therapy unit

The ITU has unique challenges. Simple and rapid tools (e.g. SNAQ®) can be used successfully.^{19,21} A protocol for nutritional screening should guide the need for specialist input to address concerns,^{3,4} i.e:

Which ITU patients require screening and/or feeding?

Which patients require more attention?

When, how and what should a patient be fed?

Fluid imbalances, plaster casts, amputations and other operations are common in ITU patients.⁴ The nutritional screening of such patients requires special consideration. Some tools have guidance notes for situations where measurements are unreliable.^{22,23} Conditions that require ITU admission (e.g. sepsis, major surgery) often cause catabolism.⁴

The resultant protein-energy malnutrition compounds critical illness.⁴ Screening should assess malnutrition due to catabolism. If a nutrition screen identifies a patient at risk of malnutrition, a detailed assessment must then be performed. This should lead to initiation of a feeding regimen to prevent further wasting and restore optimal nutritional status.

When choosing the tool to use, the purpose of screening must be considered.²⁴ For example, some tools were developed to detect the presence or risk of malnutrition, whilst others were designed to identify patients that may benefit from nutrition support (e.g. NUTRIC Score). In ITU, identifying potential benefit to clinical outcome from nutrition support is

more important than simply identifying the presence or risk of malnutrition.²⁴

The role of the Nutrition Risk in Critically ill (NUTRIC) score in ITU

A systematic review of the association between malnutrition and outcomes assessed five screening tools. The NRS 2002 and MUST were most predictive of mortality and were easiest to use.²⁵ However, these tools have not been validated prospectively. So recommendations for the use of nutrition screening tools in clinical practice can only be based on expert opinion.⁴

There are several criticisms of the NUTRIC score. Importantly the score does not include any nutritional parameters.¹⁸ Furthermore, many factors besides nutrition influence mortality and ventilator free days. So these are probably not the best outcome measures on which to judge a nutritional screening tool.

Moreover, a post-hoc analysis of a multicenter trial of permissive underfeeding of patients in ITU reported that permissive underfeeding with full protein intake was associated with similar outcomes to standard feeding in patients at high and low nutrition risk.²⁶ This study used the NUTRIC score to determine risk of malnutrition. These data suggest that the use of the NUTRIC score did not affect outcomes.^{4,26}

CONCLUSION

Malnutrition is associated with morbidity, mortality, prolonged hospital admission, so increased cost of healthcare. A two-stage approach to the diagnosis of malnutrition is recommended. The first step requires the identification of patients 'at risk'. In most patient populations this is achieved through the use of a validated screening tool. Whilst several nutrition screening tools are currently available none have been fully validated for use in ITU. Those ITUs awaiting a validated tool should adopt a pragmatic approach to identify patients at risk of malnutrition.

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Authors' contribution:

RR + MFK: Both authors were involved in concept, preparation of manuscript, editing and approval of the final manuscript for publication

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