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Feature Article

Evaluating the effectiveness of five screening tools used to identify malnutrition risk in hospitalized elderly: A systematic review

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ABSTRACT

This systematic review investigated 5 frequently used nutrition screening tools (NSTs) used in hospitals and their effectiveness at identifying malnutrition risk in the elderly. A literature review was conducted to obtain research articles focused on malnutrition screening in hospitalized elderly and effectiveness of the NST used. Twenty six articles were reviewed and evaluated, resulting in 8 that met inclusion criteria. The Mini Nutritional Assessment-Short Form, designed for use in the elderly, resulted in overestimation of malnutrition. Four screening tools did demonstrate more effectiveness in identifying malnutrition risk; however, several different biochemical and anthropometric parameters were used, which prevented meaningful comparisons. There is a need for a universal NST "gold standard" for use in the elderly, and further research is indicated.

Introduction

Nutrition screening tools (NSTs) have been utilized in the hospital setting to alert nurses and other health care professionals of a potential or actual risk of malnutrition. There is a lack of consensus throughout the nursing community to state with complete confidence that one screening tool performs best with the elderly population.[1] Several NSTs have been observed in research studies, which has created more confusion and less certainty about which tool is the most accurate. To date, there has been no gold standard definition for malnutrition, or strict clinical parameters for diagnosis.[2] Malnutrition is loosely defined as an undernutrition or a deficiency of nutrition.[3] Malnutrition is currently diagnosed through various signs and symptoms, such as weight loss, low serum albumin, infection, and muscle wasting.[1] The following malnutrition screening tools are commonly used: Mini Nutritional Assessment-Short Form, Nutritional Risk Screening, Malnutrition Universal Screening Tool, Malnutrition Screening Tool, and Geriatric Nutrition Risk Index. If malnutrition risk is determined in the elderly during the initial screening, a consultation is forwarded to a registered dietitian for a more in-depth assessment. The Mini Nutritional Assessment and Subjective Global Assessment are frequently used when a nutrition risk is identified with a NST.

In addition to uncertainty about what screening methods are most effective, a lack of timely screening and misidentification of nutritional status has been an area of concern. Mortality, infection, delayed healing, lengthy hospital stay, and increased healthcare costs are negative factors associated with inaccurate screening.[4] It is estimated that costs associated with malnutrition increase hospital expenses by 30–70%.[5] Screening within 72 h of admission and accurate risk identification will alert nurses, physicians, and dietitians of high-risk elderly patients. In a Dutch study that investigated the diagnosis of malnutrition by healthcare professionals, 15.3% of patients received a screening within 72 h by a physician, 52.8% by medical students, and 29.9% by nurses.[6] In addition, timely and accurate screening will result in a faster assessment and intervention to ensure the best possible chance at health improvement and decreased mortality. This systematic review investigates the 5 commonly-used NSTs in hospitals at identifying malnutrition risk in the elderly.

Reliability, validity, specificity and sensitivity are important indicators in research that evaluate screening tools. Validity applies to the design and methods of the research and identifies the accuracy of the research. Reliability evaluates the degree to which the

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NST produced a stable result. It is important to state that reliability has to be present in addition to validity. Specificity measures if there is a correct identification of studies with no malnutrition risk. Sensitivity measures if there is a correct identification of studies that have malnutrition risk.

NSTs have been designed to alert staff of a potential nutrition risk that requires further assessment. Commonly used NSTs included in this review were Malnutrition Universal Screening Tool, Mini Nutritional Assessment-Short Form, Malnutrition Screening Tool, Geriatric Nutrition Risk Index, and Nutritional Risk Screening. These are summarized in Table 1. There is some confusion with screening and assessment tools being used interchangeably when they are not designed for the same purpose. Mini Nutritional Assessment is lengthy to complete, so time management may be an issue if a nurse has a large nurse-to-patient ratio. Some of the NSTs are easy to administer (Mini Nutritional Assessment-Short Form, Nutritional Risk Screening, and Malnutrition Screening Tool), while other NSTs and assessment tools require a more in-depth clinical observation, calculations and laboratory values (Mini Nutritional Assessment, Subjective Global Assessment, Geriatric Nutrition Risk Index and Malnutrition Universal Screening Tool).[7]

Initial screening is most often conducted by nurses or physicians during the first 48–72 h of admission. Hospitals use a variety of screening methods, which further complicate proper diagnosis. These tools are sometimes difficult to administer and challenging for the front line staff who are completing the initial screening. One study found that only 4% of patients were screened for malnutrition risk, despite 57% of patients who were, in fact, malnourished.[8] This further emphasizes the importance of a streamlined screening process that is quick and accurate for nurses to complete.

Methods

A systematic review was conducted using Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)[9] guidelines to answer this research question: Are five commonly used screening tools effective at identifying malnutrition risk in the hospitalized elderly?

Search strategy

Several databases were used to search for relevant literature. A literature search of PubMed was performed to identify relevant sources. The following Medical Subject Heading (MeSH) terms were used to identify initial sources: malnutrition, mass screenings, aged, nutrition and hospitalized. Cumulative Index to Nursing and Allied Health Literature (CINAHL) search terms were used to identify relevant sources: malnutrition, screening, elderly and hospitalized. A Web of Science search was conducted using following terms: TS = aged AND TS = malnutrition AND TS = mass screening. A free text search was conducted using the words "malnutrition", "screening tool" and "elderly" to identify additional sources. An exhaustive literature search was performed using these search tools as well as Google Scholar. References were also located through hand-searching of the bibliographies of research articles. No language restrictions were included in the search criteria.

Inclusion criteria for studies used in the systematic review included people who were 60 years of age and above, were hospitalized, had malnutrition, had used one of NSTs: Mini Nutritional Assessment-Short Form, Nutritional Risk Screening, Malnutrition Screening Tool, Geriatric Nutrition Risk Index and Malnutrition Universal Screening Tool within 72 h of admission. Although there is no specific tool that accounts for dementia, people with dementia were included in the review. In many of the articles reviewed, similar anthropometric and biochemical data were used as key identifiers for malnutrition risk. These identifiers included height (ht), weight (wt), body mass index (BMI), serum albumin, total lymphocyte count, tricep skinfold thickness, calf circumference, and mid-arm circumference. Other variables monitored to identify malnutrition risk included: length of stay, in-hospital mortality, 3 and 6-month mortality, results of different screening tools, physical assessment, and observation. Exclusion criteria were people below 60 years of age, community dwelling or nursing home residents, non-hospitalized, or screening that was completed beyond 72 h of admission, or use of NSTs not included in this review. Titles and abstracts were reviewed to determine if inclusion criteria and the research question were met.

Assessment of quality of research studies obtained in this systematic review

Quality assessment was completed by using criteria established by the Downs and Black checklist.[10] Twenty seven items were evaluated to determine quality, as summarized in Table 2. "Yes" or "no" questions were included and there was a maximum numeric score of 27 points possible. The Downs and Black quality checklist produced scores ranging from 8 to 20 (summarized in Table 3). Although there was some variation in the studies reviewed, this did not affect interpretation of results because of the heterogeneous nature of the studies. The Downs and Black quality checklist has been shown to be effective in the systematic review process.[10]

Results

The search resulted in 1240 total references: 712 in CINAHL, 325 in Web of Science, 52 in PubMed and 151 in Google Scholar. The literature search was not limited by publication date. Duplicates were removed from the databases and 1140 papers remained. Review of title and abstract resulted in 26 papers that were obtained for full-text review. This resulted in 8 studies, which evaluated five NSTs that met established inclusion criteria (Fig. 1). There were no conflict of interests found in the studies reviewed.

Research summaries

Studies have compared screening methods to determine which is most accurate and gives the best indication of malnutrition. Parameters used to evaluate the effectiveness of NSTs are described in Table 3.

A single-center, cross-sectional study in Switzerland compared the Mini Nutrition Assessment to the Nutritional Risk Screening NST[13] The purpose was to determine if there was a correlation with protein markers used to identify malnutrition. Biochemical values that were obtained within 24 h of admission included albumin, prealbumin, retinol-binding protein, total lymphocyte count, creatinine and c-reactive protein markers. It is important to note that in 60% of the observations, classifications of Mini Nutrition Assessment and Nutritional Risk Screening scores were not in agreement. Nutritional Risk Screening identified more patients who were at risk or malnourished than did the Mini Nutrition Assessment. Some patients who were classified as severe nutrition risk in Nutritional Risk Screening, were at low or no risk according to Mini Nutrition Assessment.[13] Patients who had the highest Mini Nutrition Assessment malnutrition risk scores (23 patients) had only median values of albumin, prealbumin, and retinol binding protein markers. The Mini Nutrition Assessment did not reflect any differences in the total lymphocyte count and c reactive protein markers. Patients who were classified as malnourished using the Nutritional Risk Screening had a lower prealbumin and retinol binding protein. The protein marker that was proven to be effective