e-SPEN Journal 8 (2013) e44–e50

Contents lists available at SciVerse ScienceDirect

e-SPEN Journal

journal homepage: http://www.elsevier.com/locate/clnu

Original article

Predictive validity of 'Malnutrition Universal Screening Tool' ('MUST') and Short Form Mini Nutritional Assessment (MNA-SF) in terms of survival and length of hospital stay

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ARTICLE INFO

Article history:
Received 11 August 2012
Accepted 2 January 2013

Keywords:
Malnutrition
Nutrition screening
Outcome measurement
Mortality
Length of stay
Elderly

SUMMARY

Background & aims: The high prevalence of malnutrition and associated adverse outcomes in older people is well documented. Early identification of malnutrition and intervention in hospital patients may improve clinical outcome. 'Malnutrition Universal Screening Tool' ('MUST') is the preferred screening method for malnutrition in UK. The Short Form Mini Nutritional Assessment (MNA-SF) has been developed specifically for older populations. Little information is available regarding the comparability of these commonly used screening instruments. The aim of this study was to compare these nutrition screening tools and evaluate their predictive validity.

Method: A prospective cross sectional study of nutritional status in 149 inpatients aged 65–99 years was carried out. Exclusion criteria were terminal illness, active malignancy, and lack of capacity to consent. Main nutritional measures were weight, height, body mass index, mid arm circumference, hand grip strength, and serum albumin levels. Data on mortality, length of stay (LOS) and hospital readmissions were collected retrospectively and related to 'MUST' and MNA-SF scores.

Results: The main findings were that there was a 'moderate' agreement between 'MUST' and MNA-SF [$\kappa = 0.50$, 95% CI (0.39, 0.60)], that both 'MUST' and MNA-SF scores predicted mortality ($p = 0.013$ and 0.009 respectively), and that LOS increased progressively with MNA-SF category.

Conclusion: The MNA-SF categorises many more older people admitted to hospital as at risk of malnutrition than the 'MUST'. Both tools have predictive validity with regard to mortality but MNA-SF better predicts length of stay and readmission rates. These findings support screening all older hospital patients for malnutrition, with either tool.

1. Introduction

Malnutrition is common in hospital patients of all ages and it is estimated that up to 40% of all patients admitted can be malnourished at any time.[1,2] Of those individuals who are malnourished on admission, their nutritional status often deteriorates further during their hospital stay.[1] Surprisingly, a number of studies have indicated that malnutrition in acute hospital admissions is unrecognised and undertreated in about two thirds of cases, including older patients.[1,3–5] To facilitate early intervention a number of evidence based guidelines have recommended that all patients should be routinely screened for malnutrition on admission to hospital.[6,7]

Several different screening tools have been developed and validated for use in clinical practice to detect malnutrition. The 'Malnutrition Universal Screening Tool' ('MUST') is a validated and reliable tool developed for use in all health care settings. It has been shown to predict clinical outcome in older people, including length of hospital stay, discharge destination from hospital, rate of admission to hospital, number of GP visits and mortality.[6,8] 'MUST' is increasingly being adopted by UK healthcare providers as the preferred method of screening for malnutrition.

The Mini Nutritional Assessment (MNA) and its short form (MNA-SF) are alternative screening tools also validated for use in clinical practice.[9–11] The MNA is the only malnutrition assessment instrument specifically developed for older people.[9,12] It takes into

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http://dx.doi.org/10.1016/j.clnme.2013.01.001

account domains not directly linked to food intake, but crucial when dealing with frail individuals such as functionality (mobility), depression and cognitive impairment. There are a number of retrospective as well as prospective studies using the MNA, adding to its credibility as a reliable tool for malnutrition screening and assessment in older people.[13,14]

Little information is available regarding the comparability of these two commonly used screening instruments. In the absence of a universally recognised 'gold standard' for malnutrition,[15] their comparison is of particular interest. 'MUST' has been proven to have high sensitivity and specificity as a screening test[16] and shown to have excellent agreement with a dietitian's assessment of malnutrition,[6] but whether it has agreement with other commonly used tools such as MNA is unclear. It can also be argued that the true validity of a screening or assessment tool can only be established when its ability to predict relevant clinical outcomes has been proven. Although the ability of 'MUST' to predict mortality and length of stay in older people has been previously documented,[8] it is not clear whether a high malnutrition risk score was indeed an independent predictor of these clinical outcomes.

In hospital settings, a low MNA score has been associated with increased mortality, prolonged length of stay and greater likelihood of discharge to nursing homes according to an earlier review.[17] However, more recent studies have suggested that malnutrition as diagnosed with the MNA failed to predict mortality in hospitalised older people.[18,19]

To date studies of the MNA-SF have been limited to correlation with the full MNA and the current study is the first to compare the 'MUST' with the MNA-SF in the over 65 age group.

The aims of this study were: (1) to compare two commonly used nutrition screening tools, 'MUST' and MNA-SF, in older inpatients; (2) to evaluate their relation to other nutritional markers; (3) to evaluate the predictive validity of each tool in terms of survival over a one year period and length of stay in hospital.

2. Methods

2.1. Participants and study design

A prospective cross sectional study was carried out at Ysbyty Gwynedd Hospital, an acute general hospital. Between January and October 2010, all new patients admitted to three medical wards, as identified by searching the hospitals information system, Pims (i.SOFT Group Plc), were screened for inclusion. Patients were eligible for study inclusion if aged 65 years or older and were able to give informed consent. Exclusion criteria were terminal illness and active malignancy. People with severe expressive or receptive dysphasia were excluded as they were unable to complete the nutritional assessment questionnaires. Eligible patients were approached by the researcher who obtained written informed consent.

Approvals for the study were given by the North Wales Research Ethics Committee and Research & Development Committee of Betsi Cadwaladr University Health Board.

2.2. Data collection

Nutritional assessments were carried out within 72 h of admission by a single investigator (registered dietitian) using standard methods. Nutritional assessment was based on anthropometry, weight, Body Mass Index (BMI) and biochemical measurements. 'Malnutrition Universal Screening Tool' ('MUST') and Short Form Mini Nutritional Assessment (MNA-SF) were used to classify individuals' risk of malnutrition. Both tools are relatively easy to administer and each takes between four and six minutes to complete.

2.3. Nutritional assessment

Patients were weighed in light clothing with footwear removed. Weight in kilograms was recorded to the nearest 0.1 kg using digital electronic chair scales (SECA, UK). Standing height was measured to the nearest 0.5 cm using a portable stadiometer (SECA, UK). In patients who were unable to stand, height was estimated using ulna length measurements, as described in the 'MUST' score methodology.[20] Weight and height obtained were used to calculate Body Mass Index (BMI) which is a weight for height indicator. In addition, previous records of weight were sought from the case notes to ascertain percentage unintentional weight loss within past 3–6 months to calculate 'MUST' score. Patients were asked to self report any unintentional weight loss, if no records were found.

Mid Upper Arm Circumference (MUAC) was measured using a flexible non-stretch tape to the nearest 0.1 cm at the marked midpoint (between the acromion and olecranon process) on the non-dominant arm.[21] Triceps skin fold (TSF) was measured with a skin fold calliper (John Bull, British Indicators Ltd., UK) to the nearest 1 mm on the non-dominant arm midway between the tip of the acromion and the olecranon process. These measurements were then used to calculate Mid Arm Muscle Circumference (MAMC) by applying the equation: MAMC (cm) = MUAC (cm) − [TSF (mm) × 0.314].[22]

Handgrip strength of participant's dominant arm was measured in triplicates to the nearest kilogram using a standard hand dynamometer (Takei Scientific Instruments Co. Ltd., Japan) and the mean value of the three measurements was recorded. Brief pauses were taken between measurements to minimise fatigue effects.[23] Measurements were taken with the participant in an upright position (in patients who could not stand, measurements were made in sitting position) and with the arm of the measured hand unsupported and parallel to the body. The width of the dynamometer's handle was adjusted to each participant's hand size so that the middle phalanges rested on the inner handle. Participants were then asked to exert gradual maximal force. Measurements were performed for dominant hand as this side has a stronger grip than the non-dominant hand.[24]

Serum albumin and prealbumin were measured as markers of nutritional status. Blood samples were obtained specifically for this study and the tests were carried out in the laboratory at Ysbyty Gwynedd (using appropriate lab methods).

2.4. Malnutrition scores

Participants were categorised as being at low, medium or high risk of malnutrition using the 'Malnutrition Universal Screening Tool' ('MUST'). It is a valid and reliable tool that uses Body Mass Index (BMI), recent weight change and the effects of acute disease on nutritional intake to give an overall score for risk of malnutrition.[6] If the total score is zero, the patient is at low risk of malnutrition, a score of 1 indicates medium risk and if the score is 2 or greater, the patient is at high risk of malnutrition. The maximum score is 6.

Short Form Mini Nutritional Assessment (MNA-SF), a shortened form of the MNA, advocated for use in nutritional screening, was also used for classification of malnutrition. The MNA-SF classifies older people as well nourished, at risk or malnourished. The shortened MNA comprises six questions: Body Mass Index (BMI), declined food intake over the past three months due to loss of appetite/digestive problems or swallowing difficulties, weight loss during last three months, mobility, neuropsychological problems and psychological stress or acute disease in the past three months. The scores from all questions are summed together giving a minimum score of 0 and a maximum score of 14 with a high score