Agreement between NRS-2002 and MUST nutrition risk scores – a retrospective study

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Introduction

The nutritional status of hospitalised patients has been a growing concern during the past four decades. Worldwide studies indicate that 30% to 60% of hospitalised patients are malnourished.[1] The complications of undernutrition, which include prolonged healing, increased length of hospital stay and increased hospital cost are well known. Early identification of undernutrition and/or risk to develop undernutrition while in hospital has been recommended.[2] Various nutrition risk screening tools have been developed and are frequently used in the nutritional management of hospitalised patients. Based on sensitivity and specificity, the following four screening tools seemed to be valid and therefore recommended for nutrition risk screening: the Nutrition Risk Screening tool (NRS-2002), the quick and easy Malnutrition Universal Screening Tool (MUST), the Malnutrition Screening Tool (MST) as well as the Short Nutritional Assessment Questionnaire (SNAQ).[3]

Since 2003, the Nutrition Risk Screening tool (NRS-2002), developed by European Society for Clinical Nutrition and Metabolism (ESPEN)[2] has been used to determine the nutritional risk of patients admitted to Pelonomi, Universitas and National Hospitals in Bloemfontein. Forty to 60% of these patients had a high nutritional risk and would likely benefit from nutritional support.[4] However, the need for a more easy to apply screening tool was identified. The MUST was considered quick and easy and the screening criteria were available on the NRS screening form.

In view of the paucity of comparative data in the country on the use of such screening tools, we compared, in this study, the results obtained from MUST and NRS-2002 screening tools in the 2005–2008 period with the aim of establishing which of the two tools would be the most appropriate to use in the Bloemfontein academic hospitals.

Methods

The study was based on the screening results of a sample of adult patients (N = 3938) aged 18 years and older, who were admitted during February to October 2005–2008 to the medical and surgical wards in Pelonomi and Universitas Hospitals and the cancer wards of the National Hospital. Ethics approval was obtained from the Ethics Committee of the Faculty of Health Sciences, University of the Free State (ETOVS number 30/01).

Final year dietetic students were trained to complete the adapted NRS-2002[2] questionnaire and to take the anthropometric measurements. For standardisation purposes, pilot studies, using the final year students of the respective years over which the study was conducted, were implemented in January of each year. Anthropometric techniques, as described by Lee and Nieman[5] were used to determine current weight, height, knee-height and mid-upper arm circumference. In patients from whom standing height and weight could not be obtained, equations for estimating stature from knee-height and equations to estimate body weight from knee-height and mid-arm circumference[5] were used. Reported pre-illness weight was also noted. All new admissions were screened on weekdays only.

Statistical analysis

A non parametric Bland-Altman analysis was used to assess the level of agreement between the two methods,[6] where the 2.5th percentage and 97.5th percentage were calculated as the limits. The risk categories for BMI, weight loss and appetite loss used for MUST[2] were applied on the screening results of 2005–2008 and the final score was calculated and described by means of sensitivity and specificity, for which 95% confidence intervals for the percentage were calculated.

Results

The limits of agreement between the scores obtained by the NRS-2002 and the MUST ranged from -1 to 5 (Figure 1a). The two methods did not consistently provide similar scores because there was a level of disagreement that included clinically important discrepancies of up to a score of 6.

How small the limits of agreement should be to conclude that the methods agree is a clinical, not a statistical decision. Thus to find a stricter cut-off range, the limits of agreement were narrowed and determined by a clinical decision of $\pm$ 1, which showed an even larger level of disagreement (Figure 1b).

The diagnostic accuracy of the two methods was calculated from a 2x2 Table. The outcome of the risk obtained from the MUST was measured against the risk outcome obtained from the NRS-2002. The positive predicted value of the MUST as measured against the

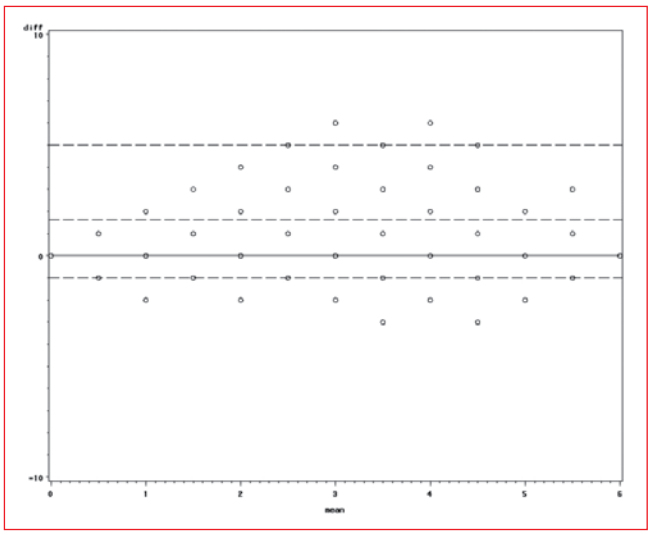

Figure 1a: BlandAltman -1 and 5 cut-off values

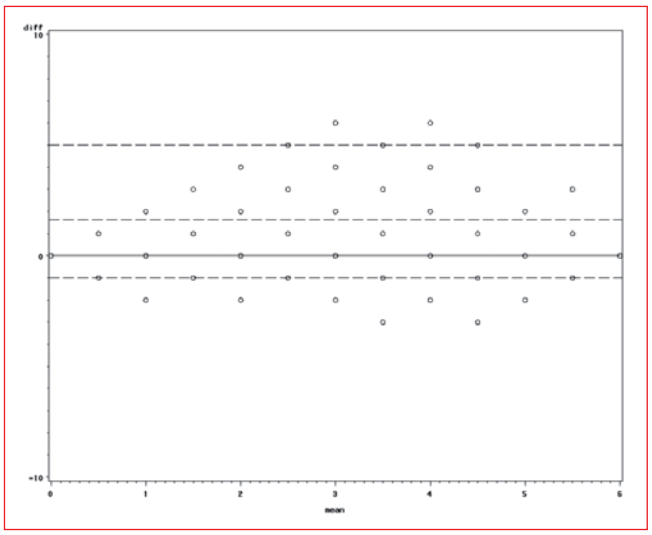

Figure 1b: BlandAltman -1 and 1 cut-off values

Figure 1: Bland-Altman analysis depicting the level of agreement between the Nutrition Risk Score/indication of nutritional risk that needs intervention by a dietitian using the risk scores obtained by the two methods. The Bland-Altman analysis involves the plotting of the difference between the measurements of the same parameter obtained with two different techniques against the mean of the two techniques. Points showing perfect agreement will lie on the horizontal line drawn through the value 0. The further away the points lie from this line, the worse the level of agreement.[6]

NRS-2002 was 89.5%, while the negative predictive value was 61.2%. The sensitivity was 59.1% with 95% CI [57.1% ; 61.1%] and the specificity was 90.3% with 95% CI [88.9% ; 91.7%].

Discussion

The diagnostic accuracy of any screening tool is important as it determines whether a patient will be accurately diagnosed as nutritionally at risk and would need nutrition support. The positive predictive value of the MUST was high (89.5%) while the negative predictive value was low (61.2%). The positive result is very predictive because there is 89.5% certainty that a person with a positive result based on the test will be identified.

The sensitivity of the MUST was low (59.1%), and the specificity was high (90.3%). If the sensitivity and specificity of 70% that was used by Neelemaat et al[3] to represent validity is used as the criterion, then the sensitivity of the MUST compared to the NRS-2002 was too low.

The limits of agreement by the Bland-Altman analysis showed a large level of disagreement between the two methods. Narrowing the limits of agreement would contribute to a more accurate assessment of the patient who would need nutritional support, thus a clinical decision of ± 1 was used, which shows how large the level of disagreement really is.

Conclusion

Findings obtained by the MUST screening tool were not found to be in agreement with those of the NRS-2002. The fact that the MUST was derived from the NRS-2002 and was not determined on its own probably contributed to the disagreement found between the two methods. It is recommended that the NRS-2002 be compared prospectively with the MUST and other screening tools.

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