**Introduction**

It is well established that the older person (greater than 65 years of age) generally experiences higher rates of undernutrition and are more prone to malnutrition than the general population (1-5). This has major implications for clinical care as those older persons who experience undernutrition have slower wound healing, compromised immunity, increased risk of infections, longer hospital stays, more frequent hospital re-admissions and ultimately increased cost of care (6,7). The accurate detection of malnutrition in the older person therefore represents a growing nutritional responsibility. If undetected, undernutrition may result in more rapid deterioration of health and early death (8).

In 1998 the authors were involved in a routine malnutrition screening initiative introduced in three regional hospitals in the Illawarra Area Health Service (IAHS), New South Wales, Australia (9). The main purpose being to flag those patients at risk of malnutrition and commence early nutrition intervention. It was proposed those repeat assessments would enable the measurement of nutritional changes over time and provide an indication of the impact of that nutrition intervention.

All patients were screened using the FBBC (10) on admission. Those identified as “at risk” of malnutrition were then assessed using the Subjective Global Assessment (SGA) (11,12). However, the dietitians assessing older clients expressed concerns that the SGA did not appear to be highly sensitive in this population. The sensitivity was questioned when serial SGA measurements were taken over time. Dietitians noted improvements in nutritional status but these changes were too small to elicit shifts in the SGA categories.

This concern prompted a closer examination of the use of the SGA in the older person. A review of the literature showed the inter-rater agreement of the SGA was less when used in older clients and there were discrepancies in reporting of malnutrition rates (13,14).

The SGA is a nutritional assessment tool validated for use in all hospitalised patients (11,12). The Mini Nutritional Assessment (MNA) however, was specifically designed and validated in the older population for integration into geriatric assessment programmes (15). A review of the area showed an absence of literature directly comparing the SGA with the MNA in the detection of malnutrition in the older population. This prompted us to compare the SGA with the MNA, for clients greater than 65 years of age.

**Aim**

The aim of this study was to determine which of the two tools (SGA or MNA) was more accurate at detecting malnutrition in hospitalised older persons in the IAHS. In particular:

1. Does the MNA detect a higher number of malnourished patients than the SGA, when used by dietitians to assess the

---

**THE JOURNAL OF NUTRITION, HEALTH & AGING©**

**ASSESSING THE OLDER PERSON: IS THE MNA A MORE APPROPRIATE NUTRITIONAL ASSESSMENT TOOL THAN THE SGA?**

L. BARONE, M. MILOSAVLJEVIC, B. GAZIBARICH

Correspondence: Lilliana Barone BSc Master Nut Diet (Sydney University) Clinical Dietitian, Wollongong Hospital Nutrition Department, P.O Box 178, Wollongong, New South Wales, Australia 2500. e-mail address : baronel@iahs.nsw.gov.au

**Abstract**: OBJECTIVES: A study was undertaken to determine which nutritional assessment tool would be better in assessing changes in nutritional status over time in hospitalised older patients. The two tools used were the Mini Nutritional Assessment (MNA) and the Subjective Global Assessment (SGA). DESIGN: Single blind, prospective study conducted over a 60-day period. SETTING: Five regional hospitals within Southern New South Wales, Australia. SUBJECTS: There were 43 patients at the commencement of the study, then 28 patients at day 30 and 20 patients at day 60. METHODS: All patients over 65 years of age admitted to the five hospitals during May 2001 were eligible. The only exclusions were those patients admitted to palliative care or with severe dementia. Two dietitians saw each patient. Each dietitian assessed the patient using his or her assigned nutritional assessment tool either the SGA or the MNA. All dietitians were randomly assigned the tool at the commencement of the study. They were familiarised with the use of the tool by participating in a workshop prior to the start of the study. RESULT: The MNA was able to detect greater numbers of malnourished subjects when compared to the SGA. This finding was consistent across Day 0, 30 and 60 and statistically significant (p<0.05) at all time periods. CONCLUSIONS: This study has shown the MNA to be a more appropriate nutrition assessment tool for older patients when compared to the SGA. The MNA is better able to identify severely malnourished patients. This study illustrated the potential use of the MNA as an ongoing monitor of nutritional status and hence a measure of the impact of nutrition intervention.

**Key words**: Nutritional status, Mini Nutritional Assessment, Subjective Global Assessment, older person, aging.
nutritional status of individuals aged 65 years and over?

2. Is there a difference in the detection of malnutrition at Day 30 and Day 60 after admission, between the SGA and MNA?

Methods

Subjects
The study included patients 65 years of age and over admitted to five hospitals within the IAHS. All new admissions to these sites over a one-month period (between May and June 2001) were eligible for the study; with the exception of palliative care patients and patients with severe dementia.

Design
This was a prospective single blind study conducted over a 60-day period. A paired sample was used. Two observations (the SGA and MNA) were done on each participant at baseline (Day 0), Day 30 and Day 60 after admission. Those patients that were discharged during this period were followed up at home or place of residence. Results and other relevant data such as social status, and admitting diagnosis (if available) were recorded on a simple patient data form by each observer for every subject.

Tools for Assessment
The SGA is a subjective global assessment tool designed for hospitalised patients (11,12) and the MNA is specifically developed for the assessment of the nutritional status of the older person (16,17).

Modification of the MNA tool
The MNA was developed in France with collaboration from the Clinical Nutrition Program, University of New Mexico USA and the Nestle Research Centre, Lausanne Switzerland (18). After consultation with the author (19), the MNA tool was modified as follows to make it more culturally specific to the older Australian population.

i) Question F  Body Mass Index (BMI) (weight in kg)/(height in m)²

<table>
<thead>
<tr>
<th>Score</th>
<th>BMI Original MNA</th>
<th>BMI Modified MNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Less than 19</td>
<td>Less than 22</td>
</tr>
<tr>
<td>1</td>
<td>19 to less than 21</td>
<td>22 to less than 24.5</td>
</tr>
<tr>
<td>2</td>
<td>21 to less than 23</td>
<td>24.5 to less than 27</td>
</tr>
<tr>
<td>3</td>
<td>23 or greater</td>
<td>27 or greater</td>
</tr>
</tbody>
</table>

The French anthropometric standards are lower than those used for the USA and Australia, therefore the BMI range was modified to reflect the ranges recommended by the Dietary Guidelines for Older Australians. For healthy older adults most assessment standards suggest a range of 22 - 27 (20), therefore Question F in the screening component was adjusted as illustrated above.

ii) Question K  Selected consumption markers for protein intake

The original MNA had two or more servings of legumes or eggs per week. After consultation with the author, this was modified to one - two servings per week to better match the Australian dietary practices. Legumes are traditionally consumed in greater quantities in Mediterranean diets. On average 18g legumes are consumed per day in Mediterranean diets compared with 6g per day in the Australia (21,22).

iii) Question Q  Mid-arm circumference (MAC) in cm

<table>
<thead>
<tr>
<th>Score</th>
<th>MAC Original MNA</th>
<th>MAC Modified MNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>MAC less than 21</td>
<td>MAC less than 26.6 (male)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25.1 (female)</td>
</tr>
<tr>
<td>0.5</td>
<td>MAC 21 to 22</td>
<td>MAC 26.6 to 30.4 (male)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25.1 to 29.7 (female)</td>
</tr>
<tr>
<td>1.0</td>
<td>MAC 22 or greater</td>
<td>MAC 30.4 or greater (male)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39.7 or greater (female)</td>
</tr>
</tbody>
</table>

Adjustments to MAC measurements were made based on the American percentile norms for measurements of MAC in older white subjects (23), which also included gender differences.

Procedure
For the purpose of the study, participating hospitals were grouped into three sites. A total of six dietitian’s (two from each site) acted as investigators. The investigators worked in pairs, each being randomly assigned a nutrition assessment tool – either the SGA or MNA.

All investigators had been trained in the use of the SGA and were currently using this tool in their normal clinical practice. To minimise user bias and familiarise themselves with the MNA tool, all dietitians involved in the study used the MNA over a trial period of one week prior to the commencement of the study. To maximise inter-rater reliability a workshop was conducted prior to this trial where the dietitians were trained in the use of the MNA.

Implementation
The SGA and MNA were each conducted on all new (and appropriate) admissions, over a 30-day period. The first assessment on admission was Day 0 (baseline). The same investigators used the same assessment tool to reassess each subject at Day 30 and again at Day 60. “Patient data forms” were completed for each subject at Day 0, 30 and 60, and forwarded on to another dietitian, independent of the study for collation. If a subject was identified as nutritionally compromised the site dietitian provided nutrition care throughout their admission as per standard dietetic practice within the Nutrition Department. Follow-up of the subjects at Day 30 and 60 were arranged closer to the time due. Where subjects were willing, an outpatient clinic appointment was made, however, the majority of follow-ups were home visits.
Results

Overall 43 subjects were assessed at baseline using each tool. Table 1 describes the subjects’ characteristics at the three time points. There was no statistical difference in the variables at each of the three time points measured.

Table 1
Demographic characteristics of subjects

<table>
<thead>
<tr>
<th>Variables Measured</th>
<th>Baseline</th>
<th>Day 30</th>
<th>Day 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Subjects</td>
<td>43</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>Age (years) mean</td>
<td>78.6</td>
<td>78.2</td>
<td>80</td>
</tr>
<tr>
<td>(range)</td>
<td>(68-94)</td>
<td>(68-92)</td>
<td>(70-92)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% female</td>
<td>60</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>% male</td>
<td>40</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>BMI (kg/m²) mean</td>
<td>24.5</td>
<td>23.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Female</td>
<td>24.8</td>
<td>23.9</td>
<td>24.4</td>
</tr>
<tr>
<td>Male</td>
<td>24.0</td>
<td>23.7</td>
<td>24.0</td>
</tr>
<tr>
<td>Social Status %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% alone</td>
<td>35</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>% partner/carer</td>
<td>60</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>% hostel</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>% nursing home</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Reasons for the dropout included subjects withdrawal from the study, subjects uncontactable for follow up, subjects on holiday over the follow up period, difficulty with time/resource constraints for dietitians to follow up some subjects who required home visits.

Graphs (Figure 1, 2 and 3) illustrate the nutritional status as detected by the SGA and MNA over the 60-day time period. There was not a significant difference between the numbers identified as undernourished (i.e. at risk and malnourished) with each tool. The significance however, lies in the degree of malnutrition detected, with the MNA identifying a greater proportion of malnourished subjects consistently across the time intervals, compared to the SGA.

Discussion

The literature cites rates of malnutrition amongst hospitalized older persons as ranging from 20 to 60% (16,24). Similar to the rates identified in this study. The rates of malnutrition and those at risk of malnutrition identified in this study using the modified MNA reflect similar rates to those found in other MNA studies (25).

The major finding from this study is that the modified MNA detected greater numbers of malnourished subjects when compared to the SGA. This finding was consistent across the three time intervals measured and was statistically significant (see table 2).
This finding supports the claim by other authors that the SGA cannot be used to monitor changes in nutritional status because of its subjectivity and non-quantitative data analysis (17), whereas the quantitative nature of the MNA allows for easier monitoring of nutritional changes over time. Other studies using the SGA for nutritional assessment of the older person have found discrepancies in the detection of malnutrition (14). This may be explained in part by the lower inter-rater agreement found with the SGA when used with older patients (13,14). The MNA however, has been found to have good inter-rater reproducibility (15).

One of the advantages of the MNA for dietitians is that it does not rely on additional measurements that may be difficult for dietitians to access—such as blood tests. It is a tool that is sensitive enough to detect the small changes in nutritional status that may occur over time with nutritional support.

Further work is needed to determine the extent to which the MNA can be used as a detector of nutritional change over time. Questions such as, “At what time interval should a patient have a repeat nutritional assessment performed to most accurately detect altered nutritional status?” need to be investigated. Vellas (17) suggests that monthly weight measurements and a repeat MNA at 3 months is an important follow up for nutritionally compromised older patients. A nutrition intervention study conducted in Nursing Homes in France (25) demonstrated changes in MNA score at day 60 following oral supplementation.

It is also interesting to note that the average BMI of this study population was 24.5 (within the normal standard range of 22-27). The MNA (at a score between 17 and 23.5) has demonstrated an ability to assess declining i.e. “at risk” nutritional status before severe changes in weight (or albumin levels) occurs (15).

**Future Directions for Clinical Practice**

The ability of the modified MNA to more accurately identify malnourished older patients compared to the SGA as demonstrated by these study findings has important implications for dietetic practice and care of this group.

Nutrition intervention is said to be easier and more effective when implemented in those identified as at risk of malnutrition than in those who are severely malnourished (26). Further investigation is warranted to determine if changes in current dietetic practices, such as more aggressive intervention in nutritional support, are necessary.

The screening component (MNA-SF) (27) could be easily administered by nursing/medical staff on admission to hospital, with those identified as at risk of malnutrition (MNA screening score 11 points or below) being referred to the dietitian for further assessment and appropriate nutrition intervention. This would increase staff awareness of the prevalence of malnutrition amongst older patients and would also allow dietitians to spend more of their clinical time in nutrition assessment, intervention and follow up of these patients.

**Table 2**

<table>
<thead>
<tr>
<th>Assessment Tool/Time period</th>
<th>SGA</th>
<th>MNA</th>
<th>*P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(category c) (less than 17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 0 ( n=43)</td>
<td>5</td>
<td>21</td>
<td>0.005</td>
</tr>
<tr>
<td>Day 30 ( n=28)</td>
<td>4</td>
<td>18</td>
<td>0.005</td>
</tr>
<tr>
<td>Day 60 ( n=20)</td>
<td>0</td>
<td>20</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* Analysed using the Wilcoxon-Sign Ranked Test.

Acknowledgments: We would like to thank the following dietitians for their invaluable assistance in the reviewing of the manuscript and their involvement in the data collection. Without their assistance and cooperation this work could not have been done. Kate Burge, Jodie Crouch, Jennifer Haughton, Jacqueline Hampton, Kelly Lambert, Craig Patch and Jane Wishart.

**References**