



## Assessment Tools for Nutritional Status in the Elderly

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The prevalence of malnutrition is estimated to be 5–10% in the free-living elderly, and 30–60% in the nursing home, homebound and hospitalized elderly [1]. Physiologic changes and an enormous rise in morbidity with aging affect the older adult food intake, leading to nutritional deficiencies and malnutrition. According to data collected for healthy non-smoking subjects aged 18–100 years, physical and physiologic deterioration in various systems with chronological aging are estimated to be on average about 0.5% per year [2]. It is also estimated that energy needs decline by 3% per decade.

Malnutrition is a disorder of nutritional status that results from undernutrition (energy restriction). Prolonged energy restriction results in depleted nutrient stores, leading to the impairment of physiologic or biochemical processes and subsequently to cellular or tissue deterioration, which in turn may lead to acute and chronic disease. The American Society for Parenteral and Enteral Nutrition defined undernutrition as a disorder of nutritional status resulting from reduced nutrient intake or impaired metabolism. Nutritional studies do not discriminate between the two terms, malnutrition and undernutrition, and they are used interchangeably. Moreover, there is some confusion about the terminology used to express deficient nutritional status. In many studies there is no discrimination between "malnutrition" and "the risk of being undernourished" or "being at nutritional risk." While some consider being at risk of malnutrition different from actually being malnourished, as the state of being malnourished certainly is worse than being at risk of it, others believe that these two terms are one and the same [3]. There is no gold standard for determining nutritional status and there are no universally accepted criteria to define malnutrition [4]. The cut-off values for defining nutritional status vary, and the reference data used in most cases are not derived from the population being studied. Since every study uses a different method of nutritional assessment, a comparison of malnutrition and nutritional risk in the community elderly as well as in hospital patients between different studies is problematic.

Nutrition screening is defined as the process of identifying characteristics known to be associated with nutritional problems. The purpose of nutrition screening is to identify malnourished individuals or those at risk of becoming malnourished [5], so that more extensive nutrition assessment can be performed and

intervention implemented. Signs of nutritional risk in surgical patients admitted to hospital were defined by ASPEN (the American Society for Parenteral and Enteral Nutrition) [6]. These are the only criteria existing for the prediction of undernutrition:

- 10% change in body weight over 6 months or 5% for 1 month
- Deviation of 20% of the ideal body weight
- Presence of a disease increasing metabolic requirements
- Changes in dietary habits due to trauma, surgery, or disease
- Artificial feeding due to trauma, surgery, or disease
- Insufficient or inappropriate intake due to digestion or absorption problems for more than 7 days.

The purpose of the present study was to review, compare and discuss the differences between the specially designed methods for the evaluation of nutritional status in the elderly.

### Specific assessment tools of nutritional status designed for the elderly

#### Mini nutritional assessment

The MNA was developed to evaluate the risk of malnutrition in the elderly in general practice and upon admission to a nursing home or hospital. It consists of a general health assessment, a dietetic assessment, anthropometric measurements, the patient's subjective assessment, and global evaluation [8]. Global evaluation includes questions on living independently, prescription drug use, psychological stress, acute disease, mobility, dementia, and skin conditions. The MNA is a very simple non-invasive, easy to administer, patient-friendly, non-expensive, very sensitive, highly specific, reliable and validated screening tool for malnutrition in the elderly [7,8]. According to the developmental study, it was shown to have an accuracy of 92% compared with clinical evaluation performed by two physicians specialized in nutrition, and of 98% when compared with a comprehensive nutritional assessment, including biochemical tests, anthropometric measurements and dietary assessment. This tool does not involve biochemical tests, which showed no added benefit when validation tests were performed. The scoring system (ranging from 0 to 30) categorizes subjects as normal (having adequate nutritional status), borderline

MNA = mini nutritional assessment

(at risk of malnutrition), or undernourished (protein-energy malnutrition) [8]. The MNA scores were found to be significantly correlated with nutritional intake [7]. However, using a cut-off of 23.5, the sensitivity ranged from 75 to 100% and the specificity from 37 to 50% as compared with albumin levels and energy intake. In acute and subacute geriatric care units, worst nutritional MNA scores on admission were associated with infectious disease, stroke, dementia and trauma, and were significantly different from those observed in patients suffering from heart disease and metabolic and gastrointestinal diseases. The relationship between the MNA score and the clinical outcome of medical or surgical patients has not yet been well established. However, recently, when completed on admission, it was shown to be predictive of length of hospitalization stay; a greater likelihood of discharge to nursing home; and mortality in a general geriatric hospital [9], university hospital, and acute and subacute geriatric care units. In addition, the data did not allow for determining the relative contribution of malnutrition and of non-nutritional factors to poor clinical outcomes in patients with a low MNA score. The MNA questionnaire also appears in a shortened version with a maximal score of 10 points. The original version of the MNA was translated to many languages, among them Hebrew. It was used in Israel with some modification [9].

### **Nutritional Screening Initiative**

The NSI is a multidisciplinary effort of the American Dietetic Association, the American Academy of Family Physicians, and the National Council on Aging, to promote routine nutrition screening in health and medical care settings and thereby to raise awareness of risk of malnutrition among the elderly [10]. This initiative incorporates screening and assessment at three levels. The first is a checklist designed to be self-administered (but can be completed by the caregivers) and consists of 10 scored (according to their importance) yes/no questions describing warning signs of poor nutritional status. The questions cover dietary assessment (the number of meals, food and alcohol intake, and autonomy in preparing food or feeding), general assessment (medical condition, medications, oral health, and weight loss), and social assessment (economic hardship, and rare social contact) [7]. The validity of the checklist was examined by retrospective and prospective studies. Individuals with higher scores were more likely to have the poorest levels of nutrient intake and an increased risk of morbidity [10]. However, the checklist has been validated only against 24 hour dietary recall [7]. The checklist is entitled DETERMINE, a mnemonic acronym, the first letter of which incorporates the ten warning signs of poor nutritional status: disease, eating poorly, tooth loss or mouth pain, economic hardship, reduced social contact, multiple medicines, involuntary weight loss or gain, needing assistance in self-care, and elder years above age 80. This screening tool is neither designed nor intended to be used as a diagnostic device and should not be used as such. On the basis of poor scores on this checklist, the elderly subject should be further evaluated at two levels. The level I screen is to be completed by a social service or healthcare professional, or by other trained personnel. It detects elderly patients who have experienced a significant change in body

weight that requires referral to a physician. The level II screen focuses on additional information to be obtained following referral to a physician. It includes anthropometry, plasma albumin and cholesterol measurements, assessment of cognitive function, emotional and functional status, number of drugs being taken, social setting, and clinical signs of malnutrition [10]. The NSI checklist is a brief, easily scored screening tool that can identify community-dwelling elderly subjects at risk for low nutrient intake and health problems [7]. However, since the purpose of the NSI is to raise awareness of risk for malnutrition, the tool is relatively non-specific and overestimates the number of persons at risk. It has an important public health effect on early death of the community-dwelling elderly, but a poor score on the checklist is at best a weak predictor of mortality.

### **NuRas**

The NuRaS was developed and validated by German investigators, like the American NSI, to enhance physicians' awareness of nutritional problems in hospitalized elderly. This assessment scale is a simple and reliable screening tool for malnutrition and can be implemented as part of a comprehensive geriatric assessment. It consists of 12 items relating to gastrointestinal disorders, chronic diseases with pain, immobility, alterations in body weight, appetite, difficulties in eating, medication, cognitive or emotional problems, medication, smoking and drinking habits, and social situation. At a cut-off score of more than 4 points, older persons should be considered undernourished. Likewise, the scale facilitates therapeutic interventions by identifying treatable risk factors that might have contributed to the poor nutritional status. The scale usefulness has been shown in hospitalized patients and its applicability in other settings still needs to be tested. In addition, further investigations are still necessary to prove its predictive validity [11].

### **Residents Assessment Instrument**

The RAI, a screening method initially implemented in nursing home residents in the U.S., has also been applied to the independently living elderly. The tool has been shown to identify subjects with decreased nutritional intake [12]. It comprises a core set of items known as the Minimum Data Set for assessment and care screening and more detailed resident assessment protocols in 18 areas, including common problem areas and risk factors for nursing home residents.

There are also items for nutritional assessment concerning changes in weight, taste changes, loss of appetite, specific diets, meal skipping, leaving of 25% of food on the dish, food preparation, mastication and swallowing problems, physical activity, and the presence of pressure sores. During the interview, the elderly subject is also asked about loneliness and socioeconomic status [12]. The RAI was validated and found to have inter-rater reliability of the core set of items (MDS). When performed by trained nurses, the

NSI = Nutritional Screening Initiative

RAI = Residents Assessment Instrument

MDS = Minimum Data Set

MDS used alone can provide a valid measure of function and cognitive status in frail home-care patients [13]. The RAI has been translated to many languages and implemented in a number of countries [12,13].

### SCREEN

Recently the Canadians, in an endeavor to develop a simple, feasible, valid and reliable screening tool for determining nutritional risk in community dwelling seniors, devised a 15-item questionnaire, SCREEN (Seniors in the Community: Risk Evaluation for Eating and Nutrition), that can be self- or interviewer-administered. The questionnaire items include weight change; the number of limited or avoided foods; frequency of eating; the consumption of fruits and vegetables, meat, milk and milk products, and fluids; chewing, biting and swallowing food; eating alone; meal replacements (such as Ensure); appetite; money for food; cooking; and shopping. It has been shown to have content validity and internal and test-retest reliability [14]. Subsequently construct validity as compared with clinical judgment has been proven [14].

### Summary and conclusions

Nutritional assessment in the elderly consists of many different tests – clinical, biochemical and anthropometric. However, objective markers of nutritional assessment often do not reflect physiologic, physical, cognitive and emotional function. Moreover, nutritional assessment using objective markers is more complicated in the older subject because metabolic changes, among others, affect some of the routine biochemical test results, and the reference values of the anthropometric measures are not always age-adjusted. In addition, it is possible that functional impairment may occur at a subclinical level and precede a measurable alteration in body composition, i.e., there may be clearly defined alterations in muscle function at a time when significant changes in body composition could not be detected. Malnutrition or nutritional deficiency is a continuum that starts with an individual's inadequate intake (that, in fact, does not meet his or her needs) and progresses through a series of functional changes that precede any changes in body composition.

At present there is no gold standard for evaluating nutritional status. The relationship between nutritional status and functional capacities apparently is the simplest, but also the most reliable

index of malnutrition. The extent of dependency and disability has a considerable impact on nutritional status and vice versa.

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