



Psychometric Properties of the Mini Nutritional Assessment (MNA)

Reliability	<ul style="list-style-type: none"> • Internal consistency: Cronbach's α 0.65 in population of elderly subjects with early dementia¹ • Equivalence (interobserver reliability): <ul style="list-style-type: none"> ◦ κ values of 0.51 in hospitalized elderly² ◦ κ values of 0.78 in institutionalized elderly³ ◦ Intraclass correlation coefficient of 0.89 in institutionalized elderly³
Validity*	<p>Construct validity: principal component analysis and discriminant analysis were used to document discriminant validity of the MNA. The gold standard in the first three studies—referred to simply as "Toulouse 91," "Toulouse 93," and "Albuquerque 93," after the city and year in which they occurred⁴—was physician assessment.</p> <ul style="list-style-type: none"> • In the Toulouse 91 sample, 3 of 125 subjects (2%) were misclassified when nutritional evaluation involved both the MNA and biochemical markers; 11 of 139 (8%) were misclassified when evaluation involved the MNA alone. • In the Toulouse 93 sample, 7 of 59 subjects (12%) were misclassified when nutritional evaluation involved both the MNA and biochemical markers; 13 of 115 subjects (11%) were misclassified when evaluation involved the MNA alone. • Cross-validation studies of the Toulouse 91 and Toulouse 93 samples, with evaluation by the MNA without biochemical markers, found that about 75% of each sample were classified correctly. • MNA threshold values (for "well-nourished," "at risk for malnutrition," and "malnourished") were developed on the basis of the New Mexico sample.
Sensitivity†	<p>Ability of the MNA to identify an older adult with malnutrition correctly ("true positives"); ability to screen for malnutrition</p> <ul style="list-style-type: none"> • 9 studies report sensitivity of the MNA to be 70% or higher, compared with other nutritional parameters.⁵⁻¹³ <ul style="list-style-type: none"> ◦ ROC curve values¹⁴ <ul style="list-style-type: none"> 0.912 (95% CI 0.850–0.974) for total cholesterol levels lower than 150 mg/dL ($P < 0.0001$) 0.916 (95% CI 0.846–0.985) for albumin levels lower than 3.5 g/dL ($P < 0.0001$) 0.855 (95% CI 0.801–0.908) for a BMI lower than 18.5 ($P < 0.0001$) ◦ Sensitivity of the MNA-SF (short form) ranged from 86% to 100%, compared with the full MNA or other nutritional parameters.^{12, 15, 16}
Specificity	<p>Ability of the MNA to identify older adults without malnutrition correctly ("true negatives"); ability to confirm malnutrition</p> <ul style="list-style-type: none"> • 3 studies report that the specificity of the MNA is higher than 70% when compared with other nutritional parameters.^{6, 10, 12} • Specificity of the MNA-SF ranged from 36% to 100% when compared with other nutritional parameters.^{9, 11, 17}

* Initial version of the MNA included biochemical measures of nutritional status. After first three developmental studies, the biochemical measures were deleted from the tool.

† Although in theory a tool can have both high sensitivity (ability to correctly identify positive cases) and specificity (ability to correctly exclude negative cases), in reality there is usually a tradeoff, with sensitivity increasing as specificity decreases and vice versa. Cutoff points are needed to distinguish positive cases from negative ones, with adequate sensitivity and specificity. In statistical analysis, these cutoff points are referred to as receiver operating characteristic (ROC curve) values. CI = confidence interval; BMI = body mass index.—Rose Ann DiMaria-Ghalili, PhD, RN, CNSN, and Peggy A. Guenter, PhD, RN, CNSN



REFERENCES

1. Holm B, Soderhamn O. Factors associated with nutritional status in a group of people in an early stage of dementia. *Clin Nutr* 2003;22(4):385-9.
2. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature—what does it tell us? *J Nutr Health Aging* 2006;10(6):466-85; discussion 85-7.
3. Bleda MJ, et al. Reliability of the Mini Nutritional Assessment (MNA) in institutionalized elderly people. *J Nutr Health Aging* 2002;6(2):134-7.
4. Guigoz Y, et al. The Mini Nutritional Assessment (MNA): a practical assessment tool for grading the nutritional state of elderly patients. *Facts and Research in Gerontology* 1994; 4(Supplement 2):15-59.
5. Christensson L, et al. Evaluation of nutritional assessment techniques in elderly people newly admitted to municipal care. *Eur J Clin Nutr* 2002;56(9):810-8.
6. Delacorte RR, et al. Mini-Nutritional Assessment score and the risk for undernutrition in free-living older persons. *J Nutr Health Aging* 2004;8(6):531-4.
7. Donini LM, et al. A “proportional and objective score” for the Mini Nutritional Assessment in long-term geriatric care. *J Nutr Health Aging* 2002;6(2):141-6.
8. Murphy MC, et al. The use of the Mini-Nutritional Assessment (MNA) tool in elderly orthopaedic patients. *Eur J Clin Nutr* 2000;54(7):555-62.
9. Read JA, et al. Nutritional assessment in cancer: comparing the Mini-Nutritional Assessment (MNA) with the scored Patient-Generated Subjective Global Assessment (PGSGA). *Nutr Cancer* 2005;53(1):51-6.
10. Thomas DR, et al. Malnutrition in subacute care. *Am J Clin Nutr* 2002;75(2):308-13.
11. Thorsdottir I, et al. Fast and simple screening for nutritional status in hospitalized, elderly people. *J Hum Nutr Diet* 2005;18(1):53-60.
12. Visvanathan R, et al. Nutritional screening of older people in a sub-acute care facility in Australia and its relation to discharge outcomes. *Age Ageing* 2004;33(3):260-5.
13. Wikby K, et al. Nutritional status in elderly people admitted to community residential homes: comparisons between two cohorts. *J Nutr Health Aging* 2006;10(3):232-8.
14. Kuzuya M, et al. Evaluation of Mini-Nutritional Assessment for Japanese frail elderly. *Nutrition* 2005;21(4):498-503.
15. Cohendy R, et al. The Mini Nutritional Assessment-Short Form for preoperative nutritional evaluation of elderly patients. *Ageing (Milano)* 2001;13(4):293-7.
16. Rubenstein LZ, et al. Screening for undernutrition in geriatric practice: developing the short-form Mini-Nutritional Assessment (MNA-SF). *J Gerontol A Biol Sci Med Sci* 2001; 56(6):M366-M372.
17. Azad N, et al. Nutrition survey in an elderly population following admission to a tertiary care hospital. *CMAJ* 1999;161(5):511-5.