

The Nutritional Form For the Elderly (NUFFE)

A Short Scale Development Report

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Background: Screening is recommended as the first step in the process for assessing nutritional status in order to identify nutritional at-risk patients and should be performed with reliable and valid instruments. The nutritional screening instrument Nutritional Form For the Elderly is especially developed for screening of older people.

Objectives: The aim of this paper was to describe the development and psychometrical testing procedures of the nutritional screening instrument Nutritional Form For the Elderly.

Development: The instrument was constructed after studies about important nutritional issues, found in the scientific literature, regarding older people and contains 15 items without anthropometrical measurements. It is developed in the Swedish context and has been translated into several languages.

Psychometrical testing procedures: Homogeneity and stability, as measures of reliability, and face validity, criterion-related, concurrent and construct validity as well as sensitivity and specificity have been assessed.

Conclusion: The Nutritional Form For the Elderly is reflecting factors of importance for the nutritional status of older people, and the testing procedures have shown that the instrument has sufficient psychometric properties in order to be used as a screening instrument in clinical practice and research.

Key words: nutritional screening instrument, older people, reliability, sensitivity, specificity, validity

BEING AT RISK for undernutrition is a frequent problem among older patients and many of these are not identified. Screening is recommended as the first step in the process for assessing nutritional status in order to identify nutritional at-risk patients and their predisposing factors and degree of exposure, i.e. low, medium or high risk for undernutrition. The original Swedish version of the nutritional screening instrument the Nutritional Form For the Elderly (NUFFE) was especially developed for screening of older people and composed of items that can be seen as risk factors for undernutrition. Before a new nutritional screening instrument can be used in clinical practice it has to be tested regarding reliability and validity as well as sensitivity and specificity. It is also of importance that feasibility and acceptability of the instrument has been examined (Söderhamn, 2006).

The aim of this paper was to describe the development and psychometric testing procedures of the nutritional screening instrument NUFFE.

The development of the Nutritional Form For the Elderly

The intention with the development of NUFFE was to obtain a simple, clinically useful screening instrument without anthropometrical measurements (Söderhamn & Söderhamn, 2001). The instrument was constructed after studies about important nutritional issues, found in the

scientific literature, regarding older people (Söderhamn, 2006) and contains 15 items. Each item score ranges between 0 and 2. The most favourable option produces a score of 0 and the most unfavourable option a score of 2. Maximum score is 30. Higher screening scores indicate higher risk for undernutrition (Söderhamn & Söderhamn, 2001; 2002).

The Swedish version of NUFFE has been translated into English, German, Italian, Hungarian and Norwegian. The English version (NUFFE-ENG) is displayed in the Appendix. The author has copyright and it may be used with permission.

Reliability and validity of the Nutritional Form For the Elderly

Today the Swedish (Söderhamn & Söderhamn, 2001; 2002), Hungarian (Gombos, Kertész, Csíkos, Söderhamn, Söderhamn, & Prohászka, 2008) and Norwegian versions of NUFFE (Söderhamn, Flateiland, Jessen, & Söderhamn, 2009) are tested regarding reliability and validity and the Swedish and Norwegian versions regarding sensitivity and specificity.

Reliability

The Swedish version of NUFFE has been tested regarding reliability in two studies among 56 and 114 older rehabilitations patients, respectively. Reliability was assessed as homogeneity or internal consistency using the Cronbach's alpha coefficient (Cronbach, 1951) and Spearman's

rank correlation coefficients between each item and the total scale when the particular item was omitted from the scale total, i.e. item-to-total correlations (Streiner & Norman, 2003). Obtained Cronbach's alpha coefficients were 0.72 and 0.70, respectively. The item-to-total correlations resulted in nine and ten significant correlations, respectively (Söderhamn & Söderhamn, 2001; 2002).

Reliability of the Hungarian version of NUFFE (NUFFE-HU) was assessed as homogeneity using the Cronbach's alpha coefficient and item-to-total correlations among 56 medical hospital patients. The Cronbach's alpha coefficient was 0.62 and six of the item-to-total correlations were statistically significant (Gombos et al., 2008).

The reliability of the Norwegian version of NUFFE (NUFFE-NO) was assessed as homogeneity by using the Cronbach's alpha coefficient and item-to-total correlations among 158 older medical hospital patients. Furthermore, reliability was assessed as stability by means of test-retest, i.e. the patients were interviewed with NUFFE-NO twice with an interval of 2–4 days. Weighted kappa-statistics was calculated to assess the agreement between the two interviews. The results showed a Cronbach's alpha coefficient of 0.77, and 13 of the item-to-total correlations were significant. A majority of the items showed good or very good agreement in the test-retest (Söderhamn et al., 2009).

Validity

The validity of the Swedish version of NUFFE was assessed as face validity (Söderhamn & Söderhamn, 2001), criterion-related, concurrent and construct validity (Söderhamn & Söderhamn, 2001, 2002). Face validity was reflected in the fact that 95% of the patients found that NUFFE to a very high degree or to some extent gave a meaningful estimate of their nutritional status. Criterion-related validity was obtained by significant Spearman correlations between NUFFE and certain criteria as albumin (Söderhamn & Söderhamn, 2001), Body Mass Index (BMI), albumin and mid-arm circumference (MAC) and calf circumference (CC) (Söderhamn & Söderhamn, 2002). Concurrent validity was shown by a Spearman's correlation coefficient of -0.74 ($p < 0.001$) between NUFFE and the instrument Mini Nutritional Assessment (MNA) (Söderhamn & Söderhamn, 2002). Construct validity was supported when significant differences in median scores of NUFFE were obtained, by using Mann-Whitney *U*-test, between risk groups with expected low and high scores in patients with and without a cancer diagnosis (Söderhamn & Söderhamn, 2001) and in patients with and without pressure sores / skin ulcers (Söderhamn & Söderhamn, 2002).

Validity of NUFFE-HU was assessed as criterion-related, concurrent and construct validity. Criterion-related validity of NUFFE-HU was

reflected in significant Spearman correlations between NUFFE-HU scores and total body weight and MAC. Concurrent validity was reflected by a significant Spearman's correlation coefficient of 0.59 ($p < 0.001$) between NUFFE-HU scores and scores from the health-related quality of life instrument EQ-5D. Construct validity was supported by significant differences regarding median scores between groups, for example, with lower and higher BMI (Gombos et al., 2008).

Validity of NUFFE-NO was also assessed as criterion-related, concurrent and construct validity. Criterion-related validity was shown in significant Spearman correlations between NUFFE-NO scores and BMI, MAC and CC. Concurrent validity was reflected in a Spearman correlation coefficient of -0.74 ($p < 0.001$) between total scores of NUFFE-NO and MNA. Construct validity was reflected in significant differences between obtained median scores for groups with and without cancer diagnosis and lower and higher CC (Söderhamn et al., 2009).

Sensitivity and specificity

In order to determine cut-off points of the Swedish version of NUFFE and NUFFE-NO, for identifying individuals at low, medium and high risk for undernutrition, MNA was used as a criterion. Values of sensitivity and specificity were calculated and receiver operating characteristic curves

(ROC-curves) were constructed. For identifying individuals at medium or high risk for undernutrition, the MNA score ≤ 23.5 (indicating risk for undernutrition) and < 17 (indicating undernutrition), respectively, were used. The following cut-off points were found for the Swedish version of NUFFE: < 6 (indicating low risk for undernutrition), ≥ 6 (indicating medium risk for undernutrition) and ≥ 13 (indicating high risk for undernutrition) (Söderhamn, 2006). Corresponding cut-off points for NUFFE-NO were: < 6 , ≥ 6 and ≥ 11 (Söderhamn et al., 2009).

The cut-off point, ≥ 6 , of the Swedish version of NUFFE was based on the sensitivity and specificity values 71 % and 86 % respectively. The cut-off point ≥ 13 was based on the sensitivity and specificity values 70% and 98%, respectively. The constructed ROC-curves confirmed the cut-off points 6 and 13 for identifying older individuals at medium and high risk for undernutrition, respectively (Söderhamn, 2006). Regarding NUFFE-NO the cut-off point ≥ 6 was based on the sensitivity and specificity values 83% and 73%, respectively and the cut-off point ≥ 11 was based on the sensitivity and specificity values 77% and 83%, respectively. The areas under the ROC-curves for the cut-off points 6 and 11 were 0.79 (95% CI=0.707–0.865) and 0.80 (95% CI=0.701–0.903), respectively (Söderhamn et al., 2009).

Feasibility and acceptability

NUFFE should be easy to use for nurses in a clinical setting because it does not require any specific nutritional assessment skills in order to be administered due to absence of anthropometry. This easiness of NUFFE makes it also suitable to be used as a self-report instrument (Söderhamn, 2006). The patients in the first study (Söderhamn & Söderhamn, 2001) found that it was just right with 15 items included.

Discussion

It is of considerable importance that a nutritional screening instrument can show sufficient psychometric properties for performing a nutritional screening. However, many factors can influence especially homogeneity as a measure of reliability. Homogeneity is an economical method requiring only one test administration. But a low Cronbach's alpha value and item-to-total correlation can be obtained due to a homogenous study group, because many participants choose the same respond alternatives. Items in NUFFE with low item-to-total correlations have not been excluded due to the fact that they have relevance in the screening of older people (Söderhamn, 2006).

It is an advantage to also use other measures of reliability than homogeneity, as stability and equivalence (Söderhamn, 2006). But also with test-retest, as a measure of stability, a homogenous study group can influence the results negatively, if not all respond alternatives of an item has been used (Söderhamn et al., 2009). To test reliability but also validity has therefore to be an ongoing process in different study groups (Söderhamn, 2006). New testing studies of NUFFE-NO are now ongoing with a larger amount of home-dwelling older people.

It is also important that a nutritional screening instrument is tolerable for the patients and easy, quick and not time-consuming to use for the staff. Perhaps NUFFE can be perceived to be too comprehensive with 15 items. But it is an advantage to perform a complete screening in one session, which is possible when anthropometrical measurements are not included in the screening process (Söderhamn, 2006).

In conclusion, the screening instrument NUFFE is reflecting factors of importance for the nutritional status of older people, and the testing procedures have shown sufficient psychometric properties in order to use NUFFE in clinical practice and research.

Appendix

NUTRITIONAL FORM FOR THE ELDERLY (ENGLISH VERSION «NUFFE-ENG»)

Has your weight changed in the last twelve months?

- 0 weight has either gone up or remained unchanged
- 1 weight has dropped somewhat
- 2 weight has dropped considerably

Do you eat the same amount of food now as you did a year ago?

- 0 More or the same as previously
- 1 Somewhat less than previously
- 2 Considerably less than previously

What is your appetite like now?

- 0 Good
- 1 Somewhat low
- 2 Poor

Do you eat at least one cooked meal/day?

- 0 Yes, always
- 1 Often
- 2 Seldom

What sized portions do you normally eat?

- 0 Large or ordinary portions
- 1 Fairly small portions
- 2 Very small portions

Do you eat fruit or vegetables on a daily basis?

- 0 Yes
- 1 Often
- 2 Seldom

Do you have the types of food that you need at home?

- 0 Yes
- 1 Often
- 2 Seldom

Do you normally eat together with anyone else?

- 0 Yes
- 1 Sometimes
- 2 Very seldom

Do you get exercise every day?

- 0 I exercise a lot, for example by taking walks
- 1 The only exercise I get is indoors
- 2 Mostly I just sit down or lie in bed

Is it difficult for you to eat because of mouth or dental problems or due to difficulties in swallowing?

- 0 No
 1 Sometimes
 2 Yes

How much liquid do you drink in total per day?

- 0 More than 5 glasses/cups per day
 1 3–5 glasses/cups per day
 2 Less than 3 glasses/cups per day

Do you have problems eating due to diarrhoea, constipation, feeling unwell or nausea?

- 0 No
 1 Sometimes
 2 Yes, often

Do you need help eating?

- 0 No
 1 Sometimes
 2 Yes, often

How many different sorts of medicine do you take per day?

- 0 none
 1 1–2 different medicines /day
 2 3 or more different medicines /day

Is it difficult for you to eat as a result of poorer health?

- 0 No
 1 Sometimes
 2 Yes, often

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