

## CLINICAL STUDY

# The efficacy of nutrition risk screening-2002 (NRS-2002) to decide on the nutritional support in general surgery patients

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**Abstract:** *Introduction:* Nutritional Risk Screening-2002 (NRS—2002) has been recently used to evaluate the nutritional status of patients according to the recommendation of ESPEN. In this prospective study, we aimed to find the effectiveness of NRS-2002 on preoperative patients who were candidates for elective procedure at a general surgery clinic.

*Material and method:* The NRS-2002 scores of 698 patients were recorded in first 24 hours subsequent to their admission to hospital. The patients who had NRS-2002 score of 3 or 4 were accepted, and the scores were correlated with their age and clinical diagnosis.

*Results:* The nutritional status was good in 655 (93.9 %) patients, and 43 patients (6.1 %) were malnourished. A total of 135 patients had malignant disorders, among them 37 had concomitant malnutrition. The rate of malnutrition was 28.1 % in patients with malignancy. The latter rate was 1.1 % in patients with benign disorders. In patients who had gastrointestinal malignancy, the malnutrition rate was 31 % (35/89), and the latter ratio was 6.5 % (3/46) in patients who had malignancies arising from other than the gastrointestinal system. The NRS-2002 score was changed significantly according to age and malignancies ( $p < 0.05$ ).

*Conclusion:* NRS-2002 can be easily used to evaluate the nutritional status of patients. This system is significant in deciding on nutritional support (Tab. 2, Ref. 12). Full Text (Free, PDF) [www.bmj.sk](http://www.bmj.sk).

**Key words:** NRS-2002, malnutrition, malignancy.

Almost 30–40 % of all patients are undernourished at admission to hospital. Moreover, malnutrition is further deepened during hospitalization (1). This can be avoided by special care focused on their nutritional status. It is very important to find out nutritional problems causing the significant clinical risks. Nutritional depletion not only can adversely affect a patient's clinical surgical condition (2, 3), it may also increase his or her risk of poor postoperative outcome (4–7). The aim of nutritional screening is to determine the outcome due to nutritional factors in patients before they undergo major surgery.

For this purpose, Nutritional Risk Index (NRI), Maastricht Index (MI), Subjective Global Assessment (SGA), and Mini Nutritional Assessment (MNA) can be used to stratify the nutritional status of patients (8). However, there is no consensus on the best scoring system for assessing the nutritional status of hospitalized patients. For this reason Kondrup et al in the year 2003 established a scoring system as part of ESPEN guidelines for nutrition screening 2002 (NRS 2002) (9).

In this prospective study, we aimed to find the effectiveness of NRS 2002 on preoperative patients who were candidates for elective procedure at general surgery clinic.

## Material and methods

General surgery patients who were hospitalized respectively for elective surgery between June 2005 — December 2005 were included in the study. The nutritional status of all patients was evaluated with NRS-2002 scoring system (Tab. 1). The patients were considered malnourished when NRS-2002 score was  $\geq 3$ . NRS-2002 scores in the first 24 hours at admission to the hospital were recorded. The patients were divided into two groups based on whether or not they had malignancy. Furthermore, the malignant patients were divided into two groups based on the fact whether the malignancy was localised within the gastrointestinal system or elsewhere. The percentage of malnourished patients in all groups was compared. SPSS 14.0 for windows was used for statistical analysis. The parameters compared with Chi square test and Anova test. P value lower than 0.05 was accepted as significant.

## Results

698 consecutive patients were included in the study. The mean age of patients was 48.6 (8–90). NRS 2002 scores of 655 pa-

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**Tab. 1. NRS 2002 Screening System.**

Impaired nutritional status		Severity of disease	
Absent (score 0)	Normal nutritional status	Absent (score 0)	Normal nutritional requirements
Mild (score 1)	Weight loss >5 % in 3 months or food intake below 50–75 % of normal requirements	Mild (score 1)	Hip fracture, chronic patients, in particular with acute complications: cirrhosis, COPD, chronic hemodialysis, diabetes, oncology
Moderate (score 2)	Weight loss >5 % in 2 months or BMI 18.5–20.5 +impaired general condition or food intake 25–60 % of normal requirement in preceding week	Moderate (score 2)	Major abdominal surgery, stroke, severe pneumonia, hematological malignancy
Severe (score 3)	Weight loss >5 % in 1 month (>15 % in 3 months) or BMI < 18.5+ impaired general condition or food intake 0–25 % of normal requirement in preceding week.	Severe (score 3)	Head injury, bone marrow transplantation, intensive care patients (APACHE > 10)
Score	+	Score:	= Total score
Age	if ≥70 years: add 1 to total score above		

**Tab. 2. The nutritional status of patients.**

	Benign disorders n (%)	Malignancies other than GIS n (%)	GIS malignancies n (%)	Total
Well nutritional status	557 (98.9 %)	43 (93.5 %)	55 (68.8 %)	655(93.9 %)
Malnourished	6 (1.1 %)	3(6.5 %)	34 (31.2 %)	43(6.1 %)
Total	563	46	89	698

GIS – gastrointestinal system

tients were 2 or lower (93.9 %) and 43 patients' scores were  $\geq 3$  (6.1 %). The mean age of patients with NRS-2002 scores being lower than 3 was 54.3 (8–88) years, and the mean age for patients whose NRS-2002 scores being  $\geq 3$  was 65.7 (24–90) years. The difference was significant between two groups ( $p < 0.05$ ). There were 135 patients with malignancies (19.3 %). Thirty-seven patients of these suffered from malnutrition at admission. The malnutrition rate of malignant patients was 28.1 %. On the other hand, 6 of 563 patients with benign disorders had malnutrition (1.1 %). This rate was significantly lower than in the malignant group, the fact of which was in accord with our expectation ( $p < 0.05$ ). When we took a look at the patients with gastrointestinal system malignancies, 89 of 698 patients had gastrointestinal system malignancies (12.7 %). The malnutrition rate of the patients with gastrointestinal system malignancies was 39.3 % (n: 35). The latter rate was 6.5 % (3/46) in the patients who had malignancies localised in other than gastrointestinal system. The difference was significant between two groups ( $p < 0.05$ ) (Tab. 2).

## Discussion

The evaluation of risk of death or morbidity related to malnutrition at an early stage during the hospital stay is very important in surgical practice. However, malnutrition is often neither recognized, nor treated properly, the fact of which is then reflected in poor clinical outcomes (8). Although there are many scoring systems that can be used to assess malnutrition and de-

termine the postoperative risk, there is currently no consensus on the best method for assessing the nutritional status of hospitalized patients (10, 11). The purpose of the NRS-2002 system is to detect the presence of malnutrition and the risk of developing the malnutrition at the hospital setting (9). It contains nutritional components of malnutrition universal screening tool (MUST), and in addition, a grading system of the severity of disease as a reflection of increased nutritional requirements. It includes four pre-screening questions for departments with few at risk patients. With the prototypes for severity of disease given, it is meant to cover all possible categories of hospitalised patients (12).

The predictive validity of NRS 2002 has been documented by applying it to a retrospective analysis of 128 randomized controlled trials (RCTs) of nutritional support, which showed that RCTs with patients fulfilling the risk criteria had a higher likelihood of a positive clinical outcome from nutritional support than RCTs of patients who did not fulfill these criteria (9). NRS 2002 content validity was maximized by involving an ESPEN ad hoc working group under the auspices of the ESPEN Educational and Clinical Practice Committee in literature-based validation (12).

We used NRS 2002 to evaluate the nutritional status of elective surgery patients. This was a very useful and easy method to be performed by physicians. When we take a look at the results of the malignant patients, especially those suffering from gastrointestinal malignancy, their outcomes were poor. On the other hand, the patients with benign disorders had good results. These results were similar to those found in literature. The negative factor of

our analysis is that our study is not blinded to the outcome when estimating the degree of malnutrition and severity of disease. The same bias has been declared by Kondrup in his study (9). However, the effect of this possible bias does not seem large since median values for total score for nutritional status and severity of disease in studies with positive or no effect were very close (9).

In conclusion, our findings revealed that NRS 2002 can be safely applied to the clinical setting and easy to perform in clinical use. In addition, this method is very valuable in assessing the nutritional state with utmost accuracy. Therefore, we strongly recommend the use of NRS 2002 to improve the outcomes of surgical care.

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