ORIGINAL ARTICLE

Evaluation of Nutritional Risk Screening-2002 and Subjective Global Assessment for general surgery patients: a prospective study

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Abstract

Objective: To investigate the reliability of nutritional risk screening (NRS-2002) and Subjective Global Assessment (SGA) tools to predict the length of hospital stay, complications and mortality, and to compare these tools in predicting outcomes of surgical patients.

Methods: The prospective study was conducted at the Surgery Department of Numune Training and Research Hospital, Adana, Turkey, from March 30 to September 30, 2010. The patients were divided into 3 groups. Group 1 included patients requiring major surgical operations for gastrointestinal malignancy; Group 2 and 3 included patients undergoing moderate surgery and minor surgical operations respectively. Discrimination characteristics of the scoring systems were evaluated using receiver operating characteristic curves.

Results: Nutritional risk at admission was found to be increased in 132 (22.5%) patients by NRS-2002, and 90 (15.3%) by SGA. The sensitivity and specificity of NRS-2002 for complications were 53.3% and 96.6% respectively. The SGA values were 55% and 98.5% respectively. NRS-2002 and SGA at admission had a reliable power of discrimination (AUC>0.8) for mortality and to predict complications in major gastrointestinal surgical patients.

Conclusion: SGA and NRS-2002 methods had positive predictive power in estimating the mortality risk in general surgical patient population. Both scoring tools were also positive in estimating post-operative complication risk in major surgical patients.

Keywords: Malnutrition, Post-operative complications, Mortality. (JPMA 63: 1405; 2013)

Introduction

Malnutrition has been reported at rates varying between 10% and 50% in hospitalised patients.[1-3] Malnutrition affects mortality and morbidity in patients for whom surgical intervention is planned. However, in the majority of the medical centres, the nutritional conditions of patients are not completely evaluated pre-operatively.[1,4,5]

Various parametres of nutritional evaluation have been used. In this study, the nutritional conditions of patients were evaluated through Subjective Global Assessment (SGA) and Nutritional Risk Screening 2002 (NRS-2002) methods. The reliabilities of these two models in terms of prediction of post-operative complications and mortality were compared.

Patients and Methods

The study was carried out at the Surgery Department of Numune Training and Research Hospital, Adana, Turkey, between March 30 and September 30, 2010. The correlation between pre-operative nutritional conditions and post-operative outcomes of patients were evaluated prospectively.

The patients were divided into 3 groups: Group 1 comprised patients requiring major surgical operations for gastrointestinal malignancy (pancreatic, hepatic, gastrointestinal resections etc.); Group 2 had patients undergoing moderate surgery (cholecystectomy, hernia repair, thyroidectomy etc.); and Group 3 had patients with minor surgical operations (haemorrhoidectomy, pilonidal sinus excision etc.). Patients who were unconscious, with psychiatric disorders, pregnant, breastfeeding, below 18 years of age, and those undergoing emergent surgery were excluded.

The Body Mass Index (BMI) of all patients were calculated. In order to conduct nutritional screening, NRS-2002 and SGA scores were noted by one of the senior surgeons. The patients with an NRS-2002 score of 3 or more were accepted as nutritionally at high risk, and scores between 0 and 2 was accepted as lower risk. The nutritional conditions of patients were listed as, A: minor, B: moderate, and C: major risk according to the SGA method.

Post-operative complications, mortality and length of hospital stay (LOS) of the patients were recorded. The value of statistical significance was accepted as 0.05. It

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was identified that the number of patients in the study and samples of the groups were sufficient. Spearman rank correlation coefficient was used to explore the correlations between measurements.

'Discrimination' referred to the ability of a model to distinguish patients who experienced an event from those who did not. Discrimination was measured by the receiver operating characteristic (ROC) curves. The area under the curve (AUC) represented the probability that a patient who experienced the event had a higher predicted probability of having that event than a patient who did not.[6,7] The higher the true-positive rate was relative to the false-positive rate, the greater was the AUC. An AUC of 0.5 indicated that the model did not predict better than chance. The discrimination power of a model was considered perfect if AUC=1; good if AUC>0.8; moderate if AUC between 0.6 and 0.8; and poor if AUC<0.6. ROC analysis was used to evaluate SGA and NRS-2002's estimating power of post-operative mortality and complications.

Results

Of the 588 patients, 270 (45.9%) were males and 318 (54.1%) were females. Group 1, Group 2, and Group 3 included 80 (13.6%), 355 (60.4%) and 153 (26%) patients respectively. The demographic characteristics of the patients, and the distribution according to SGA and NRS-2002 results were noted (Table-1).

Nutritional risk at admission was found to be increased in 132 (22.5%) patients by NRS-2002, and 90 (15.3%) by SGA. Overall, 57 (9.69%) patients had post-operative complications, and 5 (0.8%) of them resulted in mortality. The sensitivity and specificity of NRS-2002 for complication were 53.3% and 96.6% respectively. The corresponding values for SGA were 55% and 98.5%. The complications were superficial wound infection (n=44; 77%), evisceration (n=5; 8.7%), haematoma in wound (n=1; 1.7%), urethral infection (n=1; 1.7%), intrabdominal abcess (n=5; 8.7%), and extended paralytic ileus (n=1; 1.7%).

Table-1: The demographic characteristics, SGA and NRS-2002 scores.

	Median	Min-Max
Age	45	18-85
Weight(kg)	72	37-137
BMI (kg/m^2)	25.7	14.5-53.5
LOS(day)	5	1-62
SGA scores	**n**	**%**
SGA -A	498	84.7
SGA -B	74	12.6
SGA -C	16	2.7
NRS-2002 scores	**n**	**%**
Score 0	456	77.6
Score 1	16	2.7
Score 2	41	7
Score 3	31	5.3
Score 3>	44	7.5

BMI: Body Mass Index. LOS: Length of hospital stay. SGA: Subjective Global Assessment. MRS: Nutritional Risk Screening.

Table-2: Correlation of SGA and NRS-2002 according to LOS, weight, BMI and groups.

Correlat?ons			r	p
Group1 SGA-Group1 NRS			0.877	<0.01
Group1 LOS- Group1 SGA			0.329	<0.01
Group1 LOS-Group1 NRS			0.315	<0.01
Group2 SGA-Group2 NRS			0.700	<0.01
Group2 LOS -Group2 SGA			0.187	<0.01
Group2 LOS -Group2 NRS			0.148	<0.01
Group3 SGA-Group3 NRS			0.915	<0.01
Group3 LOS -Group3 SGA			0.042	>0.05
Group3 LOS -Group3 NRS			0.032	>0.05
SGA			**NRS-2002**	
	r	p	r	p
LOS	0.468	<0.01	0.434	<0.01
Weight (kg)	-0.250	<0.01	-0.217	<0.01
BMI	-0.245	<0.01	-0.195	<0.01

BMI: Body Mass Index. LOS: Length of hospital stay. SGA: Subjective Global Assessment. MRS: Nutritional Risk Screening.

Table-3: AUC values of patients.

AUC values of patients in Group 1		
	AUC	**P**
SGA Group1-Complication	0.812	0.012
NRS -2002 Group1-Complication	0.828	0.01
SGA Group1-Mortality	0.847	0.017
NRS-2002 Group1-Mortality	0.842	0.015
AUC values for all groups		
	AUC	**P**
SGA-Complication	0.578	0.043

AUC: Areas under curve. SGA: Subjective Global Assessment. NRS: Nutritional Risk Screening.

The comparisons of SGA and NRS-2002 scores on the outcomes of LOS, post-operative complications, body weights and BMI showed significant correlation (Table-2). The correlation between SGA and NRS-2002 scores were also found to be statistically significiant (r:0.874; p<0.01).

SGA and NRS-2002 were found to have successful predictive power in estimating the mortality risk in general surgical patient population, according to the AUC values (Table-3). Both the methods were found to have

successful predictive power in estimating post-operative complication risks in major surgical patients.

Discussion

Malnutrition is more common in older age groups, and in people living in caring centres or under medical treatment at hospitals.[8] It has been reported that malnutrition prevalence reaches 78% among hospitalised patients.[9,10] However, it is interesting that there is recorded information about only 20% of hospitalised patients with malnutrition.[11]

The premier results of malnutrition are increase in infection risk, delay in wound healing, hypo-protein oedema, decrease in intestine motility, tendency to shock and immune suppression. Nutritional deficit is strongly correlated with increased morbidity and mortality, prolonged hospital stay, and increased hospital costs.

In the evaluation of nutritional condition, there is no test accepted as the gold standard under all circumstances. Studies have suggested that it is not enough to use only one of these methods, and a combination of several methods results in better predictive power.[12-14]

NRS-2002 is a risk score which is offered by the European Society for Clinical Nutrition and Metabolism (ESPEN). In elective surgical patients, it was found that high NRS-2002 score was related to developing the risk of post-operative complications and prolongation of LOS.[15,16]

SGA, although it is a subjective method, is an easily applied, repeatable and cost-effective test. It is reported that results gathered with SGA are compatible with other methods' results in reliable evaluation of the nutritional condition.[17]

A study found that while the rate of malnutrition was found to be 45% with SGA, it was found to be 40% with NRS-2002, and it was found that SGA showed malnutrition rate higher than the NRS-2002.[18] In a study conducted on 850 patients, malnutrition rate was found to be 20% at admission to hospital.[5] In our study, 15.3% patients were detected to have minor, medium or major malnutrition according to the SGA, and 22.5% patients had minor, medium or major malnutrition according to the NRS-2002.

One study reported the rate of malnutrition of hospitalised patients at a range of 20-62% and the results gathered with SGA increased the degree of malnutrition significantly compared to NRS-2002. It stated that SGA might be calculated differently by different clinicians, and it is very user-dependent.[19] In our study also, the reason of difference among SGA levels at admission to hospital could have resulted from differences among the appliers. The correlations between SGA and NRS-2002 were found to be statistically significant in predicting complication in all groups. A study reported that malnutrition rate was 38 % by SGA and 28 % by NRS-2002 in a study population of 705 patients. It stated that the two methods were complementary to each other in showing hospital stay, mortality and complications.[20]

Our study had some limitations. It had a heterogeneous study population. Most of the patients were found to have a normal BMI. If surgical illness and stress of patients are taken into consideration, the patients had 7% malnutrition in terms of BMI. For this reason, more reliable results will be achieved by using some other parametres. Weight can be distracting for other reasons (oedema, acid, malign tumour).[21,22]

A study stated that for patients with serious malnutrition, post-operative complication, LOS and mortality increase by stressing the pre-operative nutrition conditions of groups with NRS-2002 score of over 3. It also found a meaningful difference of these with nutritional risk.[23] Another study compared nutritionally under risk and not-under-risk groups by using NRS-2002, and a significance was found between nutritional risk and mortality.[24]

Similar to the previous reports in literature, we found that predicting the increased complication and mortality by SGA and NRS-2002 was quite reliable. In patients who are detected as nutritionally under risk by NRS-2002 and SGA, applying a nutritional support both before and after the operation will shorten the LOS, and decrease the risk of mortality and complication.

Conclusion

There are various methods to evaluate malnutrition, and each of them has its own specific pros and cons. No universally perfect method has been developed to date. SGA and NRS-2002 are reasonably successful and complementary in predicting complications and mortality in post-operative period for major surgical patients.

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