

# Nutritional Status and Hospital Outcomes of In-patients in a Tertiary Hospital

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## Abstract

**Introduction:** Malnutrition is a widespread condition that impacts millions of people across the world annually. The World Health Organization defines malnutrition as the deficiency, excess or imbalance in a person's intake of energy and/or nutrients. It has been highly prevalent in hospitalized patients and is often overlooked as it continues to be an unrecognized problem. It is also associated with increased risk of complications, higher mortality rate, longer hospital stay, and higher hospitalization costs. The researchers aim to determine in-patients' nutritional status using the Subjective Global Assessment (SGA) and their outcomes in a tertiary hospital.

**Methods:** A cross-sectional study was conducted in a tertiary hospital in Cebu city for three months. A total of 453 patients were selected through simple random sampling from those assessed to be at risk for malnutrition. The nutritional status was obtained using the SGA tool and correlated with the demographic, nutritional and clinical profiles.

**Results:** In the study, the mean age was 54 years with a female predominance (54.1%). A larger percentage belonged to the obese 1 category (34.9%). Fifty-eight percent had moderate risk for malnutrition and 57.2% had an SGA grade

of B which corresponded to moderate malnutrition. The most common reason of admission was due to respiratory causes (25%) and the leading comorbidities were hypertension (48.79%), diabetes mellitus (36.42%) and chronic kidney disease (10.38%). The mean number of hospital stay was 6.8 days (98.9%) were discharged improved with a mortality rate of only one percent. The following factors had a positive relationship with the SGA grade: those in the older age group ( $p=0.000$ ), those with more comorbidities ( $p=0.000$ ), patients with diabetes ( $p=0.027$ ) and chronic kidney diseases (0.001), those with higher nutritional risk on screening ( $p=0.000$ ), those with pulmonologic ( $p=0.035$ ) and oncologic cases ( $p=0.012$ ) upon admission. The study results showed that the higher the SGA grade, the longer hospital stay ( $p=0.000$ ).

**Conclusion:** In this study, the prevalence of malnutrition was 86% wherein 57.2% of the study population had moderate malnutrition, 28.9% had severe malnutrition and 13.9% had no malnutrition. The degree of malnutrition was associated with longer hospital stay, but not with mortality.

**Keywords:** malnutrition, subjective global assessment, nutritional status

## Introduction

Malnutrition is defined as the deficiency, excess or imbalance in a person's intake of energy and/or nutrients that is often overlooked.<sup>1,2</sup> It is a widespread condition that impacts millions of people across the world annually.<sup>3</sup> Around 1.9 billion adults worldwide are overweight and over 462 million are underweight.<sup>4</sup> In the Philippines, there are approximately five million adult Filipinos, including the elderly, who belong to the undernourished. However, it

should not be disregarded that the population of overweight and obese are also prevalent in the country as evidenced by the rising trend in the prevalence of cardiovascular diseases.<sup>5</sup>

It is highly prevalent in hospitalized patients and is associated with increased risk of complications, higher mortality rate, longer hospital stay, and higher hospitalization costs.<sup>6</sup> If left untreated, majority of these patients will continue to decline nutritionally and may have a negative impact on recovery by increasing the risk of complications and readmission.<sup>2</sup>

The devastating effects of malnutrition could be prevented with early detection and identification through early screening and assessment. There have been several nutritional assessment tools developed but one of the most common and recommended by the American Society of Parenteral and Enteral Nutrition (ASPEN) is the Subjective Global Assessment (SGA) tool. This is a simple, proven

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nutritional assessment tool done bedside that can predict nutrition-associated complications.<sup>7,8</sup>

One of the primary goals of every health care worker is to improve nutrition care practices to guarantee that every malnourished or at risk patient is identified and treated effectively.<sup>9</sup> Despite the increasing knowledge, malnutrition rates have not reduced significantly and this can be improved if special attention will be paid to the nutritional care of patients.<sup>2</sup> Thus, this study aims to explore the prevalence of malnutrition in the hospital, its association with hospital stay and mortality.

The researchers aim to determine in-patients' nutritional status using the SGA and their outcomes.

## Methods

This study was a cross-sectional study involving admitted patients in a tertiary hospital for three months wherein their nutritional status and hospital outcomes were explored and analyzed.

Retrospective data review was done on the patients' charts. An adopted Nutritional Screening Scoring from the institution was used in this study to identify the nutritional risk. This comprised of body mass index, weight loss and admitting diagnosis. Patients identified to be nutritionally at risk were further evaluated using the SGA to determine the degree of malnutrition. SGA has seven components based on the patient's history and physical examination (see Appendix A). An SGA grade of A corresponds to a well nourished patient; B with moderate malnutrition; and C with severe malnutrition. Factors explored in this study were age, gender, admitting diagnosis, and presence or absence of comorbidities.

The patients' categorical profiles were expressed in frequency and percentage while those continuous or quantitative variables were described in mean and standard deviation. In testing associations among patients' categorical profiles, nutritional risk, and in-hospital outcomes, Chi-square test was used. Furthermore, in testing correlations among continuous variables, Pearson-r correlation was employed. Any associated *p*-values lesser than 0.05 alpha was considered significant. IBMSPSS ver 21 was used as statistical software.

## Results

The results of the study generated the following. The mean age of patients was 54 years old with a greater percentage of females (54.1%) than males (45.9%). The most frequent primary cause of admission was due to pulmonary cases (25.8%). The leading comorbidity was hypertension (48.7%) followed by diabetes mellitus (36.42%). Patients with

human immunodeficiency and cerebrovascular disease were the least common.

The BMI category based on the Asian criteria showed that a greater percentage of patients belonged to the obese I category (35.9%). Seventeen percent were overweight, while 15.2% fell under the category of obese II. Only 7.7% were recorded to be underweight. (Table II) Nutritional screening on admission showed that 57.8% of patients had moderate risk of malnutrition, 41.5% had high risk for malnutrition and 0.7% had low risk for malnutrition. Further evaluation using the SGA tool revealed an 86% malnutrition prevalence rate. Fourteen percent of patients were well nourished (SGA A), 57.2% had moderate malnutrition (SGA B) and 28.9% had severe malnutrition (SGA C).

There was no significant change in 87% of the patients in terms of functional capacity while most of them had increased metabolic demands under moderate stress with 55.8% (Table III).

The patients' outcomes were determined in terms of length of hospital stay and mortality (Table IV). The mean number of hospital stay was 6.8 days. Majority of patients were admitted for only four to five days (34.7%), and only 13.9% stayed for more than 10 days. There was a significant number of patients discharged improved with 98.9% while mortality was noted to be only one percent.

Results on the analysis done (Table V) showed statistically significant positive relationship between the SGA grade and age (*p*-value 0.000), nutritional risk (*p*-value 0.000) and length of hospital stay (*p*-value 0.000). The older the age group, the higher the nutritional risk noted and consequently, a longer hospital stay. This age group was also noted to have a higher degree of malnutrition. BMI and mortality rate did not show any statistical significance. Table VI showed a statistically significant (*p*-value 0.000) relationship between the number of comorbidities and SGA grade. The more comorbidities a patient had, the higher was the SGA grade. Among the various comorbidities, diabetes (*p*-value 0.027) and chronic kidney disease (CKD *p*-value 0.001) were found to have significant associations with SGA grade wherein a greater proportion of diabetic and CKD patients had higher SGA grades. The admitting diagnosis were also found to have an association with the SGA grade (Table VII). Patients who had higher degree of malnutrition were pulmonary (*p*-value 0.035) and oncologic cases (*p*-value 0.012).

## Discussion

In the study, the mean age was 54 years with female predominance (54.1%). A larger percentage belonged to the obese I category (34.9%), had moderate risk of malnutrition (57.8%) and had an SGA grade of B (57.2%). The

**Table I.** The demographic profile of patients (n=453)

	N	%
Age		
18-30 years	68	15.0
31-40 years	57	12.6
41-50 years	55	12.1
51-60 years	94	20.8
Above 60 years	179	39.5
Sex		
Male	208	45.9
Female	245	54.1
Admitting category		
Pulmonary cases	117	25.83
Nephrology cases	87	19.21
Neurology cases	43	9.49
Infectious diseases	37	8.17
Oncology cases	41	9.05
Cardiology cases	34	7.51
Gastroenterology cases	89	19.65
Endocrinology cases	25	5.52
Surgery cases	19	4.19
Rheumatology cases	18	3.97
Orthopedic cases	17	3.75
Hematology cases	15	3.31
Gynecology cases	12	2.65
ENT	6	1.32
Comorbidity		
Diabetes mellitus	165	36.42
Hypertension	221	48.79
Chronic kidney disease	47	10.38
Coronary artery disease	27	5.96
Malignancies	22	4.86
Myelodysplastic disease / Polycythemia vera	2	0.44
Cerebrovascular disease	11	2.43
Bronchial asthma	7	1.55
Chronic liver disease	5	1.10
Thyroid disorders	7	1.55
HIV	1	0.22
Cerebrovascular disease	1	0.22
Systemic lupus erythematosus	3	0.66

**Table II.** The nutritional parameters of patients in terms of body mass index, nutritional risk and nutritional status based on the SGA grade

	N	%
BMI		
Underweight (< 18.5)	35	7.7
Normal ( 18.5 – 22.9 )	116	25.6
Overweight ( 23 – 24.9 )	75	16.6
Obese I ( 25- 29.9 )	158	34.9
Obese II ( 30- 39.9 )	69	15.2
Risk		
High	188	41.5
Moderate	262	57.8
Low	3	0.7
SGA grade		
A	63	13.9

**Table II.** The nutritional parameters of patients in terms of body mass index, nutritional risk and nutritional status based on the SGA grade

	N	%
B	259	57.2
C	131	28.9

**Table III.** Nutritional status of patients per SGA criteria

	N	%
Weight loss		
None	35	7.7
<10% of usual weight	116	25.6
>10% of usual weight	75	16.6
Food intake		
No change	188	41.5
Suboptimal	262	57.8
Starvation	3	0.7
Gastrointestinal symptom		
None	1	0.2
Nausea, vomiting	259	57.2
Anorexia, diarrhea	131	28.9
Functional capacity		
No change	370	81.7
Dysfunction <3wks, suboptimal work, bedridden <2 wks	78	17.2
Bedridden > 2 weeks	5	1.1
Disease related to nutritional requirements		
None or low stress	87	19.2
Moderate stress	253	55.8
Severe stress	113	24.9
Physical examination		
No subcutaneous fat/muscle loss	347	76.6
+1 to +2 loss	76	16.8
+3 loss	30	6.6
Edema		
Normal / Mild	420	92.7
Moderate	15	3.3
Severe	18	4.0

**Table IV.** Hospital outcomes of patients in terms of length of hospital stay and mortality

	N	%
Length of hospital stay		
Up to 3 days	88	9.4
4-5 days	157	34.7
6-8 days	118	26.0
9-10 days	27	6.0
More than 10 days	63	13.9
Mortality		
Expired	5	1.1
Improved	447	98.9

most common cause of admission was due to respiratory causes (25%) and the leading comorbidity was hypertension (48.79%). The mean number of days of admission was 6.8 with 98.9% discharged improved and a mortality of only one percent.

The high prevalence rate of malnutrition in this study (86%) is in congruence with another literature showing 20-

**Table V. Association between SGA grade and patients' demographic profiles, nutritional profiles and hospital outcomes**

	Spearman rho/ chi-square	p-value
<b>Demographic profile</b>		
Age	0.263	0.000
Gender	2.820 (df=2)	0.244
<b>Nutritional parameters</b>		
Nutritional risk	0.357	0.000
BMI	0.028	0.555
<b>Hospital outcome</b>		
Length of hospital stay	0.231	0.000
Mortality	0.924 (df=2)	0.630

**Table VI. Association between the comorbidities and SGA grade**

	Spearman rho/ chi-square	Contingency coefficient	p-value
<b>Comorbidities</b>			
Number of comorbidities	0.165	-	0.000
Diabetes mellitus	7.201 (df=2)	0.125	0.027
Chronic kidney disease	13.121 (df=2)	0.168	0.001
Hypertension	3.654 (df=2)	-	0.161
Coronary artery disease	1.059 (df=2)	-	0.589
Malignancies	0.857 (df=2)	-	0.652
Myelodysplastic syndrome	4.938 (df=2)	-	0.085
Cardiac dysrhythmia	2.648 (df=2)	-	0.266
Bronchial asthma	0.001 (df=2)	-	0.999
Chronic liver disease	1.303 (df=2)	-	0.521
Thyroid disorders	3.070 (df=2)	-	0.215
HIV	0.751 (df=2)	-	0.687
Cerebrovascular disease	2.463 (df=2)	-	0.292
Systemic lupus erythematosus	1.140 (df=2)	-	0.566

**Table VII. Association between the admitting diagnosis and SGA grade**

	Spearman rho/ chi-square	Contingency coefficient	p-value
Pulmonary	6.700 (df=2)	0.121	0.035
Nephrology	0.446 (df=2)	-	0.800
Neurology	0.710 (df=2)	-	0.701
Infectious disease	2.467 (df=2)	-	0.291
Oncology	8.842 (df=2)	0.138	0.012
Cardiology	0.111 (df=2)	-	0.946
Gastroenterology	1.739 (df=2)	-	0.419
Endocrinology	3.530 (df=2)	-	0.171
Surgery	2.291 (df=2)	-	0.318
Rheumatology	0.240 (df=2)	-	0.887
Orthopedics	0.068 (df=2)	-	0.966
Hematology	4.744 (df=2)	-	0.093
Gynecology	0.535 (df=2)	-	0.765
Ears, nose, throat	0.129 (df=2)	-	0.938

60% of admitted patients to be malnourished.<sup>10</sup> Apparently, age is one of the key factors associated with malnutrition.<sup>3</sup> As the age increases, so does the risk for malnutrition.<sup>10</sup> In this study, 39.5% of the patients were 60 years old and above. Patients in this age group have more co-morbidities that can contribute to their overall nutritional compromise thus exposing them to higher nutritional risks.<sup>6,11</sup> A study by

Moriama et al. and Middleton et al. showed that the median age of patients noted to have malnutrition were 65.5+9 and 66 years old, respectively.<sup>12,13</sup> Local studies also supported the findings that malnourished patients belong to the older age group.<sup>14,15</sup>

According to the WHO, the global prevalence of obesity in 2008 was as high as 14% among females and 10% among males.<sup>16</sup> In the Philippines, the Food and Nutrition Research Institute conducted a study in 2013 where three out of 10 Filipinos were overweight and obese, with more women falling under this category than men.<sup>17</sup> In this study females were the predominant gender (54.1%) and majority of patients were obese (34.9%). However, BMI did not show a significant association with the SGA grade. This is consistent with a study by Allard et al., where BMI was not a good indicator of overall nutrition status and may be influenced by edema.<sup>9</sup>

This study showed an increased prevalence of hypertension as a comorbidity followed by diabetes mellitus. Overweight persons have also been associated with higher levels of blood pressure brought about by the pro-inflammatory and anti-endothelial effects of malnutrition.<sup>18</sup> In a local study done in one of the tertiary hospitals, 63% of admitted patients with diabetes were noted to have high risk of malnutrition and 45% had severe malnutrition.<sup>14</sup>

Among the different admitting categories, only pulmonary and oncologic cases showed significant association with the SGA grade. This is in consonance with a local study wherein the severity of pneumonia had a direct relationship with nutritional risk.<sup>19</sup> On the other hand, the prevalence of malnutrition among cancer patients ranged from 15% to 80% due to the production of inflammatory and catabolic mediators.<sup>20</sup>

The patient's nutritional risk upon screening and their degree of malnutrition had a significant influence on the length of hospital stay. This finding is consistent with a study conducted by Allard et al., where malnutrition upon admission and poor food intake during hospitalization have been associated with prolonged length of hospital stay. These results suggest that prompt nutritional intervention and monitoring should be performed when patients are admitted in the hospital.<sup>9</sup> Mortality did not show a significant relationship with the degree of malnutrition in this study because of the low mortality rate, which was only one percent in this study.

## Conclusion

The Subjective Global Assessment (SGA) is an effective tool in identifying the nutritional state of the patients. There was an 86% prevalence of malnutrition with a larger

percentage having moderate malnutrition (57.2%), 13.9% had no malnutrition and 28.9% had severe malnutrition. The degree of malnutrition was associated with longer hospital stay, but not with mortality. This study provides awareness specifically to physicians, nurses, nutritionist dieticians, and other allied health care workers in order to provide proper assessment and provision of appropriate nutritional interventions.

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## Appendix

### Appendix A. Subjective global assessment

Criteria	Normal/Mild	Moderate	Severe
Weight loss	None	<10% of usual weight	>10% of usual weight
Food intake (Last 1-2 months)	No change	Suboptimal	Starvation
Gastrointestinal symptoms >2 weeks	None	Nausea, Vomiting	Anorexia, Diarrhea
Functional capacity	No change	Dysfunction <3 weeks Suboptimal week Bedridden <2 weeks	Bedridden > 2 weeks
Disease and relation to nutritional requirements	No or Low Stress	Moderate Stress	Severe Stress
Physical examination	0 Subcutaneous fat and/or muscle loss	+1 to +2	+3
Edema/ Ascites	None	None	+1 or +2
SGA grade	A	B	C