



# Nurses' knowledge and responsibility toward nutritional assessment for patients in intensive care units

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## ABSTRACT

**Introduction:** Nutritional assessment is a prerequisite for nutritional delivery. Patients in intensive care suffer from under-nutrition and nutritional failure due to poor assessment. Nursing ability to early detect nutritional failure is the key for minimizing imparities in practice and attaining nutritional goals. Aim of this article is to examine the ability of Jordanian ICU nurses to assess the nutritional status of critically ill patients, considering biophysical and biochemical measures.

**Methods:** This cross sectional study recruited nurses from different health sectors in Jordan. ICU nurses from the governmental sector (two hospitals) and private sectors (two hospitals) were surveyed using a self-administered questionnaire. Nurses' knowledge and responsibility towards nutritional assessment were examined.

**Results:** A total of 220 nurses from both sectors have completed the questionnaire. Nurses were consistent in regard to knowledge, responsibility, and documentation of nutritional assessment. Nurses in the governmental hospitals inappropriately perceived the application of aspiration reduction measures. However, they scored higher in applying physical examination and anthropometric assessment. Although both nurses claimed higher use of biochemical measurements, biophysical measurements were less frequently used. Older nurses with longer clinical experience exhibited better adherence to biophysical measurement than younger nurses.

**Conclusion:** Nursing nutritional assessment is still suboptimal to attain nutritional goals. Assessment of body weight, history of nutrition intake, severity of illness, and function of gastrointestinal tract should be considered over measuring albumin and pre-albumin levels. A well-defined evidence-based protocol as well as a multidisciplinary nutritional team for nutritional assessment is the best to minimize episodes of under-nutrition.

**Keywords:** assessment; nutritional status; nurse

## INTRODUCTION

Critical illness is associated with many complications such as anorexia, hyper metabolism, malabsorption; atrophy of muscles, liver, kidney, gastrointestinal tract & heart; impaired cell mediated immunity,

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susceptibility to infections, poor wound healing, anemia, death (1,2). Enteral nutrition (EN) is the preferred nutritional method whenever is possible to feed critically ill patients (3,4). When gut is used for nutrition, bacterial translocation and septicemia are prevented.

Malnutrition is a term used frequently in healthcare system which is the analogy of under-nutrition or inadequate energy intake less than the metabolic demands (5,6). Under-nutrition can also be resulted from abnormal digestion or absorption of protein and calories (5,6). It is also acknowledged that malnutrition in the critically ill is associated with impaired immune functions; impaired ventilator drive, and weakened respiratory muscles, leading to prolonged ventilator dependence and increased infectious morbidity and mortality (7,8).

Proper nutritional assessment is strongly linked to successful nutritional plans for critically ill patients (4,9,10). The current focus on nutrition in critical care settings is that carefully selecting patient's parameters that would highly reflect patient's outcome (11-13). In order to design an appropriate and effective strategy for nutritional assessment in the intensive care, a crucial guidelines have to be applied systematically for all critically ill patients (14,15).

Nurses in intensive care are in a key position to maintain patients' nutritional status at an optimal level and closer to the nutritional goals (16,17). While most of the critical care nurses are responsible for establishing nutritional access and initiating feeding, in some instances, they calculate the caloric needs according to the body requirements and measure the daily calories delivered (16,17). However, imparity in nursing practices contributes to developing serious deficiencies and complications due lack of unified guidelines (18,19). When adherence to evidence-based guidelines is assured, the discrepancy inherent in nursing practice can be curtailed and the effectiveness of nutritional practices are maintained (20,21).

In Jordan, critical care nurses have no obvious role regarding nutritional care (22). While dietitians are available in the most of Jordanian hospitals, nurses often hold the responsibility for early detecting the sings of under-nutrition and assessing the

outcomes of the delivered feeding although lack of expertise and training is sometime evident (23,24). Unfortunately, a limited number of tools for nutritional assessment are available in the Jordanian hospitals; in addition to poor academic preparations that suffice this domain (22).

The most recommended nutritional assessment tools are as follows: (a) biophysical assessment and anthropometric measurement which include body mass index (BMI), mid-arm muscle circumference, triceps skin fold thickness, in addition to measuring Gastric Residual Volume (GRV) and detecting tube placement for enteral fed patients (16,17). However, the ratio of subcutaneous layer to total body fat may vary from 20% to 70% in the normal individuals; so they are not recommended in extreme weight change due to the risk for overestimating body fat in malnourished patients (16). (b) Physical examination which includes history of weight loss, alcohol abuse, dietary habits, skin, mouth, and neurological system monitoring (25,26). Body temperature is also a part of the physical examination (27,28). (c) Biochemical assessment includes serum albumin, transferrin, transthyretin (prealbumin), retinol-binding protein, somatolin C and fibronectin (29,30). However, changes in fluid distribution may result in pseudo rise or fall in the value of albumin level causing false medical interpretation (31). (d) Dietary assessment which includes 24 hours recall, food records (diaries), diet history and food frequency questionnaires (32). These methods may however be impractical for critically ill patients who are unable to communicate effectively with practitioners (18,33).

The purpose of this study was to assess Jordanian nurses' knowledge and responsibility of nutritional assessment in the critical care, considering biophysical and biochemical measures.

## METHODS

This descriptive cross sectional study employed nurses from four hospitals in Jordan; two governmental hospitals and two private hospitals. It is assumed that there are many differences between heath care sectors in Jordan in terms of medical protocols and nursing practice (22). For that reason, nurses in different heath care sectors may exhibit

various level of adherence to nutritional assessment tools. Nurses working in any intensive care units and had at least one year of clinical experience and hold the bachelors or diploma degree in nursing was eligible for participation. Convenient sampling technique was used to select participants from each involved hospital. The estimation of sample size was based on the medium effect size, power of 0.80, and  $\alpha$  of 0.05 (34). All selected hospitals are located in Amman, the capital of Jordan, and all are considered as major and referral hospitals that operate well occupied intensive care units.

Study instrument included a self-administered questionnaire developed to assess nurses' ability to assess patients' nutritional status while staying in the intensive care. This questionnaire consisted of five demographic questions; six questions related to the attitudes towards nutritional assessment including aspiration-reduction measures; and five questions related to using different bio-physical and biochemical measures. The scoring system ranged from 1 (to a very small extent) to 5 (very great extent). A pilot study was carried out by 10 nurses from the same study target to test the clarity, applicability, and feasibility of the questionnaire. Minor modifications were done after piloting and those nurses participated in the pilot study were excluded from the study sample. The content validity was also assessed by a panel of experts in this field, including a physician, a dietitian, and two expert nurses.

Ethical approvals were anticipated from each hospital's authority prior to data collection. A written permission (informed consent) for participation was obtained from each participant after providing complete information about the study and its significance. Anonymous participations and confidentiality of data were also assured. Data were collected in collaboration with the head nurses of the unit in which they contributed in selecting the eligible participants, handing, and returning the completed questionnaires in a sealed envelope within one week.

### Statistical analysis

After returning all completed questionnaires, data were entered the statistical package for social

sciences (SPSS) software, version 17. Descriptive statistics including number, percent, mean, Standard Deviation (SD) were used and followed by comparing differences between study groups using Chi-square and Kruskal-Wallis test.

## RESULTS

### Participants' demographics

A total of two hundred and twenty intensive care nurse participated in the study and returned the completed questionnaires. As shown in Table 1, the majority of the study participants were female accounting 65% while 34% were male. Regarding the ages, around 38% were aged less than 25 years old and the second majority age group was between 25-45 years old. About the half of the sample had a clinical experience of less than five years and very few had an experience of more than 20 years. While the majority of participants (71.4%) hold the bachelor degree of nursing, the vast majority (82.3%) claimed no previous clinical training received with the respect of nutritional assessment (Table 1).

**TABLE 1.** Participants' demographics

Variable	Category	Governmental n (%)	Private n (%)	Total n (%)
Gender	Male	46 (35.7)	31 (34.1)	77 (35)
	Female	83 (64.3)	60 (65.9)	143 (65)
	Total	129 (100)	91 (100)	220 (100)
Age	<25	51 (39.6)	33 (36.3)	84 (38.1)
	25-35	33 (25.5)	25 (27.5)	58 (26.4)
	36-45	29 (22.5)	25 (27.5)	54 (24.6)
	>45	16 (12.4)	8 (8.7)	24 (10.9)
	Total	129 (100)	91 (100)	220 (100)
Years of experience	<1	36 (27.9)	26 (28.5)	62 (28.2)
	1-5	28 (21.7)	17 (18.7)	45 (20.5)
	6-10	24 (18.6)	15 (16.5)	39 (17.7)
	11-15	24 (18.6)	16 (17.6)	40 (18.2)
	16-20	12 (9.3)	9 (9.9)	21 (9.5)
	>20	5 (3.9)	8 (8.8)	13 (5.9)
	Total	129 (100)	91 (100)	220 (100)
Level of Education	Diploma	45 (34.9)	18 (19.8)	63 (28.6)
	Bachelor	84 (65.1)	73 (80.2)	157 (71.4)
	Total	129 (100)	91 (100)	220 (100)
Attending Nutrition Course	Yes	13 (10.1)	26 (28.6)	39 (17.7)
	No	116 (89.9)	65 (71.4)	181 (82.3)
	Total	129 (100)	91 (100)	220 (100)

### Attitudes to nutritional assessment

As shown in Table 2, the nurses showed a consistent adherence to the use of nutritional assessment in the ordinary nursing process. There were no any significant differences between nurses from both groups in relation to the importance of assessment in acquiring knowledge, having responsibility, and documenting nutritional changes. Scores were mainly above the midpoint of 2.5, indicating that nurses perceived the importance of assessment through their nursing process. Regarding some nutritional assessment tools, nurses in the private sectors claimed measuring gastric aspirate more frequently than nurses in governmental sectors. Similarly, detecting tube placement was also scored higher among nurses in the private sectors than governmental nurses. In addition, nurses in the private hospitals claimed using other aspiration reduction measures such as degree of head of the bed, controlling feeding rates, and using of promotility agents more frequently than nurses in the governmental hospitals.

### Adherence to various nutrition assessment tools

This section shows nurses' attitudes towards adherence to various nutritional assessment tasks while providing EN care for critically ill patients. There were a statistical significant differences between governmental and private sector nurses in regard to adherence to these nutritional assessment provisions. Nurses in the governmental hospitals scored significantly higher in undertaking assessment using physical examination, anthropometric assessment, and dietary assessment than nurses working in the private sector. However, both groups had equally showed the extent of using biomedical assessment

and screening for nutritional risks as main tools for assessing the nutritional status (Table 3).

### Variations in nutritional assessment between demographic groups

While no significant differences between male and female nurses in regard to the adherence to nutritional assessment, older nurses with longer clinical experience scored higher in applying a nutritional assessment using biophysical measurements ( $\chi^2 = 24.261$ ,  $df=3$ ,  $p=0.043$ ). However, younger nurses with shorter clinical experience scored higher in having a nutritional assessment using biochemical measurements ( $\chi^2=35.171$ ,  $df=3$ ,  $p<0.001$ ). Although bachelor and diploma degree holders did not differ significantly in term of nutritional assessment, nurses who received previous nutritional training were more likely to adhere to different assessment measures than those who did not ( $\chi^2=76.184$ ,  $df=1$ ,  $p<0.001$ ).

### DISCUSSION

It was evident that nurses well perceived the knowledge and responsibility for nutritional assessment and claimed competency in undertaking nutritional assessment while examining the effectiveness of delivered feeding. This premise is supported by other researchers who reinforced the importance of nutritional assessment as the first step of nutritional care (14,35,36).

Aspiration is the most common dangerous side effect resulting from EN. Aspiration-reduction measures can be applied individually; however, most of them are combined into one protocol especially in patients with mechanical ventilation. For instance, Bowman et al. (2005) established and implemented a new 'evidence-based feeding protocol' and an

**TABLE 2.** Attitude to nutritional assessment

	Governmental (n=129)		Private (n=91)		Total (n=220)		Kruskal-Wallis test	
	M	SD	M	SD	M	SD	$\chi^2$ test	p-value
Knowledge of assessment	2.79	1.28	3.22	1.22	2.97	1.21	5.782	0.056
Responsibility of assessment	2.87	1.19	3.26	1.11	3.03	1.13	5.696	0.058
Documentation of assessment	3.13	1.32	3.00	1.08	3.01	1.17	1.598	0.450
Measuring gastric aspirates	3.14	1.36	4.05	1.29	3.70	1.33	25.909	<0.001
Detecting tube placement	3.88	1.31	4.31	0.93	4.00	1.14	10.176	0.006
Other aspiration reduction measures	3.06	1.19	3.59	0.99	3.27	1.14	9.249	0.010

Scores range from 1 (to a very small extent) to 5 (very great extent) \* M: Mean, \* SD: Standard deviation

**TABLE 3.** Adherence to nutritional assessment

	Governmental Mean (SD) (n=129)	Private Mean (SD) (n=91)	Kruskal-Wallis test	
			$\chi^2$ test	p-value
Physical examination	2.28 (1.03)	1.48 (0.87)	22.43	<0.001
Anthropometric assessment	2.56 (1.35)	1.74 (1.08)	19.65	<0.001
Dietary assessment	4.31 (0.93)	3.79 (1.09)	24.09	<0.001
Biochemical assessment	3.51 (1.33)	3.69 (1.09)	5.54	0.590
Screening for nutritional risks	3.27 (1.64)	3.46 (1.23)	8.17	0.360

Scores range from 1 (to a very small extent) to 5 (very great extent)

'aspiration reduction algorithm' for enteral fed, mechanically ventilated patients in the ICUs. Also, Metheny et al. (2010) evaluated the effectiveness of using 'Aspiration Risk-Reduction Protocol' (ARRP) for enteral fed patients with mechanical ventilation. The importance of controlling GRVs was adequately perceived by nurses as a protective measure to prevent higher GRV limits (28, 37). This conforms to the evidence-based recommendations that measuring GRV is an essential element in EN and should be maintained under the universal threshold of 200-500 ml (10). It is also accepted to define GRV as the cutoff point of 30% of the last given feeding amount which is remaining in the stomach (38,39). However, previous studies addressed that GRVs should not be taken into account for all potential risks for pulmonary aspiration, the evidence showed that many other factors should be considered along with GRVs to reduce the risk of aspiration such as trauma, head injury, using of sedation, and mental instability (40). A number of other recommendations are helpful to accomplish nutritional goals such as avoiding inappropriate feeding cessation, using prokinetic agents with EN, keeping the head of the bed elevated at 35-45°, increasing feeding rate in a constant manner and using pre-prepared feeding packs (10,41,42).

Studies stressed on the regular checking for tube position which is strongly associated with low complication incidences. Feeding tube should be checked regularly before each feeding administration or at least every day using a reliable indicator such as radiographic confirmation (X-ray) which is still considered as a 'gold standard' (43-45). Measuring pH of gastric aspirate is another reliable indicator for tube placement. However, studies have confirmed that radiography is superior to other technique despite

the risk of radiation exposure, but if not available, pH method can be applied (10,38,46-50).

The use of bio-physiological and bio-chemical parameters such as body weight, abdominal girth, bowel exam, skin integrity, and urine and stool analysis in addition to serum protein level in the blood were assessed in this study. The nurses showed a higher reliance on the bio-chemical indicator than bio-physical measurement. Previous studies revealed that not all patients in intensive care have a regular nutritional assessment and the essential aspects of nutritional documentation are missing(23,51). Also, it is unlikely to have entire screening tool for evaluating nutritional outcomes (52, 53). Evidence-based guidelines stressed on investigating weight, history of nutrition intake, severity of illness, and function of gastrointestinal tract prior to admission instead of measuring albumin and pre-albumin (10,54). The frequent assessment of BMI should also be measured by dividing weight in kilograms by the square of the height in meters (Normal range 19-25) (55). In general, all studies confirmed the significance of using evidence-based guidelines for nutritional assessment as the majority of nurses showed inconsistency in having the systematic tools for measuring nutritional outcomes (52).

Although the study recruited sample from two health care sectors in Jordan, involving the other health sectors such as the military health sector would enhance the external validity of the study. In addition, including other hospitals from different geographical location, away from the capital, would provide further understanding about the phenomenon and enhance generalizability.

Nurses require understanding factors associated with under-nutrition and hypo-caloric feeding through undertaking such nutritional assessment



measures that assist to early detecting the risk for these episodes. The application of bio-physical measurements in the intensive care is still deficient so further insight about the usefulness of these measures should practically be applied.

Future researchers are invited to conduct other extensive research works that involve more aspects about nutritional care. Investigating the role of multidisciplinary work is also a priority to provide further understanding about the role of physicians and dietitians in assessing patients' nutritional status while being in the intensive care.

## CONCLUSION

Nursing nutritional assessment is still suboptimal to promote patients' successful nutrition. The impact of nutritional assessment on determining the patients' status and detecting some complications such as aspiration pneumonia is well-known, but nurses need to underpin their practice with some evidence-based guidelines to manage these issues effectively.

This study provides overview to the body of knowledge about the role of intensive care nurses in maintaining optimal nutritional therapy In Jordan. Awareness about the current feature of nutritional assessment sheds the light on the future development strategies. In eventual, nurses' practitioners would emphasize of the role of training to improve their professional competency in the light of nutritional delivery in the critically ill.

## CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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