

## Factors Affecting Clinical Outcomes for Patient with Nasogastric Tube Feeding at Critical Care Unit

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### Abstract

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**Background:** Nasogastric tube feeding consisting of delivering liquid nutrients through a tube passing through the nose and into the stomach for patients with a functioning gastrointestinal tract who can't ingest enough nutrition orally to meet their needs, nurses should be aware of nasogastric feeding outcomes, These outcomes can be classified as respiratory, nutritional, endurance, hydration and bowel function categories, **Aim:** identify factors affecting clinical outcomes for patient with NGT feeding at Critical Care Unit. **Design:** a descriptive exploratory design was conducted to achieve the aim of this study. **Setting:** This study was conducted in general CCU at Dar El Shefa Hospital. **Sample:** A convenient sample of all available adult patients who receiving nasogastric tube feeding in critical care unit in Dar El Shefa Hospital. Based on sample size equation 150 patients, and 50 nurses participated in the study. **Tools of data collection:** a structured assessment questionnaire, outcome assessment sheet, and factors assessment forms. **Results:** the psychological assessment for the patients there 22.7% of total patients had a bad psychological status, regarding clinical outcomes 68% of patients were moderate compromised and 24.7% of patients were severely compromised, there was a significant relation between clinical nasogastric feeding outcomes and total level of nurses' knowledge and practice, there were 81.8% of mildly compromised patients were cared by a satisfactory knowledgeable nurses versus 97.3% of the severely compromised patients whom were cared by unsatisfactory knowledgeable nurses, there were 72.7% of mildly compromised patient were cared by competent nurses, while 91.9% of severely compromised patients were cared by incompetent nurses. in addition there was a significant relation between nurses' total level of knowledge about nasogastric feeding tube and their total level of practice. **Conclusion:** There are many factors portrayed under patient related factor, environmental related factor, and nurses' performance related factors affect the clinical outcome for patient with nasogastric tube feeding in the critical care units. **Recommendations:** Close supervision and teaching on spot is needed to ensure the quality of care provided by nurses during administration of nutrition for patients with nasogastric tube feeding.

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**Keywords:** Enteral feeding, Nasogastric tube, Complications, Critical Care Nurses, Nasogastric feeding.

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### Introduction:

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Nutritional therapy plays an important role in the treatment of critically ill patients, because it allows the administration of energy and nutrients, prevents/reduces the installation of under nutrition, or corrects nutritional alterations already installed undernourished patients In addition, it has been recently demonstrated that nutritional therapy plays a primary therapy role, intervening directly in the

pathophysiological alterations of diseases and hence, in the clinical outcome. However, the guarantee of nutritional care that meets the specific requirements of each critically ill patient, is still a challenge for nutrition professionals worldwide (Chawdhury and Lobaz, 2019).

Nutritional support in ICU is received through digestive tract or

intravenous therapy. As enteral nutrition may help in restoring gut motility, integrity of intestinal epithelial barrier and gastrointestinal function, minimizing organism transferring, and reducing incidence of systemic infection; hence, in stable patients with normal digestive tract that fail in oral intake, enteral nutrition is prioritized to parenteral nutrition. Such feeding is less expensive and more normal further. The aim of nutritional support is to attenuate the detrimental effects of critical illness on nutritional state, such as increased energy deficit and catabolism; it may favourably influence outcomes and prevent or reverse malnutrition, nutritional therapy should be started as soon as possible and certainly within the first week of critical illness (Mula, et al., 2014).

Enteral nutrition generally refers to any method of feeding that uses the gastrointestinal (GI) tract to deliver part or all of a person's caloric requirements. It can include a normal oral diet, the use of liquid supplements or delivery of part or all of the daily requirements by use of a tube (tube feeding, when a patient has difficulty eating for whatever reason, and if the GI tract is working, then using this natural means for feeding would be preferable to feeding by intravenous means. Using the GI tract is closer to normal and can help the immune system, The swallowing may normalize over time or in some instances may not return to normal which could put the patient at risk for inadvertently swallowing any solids and liquids consumed into the lungs which could cause a severe pneumonia. During the short term, a patient like this might be fed with a tube entering the nose (Babapour, et al., 2016).

Nasogastric tube feeding is a common method of enteral feeding maintaining or improving nutritional status in patients who are unable to take sufficient nutrition orally. Patients in the hospital, as well as home care sittings, often require nutritional supplementation. Nasogastric

tube feeding may be accompanied by complications. The difficulties and complications related with enteral nutrition include metabolic disorders, such as increase in blood glucose level and electrolyte abnormality, gastrointestinal complications, vomiting and bowel movement disorders (i.e., diarrhea and constipation), which are frequently observed during EN and are important to address. If such gastrointestinal symptoms do not resolve with appropriate management EN must be discontinued or interrupted (Huang, et al. 2012).

#### **Significance of the study:**

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Nasogastric tube feeding is used to feed patients who cannot attain an adequate oral intake from food and/or oral nutritional supplements. Its estimated that 50% to 68 % from patients in ICUs receiving enteral feeding through NGT (Gastroenterological Association, 2015). According to statistical department at Dar El Shefa hospital (300) patients in ICU are received NG feeding at (2017).

#### **Aim of the Study:**

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- This study aims to identify factors affecting clinical outcomes for patient with NGT feeding at Critical Care Unit (CCU).

#### **Research Question:**

- What are the factors affecting clinical outcomes for patient with NGT feeding at CCU?

#### **Subjects and Methods:**

**1-Technical Design:** The technical design included research design, setting, subject and tools for data collection used in this study.

#### **A-Research Design:**

A descriptive exploratory design was conducted to achieve the aim of this study.

#### **B-Setting:**

This study was conducted in general critical care unit at Dar El Shefa Hospital at Cairo in Egypt the unit consists of 15 beds

which distribute in 3 main rooms. There is also an intermediate intensive care unit which contain four beds.

### C-Subject:

A convenient sample of all available adult patients who receiving NGT feeding in CCU in Dar El Shefa Hospital. Based on sample size equation 150 patients participated in the study, and 50 nurses in the previously mentioned setting participated in the study.

### D-Tools for data collection:

#### I.A structured Assessment Questionnaire sheet:

For the patient with nasogastric feeding, it was developed by the investigator based on the related literature: (Alharethy, 2017; Baethge, et al., 2016 and Reber, et al., 2019 and Swartz, 2020). It was written in simple Arabic language, and it contained 29 multiple choices questions (MCQ), and 10 yes/no questions composed of three sections:

**1.1. Section:** It was used to assess patients' demographic characteristics as (age, gender, education, job, marital status, residence, smoking, lifelong medications and its type). It consisted of (8 closed-end questions).

**1.2. Section:** It was used to assess patients' psychological characteristics as if the patient cooperative, aggressive, has any type of hallucination, and it consisted of (21 MCQ questions), which distributed into two parts as the following:

**1.2.1. The 1<sup>st</sup> part: Psychological assessment** was concerned with determining if the patient was co-operative (1 question), aggressive (1 question), and type of hallucination if present (5 questions), it presented as (yes/no/ unaware) answer it was adopted for the study form (Wade, 2014; Rabiee, 2016).

**1.2.2. The 2<sup>nd</sup> part: Anxiety/ depression scale** was hospital anxiety and depression scale to screen for the presence

of depression and anxiety (14 MCQ questions) it composed of (7 MCQ questions) belong to anxiety and (7 MCQ questions) belong to depression

#### ❖ Scoring system:

**The total score** was 42 grades. Each question has 4 answers grading from zero to 3 and it's considered that:

- < 7 indicates no anxiety or depression.
- From 7 to 10 borderline for anxiety or depression.
- >10 indicates anxiety or depression.

**1.3. Section:** It was used to assess patients' physical status it was collected from medical history form, daily reports, investigations, and medication records, it consisted from (10 closed-end questions), categorized under four main headings included if the patient was mechanically ventilated, medical, surgical, and pharmacological history.

### II. Outcome Assessment Scale form:

It was developed by the investigator based on the related literature: (Halter, & Asthana, 2016; Sutton, 2018; Delegege, 2018; Atasever, & Abdullah, 2018).

**This tool was divided into four parts as the following:**

**2.1. The 1<sup>st</sup> part:** respiratory system and bowel continence outcomes.

It was used for assessing patient's clinical outcomes, regarding respiratory system and bowel continence outcomes, it is a three points Likert scale: (1) Consistently demonstrated, (2) sometimes demonstrated, (3) never demonstrated. It consisted from (8 outcome indicators) adapted from Hogstel, & Nelson, 1992; Maas, & Specht 1991.

**2.2. The 2<sup>nd</sup> part:** nutritional intake and biochemical measures outcomes.

It was used to assess patient's clinical outcomes regarding nutritional intake and biochemical indicators, it is a three points Likert scale: (1) not adequate, (2) moderately adequate, and (3) totally

adequate. It consisted from (6 outcome indicators) it was adopted by the investigator from **Gianino, & St.John, 1993; Keithley, & Kohn 1990.**

**2.3. The 3<sup>rd</sup> part:** Nutritional status, hydration, acid base balance

It was used to assess patient's clinical outcomes, regarding nutritional status, hydration, acid base balance, it is a three points Likert scale: (1) extremely compromised, (2) moderately compromised, and (3) not compromised. It consisted from (12 outcome indicators), it was adapted from **(Cullen, 1992; Methany, 1996).**

**2.4. The 4<sup>th</sup> part:** Endurance, muscle function, and bowel elimination.

It was used to assess patient's clinical outcomes, regarding Endurance, muscle function, and bowel elimination, it is a three points Likert scale, (1) extremely compromised, (2) moderately compromised, and (3) not compromised. It consisted from (14 outcome indicators).

#### ❖ Scoring System:

The scoring system was adopted with rating ranging from 1 grade to 3 grades for each item, and they are 40 items.

**The total score was from 40-120 grades:**

- Mild compromised <50%
- Moderate compromised 50-75%
- Severe compromised >75%

#### III. Factors Assessment Forms:

They were developed by the investigator after reviewing the related literature **(Knobel, & Martins, 2014; Bedier, & Shehab, 2016; Ibrahiem, 2017; Locihova, & Poncikova, 2018; Moustafa, & Mohamed, 2018).**

They were used to assess factors affecting NGT feedings, and they were written in simple Arabic language they composed of three sections:

#### **3.1. Section: Environmental related factors;**

It is consisted of (10 yes/no. questions). It was developed by the investigator it was used to assess the environment surrounded the patient, such as high / low room temp, abnormal smell,....etc.

#### **3.2. Section: Patient related factor;**

It is consisted of (7 yes/no. questions) it was developed by the investigator it was used to assess the patient related factors, such as presence of thirst, endotracheal/ oral tubes....etc.

#### **3.3. Section: Nurses related factor;**

It is consisted of three parts, and it was developed by the investigator, after reviewing the related literature, **(Morphet, 2016; Mahoney, 2015).**

##### **3.3.1. The 1<sup>st</sup> part: Nurses' demographic characteristics;**

It concerned with nurses' personal demographic characteristics, that included related to age, years of experience, training courses, work pressure, if the number nurses enough or not, and educational level.

##### **3.3.2 The 2<sup>nd</sup> part: Nurses' related knowledge;**

It included (20 true and false questions) aimed to assess nurses' knowledge of administration of feeding for patients with nasogastric tube feeding.

#### **Scoring System:**

**The total score was from 0-20 grades:**

- Knowledge satisfactory  $\geq 90\%$
- Knowledge unsatisfactory  $< 90\%$

##### **3.3.3. The 3<sup>rd</sup> part: Nurses' performance checklist;**

It was (observational practice checklist) developed by the investigator after reviewing related literature, **(Moustafa, 2018; Babapour, 2016)**, to assess nurses' level of practice regarding administration of

feeding for the patients with nasogastric tube feeding. It included:

- a) Preparation (4 steps).
- b) Procedure (29 steps).
- c) Post procedure (5 steps).

❖ **Scoring system:**

The scoring system was adopted with rating ranging from 0 (not done) to 1 (done) point for each step. Each question response was either done (1 grade) and not done (0 grade). The total score was 38 grades.

- $\geq 90\%$  was competent level of the practice ( $\geq 35$  correct actions)
- $\leq 90\%$  was incompetent level of the practice ( $35 <$  correct actions).

**Results:**

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**Table (1):** presented that, there were significant relation between patients' clinical outcomes and their education level.

**Fig (1):** shows that **22.7%** of the patients had poor psychological status, **10.6%** of them average psychological status, and **4.7%** of them good psychological status, and **62%** of them were unconscious.

**Fig (2):** emphasizes the total clinical outcomes, it shows that **68%** of patients were moderately compromised, **24.7%** were severely compromised, and **7.3%** were mildly compromised.

**Fig (3):** shows that **68%** of nurses had Incompetent level of practice regarding nasogastric tube feeding while **32%** of them were competent nurses.

**Fig (4):** represents that **30.0 %** of the nurses had a **satisfactory** total level of knowledge, and **70.0%** of them had an **unsatisfactory** total level of knowledge.

**Table (2):** presents a statistically significant relation between being aware of unusual smells around you, hearing other patients cry out, uncomfortable bed and/or pillow, being awakened by nurses, and patients' clinical outcomes respectively.

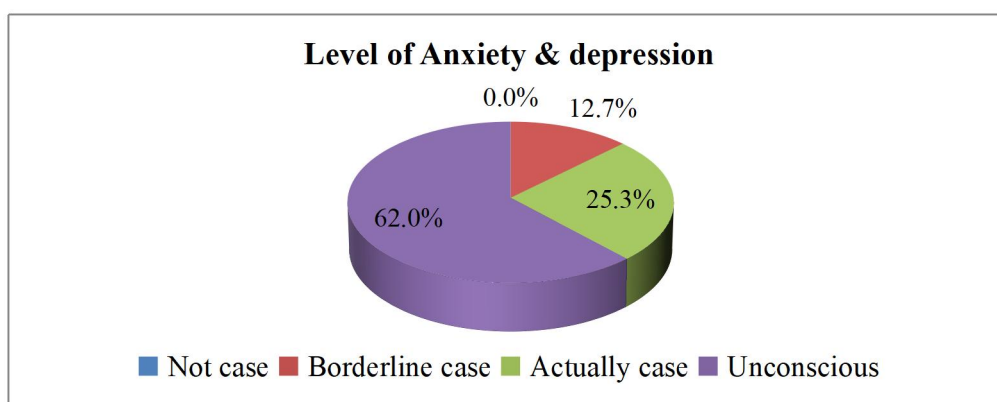
**Table (3):** presents a statistically significant relation between inability to sleep, restricted movement, and patients' clinical outcomes respectively.

**Table (4):** presents a statistical significant relation between nurses' level of knowledge and their demographic data as years of experience, training course, work stress, enough number of nurses enough and their level of education while there is no statistical significant relation between nurses' age, and knowledge level.

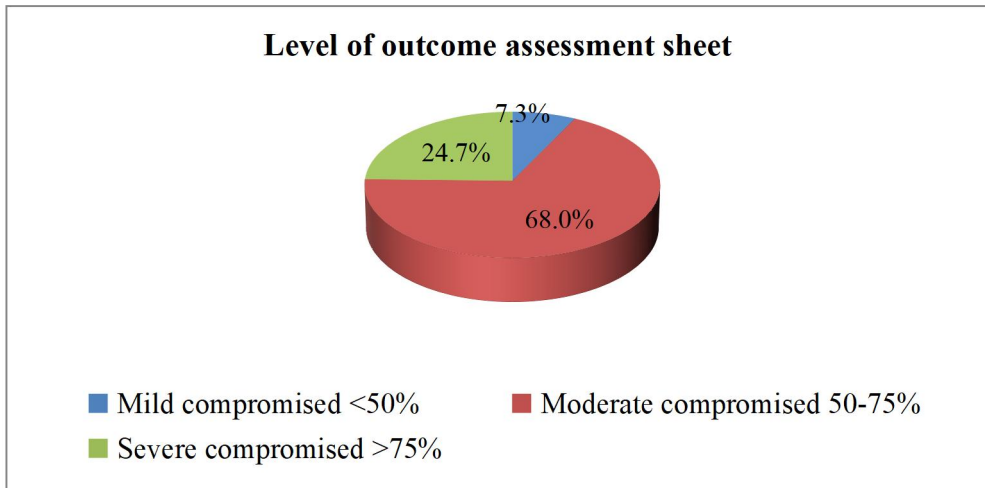
**Table (5):** shows a significant correlation between total score of patients' clinical outcomes with Total score of patient psychological status, anxiety and depression, environmental factors, patient related factors, nurses' knowledge, and their total score of Practice.

**Table (1):** Relation between patients' clinical outcomes assessment sheet and their demographic characteristics (N=150).

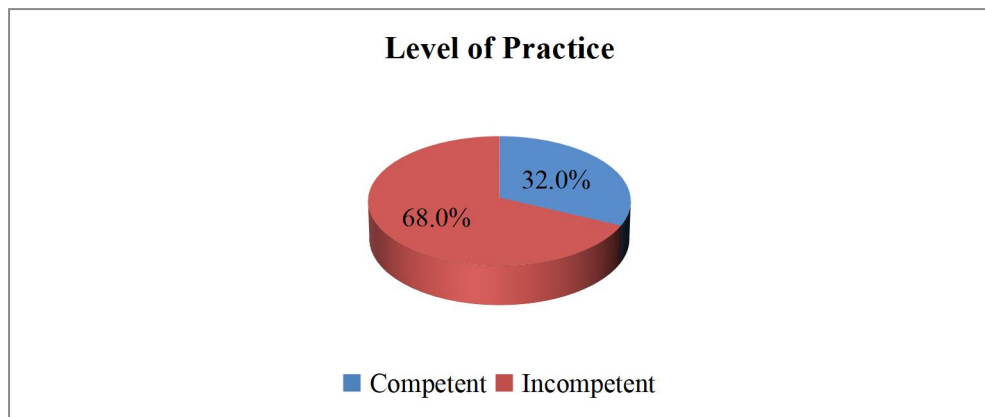
Demographic data	Levels of clinical outcomes assessment sheet						Chi-square test	
	Mild compromise d (n=11)		Moderate compromise d (n=102)		Severe compromise d (n=37)			
	No.	%	No.	%	No.	%	x <sup>2</sup>	P-value
<b>Age (years)</b>								
35-50 years	0	0.0	14	13.7	2	5.4	3.652	0.455
>50-65 years	7	63.6	61	59.8	23	62.2		
>65-85 years	4	36.4	27	26.5	12	32.4		
<b>Gender</b>								
Male	5	45.5	61	59.8	23	62.2	1.010	0.603
Female	6	54.5	41	40.2	14	37.8		
<b>Education level</b>								
Can't read or write	0	0.0	36	35.3	11	29.7	34.70	<0.001
Middle school degree	0	0.0	2	2.0	3	8.1		
High school degree	3	27.3	44	43.1	23	62.2		
Bachelor's degree or higher	8	72.7	20	19.6	0	0.0		
<b>Job</b>								
Employed (require physical effort)	0	0.0	19	18.6	8	21.6	2.812	0.590
Employed (Don't require physical)	2	18.2	17	16.7	6	16.2		
Not employed	9	81.8	66	64.7	23	62.2		
<b>Marital Status</b>								
Single	0	0.0	8	7.8	2	5.4	3.548	0.471
Married	9	81.8	56	54.9	20	54.1		
Divorced	2	18.2	38	37.3	15	40.5		
<b>Residence</b>								
Urban	8	72.7	74	72.5	28	75.7	0.138	0.933
Rural	3	27.3	28	27.5	9	24.3		
<b>Do you currently use Tobacco?</b>								
Regular	3	27.3	44	43.1	14	37.8	1.199	0.549
Not regular	8	72.7	58	56.9	23	62.2		



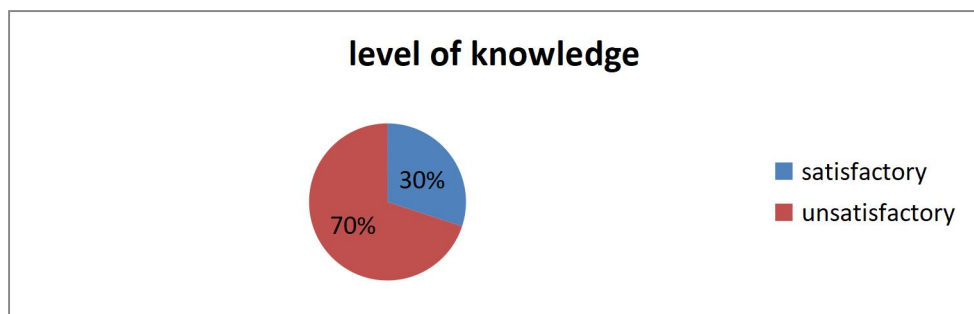
**Fig (1):** Percentage distribution of patients according to their level of anxiety & depression.



**Fig (2):** Percentage distribution of patients according to their level of outcome assessment sheet.



**Fig (3):** Percentage distribution of nurses according to their level of practice.



**Fig (4):** percentage distribution of nurses regarding their total level of knowledge

**Table (2):** Relation between patients' clinical outcomes and environmental related factor (N=150).

Environmental related factor	Level of outcome assessment sheet						Chi-square test	
	Mild compromised (n=11)		Moderate compromised (n=102)		Severe compromised (n=37)			
	No.	%	No.	%	No.	%	x <sup>2</sup>	p-value
Being in a room that is too hot.	0	0.0%	2	2.0%	1	2.7%	0.319	0.853
Being in a room that is too cold.	0	0.0%	5	4.9%	2	5.4%	0.597	0.742
Being aware of unusual smells around you.	1	9.1%	12	11.8%	22	59.5%	35.872	<0.001
Hearing other patients cry out.	2	18.2%	57	55.9%	33	89.2%	22.021	<0.001
Uncomfortable bed and/or pillow.	4	36.4%	63	61.8%	35	94.6%	18.908	<0.001
Medical staff talking too loudly.	7	63.6%	52	51.0%	22	59.5%	1.230	0.541
Being awakened by nurses.	4	36.4%	52	51.0%	35	94.6%	24.582	<0.001
Hearing the telephone ring.	7	63.6%	75	73.5%	29	78.4%	0.994	0.608
Being tied down by tubes.	10	90.9%	85	83.3%	31	83.8%	0.426	0.808
Presence of nurses constantly performing activities around your bed.	10	90.9%	69	67.6%	30	81.1%	4.456	0.108

**Table (3):** Relation between patients' clinical outcomes and patient related factors (N=150).

Patient related factors	Level of clinical outcomes						Chi-square test	
	Mild compromised (n=11)		Moderate compromised (n=102)		Severe compromised (n=37)			
	No.	%	No.	%	No.	%	x <sup>2</sup>	p-value
1- Feeling thirst	0	0.0%	10	9.8%	7	18.9%	3.762	0.152
2- Presence of tubes in the mouth.	11	100.0%	86	84.3%	33	89.2%	2.385	0.304
3- Inability to sleep	1	9.1%	31	30.4%	27	73.0%	25.18	<0.001
4- Feeling Pain	4	36.4%	38	37.3%	11	29.7%	0.678	0.712
5-Restricted movement	3	27.3%	62	60.8%	34	91.9%	19.642	<0.001
6- Connected to oxygen.	10	90.9%	91	89.2%	35	94.6%	0.929	0.628
7- Connected to ventilator.	4	36.4%	57	55.9%	30	81.1%	10.163	0.006



**Table (4):** Relation between nurses' total level of knowledge about nasogastric tube feeding and their socio-demographic data (N=50).

Socio-demographic data of nurses	Level of Knowledge				Chi-square test	
	Satisfied (n=15)		Unsatisfied (n=35)		x2	p-value
	No.	%	No.	%		
<b>Age</b>						
20-25 years	6	40	15	42.8	1.3907	0.7077
25-30 years	4	26.6	5	14.2		
30-35 years	3	20	7	20		
>35 years	2	13.4	8	22.8		
<b>Years of experience</b>						
<5 years	3	20	18	54.7	31.730	<0.001
5-<10 years	10	66.7	15	44.3		
≥10 years	2	13.3	2	0.9		
<b>Training course</b>						
Yes	4	34.1	2	1.9	28.965	<0.001
No	11	65.9	33	98.1		
<b>Work stress</b>						
Yes	4	27.3	33	92.5	64.258	<0.001
No	11	72.7	2	7.5		
<b>Are the number of nurses enough?</b>						
Yes	12	81.8	14	38.7	21.467	<0.001
No	3	18.2	21	61.3		
<b>Level of education</b>						
Secondary school diploma	0	0.0	6	17.1	31.716	<0.001
Technical institute diploma	5	40.9	25	68.5		
Bachelor degree in nursing	9	56.8	4	11.4		
Post graduated	1	2.3	0	0.0		

**Table (5):** Correlation between total score of patients' clinical outcomes, and factors affecting it (N=150).

Domain	Total score of outcome assessment sheet	
	Spearman's correlation	p-value
Total score of psychological	0.551	0.004
Total score of anxiety and depression	0.404	0.005
Total score of environment	0.697	<0.001
Total score of factors patients	0.487	<0.001
Total score of Knowledge	0.370	0.016
Total score of Practice	0.736	<0.001

**Discussion:**

Regarding the relationship between patients' clinical outcomes assessment and their demographic characteristics the result reveals a statistically significant relation between patients' clinical outcome assessment and the demographic data, related to educational level this might be due to the educated patient may be more compliant to instructions, this result goes on the same line with **Compton, et al., (2014)**

study entitled "Use of a nutrition support protocol to increase enteral nutrition delivery in critically ill patients." Who stated that, there were a relation between the gastrointestinal outcomes of nasogastric feeding and the demographic data related to educational level of patients.

On the other hand this study contradicted with a study done by **Viana, et al., (2019)** entitled "Metabolic and nutritional characteristics of long-Stay critically ill patients" which found no

statistically significant difference between education levels of patients in relation to their enteral feeding outcomes.

In relation to **psychological assessment** the study declares that about one quarter of studied patients were had poor psychological evaluation, this might elaborate the current condition of psychological status for the patients in the intensive care unit. This result is consistent with **(Topcu et al., 2017)**, who assured in a study which was entitled: "Patient experiences in intensive care units: A systematic review" that the majority of conscious studied patients were having bad psychological status, and the delirium among patients was between 40% to 80%.

The present study findings also shows that two thirds of patients received nasogastric feeding are moderate compromised for their total clinical outcomes, and about one quarter were a severely compromised, and that related to the nature of patients' conditions and associated illness, This result is in consistent with a study by **(Kadamani, et al., 2014)**, which entitled "incidence of aspiration, and gastrointestinal complications in critically ill patient using continuous versus bolus infusion of enteral nutrition " who emphasized that more than the half of the patients were in bad compromised state.

In relation to the practice of studied nurses regarding care of patients with nasogastric tube feeding, The study shows that more than two thirds of nurses had incompetent total practice level regarding nasogastric feeding, This is may be due to staff shortage and work stress, and overload as well as they didn't have enough time to perfectly done the nasogastric feeding procedure especially in the critical units, This result is in agreement with a study done by **Mehta, et al., (2018)** entitled "Practice guidelines for nutrition in critically ill patients 'that the majority 60% of studied nurse have unsatisfactory practice regarding nasogastric feeding.

Concerning the relation between patients' clinical outcomes and environment related factor within the ICU there is a significant relation between patients' clinical outcomes and the environmental factors that being aware of unusual smells around, hearing other patients cry out, uncomfortable bed and/or pillow, being awakened by nurses, this results had an agreement with **Garrido, et al., (2007)**, which entitled " stressful environmental events in intensive care unit " that there were a significant relation between the environmental factors and nasogastric feeding outcomes.

Concerning the relation between patients' clinical outcomes, and patient related factor, the results reveals that there is a significant relation between patients' clinical outcomes and the inability to sleep, restricted movement for the patients, this study is in consistent with the study done by **Ling, et al., (2020)**, which entitled " comparison of nutritional effectiveness and complication rate between early nasojejunal and nasogastric tube feeding in patients with an intracerebral hemorrhage" that there were a relation between patient factors within the ICU and the nasogastric feeding outcomes.

Nurses' demographic characteristics and their total level of knowledge regards patients with nasogastric tube feeding in the critical care unit, there were a significant relation between total level of knowledge and demographic data of nurses regarding years of experiences, level of education, training courses, and work stress.

This result had an agreement with **Metwali, et al., (2013)**, which showed that there were a significant relation between level of nurses' knowledge and demographic data regarding age, training courses, and level of education.

On the other hand this result is contradicted with a study done by **Mooi (2018)**, entitled "Knowledge of intensive

care nurses regarding the monitoring of early enteral nutrition" who showed that level of education is negatively correlated with job performance regards knowledge indicating that higher level of education the lower job performance of nurses.

Also there were a positive significant correlation between total score of patients' clinical outcomes total score of psychological status, total score of hospital anxiety and depression scale, total score of environment related factor, total score of patient related factor, total score of Knowledge and total score of Practice with patient receiving nasogastric tube feeding. This findings is in consistent with **Abdullah, (2014)** which entitled "Nurses' knowledge and practices about administration of medications via nasogastric tube among critically ill patients" who reported that there was a positive correlation between nurses' practices, knowledge, and the outcomes of administration nasogastric tube feeding and medications.

#### **Conclusion:**

Based on this study finding, it can be concluded that there are many factors portrayed under patient's demographic, psychological, and physical status, patient related factors, environmental related factors, and nurses' performance related factors affect the clinical outcome for patient with nasogastric tube feeding in the critical care.

#### **Recommendations:**

- Further study is recommended to evaluate and good physical assessment for the patients that received nasogastric tube feeding.
- Close supervision and teaching on spot is needed to ensure the quality of care is provided by nurses during administration of nutrition for patients with nasogastric tube feeding.

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