

Intensive Care Nurses' Knowledge and Practice Regarding Care of Mechanically Ventilated Patients: Descriptive Cross-Sectional Study

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Abstract

Background: Despite its drawbacks and problems, Mechanical Ventilation (MV) remains a vital and essential supporting modality in intensive care units (ICUs). To maximize the patient's prognosis, and increase the effectiveness of MV, nurses must be knowledgeable about these devices and provide appropriate nursing care for patients on them. Mechanical ventilation is a crucial technique for resuscitation and all-encompassing treatment of critically ill patients since it is estimated that 20% of acute care patients and 80% of patients in intensive care units need it **Aim:** This study aimed to assess ICU nurses' knowledge and practices regarding the care of mechanically ventilated patients. **Method:** This study used a cross-sectional design. **Setting:** This study was conducted in Intensive Care Units (ICUs) of the Gastroenterology and Liver Transplantation Surgical Center **subjects:** 160 nurses who provide direct patient care in intensive care units are involved in the study **Tool:** Nurses' Knowledge Questionnaire, **part I:** the Intensive Care Nurses' Demographic Data and the "Intensive Care Nurses' Knowledge Questions" **Part 2. Tool II:** Observation Checklist for Nurses Practice. **Results:** knowledge and practice showed a positive relation (p-value=0.002). **Conclusion:** More than half of the study nurses had good knowledge and an adequate level of practice regarding the treatment of patients on mechanical ventilation. **Recommendations:** Continuous educational training focused on mechanical ventilation in the clinical intensive care unit must be guaranteed.

Keywords: : Intensive Care Unit, Knowledge, Mechanical Ventilation, Practice

Introduction

Mechanical ventilation (MV) is a type of ventilation mode that provides respiratory support for patients with respiratory dysfunction. It uses a device to establish the principle of pressure difference between the air passage and the alveoli and regulates, changes, the abnormal spontaneous respiratory movement. It also helps patients to restore effective ventilation and improve oxygenation (**Cronin, et al., 2022**).

The general purposes of Mechanical Ventilation are to provide oxygen transfer to body organs and tissues until respiratory function improves, improve hypoxia and acute respiratory acidosis, prevent atelectasis, eliminate the fatigue and weakness of respiratory muscles, and stabilize the chest wall (**Ugur,2021& Kaplan, 2014**).

As clinical critical care medicine has advanced in recent years, mechanical ventilation or orotracheal intubation has become commonplace in intensive care

units (ICUs) (**Hashem, Nelliott, 2016**). Patients in critical condition typically have a protracted illness and are in a relatively serious state. Most patients cannot take care of themselves or have lost the ability to do so, and their bodily resistance is also lower than that of healthy individuals (**De Jong et al., 2020**).

Although Mechanical ventilators are an essential lifesaving device which maintains ventilation and oxygenation, it can cause numerous complications. A sound knowledge regarding care of a patient on mechanical ventilator and patients' clinical status enables clinicians to fine-tune ventilator settings to maximize the benefits of ventilator support while minimizing complications (**Maj, 2020**).

Because the nurses are first-line supervisors who deal with issues involving patients and ventilators, they must understand issues like respiratory distress, dyspnea, and increased respiratory effort, as well as

the steps that should be taken to solve them. The basic ventilator support, such as ventilator mode, setting, and alarms, must be understood by the nurses caring for ventilated patients. To deliver the best patient-centered care and avoid complications, it is also critical to have the ability to quickly recognize and handle common patient and ventilator-related issues (Soubhagya, Ninglunniang, 2020).

Mechanical ventilation is the most used therapeutic method in the intensive care unit (ICU) (Jung, 2018) While MV helps patients with respiratory compromise survive, if they do not receive proper nursing care often leads to several problems (Kobayashi, 2017).

2.1 Significance of the Study

To provide effective care for patients on mechanical ventilators, nurses working in critical care units must possess specific knowledge and skills that enable them to think critically quickly in life-or-death circumstances.

2.2 Aim of the Study

This study was established to assess ICUs nurses' knowledge and practices regarding the care of mechanically ventilated patients.

2.3 Research Questions

To fulfill the aim of this study, the following research questions were formulated:

Q1: What is the level of nurses' knowledge regarding the care of mechanically ventilated patients?

Q2: What is the level of nurses' practice regarding the care of mechanically ventilated patients?

Q3: Is there a relationship between nurses' knowledge and practice regarding the care of mechanically ventilated patients?

3. Method

3.1 Research Design

This study adopted A cross-sectional study design; this design is an observational research method that collects data from a sample of participants at a single point in

time (Polit & Beck, 2022). It allows researchers to investigate the prevalence, distribution, and associations between variables within a population at that specific time point (Creswell, 2018).

3.2 Setting

This study was conducted in Intensive Care Units (ICUs) of the Gastroenterology and Liver Transplantation Surgical Center affiliated to Mansoura University which are: Surgical Intensive Unit (SIU), Middle Intensive Care Unit (MICU), The liver Transplantation Intensive care Unit (LTICU).

Intensive care units in the mentioned setting consist of three units: -

ICU names	Beds	MV	Monitor	crash carts	portable monitor
Surgical ICU	8	4	8	3	1
Middle ICU	5	3	4	2	1
Liver Transplantation ICU	7	7	7	4	2

3.3 Subjects

A purposive sample of (160) nurses working in the above-mentioned ICU units who were involved in direct patient care with

different levels of education, had at least one year of work experience in ICU, and participated voluntarily in the current study.

3.4 Tools of data collection

Tool I: Nurses' Knowledge Questions

This tool was developed by the researcher after reviewing recent related literature, to assess nurses' knowledge level regarding the care of patients on mechanical ventilators ((Kedir et al., 2023; Gozde et al., 2022; Vicent et al.,2021; Zunaira et al.,2020; Amare et al.,2022; Junaidy et al .,2018; Hussein et al.,2016) It was structured in the Arabic language. It included two main parts as follows:

Part I: ICU Nurses' Demographic and Occupational Characteristics

This questionnaire was used to assess the socio-demographic and occupational characteristics of ICU nurses (age, gender, educational level, years of work experience in ICU, marital status, and attendance of training courses about MV.

Part 2: ICU Nurses' Knowledge structured self-administrative Questions

It was a structured self-administered questionnaire to assess ICU nurses' knowledge about mechanical ventilation. This tool consisted of structured true or false, multiple-choice

It included 12 main items as follows:

1. Knowledge about mechanical ventilators (6 Q true & false)
2. Knowledge about setting and modes of mechanical ventilator (7Q true & false (1 Q complete)
3. Knowledge about dealing with ventilator alarms (3 Q true & false)
4. Knowledge about dealing with circuits and humidifiers of ventilators (3Q multiple)
5. Knowledge about ETT suction and care (3Q multiple) & (7Q true & false)
6. Knowledge about patient position on MV (3Q multiple)
7. Knowledge about airway care & oral care (4Q multiple).

8. Knowledge about Ryle feeding (3Q true & false)
9. Knowledge about peptic ulcer prophylaxis (2Q true& false)
10. Knowledge about weaning (4Q true & false)
11. Knowledge about patient and relative communication (3Q true & false)
12. Knowledge about physical therapy (1Q true & false).

Knowledge's Scoring System

- The correct answer was given the score of "ONE"
- The wrong answer was given the score of "ZERO"
- Level of knowledge consisted of four categories as the following:
 - 0% < 60% Poor
 - 60% < 65% Fair
 - 65% < 75% Good
 - 75% < 85% Very Good
 - ≥ 85% Excellent

Tool II: ICU Nurses' Practice Observation Checklist

The observation checklist was developed to assess the practical aspects of the basic nurses' procedure for the care of patients on mechanical ventilators. It includes the following subitems (10):

1. Infection controls standard precautions (4)
2. Endotracheal suction (16)
3. Endotracheal care steps (5)
4. Patient positioning (2)
5. Ventilator care nursing measures
 - Causes of ventilator alarm
 - Ventilator equipment
 - Ventilator setting
6. Eye care (3)
7. Oral care (6)
8. Gastric feeding (5)
9. Arterial blood gas procedure (11)
10. Weaning (6)

Nurse Practice Scoring System

Each step was observed, categorized, and scored as follows:

- "Done correctly = 1",
- "Done incorrectly, = "Not done = 0".

Method

The study was completed in two major stages: the planning stage and the operational phase

Stage I: - The preparatory stage

This phase involved:

Administrative stage.

- To get permission to perform the study, the Gastroenterology and Liver Transplantation Surgical Center's director received an official letter from the Faculty of Nursing. To obtain collaboration and support through data collection.
- The director was briefed on the purpose of the study and its methodology.

Literature review.

- Review of national and international literature on the various aspects of mechanical ventilation care using scientific published articles, internet searches, and textbooks. This review was a guide for developing the study tools.

Preparation of the data collection

- Tools that the researcher developed were based on reviewing the relevant literature: - (Reynolds, et al., 2017), (Jun, et al., 2016) & (Urner, et al., 2018), (Hussein al.,2016)

Validity of the Tool.

- The panel of 8 expertise reviewed the tool for its inclusiveness, simplicity, relevancy, and applicability. Accordingly, the required adjustments were made. and the necessary modifications were made.

Reliability of the Tool

- knowledge and practice assessment tools were tested using the Cronbach coefficient alpha test.

Pilot Study

- It was done for 10% of the nurses from the sample to check the clarity and understanding of the study tools and the necessary modifications made before data collection.
- This pilot sample was to estimate the time needed to answer the study tools.
- Pilot study excluded from the studied sample
- Participant nurses in the pilot study were omitted from the main study sample.

Stage II: implementation (operational) phase

- The researcher set up a meeting with available nurses working in the selected study setting, explaining the study's aim and nature, and inviting them to participate in this research.
- The researcher collected participant nurses' demographic data using part I of the tool. Completing this part lasted about 10 minutes for each nurse.
- Participant nurses' practices regarding caring for mechanically ventilated patients were observed in the mentioned ICUs using part (2) of the tool.
- Each part takes about 5 to 10 minutes to be filled by the nurses with a total time of 15 to 30 minutes

3.7 Ethical Considerations

Mansoura University Faculty of Nursing's Research Ethics Committee (REC) gave its approval to the study proposal,

following thorough explanation of the study's purpose and nature, the hospital administrative authorities obtained formal consent to carry out the study. There was no risk in study participants during application of the research. The study was following common ethical principles in clinical research. Following an explanation of nature and goal of the study, nurses who were willing to participate provided written consent.

Data anonymity and confidentiality were guaranteed. Study participants were free to decline participation and/or leave the study at any moment and without explanation. The privacy of study participants was considered when gathering data. They received assurances that their personal information would be kept private, and data would be coded.

3.8 Data Collection Process

- Data were collected between February 2024 and August 2024, six months.

- After outlining the purpose of the study, the director of the Gastroenterology and Liver Transplantation Surgical Center granted formal approval to perform the study before the start of data collecting.

3.9 Data Analysis

The collected data was coded, computerized, and analyzed using the Statistical Package of Social Sciences version 20.0 (SPSS, Chicago, IL). Categorical data were expressed as number and frequency. While continuous data were normally distributed and were expressed as mean \pm standard deviation (SD). The Chi-Square test was used to compare variables with categorical data. Correlation coefficient test was used to test the correlation

4. Results

Table (1): Exhibited that more than half of nurses (53,1%) were aged more than 30 years with mean age 30.56 ± 5.11 . As well, the

majority of nurses (84.4%) were female and had bachelor's degrees, the majority (86.3%) of them were married, nearly half of the nurses (48,8%) worked in liver transplantation critical care unit, more than half of studied nurse (52,5%) had 1 – 5 years of experience with mean 5.41 ± 3.31 concerning training, about 78,8% of them attend training courses about mechanical ventilator care

Table (2): Revels in all participants (69%) possessed a good total knowledge of mechanical ventilation (MV).

Table (3): Total nurse's practice it was found that the majority of nurses had an adequate practice level in caring for ventilated patients

Table (4) Shows a significant relation between studied nurses' demographic data (age, years of experience, training courses) and practice level with p-values

(0.022& 0.001&0.006) respectively

Table (5): Illustrates that there were highly significant relations between nurses' demographic data; nurses' age (25-30) and their knowledge level (good) with p-value ≤ 0.001 & high significance relation between nurses' educational level (technical institute) (65.3%) and their level of knowledge (good) with p-value (< 0.001) & there were significant relation between nurse's (63.3%) years of experience especially 6-10 years and their knowledge level (good) with p-value (0.001)

Table (6): Demonstrated that there was a significant relation between nurses' knowledge and practice with p -value (0.002)

Figure (1): Total scores of nurse's knowledge about Mechanical Ventilation.

Figure (1): Total score of Nurses' Knowledge Regarding Care of Mechanically Ventilated Patients

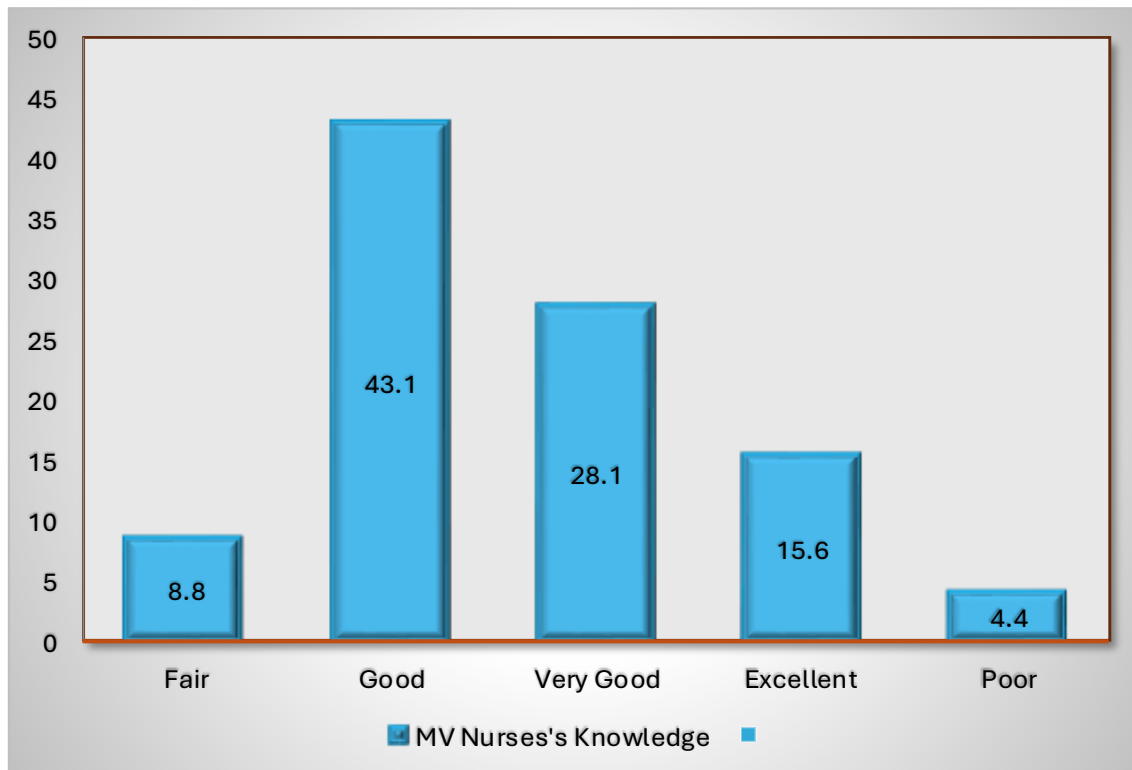


Table 1: ICUS Nurses' Demographic Data

Characteristics	Participant Nurses (n= 160)	
	N = (160)	%
Age (Years)		
• 20-<25	25	15.6
• 25-<30	50	31.3
• ≥30	85	53.1
Mean ±SD	30.56 ±5.11	
Gender		
• Male	25	15.6
• Female	135	84.4
Qualification (Level of education)		
• Secondary nursing school	41	25.6
• Technical institute of nursing	49	30.6
• Bachelor of nursing Sciences	59	36.9
• Technician diploma in nursing	11	6.9
Marital status		
• Single	22	13.7
• Married	138	86.3
Working unit		
• MICU: Middle Intensive Care Unit	33	14.4
• (SIU): Surgical Intensive Unit	59	36.9
• LTICU: liver Transplantation Intensive care Unit	78	48.8
Years of Work Experience		
• <1	6	3.8
• 1< 6	84	52.5
• 6 < 10	58	36.3
• ≥10	12	7.5
Mean ±SD	5.41 ±3.31	
Training courses		
• Yes	126	78.8
• No	34	21.3

Table 2: Total score of Nurses' Knowledge Regarding Care of Mechanically Ventilated Patients

Nurses' Knowledge Regarding Care of Mechanically Ventilated Patients	No	%
Level		
Poor	7	4.4
Fair	14	8.8
Good	69	43.1
Very Good	45	28.1
Excellent	25	15.6
Total score		
Min. – Max.	27.0-48.0	
Mean ± SD	37.3±4.5	
Percent score		
Min. – Max.	54.0-96.0	
Mean ± SD	74.7±9.0	

Table (3): Total score of Nurse's Practice Regarding Care of Mechanically Ventilated Patients

Nurses' Practice Regarding Care of Mechanically Ventilated Patients	No	%
Level		
Inadequate practical level	2	1.3
Adequate practical level	158	98.8
Total score		
Min. – Max.	150.0-204.0	
Mean ± SD	182.3±10.8	
Percent score		
Min. – Max.	54.2-91.7	
Mean ± SD	76.6±7.5	

Table (4): Relation between nurses' practice and their demographic Characteristics

Demographic characteristics	Inadequate practical level		Adequate practical level		Total		χ^2	MC _p	
	No	%	No	%	No.	%			
Age									
20-<25	2	8.0%	23	92.0%	25	100.0%	6.109*	0.022*	
25-<30	0	0.0%	50	100.0%	50	100.0%			
≥30	0	0.0%	85	100.0%	85	100.0%			
Years of experience									
<1	2	33.3%	4	66.7%	6	100.0%	13.463*	0.001*	
1<5	0	0.0%	84	100.0%	84	100.0%			
6<10	0	0.0%	58	100.0%	58	100.0%			
≥10	0	0.0%	12	100.0%	12	100.0%			
Training courses									
Yes	0	0.0%	126	100.0%	126	100.0%	7.506*	0.006*	
No	2	5.9%	32	94.1%	34	100.0%			

Table (5): Relation between nurses' knowledge and their demographic Characteristics

Demographic characteristics	Poor		Fair		Good		Very good		Excellent		Total		χ^2	MCp
	No	%	No	%	No	%	No	%	No	%	No	%		
Age														
20-<25	7	28.0%	5	20.0%	5	20.0%	4	16.0%	4	16.0%	25	100.0%	52.78 1*	<0.001*
25-<30	0	0.0%	0	0.0%	36	72.0%	8	16.0%	6	12.0%	50	100.0%		
≥30	0	0.0%	9	10.6%	28	32.9%	33	38.8%	15	17.6%	85	100.0%		
Level of education														
Secondary nursing school	7	17.1%	14	34.1%	4	9.8%	14	34.1%	2	4.9%	41	100.0%	91.68 6*	<0.001*
Technical institute of nursing	0	0.0%	0	0.0%	32	65.3%	15	30.6%	2	4.1%	49	100.0%		
Bachelor of nursing Sciences	0	0.0%	0	0.0%	31	52.5%	15	25.4%	13	22.0%	59	100.0%		
Technician diploma in nursing	0	0.0%	0	0.0%	2	18.2%	1	9.1%	8	72.7%	11	100.0%		
Years of experience														
<1	3	50.0%	1	16.7%	0	0.0%	2	33.3%	0	0.0%	6	100.0%	30.95 5*	0.001*
1-5	4	4.8%	6	7.1%	32	38.1%	27	32.1%	15	17.9%	84	100.0%		
6-10	0	0.0%	5	8.6%	35	60.3%	12	20.7%	6	10.3%	58	100.0%		
>10	0	0.0%	2	1.7%	2	16.7%	4	33.3%	4	33.3%	12	100.0%		
Training courses														
Yes	3	2.4%	9	7.1%	53	42.1%	37	29.4%	24	19.0%	126	100.0%	12.06 4*	0.012*
No	4	11.8%	5	14.7%	16	47.1%	8	23.5%	1	2.9%	34	100.0%		

Table 6: -Relation between Nurses' Knowledge and Practice

Nurses' Knowledge Regarding Care of Mechanically Ventilated Patients	Inadequate practical level		Adequate practical level		Total		χ^2	MC _p
	No.	%	No	%	No	%		
• Poor	2	28.6%	5	71.4%	7	100.0%		
• Fair	0	0.0%	14	100.0%	14	100.0%		
• Good	0	0.0%	69	100.0%	69	100.0%	12.270*	0.002*
• Very Good	0	0.0%	45	100.0%	45	100.0%		
• Excellent	0	0.0%	25	100.0%	25	100.0%		

5. Discussion

Nurses must possess extensive scientific knowledge and exhibit evidence-based practice when caring for patients on Mechanical Ventilation. Therefore, this study aimed to ascertain MV knowledge and practice level among ICU nurses.

The study's findings indicate that the average age of the nurses was 30.56 ± 5.11 . **Majeed (2017)**, in his study "Assessment of knowledge and practices of ICU nurses about ETT suctioning for adult patients in Baghdad teaching hospitals," confirmed this finding, stating that the average age of the nurses was 30.70 ± 5.99 . However, **Kedir (2023)**, in his study "Knowledge Regarding

Mechanical Ventilation and Practice of Ventilatory Care among Nurses Working in Intensive Care Units stated that the participants were between the ages of 20 and 29.

Related to gender, the study showed that the majority (84,4%) of the studied nurses were females and less than one-third of them were male. This may be due to that male can work other filed to increase income This result is in line with **Serdar (2019)** in study Knowledge and Practices of Intensive Care Nurses on Mechanical Ventilation who mentioned that the majority of participant were female(73%) but is dissimilar to **Kedir et al;(2023)** who reported that more than half (51,4%)

of nurses were male & and also in the country of This finding comes along with the study done by **Nguyen;(2014)** who mentioned conducted that the majority of the subjects (67%) were males and most of them (19 %) between the (20-30) years old.

Concerning Years of Experiences, the present study showed that the majority of studied nurse (84%) had experience 1-5 years. This result comes in contrast with **Samsoma (2019)** in study titled Effect of Self Learning Package on Nurses' Performance Caring for Patients on Ventilators

Regarding nurses' Educational Level, in our study, more than half of nurses (59%) hold a bachelor's degree. This result was in line with **Eastwood et al., 2012** who reported that most nurses working in ICU generally had a bachelor's degree in nursing. This could be due to a national initiative to increase the standard of care provided to MV

patients by hiring bachelor's degree in ICUs must be highly skilled technically and have a commitment to providing safe patient care.

As regards attending training courses about MV, the participant nurses were attaining training courses related to MV. This result was dissimilar to **Zainib, et al., (2017)** who reported that about two thirds of nurses didn't attend any training courses.

In relation to nurses' Knowledge, the existing study illustrated that, the nurses could explain the meaning and the functions of the terms PEEP (86%) and FIO2 (80%). This was in contrast with **Serdar (2019)** who mentioned in his study that the nurses could not explain the meaning and the functions of the terms PEEP (32%) and FIO2 (25%).

As regards Heat and moisture exchangers, the majority of nurses in our study (88,1%, 57.5%) gave incorrect answers when asked about

heat and moisture exchangers in contrast to **Sierra et al. (2005)**, who found that 75% of the intensive care units, ventilator circuits were changed every 72 hours or more, Furthermore, this result contradicts the findings of **Blot & Labeau (2007)**, who suggested that 76% of respondents should switch ventilator circuits at least once a week. Conversely, the findings of the current study contradict those of **Heyland et al. (2002)**, **Ricart et al. (2003)**, and **Sierra et al. (2005)**, who reported that 80%, 84%, and 96% of respondents utilized heat and moisture exchangers, respectively

In our study, 63.8% of participants repositioned the endotracheal tube (ETT) daily to prevent the risk of pressure sores in the oral cavity.

The current study revealed that 83.1% of nurses accurately identified the causes of high-pressure alarms. Potential reasons for these alarms include flexion in ventilator

connections, tube displacement towards the tracheobronchial tree, patient positioning,

Conversely, **Serdar's (2019)** study on the Knowledge and Practices of Intensive Care Nurses regarding Mechanical Ventilation revealed that 60% of nurses could not accurately identify the causes of high-pressure alarms.

About oral care, in our study, 65% of nurses perform oral care appropriately every four hours utilizing chlorhexidine. According to **Serdar's (2019)** study, 43% of the nurses reported performing oral care every four hours, while 69% indicated the use of chlorhexidine for this procedure. Oral hygiene is essential for safeguarding oral health

Our study revealed that 70% of participants **cleaned eyes** from the inner canthus to the outer canthus, 69.4% utilized teardrops, and 69.4% use eye taps in patients with incomplete eyelid closure. This differed from **Serdar's (2019)**, who

found that 81% of nurses cleaned the eyes from the inner canthus to the outer canthus, 76% secured eyelids with plaster, and 50% utilized teardrops. The **study by Ebadi et al. (2017)** indicated that nurses preferred evidence-based practice for eye care.

About dealing with alarm, it was observed that the majority of nurses accurately identified the causes of alarms, specifically high pressure and low-pressure alarms, with correct answers of 87.5%, 86.3%, and 89.4%, respectively. This contrasts with **Serdar (2019)**, who reported that 60% of nurses failed to correctly identify the reasons for high-pressure alarms. It was established in the present study that 71% of the nurses did not know the first reasons for the **low-pressure alarm**.

The current study nurse's Total knowledge score revealed that most participants (69%) possessed a good knowledge of mechanical ventilation (MV). This finding aligns with **Maj (2020)**, who reported that 73% of

nurses demonstrated a high level of knowledge about the care of patients on ventilators.

The study indicated that 65% of the military nurses surveyed were unaware that the oral route for endotracheal intubation is suggested. A study **by Gomes (2010)** revealed that 69.88% of nurses recommended oral intubation.

Patients on mechanical ventilation experience communication difficulties and restrictions in physical mobility. Intubated patients experience stress due to their reliance on a device for survival and their presence in an unfamiliar setting. The current study revealed that 86.3% of participating nurses facilitated communication between patients and their relatives while providing comprehensive explanations on the ventilator. This aligns with **Serdar (2019)**, who indicated that 58% of participants facilitated contact between the patient and their relatives. This

reduced the duration of intubation and intensive care unit stay. A study of ICU patients revealed that 72% experienced depression and 42% experienced anxiety (**Alaca et al., 2011**).

The current study shows that 61.9% of participating nurses perform hand hygiene prior to endotracheal suctioning and uphold patient privacy, while 59.4% ensure sterility by adhering to the aseptic technique of the suction catheter until its insertion into the airway. 56.9% utilize sterile gloves while doing suctioning. This aligns with **Said (2012)**, who indicated that 33% wash their hands before endotracheal suctioning (ETS), 66.7% maintain sterility, and 83.3% wear sterile gloves during suctioning.

Regarding the relationship between the total nurses' knowledge and their practice scores: The current study findings demonstrated that there was a significant relation between nurses'

knowledge and practice with p -value (0.002)

Regarding the relationship between nurses' demographic data and their practice:

The current study revealed a highly significant positive correlation between the demographic variables, such as age, years of work experience, and training courses of the enrolled nurses, and their overall mean practice score. The p-values are 0.022, 0.001, and 0.006, respectively.

7. Recommendations

Based on the study findings, the subsequent recommendations for Nursing Education, Nursing Practice, and Nursing Management.

Nursing Education

- Encourage nurses to complete their academic studies to acquire additional skills and information that will help them to deliver efficient care.
- patient safety and quality of care
- Continuous educational training focused on mechanical ventilation

in the clinical intensive care unit must be guaranteed.

Nursing Practice

- Nurses engaged in the direct care of mechanically ventilated patients must possess Continuous clinical evaluations about their knowledge and proficiency in caregiving.
- The ICU orientation module requires reevaluation, along with the accompanying PowerPoint presentation.

Nursing Management

- Activating the function of continuing education units in every hospital.
- Nursing matrons and team leaders must maintain their competencies in mechanical ventilation
- Creating a concise and thorough handbook including instructions for the nursing treatment of patients on mechanical ventilation.

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