

Nurses Knowledge toward Essential Care for Adult Patients Undergoing Mechanical Ventilation at Critical Care Unit in Baghdad City

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Abstract: A mechanical ventilator is a positive- or negative-pressure breathing device that can maintain ventilation and oxygen delivery for a prolonged period, the primary function of mechanical ventilators is to promote alveolar ventilation and CO₂ elimination, but they are often also used for correcting impaired oxygenation which may be a difficult task.

Objectives: the study aimed to identify nurses' knowledge toward essential care for patient undergoing mechanical ventilation and to find out the relationship between nurses knowledge and their socio-demographic data.

Result: The results of the study indicated that (64%) of the study sample were males and (58%) at age group (20-29) years old, (52 %) were married, (46 %) were graduate from Institute, (66%) had (1-5 years) experience in critical unit and (56%) had training session . The nurses' knowledge records a moderate level for endotracheal suctioning and weaningdomains and high level of knowledge for general information, communication, ventilator setting, and patient educationdomains. Furthermore, that a high level for a total score of nurses knowledge.

Conclusions: According to the findings the study concluded that statistical associations were found between nurses educational levels, years of experience in critical unit and training sessions toward nurses' knowledge.

Recommendation: Based on the findings, the study recommended to Prepare a special training programs to promote nurses knowledge concerning mechanical ventilation (especially in weaning and endotracheal suctioning techniques) added to that Encourage the nurses to complete their academic study to be equipped with advance skills & knowledge that enable them to provide efficient care .

Keywords: Critical care unit, Essential care, Mechanical ventilation, Nurse's knowledge.

I. Introduction

Mechanical ventilation (MV) is used in around 30% to 70% of patients admitted in the critical care unit. A practical variation in care of mechanical ventilation were found, the research team was determined to explore differences exists regarding processes of care associated with mechanical ventilation (MV) management through a cross-sectional study in addition to characteristics that influence practice variation. This study provides baseline information on CCU nurses' knowledge level so health care authority can improve it, ultimately improving patients' outcomes. Improved outcomes will shorten patient's CCU length of stay, hospitalization as well as benefit the patient financially with decreased hospital costs^[1]. If a patient has a continuous decrease in oxygenation (PaO₂), an increase in arterial carbon dioxide levels (PaCO₂), and a persistent acidosis (decreased pH), mechanical ventilation may be necessary. Conditions such as thoracic or abdominal surgery, drug overdose, neuromuscular disorders, inhalation injury, COPD, multiple traumas, shock, multisystem failure, and coma all may lead to respiratory failure and the need for mechanical ventilation.^[2]. The selection of ventilator mode and settings for tidal volume, respiratory rate, positive end-expiratory pressure (PEEP) and inspiratory to expiratory ratio is dependent on the cause of the respiratory failure. The objectives are to: improve gas exchange, minimize damage to the lung by avoiding high lung volumes, pressures and FiO₂, avoid adverse circulatory effects, make the patient comfortable without heavy sedation or muscle paralysis by reducing the work of breathing and harmonizing interaction between patient and ventilator, humidify and warm inspired gas to prevent inspissation's of secretions normally with a heat and moisture exchanger but occasionally with a hot water humidifier and arrange regular positioning, physiotherapy and suctioning to clear secretions and prevent proximal airway obstruction and distal alveolar collapse. The patient should be in a 30° head-up position to avoid aspiration.^[3]

II. Methodology

A descriptive design study was carried out to assess nurses knowledge toward essential care for patients with mechanical ventilation, A non- probability (purposive) sample were gathered of 50 nurses who work at critical care unit in five hospitals and centers in Baghdad city (Iben-Al-Betar center, the Iraqi Center for Cardiac Diseases, Baghdad teaching hospital, Ibn al –Naffes hospital and ImamsKazimainmedical City).the researcher established the questionnaire format which composed of two parts and introductory page that invites the subjects to participate in the study, part I: socio demographic information sheet and part II: essential care for mechanical ventilation instrument. The content validity of the instrument was established through a panel of (11) experts. They were (8) faculty members from the College of Nursing University of Baghdad with different nursing specialty, (3) physicians from Ministry of Health Hospitals, experts had at least 8 years of experience in their specialist with a mean (28) year, and (SD=6.8). They were asked to review the questionnaire whether they agree or disagree with its content. Reliability Determination of the questionnaire was based on the test – retest method. Ten Nurses who work at critical care unit on the same criteria of the original study were asked to repeat their response to the questionnaire after two weeks interval. The results of the study reliability were calculated by using correlation coefficient statistical method between the test and retest Nurses response which was $r = 0.936$. Relative to research ethical considerations, the National Institute of Health (NIH)/Office of Extramural Research have certified that both researchers have successfully completed the NIH web-based training course of protecting human research participants. The Institutional Review Board (IRB) at the Baghdad University/College of Nursing that was represented by the scientific committee approved the study after submitting the study proposal.

III. Results

Table (1): Distribution of nurses' knowledge by their Socio Demographic Characteristics.

Socio-demographic		F	%	Cumulative Percent
Gender				
	Male	32	64.0	64.0
	Female	18	36.0	100.0
	Total	50	100.0	
Age (year)				
	20-29 years	29	58.0	58.0
	30-39 years	15	30.0	88.0
	40-49 years	6	12.0	100.0
	Total	50	100.0	
Mean ± SD = 28 ± 6.1627				
Marital status				
	single	20	40.0	40.0
	Married	26	52.0	92.0
	Widowed	4	8.0	100.0
	Total	50	100.0	
Level of education				
	Secondary school graduate	7	14.0	14.0
	Institute	23	46.0	60
	BSN	16	32.0	92.0
	Higher education	4	8.0	100.0
	Total	50	100.0	
Number of years in critical care unit				
	≤ 5 years	33	66.0	66.0
	6- 10 years	6	12.0	78.0
	11-15 years	5	10.0	88.0
	More than 15 years	6	12.0	100.0
	Total	50	100.0	
Training sessions				
	Yes	28	56.0	56.0
	No	22	44.0	100.0
	Total	50	100%	

F. = frequency, %= Percentage

The demographic characteristics of (50) nurses indicated that the majority (64 %) of the sample were males .In relation to the age group, the highest percentage (58 %) of nurses were (20-29) years old, while the lowest percentage (12 %) of the sample which (40 – 49) years old. Regarding marital status, the highest percentages (52 %) of the study sample were married. Relative to educational level most of the study samples (46 %) had institutional level, (66%) of sample work (1-5 yrs.) in critical care unit and most of the subjects (56%) had training session.

Table (2): Distribution Nurses knowledge domains toward essential care of mechanical ventilation according to their mean, SD, relative Sufficiency and Grade

General information's		MOS	SD.	RS	G
1	Mechanical ventilation has become a common treatment, and nurses must be knowledgeable and confident when caring for ventilator patients.	2.98	0.141	99.3	H
2	Mechanical ventilation is indicated when the patient's spontaneous ventilation is inadequate to maintain life	3.00	0.00	100	H
3	Mechanical ventilation only serves to provide assistance for breathing and does not cure a disease	2.98	0.141	99.3	H
4	Sedation should be given to agitated ventilator patient to prevent extubation	2.860	0.404	95.3	H
5	Ventilator-associated pneumonia (VAP) is a major complication of mechanical ventilation	2.38	0.830	79.3	M
Communication					
1	Communication among care providers promotes optimal outcomes For mechanically ventilated patients	2.92	0.274	97.3	H
2	Ask simple yes/no questions to communicate with the patients	2.86	0.404	95.3	H

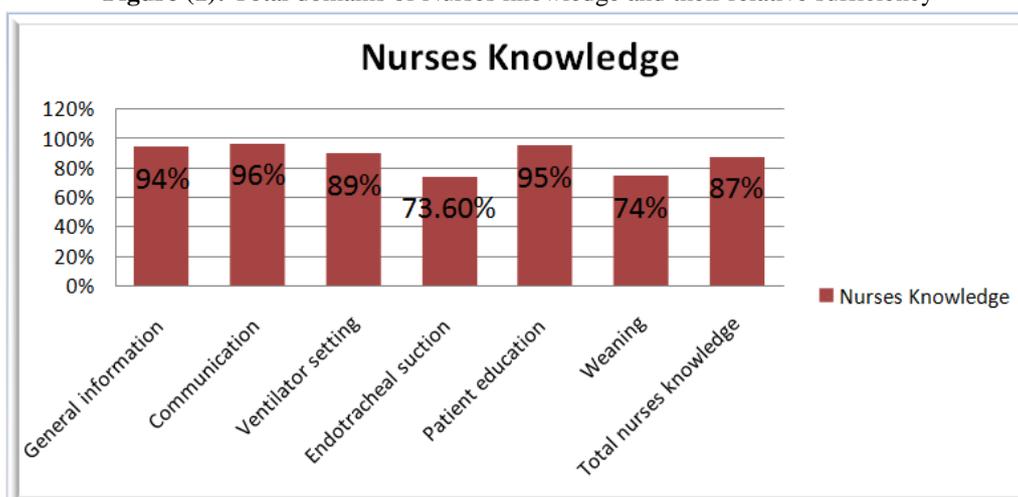
Continued table (2).....

Check ventilator settings and modes					
1	It's important to check vital signs, oxygen saturation, breath sounds, assess the patient's pain and anxiety levels when receive patient with ventilator	2.98	0.141	99.3	H
2	Should be read the patient's order and Compare current ventilator settings with the settings prescribed in the order	2.92	0.274	97.3	H
3	Must be sure that suction equipment and bag-valve mask are available for every patient with an artificial airway	2.98	0.141	99.3	H
4	Respiratory rate's the number of breaths provided by the ventilator each minute	2.80	0.494	93.3	H
5	Tidal volume (TV), mean the volume of air inhaled per breath and expressed in milliliters	1.46	0.787	48.6	L
6	Fraction of inspired oxygen (FiO ₂), expressed as a percentage (room air is 21%).	2.66	0.55	88.6	M
7	Peak inspiratory pressure (PIP), the pressure needed to provide each breath. Target PIP is below 30 cm H ₂ O.	2.50	0.707	83.3	M
8	High PIP may indicate a kinked tube, a need for suctioning, bronchospasm, or a lung problem	2.94	0.239	98	H
9	Ventilator modes are assist-control (A/C), synchronized intermittent mandatory ventilation (SIMV) and pressure support ventilation (PSV)	2.90	0.303	96.9	H
10	Peep: mean a positive end expiratory pressure and used for patients with heavy secretions	2.64	0.662	88	H
Standard care for Endotracheal Suction					
1	Endotracheal suction done as needed—not according to a schedule	2.10	0.931	70	M
2	Hyperoxygenate the patient before and after suctioning to help prevent oxygen desaturation	2.96	0.197	98.6	H
3	Don't instill normal saline solution into the endotracheal tube in an attempt to promote secretion removal	1.18	0.522	39.3	L
4	Limit suctioning pressure to the lowest level needed to remove secretions.	1.42	0.730	47.3	L
5	Suctioning is done for shortest duration as possible to prevent hypoxia	2.96	0.197	98.6	H
6	airway humidifier recommended for patients with thick secretion	2.68	0.65	89.3	H
patient and family Education					
1	Teach the patient and his family why mechanical ventilation is needed and emphasize the positive outcomes it can provided	2.94	0.239	98	H
2	Communicate desired outcomes and progression toward outcomes so the patient and family can actively participate in the plan of care.	2.76	0.624	92	H
3	Reinforce the need and reason for multiple assessments and procedures, such as laboratory tests and X-rays.	2.92	0.274	97.3	H
Weaning					
1	spontaneous breathing & stable parameter are the indications for ventilator weaning	2.96	0.197	98.6	H
2	Before weaning the patient must place on a T-piece	2.78	0.581	92.6	H
3	Evaluation of baseline vital signs and arterial blood gas(ABG _s) are important before weaning	1.48	0.814	49.3	H
4	It's important to Provide supplemental nasal cannula oxygen after extubation	1.66	0.875	55.3	H

SD= standard deviation, RS= Relative Sufficiency, G= Grade

Table 2 shows a high grade of nurses' knowledge in all items of weaning, educate the patient and communication domains while another domains record (4items,7items, 3 items) for General information's, ventilator setting and endotracheal suctioning respectively.

Figure (1): Total domains of Nurses knowledge and their relative sufficiency



This figure demonstrate that a high grade of knowledge in the four domain (general information, communication, ventilator setting, and patient education) while a moderate level for two domain (endotracheal suctioning and weaning).

Table (3): Association between socio-demographic information and Nurses knowledge toward mechanical ventilation

Total score of Nurses knowledge					T test& ANOVAs test			
Gender	F	%	Mean	SD	CV	df	p	sig
Male	32	64.0	77.3750	3.73087	0.510	48	0.612	NS
Female	18	36.0	77.8889	2.76297				
Age Group	F	%	Mean	SD	CV	df	p	sig
20-29 years	29	58.0	76.7931	2.67768	1.828	49	0.172	NS
30-39 years	15	30.0	78.6667	4.43471				
40-49 years	6	12.0	78.5000	3.08221				
Marital Status	F	%	Mean	SD	CV	df	p	sig
single	20	40.0	76.9500	2.83725	0.572	49	0.56	NS
Married	26	52.0	78.0385	3.84167				
Widowed	4	8.0	77.5000	3.10913				
Educational Level	F	%	Mean	SD	CV	df	p	sig
Secondary graduat	7	14.0	79.1429	3.76070	1.504	49	0.04	S
Institute graduate	23	46.0	77.3043	3.77112				
postgraduate	16	32.0	75.6875	2.70108				
Higher education	4	8.0	79.7500	1.50000				
Years of work in critical care unit	F	%	Mean	SD	CV	df	p	sig
5 years and less	33	66.0	77.2727	3.06464	1.048	49	0.03	S
6- 10 years	6	12.0	76.8333	5.23132				
11-15 years	5	10.0	80.0000	3.80789				
Above 15 years	6	12.0	74.8333	2.56255				
Training sessions	F	%	Mean	SD	CV	df	p	sig
yes	28	56.0	78.2857	2.92951	1.741	48	0.058	S
no	22	44.0	76.6364	3.77391				

CV = computed value, F = frequency, SD = standard deviation, DF = degree of freedom, S = significant, NS = not significant

This table shows that significant statistical associations were found between educational levels, years of work in critical care unit and training sessions while no association with other items (gender, age group and marital status)

IV. Discussion

Part 1: Discussion of Socio-Demographic Characteristics of nurse’s knowledge toward essential care of mechanical ventilation.

Throughout the course of data analysis of (50) nurses who work in critical care unit: the result indicates that the majority of the study sample (64 %) were males in comparison with (36%) female, most of them (58%) at the age group (20 – 29 yrs.). (Table 3)

This finding comes along with the study done by Nguyen; who conducted a cross-sectional multicenter study for mechanical ventilation and clinical practice heterogeneity in intensive care units and indicated that the majority of the subjects (67%) were males and most of them (19 %) between the (20-30) years old.^[4] Regarding the marital status, educational level and number of years working in critical care unit, the majorities (54%) were married, (48%) graduate from the institute and (66%) work less than five years in critical care unit. A descriptive research is designed to obtain more information about health care provider knowledge for mechanical ventilation, The study indicate that (63%) of the subject were married , (33%) bachelor graduate and (32.5%) have less than five years' experience in ICU^[5].

Part 2: Discussion nurses knowledge level and association with socio-demographic data

In relation to nurses knowledge toward essential care of mechanical ventilation; a moderate level of nurses knowledge were found toward endotracheal tube suctioning domain and weaning domain, while a high level of knowledge toward another domains (general information, communication, ventilator setting and patient education). These findings comes compatible with the study done by Khatib; who evaluate knowledge of critical care providers about evidence-based guidelines for ventilator and found that adequate knowledge with a moderate level (78%) were measured for 41 nurse^[6]. The study show that a significant statistical association were found between nurses educational level, years of working in critical care unit and training sessions and their educational level toward essential care for mechanical ventilation. This result is supported by a study done by Said; who conclude that nurses knowledge of mechanical ventilator were statistically associated with educational level (p value 0.04), years of work experience (p value 0.03) and training course (p value 0.05)^[7].

V. Conclusions

From the present study findings, the researchers have got the following conclusions.

- A high percentage of Nurses who work in critical care unit were males at age group 20-29 years old and most of them were married, have a diploma level, ≤ 5 years' experience in critical care unit and the majority have a training sessions
- All nurses' responses toward essential care of mechanical ventilation were at the high level of knowledge except in two domains (endotracheal suctioning and weaning) at a moderate level.
- Statistical associations were found between educational levels, years of working in critical unit, training sessions toward nurses' knowledge.

VI. Recommendations

- 1- Preparing a special training program to promote nurses knowledge concerning mechanical ventilation (especially in weaning and endotracheal suctioning techniques).
- 2- Encourage the nurses to complete their academic study to be equipped with advance skills& knowledge that enable them to provide efficient care.
- 3- Activating the role of continuing educational units in each hospital.

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