Nurses' Knowledge, Attitude and Practice on Prevention of Ventilator-Associated Pneumonia (VAP) Among Critically Ill Patients in Omdurman Teaching Hospital 2023

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Abstract

Background: Ventilator-associated pneumonia (VAP) is the most common infectious complication among the patients admitted in the intensive care units (ICUs), which is developed in the patients receiving mechanical ventilation. Study aimed to assess Nurses' Knowledge, Attitude and Practice on Prevention of Ventilator-Associated Pneumonia (VAP) Among Critically Ill Patients in Omdurman Teaching Hospital. **Methods.** An exploratory hospital based study carried in Omdurman teaching hospital which include 45 nurses. Randomly selected by systemic random sampling. Data were collected via what's up and the questionnaire focused on knowledge attitude and practice regard (VAP), using descriptive (Mean+SD) for socio demographic data and inferential statistics for variable knowledge, attitude and practice Mean+SD ,and using chi squire and 0.001 as significant correlation and suggested that mean knowledge mean score if >than 80%-75% consider good mean knowledge level and less than 75%-50% consider as moderate level,less than 50% considered poor . Same suggestion with attitude and preventive practice. Results: participants knowledge and practice were moderate, but the showed poor mean level attitude .there were significant relation between age, experience between knowledge, practice. **Conclusion:** participant showed moderate score level on knowledge and practice while poor level toward attitude. Recommendation: extensive educational programs should be arranged for nurses to improve their attitude regard ventilator patients in CCU so that can improve their attitude.

Keywords: coronary care unit nurses, ventilator-associated pneumonia.

Introduction:

Ventilator-associated pneumonia (VAP) is the most common infectious complication among the patients admitted in the intensive care units (ICUs), which is developed in the patients receiving mechanical ventilation; it is developing within 48 to 72 hours after the intubation of the tracheal tube **(Timsit JF.et al., 2011).**

VAP represents a common nosocomial complication arising in the ICU, which affect about 8-20% of ICU patients, and up to 27% of the mechanically ventilated patients **Dellit TH, Owens RC, McGowan JE, Gerding DN, Weinstein RA, et al. (2007).**

It is one of the leading causes of hospital-acquired infections in ICUs **Sedwick MB, et al. (2012)**

Mechanical ventilation (MV) is used to support the respiratory system for critically ill patients and has a huge number of techniques to save the lives of these patients however (MV) has so many complications, such as ventilator associated pneumonia (VAP), sepsis, acute respiratory distress syndrome (ARDS), pulmonary embolism, barotrauma, and pulmonary edema **(CDC. 2024).**

The use of artificial respiratory and mechanical ventilation (MV) is an essential and frequent life-saving measure in intensive care units (ICUs) since 76% of intensive care units of ICU.

Patients need ventilation support. (MV) However, many risks and complications. However, (MV) carries many risks and complications, the most common one being ventilator associated pneumonia (VAP).

(Sedwick MB, Lance-Smith M, et al., 2012). Which is defined as lung infection occurring in a patient who has been assisted by invasive (MV) within the past 48 hours **(Ali NS.2013)**

Ventilator associated pneumonia is an important safety issue, and the most common nosocomial infection in critically ill patients and mechanically ventilated patients. (**Akın Korhan E,et al., 2014**)

Although mechanical ventilation is a life-saving intervention, it poses significant clinical and economic challenges due to risk of complications. Approximately 40% of mechanical ventilation lasts eight days or longer, and 20% of patients on mechanical ventilation develop VAP. (**Zimlichman et al., 2013**).

This study aimed to assess nurses' knowledge, attitude and practice on prevention of ventilator-associated pneumonia (VAP) among critically ill patients in Omdurman teaching hospital.

To find association between their demographic data and prevention of (VAP) their (KAP) knowledge, attitude and preventive practice.

Significant of study:

Critical care nurses play an important role in prevention of Ventilator associated Pneumonia by preventing patient from risk factors, notifying early symptoms of VAP in Patients and assisting in diagnosis there for Nurses who protect patients from infection and to prevent infection nurse is back bone in CCU to prevent VAP. The occurrence of ventilator acquired Pneumonia indicates inadequacy of experienced nurses, insufficient knowledge and understanding about the pathophysiology and prevention of

VAP. The spread of VAP may be due to ICU Nurses' contact with patients receiving care of mechanical ventilation and their contact with nursing students, visitors and health care workers

Research questions:

What is level of nurses' knowledge regarding Prevention of Ventilator-Associated Pneumonia (VAP) among Critically Ill Patients?

What is level of nurses' practice regarding Prevention of Ventilator-Associated Pneumonia (VAP) among Critically Ill Patients?

What is level of nurses' attitude regarding Prevention of Ventilator-Associated Pneumonia (VAP) among Critically Ill Patients?

Is there correlation between nurses' knowledge, practice and attitude regarding Prevention of Ventilator-Associated Pneumonia (VAP) among Critically Ill Patients?

Operational definition

Practice of VAP prevention: The response to activities performed by ICU health care professionals concerning the prevention of VAP

Knowledge: The response of ICU health care professionals about the practice of VAP prevention

Intensive care unit (ICU): A hospital unit that's concentrated with extraordinary equipment and extraordinarily trained healthcare professionals who give care to fundamentally sick patients requiring immediate and nonstop consideration.

Research Design

This is descriptive exploratory cross-sectional hospital based study. Conducted to assess knowledge, attitude and practices on the prevention of VAP among nurses working in intensive care units at governmental hospitals Carried in ICU in Omdurman teaching hospital. This study was carried out from January 2025 to February 2023.

Study area:

Omdurman teaching hospital in CCU and intensive care unit

Study Setting:

The study was conducted Coronary care unit and intensive care unit Omdurman teaching hospital

Study Participants and Sample Size

This study included all male and female nurses working in ICUs unit in Omdurman teaching hospital, were included. nurses who were working in ICUs unit were randomly selected and formed the study population. nurses who were working in various positions in hospitals for at least one year prior to the survey period were included in the study.

Sample size collected randomly using systematic technique 45 nurses were selected

Data collection tool:

Structured questionnaire developed by researcher according to CDC guide line 2003 we made some modification so that become adjustable for our variable,and add some of questionnaire that constructed by **(Blot, Labeau, Vandijick, Clas, and Van Aken, 2007).**

The questionnaire consisted of two main parts. First part is a socio demographic characteristic of the nurses which included age, gender, qualification level, and years of experience. The second part consisted of (12) items regarding knowledge of VAP, (4) item attitude regard VAP. And practice divided into (17) items, (5) for hand washing, Suctioning from the ETT/tracheotomy (7) items. (5) Items for When Oral care done.

The responds regard knowledge consist of three answers we yes, no I don't know the total score of the knowledge questionnaire was14 scores one mark for every yes answer .regard attitude it divided according to Likert scale to strongly agree, agree, neutral, disagree and strongly disagree for strongly agree we give (5) degree, agree (4), neutral (0) and (2) for disagree (1) for strongly disagree total score for it is (20)

Data collection tool and procedure

The tool consists of three parts. The first portion was utilized to evaluate the sociodemographic data, the second portion was utilized to assess the knowledge of ICU health care professionals, and the third portion was an organized practice checklist utilized to survey the practice of the health care professionals within the ICU of each hospital. Data were collected using organized, pre-tested, and self-administered survey questions. The questions were adjusted from related sorts of writing and modified in like manner to the setup (Maria et al., 2013; Alvarez et al., 2014; Girma et al., 2018). Six bachelor's degree sciences pharmacists and one experienced master's in sciences epidemiologist were recruited for data collection and supervision respectively. The data collection process was carried out by self-administering the questionnaire for the selected healthcare professionals within the ward.

Data analysis:

The researcher used Statistical Package for Social Sciences (SPSS, version 25) for data entry and analysis. Data collected arranged coted. Using Descriptive data expressed as frequency, mean, standard deviation (SD), and percentages. Inferential statistic tests used knowledge, attitude and practice. Using chi squire and 0.001 as significant correlation and researcher suggested that mean knowledge mean score if >than 80%-75% consider good mean knowledge score and less than 75%-50% consider as moderate scoreless than 50% considered poor . Same suggestion with attitude and preventive practice.

Ethical approval:

Before starting the study ethical approval was obtained ,written consent were taken from participants after explaining the purpose of the study and explained that it has no any risks for them and they have right to withdraw from the study at any time without giving any reasons.

Results:

This is exploratory cross section hospital based study. A number of 45 critical care who are working in CCU in Omdurman hospital participated in our study.

Their demographic characteristics of participants in the table (1) their age more thn30 years while 21(46.7%) their age between 25-30 years old. Majority of them was female which represent 6(86.7%), regard their qualifications 25(55.6%) with bachelor while 1(24.4%) with master degree and the rest with diploma certificate, their experience more than 3 years 24(53.3%) and 21(46.7%) between1-3 years ,the majority of them not received short course in respiratory therapy. Mean and SD shown in the table.

Our results shown in table (2) regard participants knowledge when asked them if a nurse is required to dispose of a suction catheter the majority of them said yes 31(68.9%), 8(17.8%) said no and the rest did not know, and when asked about best airway humidifier to prevent VAP is a heated humidifier their answered were 19 (42.2%), 16 (35.6%), 10 (22.2%) they said yes,no,don't know respectively. Again in same table we asked them about considering procedure elevation head of the bed

should be ranging from30-45 degree their responses as follows: nurse caring for a ventilated patient is required to wash hands. When caring for a ventilated patient is required to wear sterile gloves during. It is recommended to perform Oral care by using a swab moistened with mouth wash and water. Early weaning from MV reduces the risk of VAP is recommended to perform chest physiotherapy for ICU patients to reduce the risk of VAP

Semi-recumbent positioning is recommended for ventilated patients. 29 (64%) 6 (13.3%) 10 (22.2%). 36 (80%) 6 (13.3%) 3(6.7%) respectively and the rest in the table, their Mean knowledge majority of them considered as moderate 44 (97.8%) p value is .203.

In table (3) regard their attitude when asked them if All patients are at potential risk of developing VAP, 33(73.3%) strongly agree, 6(13.3%),6(13.3%) agree and not decided respectively ,regard question if Ventilator associated pneumonia prevention is time consuming for me to carry out 21(46.7%)strongly agree 5(11.1%) agree and only 4(8.9%) strongly disagree.all of them their attitude considered moderate 49 (100%).

Mean and SD and p value 2.3222 .51847 .022 respectively

In table (4) the researcher asked the participants about the preventive practice of VAP first regard hand washing (5 questions) Hand washing ,25(55.6%) used alcohol hand rub while

13(28.9%) never used it the rest percent said no, while 40(88.9%) Hand washing after contact with a source of microorganisms, while never do this 13(28.9%) and 16(35.6%)always washing hand before patient contact, 15(33.3%) never do it while the rest said sometimes, they only sometimes wash hands before entering the unit 7(15.6%) the majority of them never do this 25(55.6%).

The second part of preventive practice about Cuffed Endotracheal tube used, we found that 37(82.2%) and same result for Hand washing when Insert the catheter into the ETT gently by using aseptic technique activity and early mobilization done on patient is maintained this, and 4(8.9%)same percent represent doing it sometimes and never respectively.

The third part in practice regard oral care done all of them answered by always regard Positioning a patient in a semi recumbent, Clean mouth using tooth brush or gauze moistened, mouth wash and water with chlorhexidine /povidone and Use of facemask during suctioning 45(100%),while 38(84.4%) always washing hand after oral care. Mean and SD and p value 2.00 .000.000 respectively.

From the results there is significant association between knowledge, age and experience .000. And significant association between attitude age and education level while significant association between practice and experience .000.

Table (1): Distribution of socio-economic data   no (45)

Variable	Frequency	Percent (%)	Mean	SD
Age by years				
25-30	21	46.7	1.5333	.50452
More than 30	24	53.3		
Gender				
Male	6	13.3	1.8667	.34378
Female	39	86.7		
Education level				
Diploma	9	20.0	2.0444	.67270
Bachelor	25	55.6		
Master	11	24.4		
Experience level				
1-3 years	21	46.7	1.5333	.50452
More than three years	24	53.3		
Acquisition of short course in respiratory therapy				
Yes	13	28.9	1.7111	.45837
No	32	71.1		

Table (2): Responses of participants Knowledge regard ventilator associated pneumonia   no (45)

Item	Yes Percent (%)	No Percent (%)	I don't know Percent (%)
A nurse is required to dispose of a suction catheter	31(68.9%)	8(17.8%)	5(13.3%)
The best airway humidifier to prevent VAP is a heated humidifier	19(42.2%)	16(35.6%)	10(22.2%)
insertion of the suction catheter into the endotracheal tube is sterile procedure	23(51.1%)	12(26.7%)	10(22.2%)
It is recommended to change the ventilator circuit when clinically indicated	32(71.1%)	6(13.3%)	7(15.6%)
procedure considered			
Elevation Head of the bed should be ranging from30-45 DIGREE	29(64%)	6(13.3%)	10(22.2%)
A nurse caring for a ventilated patient is required to wash hands	36(80%)	6(13.3%)	3(6.7%)
When caring for a ventilated patient is required to wear sterile gloves during	29(64%)	5(11.1%)	11(24.4%)
It is recommended to perform Oral care by using a swab moistened with mouth wash and water	23(51.1%)	13(28.9%)	9(20%)
early weaning from MV reduces the risk of VAP	27(60%)	12(26.7%)	6(13.3%)
t is recommended to perform chest physiotherapy for ICU patients to reduce the risk of VAP	26(57.8%)	9(20%)	10(22.2%)
Semi-recumbent positioning is recommended for ventilated patients	26(57.8%)	14(31.1%)	5(13.3%)
During the care of ventilated patient maintenance of adequate cuff pressure	31(68.9%)	7(15.6%)	7(15.6%)
Mean score knowledge	Frequency		Percent (%)
Good more than 80%-75%	0		0
Moderate less than 75%-5-%	44		(97.8%)
poor less than 50%	1		(2.2)

Table (3): Responses of participant's attitude regard ventilator associated pneumonia   no (45)

Item	Strongly agree	agree	Not decided	disagree	Strongly disagree
All patients are at potential risk of developing VAP.	33(73.3%)	6(13.3%)	6(13.3%)	0	0
Ventilator associated pneumonia prevention is time consuming for me to carry out	21(46.7%)	5(11.1%)	7(15.6%)	8(17.8%)	4(8.9%)
In my opinion, patients tend not to get as many VAP now days	6(13.3%)	7(15.6%)	11(24.2%)	11(24.2%)	10(22.2%)
I do not need to concern myself with Ventilator associated pneumonia Prevention in my job.	21(46.7%)	5(11.1%)	9(20%)	4(8.9%)	6(13.3%)
Mean score attitude level	frequency		Percent (%)		
Good more than 80%-75%	15		33.3		
Moderate less than 75%-5-%	11		24.4		
poor less than 50%	19		42.2		

Table (4): Responses of participants preventive practice regard ventilator associated pneumonia no (45)

Item	Always	Sometimes	Never
Hand washing			
Hand washing before entering ICU	7(15.6%)	13(28.9%)	25(55.6%)
Hand washing Before patient contact	16(35.6%)	14(31.1%)	15(33.3%)
Hand washing frequently when continuing working with the same patient	13(28.9%)	18(40.0%)	14(31.1%)
Hand washing After contact with a source of microorganisms	40(88.9%)	3(6.7%)	2(4.4%)
Hand washing Use of alcohol rub	25(55.6%)	7(15.6%)	13(28.9%)
Suctioning from the ETT/tracheotomy			
Cuffed Endotracheal tube used	28(62.2%)	8(17.8%)	9(20%)
ETT cuff pressure maintained	37(82.2%)	4(8.9%)	4(8.9%)
Hand washing before suctioning	25(55.6%)	9(20%)	11(24.4%)
Hand washing /Wear gloves	36(80%)	4(8.9%)	5(11.1%)
Hand washing/ Prepare sterile equipment's required during suctioning	31(68.9%)	8(17.8%)	6(13.3%)
Hand washing/ Insert the catheter into the ETT gently by using aseptic technique Activity and early mobilization done on patient	37(82.2%)	2(4.4%)	6(13.3%)
Measure the amount and characteristics of secretion	37(82.2%)	5(11.1%)	3(6.7%)
When Oral care done			
Hand washing before oral care	28(62.2%)	16(35.1%)	1(2.2%)
Positioning a patient in a semi recumbent	45(100%)	0	0
Clean mouth using tooth brush or gauze moistened, mouth wash and water with chlorhexidine /povidone	45(100%)	0	0
Use of facemask during suctioning	45(100%)	0	0
Hand washing after oral care	38(84.4%)	1(2.2%)	6(13.2%)
Mean score preventive practice level			
Good more than 80%-75%	0	0	
Moderate less than 75%-5-%	45	(100%)	
poor less than 50%	0	0	

Table (5): Mean.SD and P. value for participant's knowledge, attitude and preventive practice

Item	Mean	SD	P.value
knowledge	1.5593	.28847	.203
attitude	2.3222	.51847	.022
Preventive practice	2.00	.000	.000

Table (7): Correlation of characters and socio demographic data and knowledge, attitude and preventive practice with chi squire distribution

Items	Demographic variable	P value
Knowledge	age	.000
	gender	.927
	Education level	.165
	Experience	.000
Attitude	age	.003
	gender	.157
	Education level	.003
	Experience	
Preventive practice	age	.157
	gender	.142
	Education level	.003
	Experience	.000

Discussion:

This is exploratory hospital based study conducted in CCU in Omdurman teaching hospital. The findings of this study highlight that nurses working in CCU the majority of them had moderate level of knowledge for preventing VAP, researcher compare these finding with study done in Yemen their finding showed significant low level of their knowledge regard VAP **(Al-Sayaghi K M.et al., 2014)**

Also our results showed opposite comparison with level of knowledge when compared it with study done by **(Davoud Mardani et al., 2016)**.

It is well-known that nurses in CCU play an important role in prevention of VAP. Our participants had moderate level of knowledge, again this moderate level of knowledge of our participants inconsistent with study done by with other studies that reported total mean scores from 37.3% in comparison with our mean 44 (97.8%) **(Llauradó M. 2011).**

A Systematic Review done by **Khaild AL-Mugheed. (2021)**.

The review results confirmed that nurses in the eastern Mediterranean region showed low levels of knowledge and insufficient levels of compliance of ventilator-associated pneumonia. Another study done by **(Cybele Lara Abad.et al., 2021)** where their participants had difficulty answering the knowledge questionnaire, with a mean of 5.25 (range 3–8) points. Most correct responses were on questions which is poor **(Cybele Lara Abad.et al., 2021).**

Regard attitude our participant reported moderate mean level of attitude level regard VAP 19(42.2%) this consistent with study done by by **(Davoud Mardani et al., 2016)** **(Davoud Mardani et al., 2016).** Exploration of knowledge of, adherence to, attitude and barriers toward

Their results shown that poor attitude score of HCWs toward preventive strategies of VAP.

Regard preventive practice we found study done in India their participants showed good practice regard VA P, most of the intensivists (96.8%), reported using VAP bundles in their ICUs with a high proportion while all our participants showed moderate level not support our study 45(100%) **(Juneja D, 2011).**

From the results the researcher found that significant correlation between demographic (age) data and knowledge, attitude and practice in agreement with with study done in arizona by **(Ramirez-Damilig, Jeremiah, 2017)** study showed that correlation between perceptions and attitudes of nurses of the CUSP 4 MVP-VAP and participant's demographic characteristics at a-level of 0.05. **(Ramirez-Damilig, Jeremiah. 2017).**

Conclusion:

Participant showed moderate score level on knowledge and practice while poor level toward attitude**.**

Recommendation:

Extensive educational programs should be arranged for nurses to improve their attitude regard ventilator patients in CCU so that can improve their attitude.

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