Nurses' Knowledge and Practices Regarding Prevention of Ventilator Associated Pneumonia in a Tertiary Care Hospital Lahore

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Abstract: Ventilator associated pneumonia is the most common nosocomial infection arising as complication at Intensive care units. It affects nearly 8-20% of the clients admitted at intensive care units and is 27% among the mechanically ventilated patients (Al Shameri). The main purpose of this study was, to assess the knowledge and practice of Ventilator associated Pneumonia prevention among nurses at PIC Hospital Lahore. A cross sectional descriptive survey was performed to assess the knowledge and practices among Nurses. A convenient sample of n=122was used to collect the data. A structured adopted questionnaire was used to collect data. The questionnaire consisted demographic variables, Knowledge of VAP and Practices of VAP among the nurses of the ICU at PIC Lahore. The data was analyzed on SPSS version 21. Overall knowledge was satisfactory where 50% of the study participants had good knowledge and gave more than 80% correct responses about different aspects of the Ventilator Associated pneumonia prevention. 30.33% were satisfactory knowledge about the VAP prevention. Overall Practice result very good practices among 83% of the participants who were practicing 20 or more items out of 24 statements. 12.33% had satisfactory practices. Overall knowledge was satisfactory and practices were good among the nurses at PIC regarding ventilator associated Pneumonia.
Keywords: Knowledge, Practices, Ventilator Associated Pneumonia.

INTRODUCTION

One of the most needed and essential life saving measure in Intensive care units is the use of artificial airway or the use of mechanical ventilation. It is found that about 76% of the patients at Intensive care units require mechanical ventilation. This artificial mechanical ventilation carries different risks and complications where the ventilator associated pneumonia is the most common complication [1]. Ventilator associated pneumonia is the most common nosocomial infection arising as complication at Intensive care units. It affects nearly 8-20% of the clients admitted at intensive care units and is 27% among the mechanically ventilated patients [2]. Pneumonia associated with ventilator is termed as the type of pneumonia among the patients who are on mechanical ventilator support, which occurs after 48 hours of mechanical intubation and was not present before intubation or the time of admission [3].

The prominent features and characteristics of Ventilator associated pneumonia include Progressive pulmonary infiltrate, high temperature, purulent trachea-bronchial secretions and leukocytosis. The risk of death is very high, ranging from 6% to 68% and can be further high in high risk population, therefore it is a serious concern of ventilated patients at Intensive care units [4]. During intubation, the aspirations are collected around the cuff of tube frequently, and microbial access to the lower respiratory tract is facilitated and thus it remains a leading cause of death [2]. The end tracheal intubation and artificial ventilation raises the chances of entry of bacteria to the lower respiratory tract through trachea thus increases the chances of pulmonary infection. The risk is very high during the first 5 days which gradually decreases as 2% per day from day 5 to day 10 and 1% per day after day 10 [5].

The ventilator associated pneumonia extends the patients stay and increase the morbidity and mortality therefore it is considered as an expensive complication. It is stated that a single case of ventilator associated pneumonia increasing the cost by $25,000 [6]. Reasons identified in literature for such high incidences of VAP include 1. Lack of knowledge among nurses and other health care professionals regarding evidence based guidelines 2. Poor compliance of the guidelines in the prevention of ventilator related infections [7]. It is stressed that the

high incidence of VAP has link with gap in knowledge of nurses and other health care workers and failure to translate the required knowledge into practice which leads to high incidences of VAP, high cost of the treatment and the increased number of deaths [2].

The nurses working at Intensive care units require a specialized care which they can use to save the lives of critically ill patients. Furthermore a combination of adequate knowledge and integration of that knowledge into safe practices is the essential key to rescue the serious patients at Intensive Care Units. Thus every single nurse is accountable for the provision of safe care. Having necessary knowledge and provision of safe care is the moral and professional responsibility of every nurse [8]. The Intensive care nurses are the most suitable professionals to practice the evidence based guidelines, because they are there for 24 hours thus can play a vital role in the prevention of Ventilator associated pneumonia [9]. To reduce the risk of such ventilator associated infections there is need to have skillful and knowledgeable nurses. They can play an important role to have appropriate decisions in minimizing the risks to patients. Unfortunately there is very limited research to know the level of nurses' knowledge and practices on the care of ventilation and ventilator associated pneumonia prevention and control [10].

Nurses are the supposed to equip with knowledge of diagnosis and timely management of complications will decrease the incidence of ventilator associated infections. On the other hand lack of adequate nursing staff and inappropriate practices may affect the quality of nursing care and can increase the incidences of ventilator associated pneumonia [11]. Different strategies are created to solve the serious problem of ventilator associated pneumonia. These strategies can decrease the incidence of ventilator associated infections and patient's outcomes can be improved. The strategies for preventing VAP include physical strategies 10, positional strategies 3 and pharmacological strategies 8 [3].

The physical strategies are end tracheal intubation route, maxillary sinusitis appropriate systematic search, change of ventilator circuit frequency, proper humidification of airway (type of humidifier and frequency to change humidifier), suctioning system, secretion drainages' of subglottic, tracheotomy timing and bacterial filters use. The positional strategies are Kinetic bed therapy, Semi recumbent positioning and prone positioning. Pharmacological strategies include prophylactic antibiotic use, antibiotic nasal prophylaxis, Intravenous antibiotic prophylaxis, topical prophylaxis, oral decontamination with chlorhexidine, oral

decontamination using providence and Prevention of maxillary sinusitis [11].

The intensive care units nurses have an important role in maintaining direct and smooth contact and the development or implementation of different programs to prevent ventilator associated pneumonia. The adaptation and implementation of effective measures needs expertise in skills and knowledge among the Intensive care units nurses. Thus it is necessary to study the related knowledge and practice of ICU nurses about the prevention of Ventilator associated pneumonia [12].

ICU nurses have been found to be in the best position to put knowledge into practice as they are at the patient's bedside 24 hours daily providing nursing care and therefore play an important role in the prevention of VAP. Nevertheless nurses need to have an awareness of the problem as well as knowledge so as to adhere to such practices. Various measures to prevent VAP have been reported in the literature, however there are very few data concerning nurses' knowledge on VAP prevention and the level of their practice, as well as factors that may influence their application at the bedside, lack of knowledge may be a barrier to practice [13].

A study conducted found that nurses' knowledge score about ventilator associated pneumonia was 7.1/15 which is 47.3%. There was an association of better knowledge with the degree in nursing and training of short ICU courses [1].

A study conducted at South Africa assessed the knowledge of ventilator associated pneumonia among both the trained and non-trained nurses. It was revealed that both the groups had inadequate knowledge. There was a very low mean knowledge score 47.56%. The nurses with ICU training had 50% and non ICU training had 45% correct responses about the ventilator associated pneumonia. There was no significant found between the knowledge level and years of experience [8].

A study conducted at Saudi Arabia assessed the knowledge, attitude and practices of health care professionals. The findings suggest that mean knowledge score was 11.14 and practice score was 8.83 respectively. The average knowledge of physicians was slightly higher than the nurses. The best practices of ventilator associated pneumonia prevention were observed among the respiratory therapist [2].

AIMS OF THE STUDY
This study is aimed to identify the knowledge and practices of intensive care nurses about the

prevention of ventilator associated pneumonia in the intensive care units of Punjab institute of Cardiology. The recommendations from this research will contribute to the improvement in care of critical patients end outcomes

Significance of the study

This study will be very helpful tool for the ICU nurses to provide base line knowledge and practices in future. It will be very helpful to give them a strong scientific based knowledge which can further enhance the standard of safe practices. The improved outcomes as safe nursing care at intensive care units reduce the stay of patients; provide them financial benefits as a reduced treatment cost. The hospitals will also be benefited from the study because the hospitals are aimed to provide cost effective care and if there are less cases of ventilator associated pneumonia, the cost will be reduced.

METHODS
Setting

This study was conducted in Adult ICU and other critical care areas of selected Hospitals (PIC) in Lahore Pakistan.

Research design

Descriptive cross-sectional Study was conducted from February to May 2018. A descriptive cross-sectional design is an observational study used where more information required in a particular field as it occur naturally and it is often the first step or initial enquiry in to a new topic, event, disease or condition.

Population

All nurses working in the Intensive (critical) Care Unit and other critical care areas in PIC Hospital Lahore. Polit and Beck describe the study population as ―the entire aggregation of cases in which a researcher is interested in. This study is interested in nurses working in critical care areas in selected hospital.

Sampling

Convenient Sampling technique was used to recruit a sample of n=122 from the recommended population.

Research instrument

An adopted questionnaire from a study 'knowledge and practice of intensive care nurses on prevention of ventilator associated pneumonia' [11]. The questionnaire consists of part-I Questions used to assess on demographic information's and part-II with 20 questions which used to assess nurses level of knowledge and part-III, an observational checklist, used to assess the practice of intensive care nurses.

Data gathering procedure

The questionnaire was distributed to the participants in printed form where they answered all the questions according to their own understanding. A time of about 30 minutes was given to fill the questionnaires. Then the filled questionnaires were collected.

Methods used to analyze data

Data analysis was done by entering the data on SPSS Data was entered to SPSS version 21 and was analyzed in the form of Tables and graphs, Frequency, percentage etc. Descriptive statistics were performed through Bar graphs and frequency distribution table.

Study timeline

The data was collected from February, 2018 to April, 2018.

Ethical consideration

First of all a written permission from the management of National college was granted. Then permission was taken from the head of the study setting hospital. During the study the participants were respected for their rights. All the participants were recruited for the study after their permission. They were given the right if they want to participate or not participate. For this purpose a proper written informed consent was given to the study participants. Secondly the confidentiality of the study participants was maintained. The data was provided codes on computers and the information collected from participants were not shared unnecessarily.

RESULTS
Profile of the respondents

Respondents were taken from different selected groups of Hospital Lahore.

Table-1 reveals different demographic findings of the study participants. According to age distributions, 19.7% of the participants belong to age group 21-25 years, 54% were age 26-35 years and above 35 years were 26% participants. All the study participants 100% were females. 41.8% of the participants were having only nursing Diploma, 34.4% were with diploma plus specialization while the remaining 23% participants have done BSN or above qualification. Majority of the participants 95% said they have been train in ICU while only 5% said they were not trained. Experience results reveals that majority participants were low experienced that is 78% had 1- 5 years of experience, 12% had 6-10 years of experience and 9% had more than 10 years of experience.

Table-1: Demographic frequency

Variables	Number (n)	Per cent
Age:		
21-25 years	24	19.7
26-35 years	66	54.1
Above 35 years	32	26.2
Gender		
Male		
Female	122	100
Education:		
Nursing Diploma	51	41.8
Diploma plus specialization	42	34.4
BSN/PRN BSN and above	29	23.8
ICU Training		
Yes	116	95.1
No	06	4.9
Experience:		
1-5 years	96	78.7
6-10 years	15	12.3
Above 10 years	11	9.0

Table-2: Frequency and percentage of the Knowledge

S.NO	Statement	Correct		Incorrect	
		N	%	N	%
1.	Which route is best recommended when intubation a patient?	118	96.7	4	3.3
2.	The recommended route of intubation in Qn. 1 decrease the risk of VAP because	69	56.6	53	43.4
3.	A nurse is required to dispose a suction catheter	108	88.5	14	11.5
4.	It is recommended to change humidifiers	96	78.7	26	21.3
5.	Insertion of the suction catheter into the End tracheal tube	97	79.5	25	20.5
6.	Dusting of respiratory and bedside equipment with antiseptic should be done	109	89.3	13	10.7
7.	Head of the bed elevation should be ranging from	110	90.2	12	9.8
8.	A nurse caring a ventilated patient is required to wear sterile gloves during	115	94.3	7	5.7
9.	A nurse caring a ventilated patient is required to wash hands	110	90.2	12	9.8
10.	It is recommended to perform Oral care by using a swab moistened with mouth wash and water	74	60.7	48	39.3
11.	Prolonged use of Stress ulcer prophylaxis to a ventilated patient	26	21.3	96	78.7
12.	Maintenance of a high nurse to patient ratio in critical care setting is associated with	87	71.3	35	28.7
13.	Continuous education to ICU nurses on prevention of nosocomial infection is associated with	84	68.9	38	31.1
14.	It is recommended to perform chest physiotherapy due to the following reason	114	93.4	8	6.6
15.	Adjustable vs. non-adjustable beds	97	79.5	25	20.5
16.	ETT suctioning should be done to patient	101	82.8	21	17.2
17.	Early weaning	88	72.1	34	27.9
18.	Over feeding a ventilated patient is associated with	102	83.6	20	16.4
19.	During the care of ventilated patient maintenance of adequate cuff pressure	96	78.7	26	21.3
20.	Unplanned extubation is associated with increased risk of aspiration therefore	108	88.5	14	11.5

Table-2 shows different percentages of correct and incorrect responses about the knowledge of VAP among the participants. Regarding the best recommended rout a good majority of the participants 97% gave correct answer; whereas 3% gave incorrect response. Regarding the disposal of suction catheter properly, 88.5% gave correct response while 11.5% were unable to give correct answer. Nurses were also having the knowledge of changing humidifier and 78.7% gave correct response for this question. About 80% of the participants had knowledge of the insertion of the catheter into the end tracheal tube. More than 89% study participants had knowledge of dusting equipment with antiseptic. 90% of the participants gave correct reply to a question regarding head of the bed rising to which level. Regarding the question, nurse need to wear sterile gloves when caring for ventilated patient. 94.3% gave correct responses. About 90% of the participants correctly replied about nursing need to wash hand while dealing with

ventilated patients. 60.7% of the study participants correctly responded for the question that oral care of ventilated patients should be performed using swab moist with mouth wash. The knowledge of participants regarding prolong use of ulcer prophylaxis effects was very poor and only 21% gave correct reply. More than 70% nurses were aware of maintaining the high nurse ratio while caring for ventilated patients. 68.9% of the participants knew the important role of continuous nursing education and its role for the growth of ICU nurses. The reason of chest physiotherapy was correctly known by more than 93% nurse participants. The role of adjustable and nonadjustable beds, were correctly answered by 79.5% of the study participants. About the question ETT suctioning should be done to patient, 82.8% of the study participants answered correctly. The role of early weaning was correctly answered by 72% of the study participants. The use and disadvantages of over feeding ventilated patients and its problems were correctly answered by 83.6% of the study participants. 78.7% of the participants knew the role of maintaining an appropriate cuff pressure.
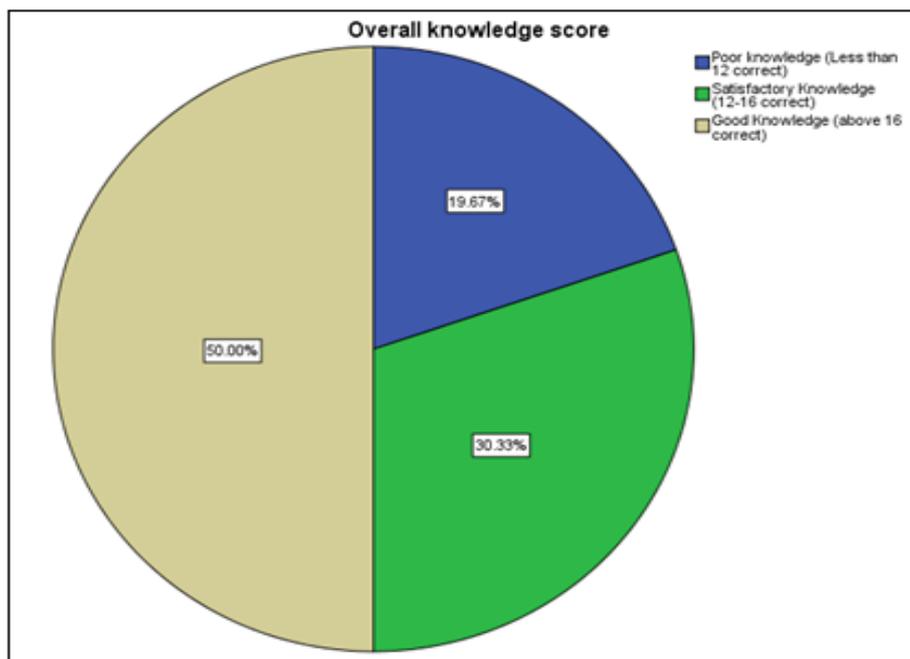
The above graph and table of overall knowledge shows that 19.67% of the study participants had poor knowledge, having correct answers less than 12, 30.33% had satisfactory knowledge and 50% of the participants had good knowledge about the VAP prevention who answer more than 80% correct responses.

Table-3 shows the result of different practice questions. In the Infection prevention section of practice the participants were asked, whether generally they wash their hands when dealing patients, in response 99.2% said they always wash their hands, while .8% said no to the question. Further they replied that majority 81.1% of the study participants wash their hands before entering to the ICU while 18.9% said they do not wash. Furthermore they were asked if they wash their hands before contacting any patients, where the participants replied that 90.2% said yes while 9.8% said that do not usually wash their hands before contacting the patients. The number of participants washing their hands after the attending patient was very high and almost 100% of the participants said they wash their hands after patient contact. Similarly 97.5% replied that they wash their hands when come in contact with some source of microorganism. 88.5% of the participants said that they use alcohol rub regularly. Of the participants, 89.3% said they wash their hands before suctioning and 9.8% said they do not wash their hands. 100% of the study participants said they always practice wearing gloves during suctioning of the tracheotomy or ventilated care patient. 97.5% of the study participants stated that they practice while preparing sterile equipment during suctioning, whereas 2.5% do not practice.98.4% of the study participants practice to make sure a clean environment during suctioning of ventilated patients while 1.6% said they do not practice. 95.1% were practicing the discarding of suction catheter after use immediately and 4.9% said they do not practice. 91.8% of the study participants measure the amount and characteristics of secretion while 8.2% do not practice it. Majority 98.4% said they practice washing hands after suctioning while 1.6% said they do not practice. 90.2% said they practice documentation of suctioning while 9.8% said they do not practice. 96.7% of the study participants stated that they wash hands before oral care of the patients, 3.3% said they do not practice

it. During oral care 99.2% stated that they wear clean gloves and .8% said they do not practice it. Placing patient in the appropriate position is practiced by 94.3% of the study participants while 5.7% did not practice it. 96.7% said Yes that they use clean mouth using tooth brush or gauze moistened with mouth wash and water, 3.3% said No to the question. 95.1% of the participants said that they rinse their patient's mouth with clean swab and 4.95 said no. 98.4% said yes that

they practice collecting and cleaning suction secretions as they accumulate if necessary and 1.65 said no to this option. 97.5% of the study participants practice to apply water soluble jelly to patients' lips and 2.55 of the study participants do not practice it. Almost 100% of the study participants said that they return the equipment to the appropriate place. 98.4% stated that they wash their hands after washing their patient's mouth and 1.6% did not practice it.

Table-3: Frequency and percentage of the Practices

S. NO	Statement	Yes		No	
	Prevention Practice	N	%	N	%
1.	Hand washing	121	99.2	1	0.8
2.	Hand washing before entering ICU	99	81.1	23	18.9
3.	Hand washing before patient contact	110	90.2	12	9.8
4.	Hand washing after patient contact	121	99.2	1	0.8
5.	Hand washing after contact with the source of microorganism	119	97.5	3	2.5
6.	Use of alcohol rub	108	88.5	14	11.5
	Suctioning from the ETT/Tracheotomy				
7.	Hand washing before suctioning	109	89.3	12	9.8
8.	Wearing Gloves	122	100	0	0
9.	Prepare sterile equipment required during Suctioning	119	97.5	3	2.5
10.	Ensure Environmental cleanness	120	98.4	2	1.6
11.	Discard suction tubes immediately after one single use	116	95.1	6	4.9
12.	Measure the amount and characteristics of secretions	112	91.8	10	8.2
13.	Hand washing after suctioning	120	98.4	2	1.6
14.	Documentation	110	90.2	12	9.8
	Oral Care				
15.	Hand washing before Oral care	118	96.7	4	3.3
16.	Wearing clean gloves	121	99.2	1	0.8
17.	Position a patient in semi recumbent position	115	94.3	7	5.7
18.	Clean mouth using tooth brush or gauze moistened with mouth wash and water	118	96.7	4	3.3
19.	Rinse mouth with a clean swab	116	95.1	6	4.9
20.	Suction secretions as they accumulate if necessary	120	98.4	2	1.6
21.	Apply water soluble jelly to patients' lips	119	97.5	3	2.5
22.	Clean equipment and return to its proper place	121	99.2	1	0.8
23.	Hand washing after oral care	120	98.4	2	1.6
24.	Documentation	108	88.5	14	11.5

DISCUSSION

The findings of this current study show that 50% of the study participants had good knowledge about different aspects of the Ventilated Associated pneumonia prevention. 19.67% of the study participants had poor knowledge while, 30.33% had satisfactory knowledge about the VAP prevention who answer more than 80% correct responses.

A study conducted found similar findings where nurses' knowledge score about ventilator associated pneumonia was 7.1/15 which is 47.3%. There was an association of better knowledge with the degree in nursing and training of short ICU courses [1].

Another similar study found that 44% of the study participants nurses were having average

knowledge, 32% participants were having good knowledge and 16% had below average knowledge [11].

Another previous study found that an average knowledge among the cardiac nurses about the 69%. But no significant association was found between knowledge and age of the nurses, knowledge and professional qualification, knowledge and experiences of the staff and their special ICU training [9].

A previous study found that there was an average knowledge among the cardiac nurses about the 69%. But no significant association was found between knowledge and age of the nurses, knowledge and professional qualification, knowledge and experiences of the staff and their special ICU training [9].

In a previous study, nurses with ICU training had 50% and non ICU training had 45% correct responses about the ventilator associated pneumonia. There was no significant found between the knowledge level and years of experience [8].

Overall Practice result shows that 4.92% of the study participants had poor practice who answered less than 15 yes out of 24, 12.33% had satisfactory practices with 15-20 Yes answers and a majority 83% of the participants had very good practices about the VAP prevention who answer more than 80% correct responses.

In a previous study, practices among the ICU nurses were found unsatisfactory in the prevention of VAP. Those with more experience and proper intensive Care units training had better practices of VAP prevention [11]. Another previous research study found that practices were also not good among the health care workers at the hospitals

LIMITATIONS
- Less sample size 122 due to which, the findings cannot be generalized.
- Time was too short, to see any prospective events or detailed associations of awareness and practices
- Convenient sampling technique was used which may have some biasness

CONCLUSION
This study was conducted to assess the knowledge and practices of nurses regarding the ventilated associated pneumonia prevention. Overall knowledge was satisfactory where 50% of the study participants had good knowledge and gave more than 80% correct responses about different aspects of the Ventilator Associated pneumonia prevention. 30.33% were satisfactory knowledge about the VAP prevention.

Overall Practice result very good practices among 83% of the participants who were practicing 20 or more items out of 24 statements. 12.33% had satisfactory practices

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