**International Journal of Medical and Health Research**
**ISSN: 2454-9142, Impact Factor: RJIF 5.54**
**www.medicalsciencejournal.com**
**Volume 3; Issue 7; July 2017; Page No. 97-101**

# Awareness and attitude about ventilator-acquired pneumonia among post-graduate medical and physiotherapy students working in high dependency ward and intensive care center: A survey

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**Abstract**
**Background:** Ventilator-acquired pneumonia (VAP) is the most common hospital-acquired infection among patients who receive mechanical ventilation for longer than 48 hours in the intensive care unit (ICU). VAP is associated with increases in morbidity and mortality, hospital length of stay and costs. Hence, there is also need to determine the knowledge and awareness of the medical staff about VAP.
**Methods:** This descriptive cross-sectional study of 151 Post Graduate Students was conducted using a pre-validated multiple-choice questionnaire developed for post graduate students to evaluate knowledge of VAP and its prevention. All Medical and Physiotherapy Post Graduate Students posted In ICU and High Dependency Ward were included in the study. Students not willing to participate were excluded.
**Results:** 86.5% of respondents recognized the importance of recumbent position for prevention of VAP. Of respondents, 95 (62.91%) knew that VAP occurs > or equal 48 hours after endotracheal intubation and almost 78% reported preferring the use Closed suction system is recommended. The difference between the knowledge of male and female participants was statistically significant ($p<0.001$). Similarly statistically significant difference was seen between various fields ($p<0.0001$) while other variables like ICU experience and Different Courses were not statistically significant by using ANOVA test ($p= 0.466$; $p= 0.084$)
**Conclusions:** The results of this study can be used to focus on educational programs on prevention of VAP. Knowledge alone cannot be considered for prevention of VAP but practice along with it is recommended.

**Keywords:** awareness, medical, post-graduates, physiotherapy, ventilator-acquired pneumonia

## Introduction
Ventilator-associated pneumonia or Ventilator-acquired Pneumonia (VAP) is the most common hospital-acquired infection among patients who receive mechanical ventilation for longer than 48 hours in the intensive care unit (ICU) [1]. VAP basically occurs due to aspiration, which is the primary route of transmission of pathogens into the lungs [2]. Factors causing aspiration are oropharyngeal colonization, gastric fluid, and enteral feeding. At times, majority of the patients admitted in ICU are already colonized with bacterial infections [1]. The incidence of VAP is 22.8% in patients receiving mechanical ventilation and patients receiving ventilator support account for 86% of the cases of nosocomial pneumonia [3].

VAP is associated with increases in morbidity and mortality, hospital length of stay and costs. The mortality rate attributable to VAP is 27% and has been as high as 43% when the causative agent was antibiotic resistant [4]. Length of stay in the intensive care unit is increased by 5 to 7 days [3] and hospital length of stay 2- to 3- fold in patients with VAP [1].

Since VAP is such a morbid complication, the medical and nursing staff attending the patients in the Intensive Care Unit (ICU) need to know how to prevent the occurrence of VAP and its management. Several studies have been done to determine the awareness and knowledge about VAP in the nursing staff [6, 7, 9, 10]. But there is also need to determine the knowledge and awareness of the medical staff about VAP. Hence, the present study was conducted.

## Aims and Objectives
The aim of this study was to determine the awareness and attitude and knowledge of VAP in Post-graduate Medical and Physiotherapy students working in Tertiary Care Centre.

## Materials and Methods
This descriptive cross-sectional study of 151 Post Graduate

Students was conducted using a pre-validated multiple-choice questionnaire developed for post graduate students to evaluate knowledge of VAP and its prevention. The study was conducted from February 2016 to March 2016; over a period of one and half month.

**Ethical Consideration and Data collection**

Approval for the survey study was obtained from institutional board of a tertiary care hospital and ethical clearance issued. Permission was requested from the hospital's management and unit managers where the study was conducted. The contextual framework of the study was explained before asking the participants to complete the questionnaire. Participation in the survey was voluntary, and the written consent forms were filled by all the participants. Confidentiality of participants (individuals) was maintained. A single VAP related questionnaire was provided to the participants. All Medical and Physiotherapy Post Graduate Students posted In ICU and High Dependency Ward were included in the study. Students not willing to participate were excluded. The questionnaire was designed to evaluate attitude and awareness about VAP. The questionnaire was designed by Labeau *et al.* (2007) [6] and supplemented by Lin, Lai & Yang [10]. The questionnaire consisted of 11 multiple questions with 4 choices and only one correct answer. The score 1 was given to the correct response and scores 2 and 3 were given to incorrect and don't know responses respectively. The questionnaire was evaluated for content validity by panel of experts (infection control consultant, infection control physician, infection control expert nurse and respiratory therapist). The questionnaire was pretested.

The questionnaire consists of 11 questions. Amongst them 5 were must to know, 4 were need to know and 2 were good to know. The questionnaire was as follows:

**Statistical Analysis**

Data were analyzed using SPSS software, version 16.0. Descriptive statistics, including frequency distribution and percentages were used to describe the participants' characteristics, correct answers in the questionnaire and perceived barriers of participants toward adherence to VAP prevention guidelines. Level of significance was set at 5%.

**Results**

The questionnaire was distributed to 151 participants with a response rate of 100%. Among 151 participants age varied from 21 to 29 years and mean was 24.93 years. Among 151 participants, 70(46.35%) were females and 81(53.64) were males. Among them, 94(62.25%) had 1 year of ICU experience and 25(16.55%) and 32(21.19%) had ICU experience of 2 and 3 years respectively. Of the 151 participants, 6(3.97%) belonged to emergency medicine, 33(21.85%) belonged to medicine, 17(11.25%) belonged to anesthesia, 13(8.60%) belonged to orthopedics, 18(11.92%) belonged to surgery, 8(5.29%) belonged to obstetrics and gynecology, 4(2.64%) belonged to ENT and 52(34.43%) were doing their masters in physiotherapy. 5(3.31%) had done Basic Life Support (BLS), 4(2.64%) had done Advanced Cardiac Life Support (ACLS) whereas 142(94.03%) had not undergone any relevant courses. The demographics are as shown in Table 1.

**Table 1:** The main demographic data of the study population (n=151)

| **Age (Mean ± SD)** | | **24.93 ± 1.93 (21-30)** |
|---|---|---|
| Gender | Male (%) | 81 (53.6%) |
| | Female (%) | 70 (46.3%) |
| ICU experience* | 1 year (%) | 94 (62.25%) |
| | 2 Years (%) | 25 (16.55%) |
| | 3 Years (%) | 32 (21.19%) |
| Department | Emergency Medicine (%) | 06 (03.97%) |
| | Medicine (%) | 33 (21.85%) |
| | Anaesthesia (%) | 17 (11.25%) |
| | Orthopedics (%) | 13 (08.60%) |
| | Surgery (%) | 18 (11.92%) |
| | Obs And Gyneac (%) | 08 (05.29%) |
| | ENT (%) | 04 (02.64%) |
| | M. Physiotherapy (%) | 52 (34.43%) |
| BLS (%) | | 05 (03.31%) |
| ACLS (%) | | 04 (02.64%) |
| None (%) | | 142 (94.03%) |

In this study, 86.5% of respondents recognized the importance of recumbent position for prevention of VAP. Of respondents, 95 (62.91%) knew that VAP occurs > or equal 48 hours after endotracheal intubation and almost 78% reported preferring the use Closed suction system is recommended (Table-2 and Figure -1).

**Table 2:** Responses given by the participants

| **Responses given by the participants** | **n (%) of answers *** |
|---|---|
| **The definition of Ventilator Associated Pneumonia (VAP) is**<br>Pneumonia that occurs > or equal 48 hours after endotracheal intubation | 95 (62.91%) |
| **What is the pathogenesis of VAP?**<br>Via oral flora a translocation | 40(26.49%) |
| **Which pathogen does not cause VAP?**<br>Clostridium difficle | 55 (36.42%) |
| **Oral versus nasal route for endotracheal intubation**<br>Oral route is recommended | 92 (60.92%) |
| **Which suction system is recommended to be used open suction or close suction system**<br>Closed suction system is recommended | 94 (62.25%) |
| **Frequency of change in suction system**<br>It is recommended to change systems for every new patient | 73 (48.34%) |
| **Do you prefer to use kinetic beds or standard beds for ventilated patients?**<br>Kinetic beds reduce the risk of VAP | 56 (35.66%) |
| **What is the recommended position for ventilated patients?**<br>Semi recumbent positioning is recommended | 108 (71.52%) |

| | |
|---|---|
| **Which intervention can prevent VAP**<br>Use of endotracheal tube with subglottic suction | 62 (41.05%) |
| **Which solution is recommended for oral care?**<br>Chlorhexidine | 76 (50.33%) |
| **Frequency of oral care**<br>At least once per shift | 48 (31.78%) |
| NB: * = correct answer | |

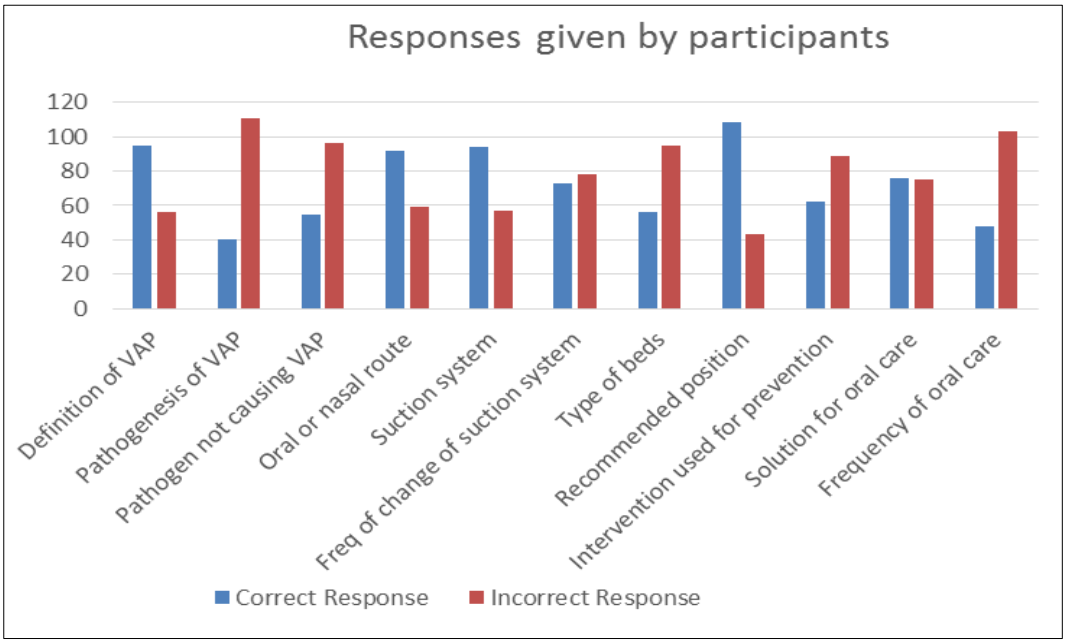


**Fig 1:** Responses given by the participants

An independent samples t test was run to determine if there were differences in the means of the total knowledge score between males and females. Although the mean of the total knowledge score was higher for male participants (6.11 ±1.65) than female participants (4.34 ±1.42), the difference was statistically significant ($p < 0.001$). Similarly statistically significant difference was seen between various departments ($p<0.0001$) while other variables like ICU experience and Different Courses were not statistically significant by using ANOVA test ($p= 0.466$; $p= 0.084$) (Table – 3).

**Table 3:** Knowledge total scores according to participant's gender, ICU Experience, Department and Different Course

| Variables | | Mean ± SD | P Value |
|---|---|---|---|
| Gender | Female | 4.34 ± 1.42 | <0.0001[a] |
| | Male | 6.11 ± 1.65 | |
| ICU Experience | 1 year (%) | 5.27 ± 1.61 | 0.466[b] |
| | 2 Years (%) | 5.00 ± 2.27 | |
| | 3 Years (%) | 5.56 ± 1.45 | |
| Department | Emergency Medicine | 6.00 ± 1.41 | < 0.0001[b] |
| | Medicine | 6.57 ± 1.75 | |
| | Anesthesia (%) | 6.11 ± 1.26 | |
| | Orthopedics (%) | 5.07 ± 2.05 | |
| | Surgery (%) | 5.66 ± 1.64 | |
| | Obstetrics And Gynecology (%) | 5.50 ± 1.19 | |
| | ENT (%) | 5.50 ± 1.00 | |
| | M. Physiotherapy (%) | 4.00 ± 1.20 | |
| Different Course | BLS | 6.40 ± 2.60 | 0.084[b] |
| | ACLS | 6.75 ± 2.21 | |
| | None | 5.21 ± 1.72 | |

NB: a = Independent t-test b=ANOVA test

## Discussion

The present study was conducted to determine the knowledge and awareness about VAP in post-graduate medical and physiotherapy students. The present study found that almost 63% students had knowledge what VAP was but only 27% and 36% respectively knew about the pathogenesis of VAP and what the causative organism was. 61% knew that the oral route was recommended for endotracheal intubation and 62% knew that a closed suction system is recommended for suction but only 48% were aware that the system needs to be changed for every new patient. 41% knew that the use of endotracheal tube with subglottic suction can prevent VAP. Rello *et al.* (2006)

explored type and frequency of oral care practices in European ICU's and knowledge of health care workers. A questionnaire was distributed in seven countries. 91% were registered nurses. Of the respondents 77 % said that they had received adequate training on providing oral care and 68% considered it difficult. In the present study only 50% of participants knew that Chlorhexidine was used for oral cleaning and only 32% knew that oral care should be given at least once per shift. In an international online survey :Prevention of ventilator-associated pneumonia in intensive care units by Marie-Laurence Lambert stated "head of bed elevation" was not practiced mostly because it was perceived difficult to implement as mentioned by 96% of the respondents and this clinical practice was known to only 85% of European nurses. In the present study, only 35.66% of participants knew the advantage of kinetic beds and elevation of head end and 71.52% knew semi recumbent position is preferred in ICU patients. In the present study, statistically significant difference was observed between males and females ($p<0.0001$) with males being more aware about VAP. Also, there was no statistically significant difference between students having 1, 2 or 3 years of experience ($p=0.466$). This is contradictory to the findings of Blot *et al.* (2007) [12] and Labeau *et al.* (2008) [6] found more experienced nurses (ICU experience> 5 years) performed better in the knowledge test than less experienced (ICU experience≤ 5 years). It can be stated that may be 3 years is not an adequate period to gain sufficient knowledge about VAP. There was statistically difference between the knowledge of students belonging to areas of expertise ($p<0.0001$) with students belonging to Medicine, Emergency Medicine and Anesthesia having more knowledge and those belonging to Physiotherapy and Orthopedics having less. This may be because of the fact that students belonging to the fields of Medicine, Emergency Medicine and Anesthesia spend more time in the ICU than the other specialties. There was also no statistically significant difference between students who had undergone BLS and ACLS courses and those who had not ($p=0.084$). This may be attributed to the lack of such knowledge been provided in such courses. Most of the BLS and ACLS courses focus on the resuscitation techniques and are not majorly concerned about the complications of intubation.

## Conclusion

The results of this study can be used to focus on educational programs on prevention of VAP. Knowledge alone cannot be considered for prevention of VAP but practice along with it is recommended. VAP continues to remain a challenge amongst patients in ICU set ups on mechanical ventilation which carries burdens of morbidity, antibiotic utilization and cost. Certain measures such as NPPV (Non-invasive Positive Pressure Ventilation) when possible; sedation and weaning protocols for patients who require mechanical ventilation; head end of bed elevation, oral care and removal of subglottic secretions. VAP can be prevented by continuous health education and training of health care personals working in ICU including nurses.

## Acknowledgements

The authors would like to thank all the participants who took out their time and agreed to participate in the study.

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