Knowledge and practices of critical care health professionals related to ventilator associated pneumonia in tertiary care hospitals of Islamabad and Rawalpindi

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Abstract

Objective: To assess knowledge and practices of critical care health professionals related to ventilator associated pneumonia.

Methods: This cross-sectional survey was conducted at eight tertiary care public and private hospitals of Islamabad/Rawalpindi, Pakistan, from September 2015 to March 2016, and comprised healthcare professionals. Stratified random sampling was used. Data was collected using close-ended validated questionnaire. SPSS 22 was used for data analysis.

Results: Of the 153 participants, 45(29.4%) were doctors, 91(59.4%) were nurses and 17(11.1%) were respiratory therapists. The overall mean age was 31±8.14 years. The overall mean knowledge and practice scores regarding prevention of ventilator-associated pneumonia were 11.14±3.12 and 8.83±1.53, respectively. The mean knowledge score was 11.77±3.84 for physicians, 10.84± 2.91 for nurses and 10.82±1.94 for respiratory therapists. However, the best practice scores were seen in the respiratory therapists 9.64±0.78 (p=0.008).

Conclusion: The majority of the participants had adequate knowledge and even better practices, particularly respiratory therapists.

Keywords: Doctors, Knowledge, Nurses, Pneumonia, Practices, Ventilator. (JPMA 67: 1714; 2017)

Introduction

The burden of different nosocomial infections in intensive care units (ICU) is increasing, especially in patients requiring ventilator support.[1] One of the most common such infection is ventilator-associated pneumonia (VAP).[1,2] A pneumonia where the patient is on mechanical ventilation for >2 calendar days on the date of the event, with day of ventilator placement being Day 1, and the ventilator was in place on the date of event or the day before.[2]

Intubation harms the oropharynx and trachea and allows secretions to invade the lower airways.[2,3] VAP is the second-most common infection occurring in mechanically ventilated patients in ICU. It not only increases a patient's hospital stay by 7-9 days, but also increases the cost of treatment.[2-5]

During the initial five days of the ventilation the risk is greatest which decreases to 2%/day between 5-10 days and 1%/day thereafter.[5] The risk can be divided as host-related, device-related, and personnel related.[5,6] Host-related factors include conditions such as immunosuppression, acute respiratory distress syndrome and chronic obstructive lung disease. Other factors might be patients' body positioning, consciousness, number of intubation and medications. Loss of cough and gag reflexes contributes to the risk of aspiration whereas re-intubation can increase the chances of VAP 6-folds. Device-related risk factors include endotracheal tube (ETT), presence of a nasogastric or an oro-gastric tube and ventilator circuit. Personnel-related factors include improper hand washing and change of gloves between patients has been linked with an increased VAP incidence.[6-10]

Hence, intubation remains the leading cause of VAP resulting in offence of defences (cough reflex) against aspiration collected around the cuff of tube, leading to microbial access to lower respiratory tract.[11,12]

The 2003 guidelines from the Centres for Disease Control and Prevention (CDC) outlined that 63% of patients admitted in an ICU have oral pathogens linked with VAP.[13] Guidelines to prevent VAP have been broadcasted by different expert groups and, when fully placed into practice, they helped improve patient progress and cut treatment cost.[14] Despite the ascent in evidence-based medicine and the presence of clinical practice guidelines, these are not being properly exercised in daily nursing practice.[15]

The detection and management of VAP remain one of the

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most debatable and demanding topics in management of terminally ill patients. It is no longer just an "unfortunate" incident, but a serious medical error.[15] Therefore, appropriate training of concerned ICU staff, i.e. clinicians and nurses, regarding pathophysiology, risk factors, and preventive measures of VAP must be mandatory.[15] Most of the studies in Pakistan have been conducted on nurses. The present study was planned to assess the knowledge and practices of doctors, nurses and respiratory therapists regarding prevention of VAP.

Subjects and Methods

This cross-sectional study was carried out in eight tertiary care public and private hospitals of Islamabad/Rawalpindi, Pakistan, from September 2015 to March 2016, and comprised healthcare professionals including doctors, nurses and respiratory therapist working in ICU. Permission was taken from respective hospital administrations. Confidentiality of the data was ensured. Approval was taken from the ethics review board of Yusra Medical and Dental College. There are 18 tertiary care hospitals in Islamabad/Rawalpindi, including 10 public/armed forces hospitals and eight private/semi-government hospitals. Stratification was done on the basis of free treatment offered in the government/armed forces set-ups. Hospitals having more than 8 ventilators and agreeing to participate in the study were included. Usually there are three shifts in each ICU. Data was collected from staff of each shift separately by visiting during their rotation. The sample size was calculated using 75% expected knowledge (taken from regional studies[10,13]) at 6% margin of error and 95% confidence level using EpiTools sample size calculator.[16] The calculated sample size was 168 and the researchers approached 175 health care workers. The health care professionals working in the intensive care department for more than 5 months, dealing with patients on ventilator, irrespective of age and gender were included in the study. Those who refused to participate or on rotation to intensive care for less than 2 months were excluded. House officers, student nurses and student respiratory therapists were also excluded.

Knowledge questionnaire with slight modification was adopted from a reliable tool.[17,18] Later the tool face and content were validated by experts. The practice questions were also added to the questionnaire based on recently published evidence-based systematic review.[19-21]

Multiple choice questions had a score of '1' if answered correctly and '0' for incorrect answer. The knowledge and practice scores were calculated separately by summing the responses of the individuals. Responses were added to form a score for each subscale, thus giving each participant two scores for the two components of knowledge, attitudes and practices (KAP). The knowledge score ranged from 0 to 21. It was categorised as adequate and inadequate knowledge based on the median score. Higher scores indicate better knowledge. The practice score ranged from 0 to 11. It was categorised as adequate and inadequate practices based on the median score. Higher scores indicate better practices.

Data analysis was done using SPSS 22. Total median scores with interquartile range were calculated. As the data was not normally distributed (which was confirmed by Kolmogorov-Smirnov test), Kruskal-Wallis test and Mann-Whitney U test were used for the quantitative variables. Chi-square test was used to establish relationship between knowledge and years of practice and type of hospital, and to find out association between knowledge, practices and profession (doctor, nurse) on prevention of VAP. Knowledge and practice scores were categorised as adequate and inadequate based on the median scores. Participants scoring less than 11 for knowledge and less than 9 for practices were categorised as having inadequate knowledge and practices, respectively.

Results

Of the 175 healthcare professionals approached, the questionnaire was filled in by 153(87.4%). Of them,

Table-1: Demographic profile (n=153).

Variable	Frequency	Percentages
Gender		
Male	67	43.8
Discipline/ profession		
Doctor	45	29.4
Nurses	91	59.5
Respiratory therapist	17	11.1
Hospital type		
Public	80	52.3
Private	73	47.7
Total Experience (in years)		
< 3	66	43.1
3-6	48	31.4
> 6	39	25.5
Department		
Medical ICU	62	40.5
Surgical ICU	46	30.1
Neonatal ICU	12	7.8
Paediatric ICU	21	13.7
Others	12	7.8
ICU/ Critical care refresher training		
Yes	38	24.8
No	115	75.1

ICU: Intensive care unit.

Table-2: The overall and individual knowledge and practices scores.

Variable	Sub groups	Minimum score	Maximum score	Mean score (±SD)	Median	IQ range	p value
Knowledge	Overall	3	19	11.14 (3.12)	11	10-13	
Practices	Overall	5	11	8.83 (1.53)	9	8-10	
Individual group mean, median scores of knowledge and practices							
Knowledge	Doctor	4	19	11.77 (3.84)	11	10-15	0.501
	Nurses	3	18	10.84(2.91)	11	10-13	
	Respiratory therapist	5	13	10.82(1.94)	11	10-12.5	
Practices	Doctor	5	11	9.11(1.46)	9	8-10	0.008
	Nurses	5	11	8.53(1.50)	9	8-10	
	Respiratory therapist	9	11	9.64(0.78)	9	9-10	

*Kruskal-Wallis test.
IQ: Interquartile.
SD: Standard deviation.

Table-3: Scores according to the participant's year of experience.

Year of experience in ICU	Variable	Score Median (IQ range)	p value
<5	Knowledge	11 (10-13)	<0.001
>5		14 (11-14.5)	
<5	Practices	9 (8-10)	<0.000
>5		10 (9-11)	

* Mann-Whitney U test
ICU: Intensive care unit
IQ: Interquartile.

45(29.4%) were doctors, 91(59.4%) were nurses and 17(11.1%) were respiratory therapists. The mean age of the participants was 31±8.14 years. Moreover, 124(81%) had less than 5 years of ICU experience. The number of male participants was 67(43.8%) and that of females was 86(56.2%). Also, 80(52.3%) participants were from public hospitals and 73(47.7%) from private ones (Table-1).

Good knowledge was seen in the all the groups about the semi-recumbent position, use of ETT having extra lumen for drainage of secretions 103(67%), importance of regular and comprehensive oral hygiene 130(85%), and regular emptying of ventilator tubing 98(64%). Less knowledge was noted about the moisture exchange humidifier 66(43%), and frequency of humidifier change 83(54%). As the knowledge scores were not normally distributed, so the median with interquartile range was calculated. The overall mean knowledge and practice scores were 11.14±3.12 and 8.83±1.53, respectively (Table-2).

There was a significant difference found in the mean scores of knowledge and practices among participants on the basis of years of experience (Table-3).

Besides, 90(58.8%) health care professionals had adequate knowledge and 96(62.7%) had better practices regarding the prevention of VAP.

Similarly, association between knowledge and practices and public and private hospitals was assessed. Better knowledge 48(65.7%) and practices 49(67.1%) were

Table-4: Association of different variables.

Variable	Adequate		Inadequate		P value	
	Knowledge n (%)	Practice n (%)	Knowledge n (%)	Practice n (%)	Knowledge	Practice
Profession						
Doctor	28 (62.2)	28(62.2)	17 (37.7)	17(37.7)	0.581	0.931
Nurses	62 (57.4)	68 (62.9)	46 (42.5)	40(37.0)		
Hospital type						
Public	42 (52.5)	47 (58.7)	38 (47.5)	33 (41.2)	0.096	0.285
Private	48 (65.7)	49 (67.1)	25 (34.2)	24 (32.8)		
Experience in years						
Less than 3	62 (53.9)	70 (60.8)	53 (46.0)	45 (39.1)	0.020	0.033
3-6	12 (60)	10 (50)	8 (40)	10 (50)		
More than 6	16 (88.8)	16 (18.8)	2 (11.1)	2 (11.1)		

* Chi-square test.

observed in the private hospitals (Table-4).

Discussion

The evaluation of ICU staff's knowledge and practices, based on well-recognised and accepted principles and guidelines of VAP, done in this study revealed much room for improvement. It also highlighted the need for continuous training sessions on these recommendations/guidelines. There was not much difference in the physician's and nurse's knowledge, but respiratory therapists were found to follow the practices religiously.[11-14]

VAP, often preventable, has a large morbidity and mortality rates and many scientific societies have provided prevention guidelines in the last few decades.[15] Although VAP is not a new diagnosis, health-care providers and nurses hold an important responsibility in VAP prevention by following these guidelines.[17,18] Education and research on the prevention of this fatal issue are still ongoing.[19-22] A lack of knowledge which was also reflected in the practice was seen in our study. The scores were quite low in some extremely important areas including risk factors associated with the development of VAP, CDC recommendations for ventilated patients, etc. Similar findings were highlighted in earlier studies.[22-24]

Studies showed that most of the doctors and nurses gain knowledge regarding care of critically ill patients only from their basic educational programmes.[23] During their studies/training they were given exposure to critical care patients and their nursing care, but not prepared enough to provide evidence-based care.[22,24] Recommended specific trainings on international guidelines were not common in this part of the world.[13,23,25] Similar findings were seen in our study also where no refresher courses were reported. Studies recommended clinical teaching with effective mentoring helped them to integrate learned concepts into real patients' care.[23] A decrease in VAP was observed by Babcock et al. following educational initiatives directed at ICU nurses.[26] Similarly, improved knowledge scores and practices were seen after educational sessions done in Aga Khan Hospital.[23]

A score of around 50% for knowledge was seen in our study, consistent with findings of studies done in India,[10] Bangladesh[25] and Belgium.[14] The less score showed that a proportion of critical care providers have inadequate knowledge, and practices on the prevention of VAP can and should be improved by adopting recommended strategies.[25,26] However, the findings were different from a study done by El-Khatib et al. in Lebanon where the knowledge score was around 78% due to the introduction of dedicated respiratory therapists for ICUs and lessons on evidence-based guidelines for the prevention of VAP during daily consultant rounds.[27] The present study showed that the practice scores were better as compared to knowledge scores, indicating knowledge and actual clinical practice scores may differ and not necessarily have to run in parallel, in contrast to the findings by Pérez-Granda et al. where no difference existed between the two.[28] The implementation of some bedside practices like subglottic suctioning of respiratory secretions mainly depended on the unit or hospital's policies rather than one's knowledge.[28]

Our study revealed that the knowledge and practice scores were higher among the health care professionals having more experience, but much less than doctors and nurses of developed countries.[8,9,27] This can be because of high turnover and unavailability of specialised critical care trained staff. Furthermore, less 'specialty care' higher education opportunities, especially for the nurses, and lack of knowledge of evidence-based practice guidelines were a few possible barriers for non-adherence to the parameters for the prevention of VAP.[23,25]

There was a significant difference in knowledge and practice scores of critical care staff having more than 5 years of experience, similar to the findings of Blot et al.[14] and Labeau et al.,[29] but in disagreement with the findings of studies conducted in India,[10] Turkey[21] and South Africa.[29] According to a survey conducted in tertiary care hospitals of Rawalpindi, communication gap between doctors and nurses and lack of supervision of nurses by the consultants were identified as reasons for increased VAP.

One of the limitations of this study was its small sample size. Moreover, the information given by the participants may not reflect their exact clinical practices and significant instructional commitment of intensive care consultants were not addressed in the current study.

Conclusion

Most participants had adequate knowledge and even better practices, particularly among respiratory therapists as compared to doctors and nurses. However, the appropriate critical care patient management practices can be improved by continuous learning on risk factors and preventive measures based on evidence-based guidelines.

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