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A Study to Assess Practice of Ventilator-Associated Pneumonia in the Intensive Care Unit: A Review of the Clinically Relevant Recent Advancements

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Abstract: **Introduction: Prevention implies 'to stop doing something'. Cure means 'to find a solution'. Man is prone to commit mistakes. Prevention is the shield which saves mankind from many disasters, chaos and destruction. In medical profession have lots of condition we can prevent such as VAP. Ventilator-associated pneumonia (VAP) is a major cause of hospital morbidity and mortality despite recent advances in diagnosis and accuracy of management.** *Material and Methods:* **descriptive study survey design was used to collect data from 24 all ventilated patient, non-probability convenience Sampling technique done in critical care area –ICUA, ICU-B and ITU of Ruby General Hospital, every day collect data on basis of inclusion criteria on 21/10/17 to 8/12/17, data analysis done descriptive and inferential statistics and association analysis by Chi square test.** ***Results*** **: 100% compliance rate about some selective criteria among 24 patient under mechanical ventilator such as cuff pressure maintained 20-30 cmH2O(100%), elevation of the head of the bed(100%) ,used of PPI(100%) ,mouth care by tooth and pest (100%), the another practice for prevention of gastric distension got 80% followed intermittent RT feeding and 35% practice continues RT feeding under patient mechanical ventilator .Sixth number criteria ; sending of sputum after putting patient ET and find any sign of infection –here got 100% compliance on sputum send after patient put ventilator within 48hr -72 hrs of intubation ,31.25% patient had positive sign of infection which induce VAP under 24 patient under mechanical ventilator . The findings showed, that there were no significant association between development of VAP and patient age and disease condition.** ***Conclusion*** **: From the above findings it was concluded that the practice of prevention on VAP health care personnel is effective and 100% compliance rate to maintain standard practice .Another findings got there is no association between predisposing factor to development of VAP and patient age . There is no association between predisposing factor to development of VAP and patient Diagnosis.**

Keywords: **VAP, ventilator, RT feeding, ET tube, Non probability convenience Sampling technique, Chi square test.**

1. INTRODUCTION

Background of the problem:

"Prevention is better than cure."….Benjamin Franklin"

Prevention implies 'to stop doing something'. Cure means 'to find a solution'. To know how to prevent, one needs to be alert. One should be very careful while doing something. We should start every work only after judging the pros and cons of that. It is better to avoid doing certain things, the benefits of which are not significant. By combining one's judgment and preventive abilities, one can lead a joyous and healthy life. So health care personnel can take crucial role model to prevent better than cure if they wand by team work .In medical profession have lots of condition we can prevent such as VAP . Ventilator-associated pneumonia is defined as pneumonia that occurs 48-72 hours or thereafter follow¬ing endotracheal intubation, characterized by the pre¬sence of a new or progressive infiltrate, signs of systemic infection, changes in sputum characteristics, and detection of a causative age.

Need of the study:

Ventilator-associated pneumonia (VAP) is one of the most commonly encountered hospital-acquired infections in intensive care units and is associated with significant morbidity and high costs of care. The pathophysiology, epidemiology, treatment and prevention of VAP have been extensively studied for decades, but a clear prevention strategy has not yet emerged.

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Purpose of the study

The purpose of the study is to assess practice of health care personnel for prevention of VAP in critical care area for improving practice among staff there by empowering the staff with upto date skill and reduce mortality due to development of VAP Cases by promoting the standard of care.

Objectives

- To assess the practice on VAP among staff as measured by structured observation checklist.
- To find the association between prevention of VAP bundle and selected variables :- Age ,disease condition

Delimitation

The study is delimited to---

1. Under mechanical ventilator patient (more than 48 hours and less 6 days under ventilator patient).

2. REVIEW OF LITERATURE

Literature review refers to the activities involved in identifying and searching for information on a topic and developing an understanding of the knowledge on the related topic [12].

The literature review for the present study will be organized under the following heading (2000-2017)

- The literature review related patient to VAP.

3. RESEARCH METHODOLOGY

This chapter deals with type of research methodology adopted. It includes the research approach ,research design ,sample and sampling techniques ,selections and development of data collection tools ,setting ,population ,preparation of planned teaching programme ,development and description of tools ,pilot study ,procedure for data collection and plan for data analysis .

Research Design: descriptive study survey design was used for this study

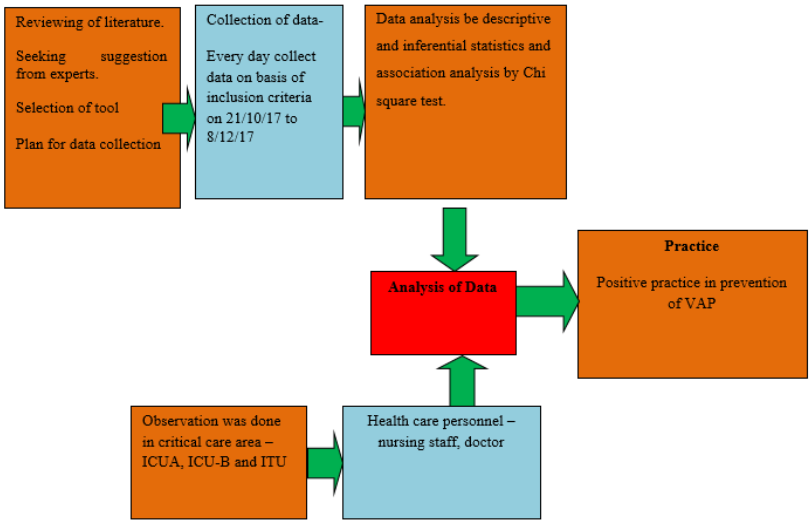

FIG 1: SCHEMATIC REPRESENTATION OF VAP

Setting of the study

Setting for this study are critical care area in Ruby General Hospital, Kolkata

Population: The population selected for the study are all ventilator patient in a selected Hospital, West Bengal.

Sample and Sampling technique:

Total sample size was 24. Non probability convenience Sampling technique was used for the study.

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Sample selection criteria:

Inclusion criteria:

1. All ventilator patient in Ruby General Hospital.
2. Present in the Hospital during data collection period.
3. Those patient under mechanical ventilator more than 48 hour and less than 6 days.

Exclusion criteria

Indisposed patient.

Tool for data collection

Standardized modified tool used .The following toolls are developed for this study based on the objectives of the study in order to obtain the necessary information.

Sl no	Variables to be measured	Tools	Methods of data collection
3	Practice on VAP	Observation checklist on VAP	Observation

Plan of Data analysis

In this study data analysis will be done using descriptive and inferential statistics. Findings will be presented in the form of tables and figures.

- Data will be presented in terms of frequency, percentage, mean and standard deviation.
- The association between selected demographic variables and mean practice score will be determined by Chi square test

Analysis and interpretation of data

Data were tabulated, analyzed and interpreted by using descriptive and inferential statistics. The study findings are organized under the following heads:

Section -1: analysis of Sample characteristics

Section –II: Association between development of VAP score and selected variables

i.e age ,disease condition of patient.

SECTION -1- Compliance rate of prevention of VAP bundle

TABLE -1

SELECTIVE CRITERIA	DATE- 21/10/17- 8/12/17 Total observation days -47 days																								Total Com	Total Non comp
	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}		
	6days	4day	5day	3day	6day	5day	6day	6day	6day	3day	5day	4day	5day	3day	6day	6day	4day	6day	5days	6days	3days	4days	6days	4days		
	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp	Comp		
Cuff pressure	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0
Elevation of the head of the bed	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0
H_2 Blockers /PP1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0
Mouth care	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0
Gastric distension -RT intermitted		100%	100%		100%		100%	100%	100%	100%	100%	100%	100%	100%		100%	100%			100%	100%	100%	100%		80%	-
-Continue RT	100%			100%		100%									100%			100%	100%					100%	35%	-
Sputum /ET suction -Intubation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0
-Any sign of infection	12.5%	25%	20%	33.33%	12.5%	20%	16.66%	16.66%	0%	33.33%	0%	25%	33.33%	100%	16.66%	16.66%	25%	16.66%	20%	16.66%	33.33%	25%	16.66%	25%	68.75%	31.25%

Table -1 showed that 100% compliance rate about some selective criteria among 24 patient under mechanical ventilator such as cuff pressure maintained 20-30 cmH2O(100%), elevation of the head of the bed(100%) ,used of PPI(100%) ,mouth

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Section -1 Sample characteristics

This section describes the characteristics of 24 samples in term of their age and disease condition of patient. The data was summarized in pie diagram to describe the sample characteristics in terms of their age, disease condition of patient using descriptive statistics: in frequencies and percentage.

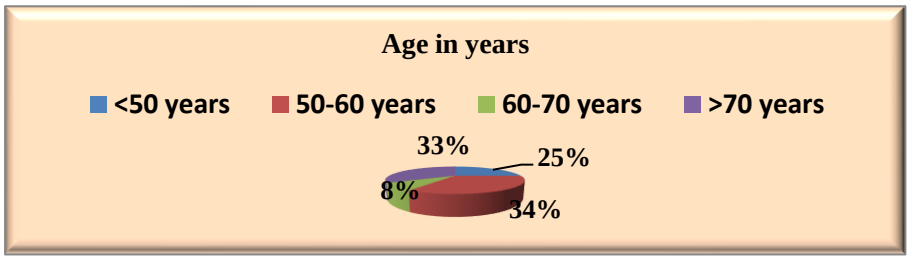

Fig .2 Pie diagram showing distribution of sample based on their age

The data presented in the pie diagram in (fig -2) showed that among 24 patient ,6 (25%) patient bellow 5o years ,8 patient (33%) belongs 50-60 years, 2 patient (8%) above 60 years and another 8 patient (34%) above 70 years.

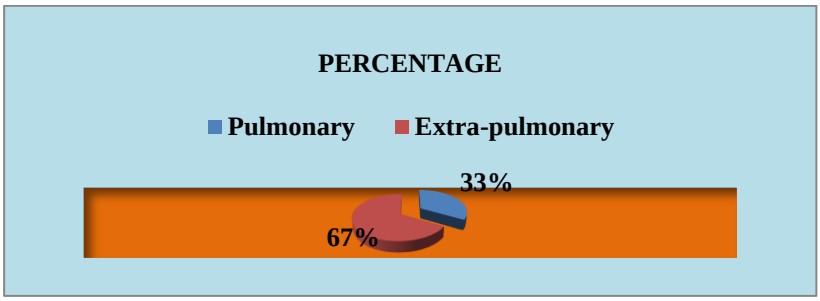

Fig- 3: Pie diagram showing sample distribution based on their disease condition.

The data presented in the pie diagram in (fig -3) showed that among 24 patient, 8 (33.33%) were suffering from pulmonary disease condition and 16 (66.66 %) patient are extra –pulmonary disease condition.

Section –11 Association between practice score on VAP prevention bundle and selected variables i.e age, disease condition.

This section presents the findings on the association between Patient development of VAP and selected variables. Chi-square test was computed in order to determine the significance of the association between Patient development of VAP with selected variables. To find the association between development VAP score and selected variables the null hypothesis was stated as:

H_{03}There is no significant association between obtained score on VAP prevention bundle and selected variables.

TABE -2

Sl no	Variable	Below median (<36)	Above median (>36)	Chi square value	df	Significant at 0.05 level
1.	Age in years					
	a) <50	6	0			
	b) 50-60	4	4	7.535	3	**Not significant**
	c) 60-70	0	2			
	d) >70	4	4			

2.	Disease condition						
	a)	Pulmonary	3	5			**Not Significant**
	b)	Extra-pulmonary	11	5	2.1387	1	

$\chi^2_{(1)}$ - 3.84, $\chi^2_{(3)}$- 7.8 <0.05 level significance

Data presented in the table - showed the result of chi test to find association between patient development of VAP and selected variables: age, disease condition of patient .The obtained chi value (7.53) and (2.13) are less than the table value (7.8 and 3.84) at 0.05 level significance for the variable age of patient and disease condition. So, it can be inferred that development of VAP is not associated with patient age and disease condition.

4. SUMMARY, FINDINGS, DISCUSSION, RECOMMENDATIONS AND LIMITATIONS

The main study was conducted at Ruby General Hospital, Kolkata from 21/10/2017-8/12/2017. 100% compliance rate about some selective criteria among 24 patient under mechanical ventilator such as cuff pressure maintained 20-30 cmH2O(100%), elevation of the head of the bed(100%) ,used of PPI(100%) ,mouth care by tooth and pest (100%), the another practice for prevention of gastric distension got 80% followed intermittent RT feeding and 35% practice continues RT feeding under patient mechanical ventilator .Sixth number criteria ; sending of sputum after putting patient ET and find any sign of infection –here got 100% compliance on sputum send after patient put ventilator within 48hr -72 hrs of intubation ,31.25% patient had positive sign of infection which induce VAP under 24 patient under mechanical ventilator . The findings showed, that there were no significant association between development of VAP and patient age and disease condition.

A was conducted by Mohsen Adib-Hajbaghery, Akram Ansari, Ismail Azizi-Fini[9] to provide Oral care is an essential aspect of critical care nursing. However, no study has been published on oral care practice of Iranian and Asian nurses. The majority of published studies were conducted in western and European countries. Aims: This study aimed to evaluate the nurses' opinions and practice about oral care in patients under mechanical ventilation. Settings and Design: A cross-sectional study was conducted on 130 intensive care nurses from 6 intensive care units in the university hospitals of Iran. Materials and Methods: A questionnaire was used to gather the data and charts of 45 patients were evaluated. Statistical analysis: Descriptive statistical analysis are presented.Results: Oral care obtained the 7 th rank in prority and a mean score of 5.7 on a scale of 1-10. More than 21% of subjects did not perform oral care in their usual duties. High load of writing tasks and personnel shortages were the major barriers to oral care. Only 20% of the patients' charts contained a report on oral care. Conclusions: Nurses did not consider oral care in intensive care patients as a high priority. This result highlights the need to continue education programs on oral care for improving the knowledge and attitude of intensive care nurses with respect to oral care.Above study discussed and found that Only 20% of the patients' charts contained a report on oral care but In this present study got 100% compliance on oral care by tooth and pest while patient under mechanical ventilator

Implications: VAP is important topic for staff to maintain standard practice to prevention infection .The present study has implication for medical practice, medical administration, medical research and medical education.

Medical practice: VAP is important topic for patient to prevent infection. Standard tool is minimizing malpractice and improve practice among staff on VAP control policy .Health care professionals should be use appropriate tool and minimizing rate of hospital acquired infection.

Medical administration: VAP control guideline should be followed with advancement of technique, making them readily available to all members of the health care team and practice should be appropriate to the developmental level and to maintained high quality practice. Health care institutions should develop and implement VAP control policies to assess, prevent, and manage VAP in hospital. The administrator should provide validated tool or standardized guideline assessment of practice and make it available in the unit in order to prevent VAP.

Medical research: The main goal of Medical research is to prevent VAP. Since, the health care system today is driven by cost, research about outcomes related to cost is especially important. It is possible if staff have standard tool to provide Ventilator care and prevention of infection. Now, we think of evidenced based practice that is possible only by research. VAP is a important topic can practice on the basis of evidenced based in health care setting .Today's healthcare environment continually places increasing demands on medical staff to communicate, share and synthesize information and plan care

based on research. Appropriate utilization of research helps staff to make decisions based on evidences for prevention of VAP. More research should be carried out and more valid and reliable guidelines could be made for prevention of VAP.

Medical education: In education, medical educator are crucial role model in providing a foundation for research –based practice. It allows reflecting the skills they need to use in prevention of infection. Research –based clinical practice that helps staff to solve problem while facing critical situation .VAP is one problematic situation where need update guideline and tool to practice for prevention of VAP .So, the Medical educator always should keep update and guidelines with curriculum to lecture and teaching for staff.

Conclusion : The following conclusions were drawn on the basis of the study findings :- From the above findings it was concluded that the practice of prevention on VAP health care personnel is effective and 100% compliance rate to maintain standard practice .Another findings got there is no association between predisposing factor to development of VAP and patient age . There is no association between predisposing factor to development of VAP and patient Diagnosis.

Limitations: The following limitations was recognized in this study:

- The study did not use any control group therefore ,there was a possibility of threat to internal validity
- External variable were beyond investigator control.

Recommendations: Based on the present study, recommendations offered for future research are:

1. Study can be done in larger samples to increase validity and generalizations of findings.
2. Study can be done by using communication based education on infection control checklist CPR for nursing staffs.
3. Study can be done using other video based learning programme.
4. A similar study can be replicated with a control group.
5. A comparative study can be done using different setting.

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