

## Clinical Audit on Baseline Monitoring of Ventilator Care Bundle Components in ICU Patients

Shibilamol C Baby

### Abstract

**Background:** Ventilator associated pneumonia (VAP) is a type of lung infection that occurs in people who are on mechanical ventilation breathing machines in hospitals. As such, VAP typically affects critically ill persons that are in an intensive care unit (ICU). VAP is a major source of increased illness and death. Persons with VAP have increased lengths of ICU hospitalization and have up to a 20–30% death rate. The main aim of the study was to attain 0% of VAP rate in ICUs. The purpose of the study was to analyzing the standard practices in nursing care and to identify the faults in VAP bundle care checklist.

**Methods:** We conducted a retrospective case note review of 29 electronic patient records out of a whole population size of 48 from 4 ICUS (NMICU, NSICU, CICU, COVID ICU). The sample was taken randomly from 4 main ICUS. This was done to ensure that patients had equal chance of selection and to reduce researcher bias. The information was extracted from the electronic patient notes on EMR system. The VAP bundle care checklist was audited by using VAP bundle checklist audit form. The audit form includes 5 parameters (Semi recumbent patient positioning, Ventilator weaning, PUD prophylaxis, DVT prophylaxis, Suction of secretions).

**Results:** Most percentage distribution 10 (100%) belongs to the category of head elevation and suction, there was an equal distribution among sedation and DVT prophylaxis which was 9 (90%), the least percentage distribution 7 (70%) belongs to the peptic ulcer in January month. Whereas February month, the largest category observed were in the category of head elevation, suction, peptic ulcer prophylaxis which consist 10(100%), 7(70%) were in sedation category. Followed by DVT prophylaxis 6(60%). In accordance with percentage distribution in March month, majority of compliance belongs to the category of head elevation 8(88.8%), 7(77.7%) of compliance were in the DVT prophylaxis category. 6(66.6%) in the category of sedation and 5(55.5%) were equally distributed to the category such as suction and peptic ulcer prophylaxis. The study results that overall percentage distribution of VAP bundle care parameters, 96.5% was noted in head elevation parameter and 86.2% in suction parameter. There was an equal distribution 75.8% in the category of sedation, DVT prophylaxis and peptic ulcer prophylaxis.

### Introduction

Ventilator associated pneumonia (VAP) is a type of lung infection that occurs in people who are on mechanical ventilation breathing machines in

hospitals. As such, VAP typically affects critically ill persons that are in an intensive care unit (ICU). VAP is a major source of increased illness and death.<sup>1</sup> Persons with VAP have increased lengths of ICU hospitalization and have up to a 20–30% death rate. The goal of infection control is to

### AUTHOR'S AFFILIATION:

<sup>1</sup>CNE Educator, Quality Department, Sun Medical and Research Centre, Thrissur, Kerala 680001, India.

### CORRESPONDENCE AND REPRINT REQUESTS:

Shibilamol C Baby, CNE Educator, Quality Department, Sun Medical and Research Centre, Thrissur, Kerala 680001, India.

E-mail: shibilachirayath@gmail.com

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prevent cross transmission of pathogens, which has been shown to play an important role in the development of nosocomial infections including VAP. An effective strategy should target infection control from several vantage points: education of the medical team, universal hand hygiene, use of personal protective equipment and a protocol for microbiological surveillance. Clinical audit and care bundles have been proposed to address the gap in implementation of guidelines. The monthly indicator of Sun medical hospital shows that, there was a 23.80% VAP rate in January month and 40% in March month. It is the main motivation to conduct this clinical audit.<sup>2</sup>

#### *Purpose of the Study*

The main aim of the study was to attain 0% of VAP rate in ICUs. The purpose of the study was to analyzing the standard practices in nursing care and to identify the faults in VAP bundle care checklist.

#### *Objectives*

- To reduce or prevent the nosocomial infections especially VAP in ICU patients.
- To obtain the 0% in ventilator associated pneumonia rate in monthly indicator.
- To assess the compliance to ventilator care bundle in critical care units in Sun Medical Hospital and Reseach Centre.

#### *Standards*

- 100% of compliance in ventilator care bundle components.
- To attain standard practices in nursing care.
- Methodology
- Study Period
- The study was carried out for a period from 2021 January to 2021 March.

## RESULTS

**Table 1:** Percentage distribution of compliance of five parameters of VAP prevention bundle (N=29)

	Sedation vacation	Head elevation	DVT prophylaxis	Suction	Peptic ulcer prophylaxis
Frequency	22	28	22	25	22
Percentage distribution	75.8%	96.5%	75.86%	86.2%	75.86%

## Sampling Size

A retrospective case note review of 29 electronic patient records out of a whole population size of 40 from 4 ICUS (NMICU, NSICU, CICU, COVID ICU).

## Sampling Technique

The sample was taken randomly from 4 main ICUS (NMICU, NSICU, CICU, and COVID ICU). This was done to ensure that patients had equal chance of selection and to reduce researcher bias.

## MATERIAL AND METHODS

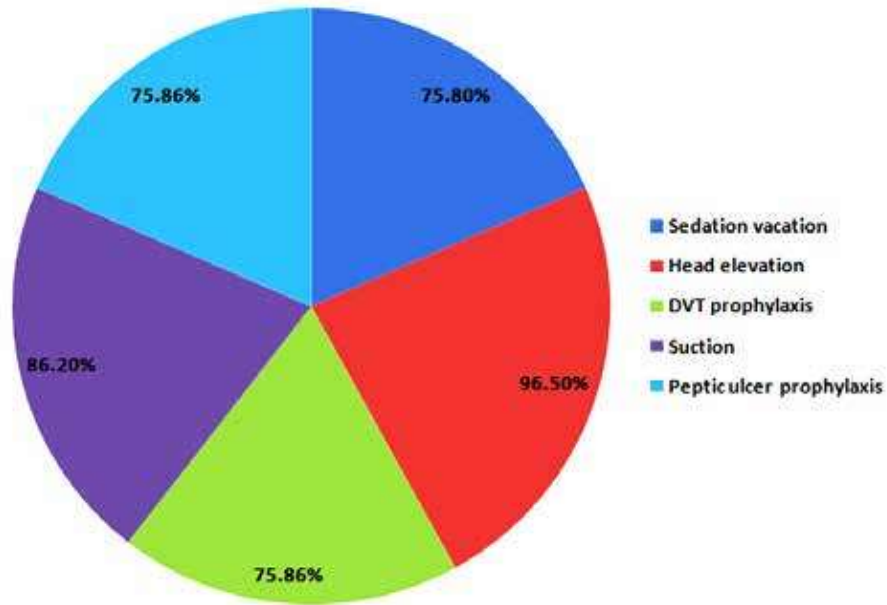
The information was collected from the electronic patient notes on EMR system. The VAP bundle care checklist was audited by using VAP bundle checklist audit form. The audit form includes 5 parameters.

#### *Parameters*

The Institute for Healthcare Improvement (IHI) has tackled VAP as one of six areas that hospitals can address to reduce inpatient morbidity and mortality.

*The IHI VAP-prevention bundle includes the following strategies:*

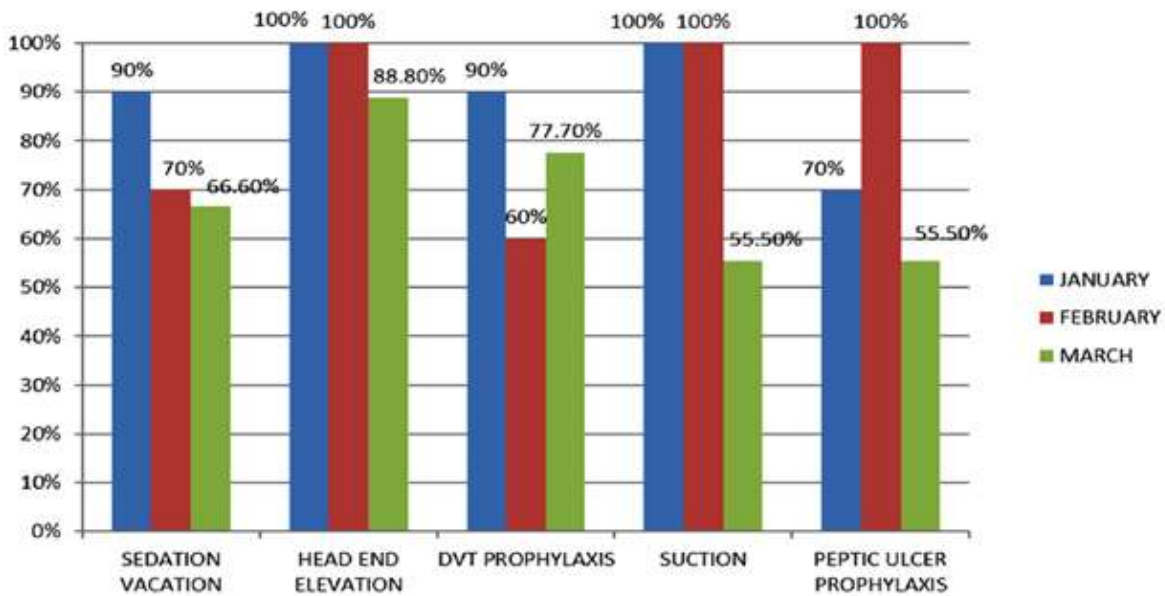
- Semi recumbent patient positioning, to at least 30 degrees.
- Ventilator weaning, via periodic sedation vacations and daily assessment of extubation readiness.
- Peptic ulcer disease (PUD) prophylaxis.
- Deep-vein thrombosis (DVT) prophylaxis.
- Suction of secretion



Graph 1: Percentage distribution

Table 2: Frequency and percentage distribution of five parameters from January 2021- March 2021

Month	Sedation Vacation		Head End Elevation		DVT Prophylaxis		Suction		Peptic Ulcer Prophylaxis	
	Frequency	Percentage of compliance	Frequency	Percentage of compliance	Frequency	Percentage of compliance	Frequency	Percentage of compliance	Frequency	Percentage of compliance
January (N=10)	9	90%	10	100%	9	90%	10	100%	7	70%
February (N=10)	7	70%	10	100%	6	60%	10	100%	10	100%
March (N=9)	6	66.6%	8	88.8%	7	77.7%	5	55.5%	5	55.5%



Graph 2: Percentage distribution of five parameters from January 2021- March 2021

### Analysis and conclusion

- Regarding the total percentage distribution of VAP bundle care parameters, 96.5% was noted in head elevation parameter and 86.2% in suction parameter. There was an equal distribution 75.8% in the category of sedation, DVT prophylaxis and peptic ulcer prophylaxis.
- In a view of percentage distribution of compliance in January month, most percentage distribution 10 (100%) belongs to the category of head elevation and suction. There was an equal distribution among sedation and DVT prophylaxis which was 9 (90%), whereas the least percentage distribution 7 (70%) belongs to the category of peptic ulcer.
- With the reference to the percentage distribution February month, the largest category observed were in the category of head elevation, suction, peptic ulcer prophylaxis which consist 10 (100%), 7 (70%) were in sedation category. Followed by DVT prophylaxis 6 (60%).
- In accordance with percentage distribution of compliance in March month, majority of compliance belongs to the category of head elevation 8 (88.8%), 7 (77.7%) of compliance were in the DVT prophylaxis category. 6 (66.6%) in the category of sedation and 5 (55.5%) were equally distributed to the category such as suction and peptic ulcer prophylaxis.

### Recommendations

#### 1. Oral care/hygiene in every 2-4 hrs

- Perform regular oral care with an antiseptic solution, e.g. Chlorhexidine, in accordance with the manufacturer's product guidelines.
- Include daily oral care with Chlorhexidine as part of the ICU admission and ventilator order sets.
- Educate the RN staff about the rationale for supporting good oral hygiene and its potential benefit in reducing ventilator-associated pneumonia

#### 2. Semi recumbent patient positioning, to at least 30 degrees.

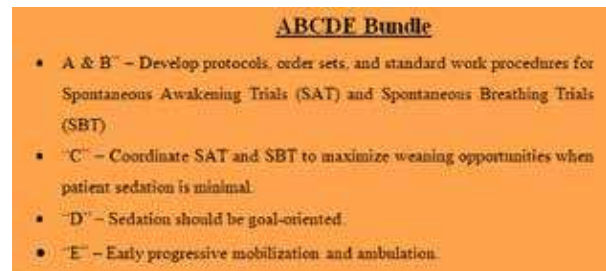
Use visual cues that make it easy to identify when the bed is in the proper position, e.g. a line on the wall that can only be seen if the bed is below a 30 degree angle.

Include clues on order sets for the initiation of and weaning from mechanical ventilation, of tube feedings, and for provision of oral care.

Create an environment in which respiratory therapists work collaboratively with nurses to maintain head of the bed elevation.

#### 3. Ventilator weaning, via periodic sedation vacations and daily assessment of extubation readiness.

- Perform daily assessments of readiness to wean and extubate.
- Provide a daily reduction or removal of sedative support.
- Designate one time of the day for the SAT and SBT to be attempted.
- Introduce ABCDE Bundle



#### 4. Peptic ulcer disease (PUD) prophylaxis.

- Use medications: H2 blockers are preferred over sucralfate, and proton-pump inhibitors may be efficacious and an alternative to sucralfate or an H2 antagonist.
- Include PUD prophylaxis on the ICU admission and ventilator order sets.
- Incorporate review of PUD prophylaxis into daily multi-disciplinary rounds.
- Engage pharmacy in daily multi-disciplinary rounds to ensure ICU patients are given appropriate PUD and VTE prophylaxis.

#### 5. Deep-vein thrombosis (DVT) prophylaxis.

- Initiate DVT prophylaxis unless contraindicated.
- Engage the pharmacy to ensure ICU patients are given appropriate DVT prophylaxis (redundancy, failure remediation).
- Include DVT prophylaxis on daily checklist.

#### 6. Suction of secretions

- Hand hygiene and use of gloves when handling respiratory secretions as well as adequate disinfection and maintenance of equipment and devices.
- Utilization of endotracheal tubes with subglottic secretion drainage (only for patients ventilated for longer than 24 hours)
- Initiation of safe enteral nutrition within 24-48 hours of ICU admission.

**Action Plan**

- Introduce a new parameter oral care/ oral hygiene in VAP bundle care checklist
- Encourage the nurses to do the oral care/ oral hygiene in every 2-4 hrs.
- Educate all departmental staff about the importance and purpose of VAP bundle care checklist.
- Inform the nurses to strictly follow the proper method of VAP bundle care checklist documentation.
- Continuous assessment and supervision of bundle care checklist audit.
- Engage respiratory therapy to all ventilator patients.
- Inform the nurses to inspect and changed the ventilator circuit when visibly soiled.

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