

Implementation of a high impact intervention to prevent Ventilator Associated Pneumonia

A multiple methods study

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Ventilator-associated pneumonia (VAP) is a common avoidable healthcare associated infection that can develop in ventilated critical care patients. VAP has a detrimental impact on patient recovery and can increase the burden of care. Respiratory Care bundles consist of 4-5 evidence-based elements that when applied together have been shown to decrease VAP rates and improve patient outcomes.^{1,2}

AIM: The aim of this study was to determine the change in uptake of evidence-based nursing care, after implementation of a respiratory care bundle within a tertiary level intensive care unit.

METHOD: A before and after observational study design was used to evaluate the impact of bundle implementation on adherence to evidence based practices. Adherence was measured using both observational and chart audit data



Ventilator Care Bundle

The Ventilator Care Bundle (VCB) consisted of five evidence-based core elements:

- (1) Adherence to infection prevention and control measures
- (2) Head of the bed elevation >30°
- (3) Regular mouth care
- (4) Maintenance of the artificial airway (Airway suction & Cuff Pressure checks)
- (5) Assessment and titration of sedation

Table 1 Measurement criteria for each element of the VAP prevention bundle

Measures	Observational data	Chart Audit Documentation of...
Element 1	Absence of contamination between procedures	Not measured
Element 2	Head of the bed elevation measured ≥ 30 degrees with corresponding accurate documentation.	Head of the bed elevation ≥ 30 degrees, unless documented as directly contraindicated.
Element 3	Observed and recorded if they took place during the observation period	Provision of oropharyngeal suction and mouth care with mouthwash once a shift.
Element 4	Observed and recorded if they took place during the observation period	Assessment of the endotracheal cuff pressure and endotracheal suction once a shift.
Element 5	Not Measured	Sedation management plan and evidence of sedation weaned at least once in a 24 hour period.

Themes from Focus Group

A 'Care bundle' provides a structured approach to nursing care

- Care bundle supports integration of evidence-based practice
- The bundle approach may enhance continuity of care

Unit Culture that can be resistance to change

- Leadership and role-modelling by senior staff are the foundation for achieving change
- Preventative care is not always the main priority
- Adherence to IPC measures can be challenging
- Lack of collaborative approach to sedation management
- Lack of consistency in clinical practice

[...] because prior to that [the ventilator care bundle] there wasn't any strict guidelines for people to follow and so people only did what they thought was necessary

Simple PPE principles are not adhered to well, for example I see people who remove their mask before washing their hands or remove their gown before their gloves

Observational data

Registered nurses were observed performing routine nursing care for ventilated patients .

The proportion of patients where the head of bed elevation was measured to be ≥ 30 degrees increased by 15.8% from 43.8% at baseline to 62.5% at follow-up ($\chi^2(1) = 1.13, p = .289$).

The proportion of patients who were observed to have the head of bed elevation ≥ 30 degrees and this was documented in the chart increased from 43.8% to 90.0% ($\chi^2(1) 6.79, p = .009$).

More than 50% of the nurses observed providing mouth care also documented their actions in the patient chart upon completion.

There were consistent gaps in the use of Personal Protective Equipment and performing the 5 moments of Hand Hygiene (Table 2).

Table 2 Observed adherence to IPC measures during provision of respiratory care

IPC measures	Pre (n = 16)	%	Post (n = 16)	%	Total (N = 32)	%
Personal Protective Equipment						
Dons gloves	14	87.50	9	56.25	23	71.88
Disposable gown/apron	6	37.50	1	6.25	7	21.88
Goggles	3	18.75	2	12.50	5	15.63
Hand Hygiene						
Prior to donning gloves	11	68.75	8	50.00	19	59.38
Post removal of gloves	10	62.50	9	56.25	19	59.38
Evidence of cross contamination between care activities						
	8	50.00	3	18.75	11	34.38

Chart Audit

A structured audit tool was used to collect data over the previous 24 hour period, capturing 3 nursing shifts. Documentation of elements 2 to 5 was audited .

Table 3 Documented adherence to the VCB in the patient chart

Chart Audit - Measures		Baseline (%)	Follow-up (%)	Change* (%)
Element 2	HOB elevation > 30 degrees or clearly documented contraindication	94.9	80.5	-14.4
Element 3	Oropharyngeal suction at least 4 hourly	66.7	56.1	- 10.6
	Mouth care with mouth wash at least once	30.8	31.7	+0.9
Element 4	Endotracheal tube suction at least once a shift	97.4	95.1	-2.32
	Cuff pressure checked once a shift	76.9	92.7	+15.8*
	Documented both at least once per shift	76.9	90.2	+13.3
Element 5	Sedation management plan documented	43.6	31.71	-11.9
No of nursing shifts audited		n = 39	n = 41	Total N = 80

Conclusion

A short-term rapid quality improvement intervention improved adherence to patient positioning and performance of ETT cuff pressure checks. Adherence to hand hygiene was observed to be 60% and appropriate use of PPE up to 70% of all observed encounters. Gaps were identified in translation of evidence into practice for sedation, management of oropharyngeal secretions and adherence to routine infection prevention and control measures. The rapid implementation of a care bundle increased the adherence to some elements of best practice thus decreasing the risk of ventilator-associated pneumonia. Sustainability of such improvement needs to be investigated.

References

1. Infection Prevention Society. (2017). High impact interventions care processes to prevent infection. Retrieved from https://www.ips.uk.net/files/6115/0944/9537/High_Impact_Interventions.pdf
2. Resar, R., Griffin, F., Haraden, C., & Nolan, T. (2012). Using care bundles to improve health care quality; IHI innovation series white paper. Retrieved from <http://www.ihi.org/resources/Pages/IHIWhitePapers/UsingCareBundles.aspx>