

High Impact Intervention

Care bundle to reduce ventilation-associated pneumonia

Aim

To reduce the incidence of ventilation-associated pneumonia (VAP).

Context

The aim of the care bundle, as set out in this high impact intervention, is to ensure appropriate and high quality patient care. Regular auditing of the care bundle actions will support cycles of review and continuous improvement in care settings.

Registered providers must audit compliance against key policies and procedures for infection prevention, inline with the relevant legislation at the time of publication¹.

Ventilation-associated pneumonia (VAP) is the most frequent infection occurring in patients after admission to the intensive care unit (ICU)². In a recent large European observational study, almost 25% of patients developed an ICU-acquired infection, and the respiratory site accounted for 80% of these infections. The attributable mortality of VAP continues to be debated³, but VAP can be linked with increased duration of ventilation, ICU and hospital length of stay, and significantly increased costs⁴. Prevention of VAP is possibly one of the most cost-effective interventions currently attainable in the ICU⁵.

VAP is a consequence of tracheal intubation in critically ill patients. Subsequent bacterial colonisation of the oropharynx and then silent and continuous aspiration past the cuff of the tracheal (endotracheal or tracheostomy) tube with contaminated secretions is the likely pathogenesis.⁶

Many evidenced-based guidelines have been published by different organisations from around the world^{7,8,9} and there is now substantial data suggesting that using a bundle approach in this setting is highly effective in reducing VAP^{10,11}.

It is acknowledged that there is no universally accepted definition of VAP, but this should not be a reason to delay improvement. Indeed, simple interventions that encourage best practice can significantly reduce the rate of VAP, and currently represent the optimum strategy for reducing morbidity and cost of this nosocomial infection¹².

This VAP bundle incorporates 6 key actions that are simple, cost effective to implement, and are frequently cited as the most evidenced-based interventions. Three of these care actions; oral hygiene, subglottic aspiration and tracheal tube cuff pressure monitoring are new additions to this current version of the care bundle. Oral hygiene with adequate strength antiseptics has been found to reduce the risk of VAP, as poor oral hygiene is associated with colonisations by potential pathogens and lead to secondary pulmonary infection¹⁴.

The use of tracheal tubes with subglottic drainage ports can reduce VAP by preventing contaminated oral secretions that accumulate above the tracheal cuff intubated patients leaking past the cuff into the lungs^{15,16}. Maintaining an appropriate inflation pressure in the tracheal cuff is important, since underinflation (<20cm H₂O) is associated with VAP¹⁷. Over inflation (>30cm H₂O) is also harmful and contributes to long-term tracheal damage.

Although not included as an auditable element, ventilator tubing should be managed and positioned effectively to ensure condensate flows away from the patient and does not enter the patients' airways.⁹

It is acknowledged that VAP is also an issue for ventilated patients in the non-acute setting. Not all the care actions outlined in this HII will be relevant to this patient group; however, it is recommended

that it is adapted and agreed with clinicians in the non-acute care setting to reflect the needs of their local patient group.

These measures should be part of an overall strategy to reduce healthcare acquired infections in the care setting. This strategy should also include, hand hygiene, the use of personal protective equipment and good environmental cleaning.

At the present time, this ventilator bundle should not be used as a quality indicator ²², but considered as dynamic standardisation of best practice in the management of a ventilated patient. The recommendations will evolve as new evidence emerges.

Why use the care bundle?

This care bundle is derived from evidence-based guidance and expert advice.

The purpose is to act as a way of improving and measuring the implementation of key elements of care. The risk of VAP increases when one or more elements are excluded or not performed.

Staff competence and training

In line with policy, staff should be appropriately trained and competent in any stated procedure or care process. Assessment of competence is not a specific care action within the HII as it is a pre-requisite for any care delivered. Registered care providers will have mechanisms for assuring training, assessment and recording of competence.

Elements of the care process

The 6 actions outlined below are the recommended good practice.

1. Elevation of the head of the bed <ul style="list-style-type: none">▪ The head of the bed is elevated to 30-45° (unless contraindicated) ⁸.
2. Sedation level assessment <ul style="list-style-type: none">▪ Unless the patient is awake and comfortable, sedation is reduced/held for assessment at least daily (unless contraindicated) ¹³.
3. Oral hygiene <ul style="list-style-type: none">▪ The mouth is cleaned with chlorhexidine gluconate (≥1-2% gel or liquid) 6 hourly ^{14, 23, 24} (as chlorhexidine can be inactivated by toothpaste, a gap of at least 2 hours should be left between its application and tooth brushing).▪ Teeth are brushed 12 hourly with standard toothpaste.
4. Subglottic aspiration <ul style="list-style-type: none">▪ A tracheal tube (endotracheal or tracheostomy) which has a subglottic secretion drainage port is used if the patient is expected to be intubated for >72 hrs ^{15, 16}.▪ Secretions are aspirated via the subglottic secretion port 1-2 hourly.
5. Tracheal tube cuff pressure <ul style="list-style-type: none">▪ Cuff pressure is measured 4 hourly, maintained between 20-30cm H₂O (or 2cm H₂O above peak inspiratory pressure) and recorded on the ICU chart ¹⁷.
6. Stress ulcer prophylaxis <ul style="list-style-type: none">▪ Stress ulcer prophylaxis is prescribed only to high-risk patients according to locally developed guidelines ^{6, 18, 19, 20, 21}.▪ Prophylaxis is reviewed daily ^{6, 19, 20, 21}.

Using the care bundle and the electronic tool

The use of this care bundle will support cycles of review and continuous improvement, which will deliver appropriate and high quality patient care.

Audits of compliance with the care bundle should be carried out regularly and the results recorded at the point of care. They should be carried out by peers and the results can be collected manually or electronically depending on what is appropriate. The use of an electronic, graphical package such as the HII electronic tool provided is recommended, as this will increase the understanding and usefulness of the overall results.

The electronic tool will:

- Collect, collate and produce different views of the information
- Clearly identify when actions within the care bundle have or have not been performed
- Provide information to support the development of plans to resolve any issues and improve the quality of care
- Support a culture of continuous improvement.

Recording and making sense of the results

- Print an audit sheet from the HII electronic tool or alternatively create one such as the example below.
- When a care bundle action is performed, insert a Y in the relevant column. If the action is not performed, insert an X in the relevant column.
- When the care action is not performed, as it is not applicable (for example local policy has determined it as not applicable in all or certain situations) insert an N/A to demonstrate that local policy is being adhered to (this is then recognised as a Y when total compliance is being calculated).
- Calculate the totals and compliance levels manually or enter the results into the HII electronic tool to calculate.
- The goal is to perform every appropriate action of care every time it is needed and achieve 100% compliance with the care bundle. The “all actions performed” column should be filled with a Y when all the appropriate actions have been completed on every required occasion (see the example below).
- Where actions have not been performed, overall compliance will be less than 100%. This provides immediate feedback for users on those care bundle actions not completed, and action can then be taken to improve compliance levels.

Example audit sheet

Care Actions Observation	Care action1	Care action 2	Care action 3	Care action 4	All actions
1	Y	N	Y	Y	N
2	Y	Y	N	Y	N
3	Y	Y	N/A	Y	Y
4	Y	Y	Y	N	N
5	Y	Y	Y	Y	Y
Total number of times an individual action was compliant	5	4	4	4	2
% when action of care was given	100%	80%	80%	80%	40%

- This example tool shows that while most care actions were performed, on only two occasions were ALL actions performed correctly while all actions was only 40% and as a result the risk of infection was significantly increased. (Please note for observation no 3. the N/A was calculated as a Y and overall compliance was achieved)
- When the information has been entered into the HII electronic tool a compliance graph for each action of care and for overall compliance with the care bundle can be produced. This will show where to focus the improvement efforts to achieve full compliance and achieve high quality patient care.

References:

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