



Prevention of Ventilator Associated Pneumonia Guidance

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Introduction

Ventilator associated pneumonia (VAP)¹ is a common form of hospital acquired pneumonia which occurs within the critical care setting. It affects between 10 and 20% of patients who are mechanically ventilated. It is known to have a significant negative effect on mortality, length of ICU (and hospital) stay, duration of mechanical ventilation and increased healthcare costs. Antimicrobial treatment of VAP adds to the increasing burden of antimicrobial use within the ICU.

Definition of VAP

There is presently no consensus definition of VAP. It is widely acknowledged as a pneumonia that occurs more than 48 hours from the instigation of invasive ventilation and is diagnosed using a combination of non-specific clinical, radiological and microbiological criteria.

Primary Review (Answer must be yes to all questions)

	Yes	No
Invasive Ventilation for greater than 48 hours		
Antimicrobial therapy started for NEW* chest deterioration		
Antimicrobial therapy continued for greater than 48 hours		

**No antibiotics for chest infection in previous 5 days*

Secondary Review (Must have ONE of the following:)

	Yes	No
New/Progressive changes on CXR		
Positive Microbiology on respiratory sample		

OR TWO of the following:

	Yes	No
Reduced PF ratio > 4 or FiO₂ increased by > 0.1		
Fever >38.5 or <36 degrees celsius		
Worsening infection markers WCC >11 or increase >2 / PCT >0.25 or any increase		

Objectives of Prevention²

- **Reduce aspiration of microorganisms**
- **Reduce length of invasive ventilation**

Associated care bundles

- VTE prophylaxis
- Gastric ulcer prophylaxis
- Sputum sampling

Reducing Aspiration of Microorganisms³

Elevation of head of bed 30-45°

All mechanically ventilated patients should be nursed at a minimum of 30° head up elevation. There is a demonstrated link between VAP and patients nursed supine.⁴

Possible considerations and contra-indications

- Spinal or Pelvic instability
- Patients nursed in prone position
- Significant haemodynamic instability

If a procedure is undertaken that requires a flat supine position (e.g. tracheostomy or line insertion) the patient should subsequently be assessed for reinstatement of head up position.

Maintenance of endotracheal tube cuff pressure

Endotracheal tube (ETT) cuff pressures should be checked and maintained at 20-30 cm H₂O using a cuff manometer.

- Immediately after cuff inflation
- On admission to Critical Care
- 4 hourly as a routine
- If concerns arise regarding cuff pressures (e.g. audible or monitored leak apparent)

Use of ETT with subglottic suction

Pooling of endotracheal secretions are a potential source of pathogens (particularly in cases of cuff leak or deflation).

All patients requiring invasive ventilation should be intubated using an ETT with subglottic suction available e.g. a Taperguard tube. Suction should be performed 4 hourly as a minimum.

If patients are admitted from elsewhere without such a tube, a pragmatic decision should be made upon re-intubation with one. This will depend upon individual circumstances that take account of predicted length of ventilation. Generally speaking, anyone who is likely to require invasive ventilation for more than 48 hours should have an ETT change undertaken in daytime hours.

Avoidance of unnecessary ventilator circuit manipulation

Contamination of condensate in ventilator tubing and subsequent infiltration of this into the airway is associated with VAP.

Circuits should only be replaced if:

- Visibly soiled or mechanically malfunctioning
- If following manufacturers guidance.

Oral Care

A major factor causing VAP is the aspiration of oral colonization because of poor oral care practices.

In a mechanically ventilated patient, an oral care assessment should be completed within 6 hours of admission using a standardised oral care assessment tool, with reassessment every 12 hours thereafter. Oral care should include brushing teeth, gums, and tongue at least twice a day with a soft toothbrush and toothpaste (fluoride/non foaming) and moistening oral mucosa and lips every 2-4 h⁵.

The use of chlorhexidine will be dependant upon patient group.

Organisations must have oral care guidelines for patients in critical care⁶.

Use of proton pump inhibitors (PPI) and enteral feeding.

The prevention of stress ulcers must be weighed against the increased risk of VAP. There is insufficient evidence to give a clear recommendation of the use of PPI's and the potential protective benefits of enteral feeding. It is recommended that consideration is taken of the risk profile of GI bleeding in each patient with judicious use of PPI's in patients considered to be at risk of GI bleeding.

Reducing Length of Invasive Mechanical Ventilation

Daily Sedation Holds

As a patient is ventilated for longer periods of time, their risk of developing VAP increases⁷. Continuous or excessively deep sedation can lead to accumulation of sedatives and prolong mechanical ventilation duration.

Performing a daily sedation hold can shorten the duration of mechanical ventilation and reduce the risk of developing a VAP.

All mechanically ventilated patients receiving continuous infusions of sedative drugs for greater than 24 hours should have daily sedation holds.

Contra-indications

- Requirement for muscle relaxants
- High ventilatory requirements (e.g. prone positioning, FiO₂ greater than 0.6, high airway pressures)
- Raised Intra-cranial pressure
- Seizures or severe agitation
- Risk of unresolvable loss of airway
- Therapeutic temperature management (e.g. post cardiac arrest)
- Haemodynamic instability
- Planned intervention (such as surgery - in this case a sedation hold may still be considered appropriate afterwards)

Planned Weaning

Implementation (and adherence to) weaning plans to instigate spontaneous breathing and culminate in liberation from the ventilator. Reducing the length of invasive ventilation via the weaning process assists in reducing the incidence of VAP.⁸

Summary

The guideline provides a definition of VAP that can be used to record and report the incidence on units. Network adaptation will allow benchmarking. Prevention of VAP and reduction of VAP rates is possible using the clinical advice shown.

Related Documents and Guidance

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