**Topic Expert Group:** Patient safety and hygiene practice

**Prevention of ventilator associated pneumonia**

Dubois C, Tissières P, Helder O, Mader S, Borghesi A

**Target group**
Infants receiving mechanical ventilation and parents

**User group**
Healthcare professionals, neonatal units, hospitals, and health services

**Statement of standard**
The risk of ventilator associated pneumonia (VAP) is minimised by systematic application of care bundles.

**Rationale**
Ventilator associated pneumonia (VAP) may occur in between eight and 50% of ventilated infants (1,2), with a prevalence of up to 37 cases per 1000 ventilator-days (2–8). Criteria used to define VAP vary and affect incidence reporting. Despite formal definition in older infants, a specific definition for newborn infants is lacking. (1)

The risk of nosocomial infection is increased because of immature host defences and frequent invasive procedures. VAP arises when there is bacterial invasion of the pulmonary parenchyma in a patient who receives ventilation for more than 48 hours. (1) VAP arises following colonisation of the aerodigestive tract, aspiration of oral secretions and contaminated equipment. (2) Identification of causative microorganisms is not necessary to establish a diagnosis, but microbiological tests are essential to narrow the spectrum of antibiotic therapy.

Risk factors for VAP include low birth weight, prematurity, prolonged mechanical ventilation, reintubation, frequent endotracheal suctioning, presence of invasive devices, transfusions, inotropic drugs, and a history of bloodstream infection. (4,6,8–14) VAPs are associated with increased mortality, morbidity, prolonged hospital stay, and additional costs. (3,4,6,10,15) Multiple interventions are required to minimise the frequency of VAP. VAP may be reduced by careful attention to care practices. (11,16)

**Benefits**

**Short-term benefits**

- Reduced occurrence of VAP (11,16)
- Reduced risk of systemic sepsis (9,10,17)
- Reduced mortality and morbidity (6,12,18)
- Reduced duration of mechanical ventilation (3,6,8–10,13,14)
- Reduced length of hospital stay

**Long-term benefits**

- Reduced exposure to antibiotics (consensus)
- Reduced risk of chronic lung disease (4,12)
- Improved neuro-developmental outcome (19)
- Reduced healthcare costs (15,18,20)

**Components of the standard**

<table>
<thead>
<tr>
<th>Component</th>
<th>Grading of evidence</th>
<th>Indicator of meeting the standard</th>
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<tbody>
<tr>
<td><strong>For parents and family</strong></td>
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<tr>
<td>1. Parents are informed and instructed by healthcare professionals about ventilator associated pneumonia (VAP) and prevention using proper hand hygiene. (2,21,22) (see TEG Patient safety &amp; hygiene practice)</td>
<td>A (Moderate quality) B (High quality)</td>
<td>Patient information sheet</td>
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<tr>
<td>2. Parents are encouraged to report incidents where they believe an error has been made in hygiene, and receive confidential timely feedback. (23) (see TEG Patient safety &amp; hygiene practice)</td>
<td>A (Moderate quality) B (High quality)</td>
<td>Parent feedback</td>
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<td><strong>For healthcare professionals</strong></td>
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<tr>
<td>3. A unit guideline for screening, documentation, prevention, and treatment for VAP is adhered to by all healthcare professionals. (2,5,11,12,15,16,18,24–32)</td>
<td>A (Moderate quality) B (High quality)</td>
<td>Guideline</td>
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<td>4. Head of bed is elevated at least 30°. (5,21)</td>
<td>A (Moderate quality) B (High quality)</td>
<td>Guideline</td>
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<td>5. Training on screening, documentation, and treatment for VAP is attended by all responsible healthcare professionals.</td>
<td>B (High quality)</td>
<td>Training documentation</td>
</tr>
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<td>6. Hand hygiene according WHO’s ‘my five moments of hand hygiene’ is applied including after handling respiratory equipment and supplies. (2,15,33,34)</td>
<td>A (High quality) B (High quality)</td>
<td>Guideline</td>
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<td>7. A daily evaluation for readiness for extubation is undertaken. (2,11)</td>
<td>A (High quality) B (High quality)</td>
<td>Clinical records</td>
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<td><strong>For neonatal unit and hospital</strong></td>
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<tr>
<td>8. A unit guideline for screening, documentation, prevention, and treatment for VAP is available and</td>
<td>A (Moderate quality) B (High quality)</td>
<td>Guideline</td>
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</tbody>
</table>
regularly updated.  
(2,5,11,12,15,16,18,24–32)

9. A unit guideline including criteria for intubation and extubation, and intubation procedures is available. (2,11,16,35)

10. Training on screening, documentation, treatment and prevention for neonatal VAP is ensured. (31,32)

For health service

11. The frequency of neonatal VAP is monitored between neonatal services using a common definition and expressed as infections per 1000 ventilator-days.

Where to go – further development of care

<table>
<thead>
<tr>
<th>Further development</th>
<th>Grading of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>For parents and family</td>
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<tr>
<td>N/A</td>
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<tr>
<td>For healthcare professionals</td>
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<td>N/A</td>
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<tr>
<td>For neonatal unit</td>
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<tr>
<td>• Develop checklists for monitoring care of intubated patients.</td>
<td>B (Moderate quality)</td>
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<td>For hospital</td>
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<td>N/A</td>
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<td>For health service</td>
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<tr>
<td>• Refine and implement VAP care bundles. (11,16)</td>
<td>A (Moderate quality)</td>
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<tr>
<td>• Develop a European definition of VAP for newborn infants.</td>
<td>B (High quality)</td>
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Getting started

Initial steps

For parents and family
• Parents are verbally informed and educated by healthcare professionals about hand hygiene, nosocomial infections, and intubation.

For healthcare professionals
• Attend training on screening, documentation, and treatment for VAP.
• Develop strategies for non-invasive ventilation when appropriate.
For neonatal unit and hospital

- Develop and implement a unit guideline on screening, documentation, prevention, and treatment for VAP.
- Develop information material on VAP and prevention using proper hand hygiene for parents.
- Support healthcare professionals to participate in training on screening, documentation, and treatment for VAP.
- Develop written protocols for ventilator care and audit compliance.
- Document and monitor the frequency of VAP.

For health service

- Develop a national guideline for screening, documentation, prevention, and treatment for VAP.

Description

A care bundle for the prevention of VAP includes:

- A clear pragmatic definition of neonatal VAP.
- A unit specific guideline covering ventilation strategy aimed at the use of ventilation strategies to minimise duration of endotracheal intubation.
- Development of objective criteria for intubation and extubation and use non-invasive respiratory support whenever possible.
- A daily assessment of readiness for extubation to be recorded in the clinical record.
- Careful attention to hand hygiene before and after contact with the infant for oral care and handling respiratory equipment and supplies.
- Procedures for minimising contamination of endotracheal tubes during insertion.
- Adoption of full sterile precautions for suctioning.
- Use of closed endotracheal suction devices.
- Regular oropharyngeal suction before ET manipulation, changing infant position, extubation and reintubation.
- Head of bed elevated at least 30°.
- Oral care provided 3-4 hourly.
- Minimisation of ventilator circuit changes (e.g. only on visible soiling, malfunction).
- Regular audits of adherence to the protocol.
- Monitoring and reporting the occurrence of VAP (rate per 1000 ventilator days).
- Regular training sessions for staff on prevention of VAP care bundle.

Source


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Lifecycle
5 years/next revision 2023

Recommended citation