

Ventilator Associated Pneumonia (VAP) Prevention Bundle

Scope

This guideline is relevant to all medical and nursing staff involved in patient care on the neonatal intensive care unit (NICU)

Aim

To prevent the development of ventilator associated pneumonia in the critically ill neonate

Definition

Ventilator associated pneumonia (VAP) is defined as hospital-acquired pneumonia in a patient receiving invasive ventilation, including CPAP via an endotracheal tube or tracheostomy, for at least 48 hours.

Diagnosis

Pneumonia is identified by using a combination of radiologic, clinical, and microbiologic criteria, as defined by the CDC, National Health and Safety Network (NHSN) Protocol for Ventilator Associated Events, January 2016

Imaging Test Evidence	Signs/Symptoms	Laboratory
<p>One or more serial CXRs with 1 of:</p> <p>New/progressive</p> <ul style="list-style-type: none"> pulmonary infiltrates Consolidation Cavitation Pneumatoceles <p>2 or more serial CXRs in babies with underlying pulmonary or cardiac conditions</p>	<p>Worsening gas exchange (e.g. desaturation, FiO₂ requirements by $\geq 10\%$ or ventilation demand) and 3 of :</p> <ul style="list-style-type: none"> Temperature $> 38.5^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$ Leukopenia (< 4000)/leukocytosis (> 15000) and left shift ($> 10\%$ band forms) New or change in amount/purulence of 	<ul style="list-style-type: none"> Positive LC-BSI* not related to another source of infection Positive pleural fluid culture Positive BAL $\geq 10^4$cfu/ml Pleural or pulmonary abscess with positive culture from needle aspiration Lung biopsy showing histological evidence of pneumonia or positive on culture

	<ul style="list-style-type: none"> • secretions • Wheezing/cough <p>New or respiratory distress, tachypnoea, or</p> <ul style="list-style-type: none"> • apnoeas <p>Tachycardia (HR > 170) or bradycardia (HR < 100)</p>	<ul style="list-style-type: none"> • Positive exams with virus or particular micro-organisms (Legionella, Aspergillus, mycobacteria, mycoplasma, Pneumocystis carinii)
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General Strategies

1. Adhere to hand-hygiene guidelines
2. Use non-invasive positive pressure ventilation whenever possible
3. Drain ventilator circuit water away from patient every 2-4 hours or before repositioning or when condensate accumulates.
4. Minimize duration of ventilation
5. Avoid unplanned extubation and reintubation
6. Avoid opening and disconnecting the ventilator equipment
7. Wear gloves according to standard precautions
8. Wear sterile gloves for intubation and each new endotracheal tube attempt for neonatal intensive care unit patients.

Provider Responsibilities

1. Perform daily assessments of readiness to wean ventilation and use unit-specific weaning protocols
2. Avoid gastric over distention

Nursing Responsibilities

1. Maintain patients in a semi recumbent position unless there are contraindications.

- ≤ 48 weeks corrected gestational age (CGA) 15-30 degrees

- >48 weeks CGA 30-45 degrees

2. Perform regular oral care: Every 3-4 hours, before repositioning of infant or of the ETT, and before elective intubation or extubation to keep the patient's mouth clean. Oral care reduces the overall bacterial flora count that causes VAP. Pathogens have been shown to form a bio-film on ET tubes and then migrate down the tube to infect the lungs causing pneumonia.

Replace the oral suction catheter every 24 hours, the canister every three days and tubing daily or when visibly soiled.

1. ≤ 48 weeks CGA – Every 3-4 hours use cotton tip applicator dipped in fresh expressed breast milk (EBM) to coat buccal mucosa, use new applicator each pass

- If fresh EBM is not available, use thawed BM or sterile water.
- Use colostrum if available for oral cares

2. Infants >48 weeks CGA

- If breast feeding, every 3-4 hours use cotton tip applicator dipped in fresh EBM to coat buccal mucosa, use new applicator each pass (if fresh EBM not available, use thawed breast milk or sterile water)
- If not breastfeeding, every 3-4 hours moisten mouth with swabs soaked in clean water or physiological saline.

3. Suctioning:

- a) Assure meticulous hand hygiene and don gloves
- b) Suction ETT only as clinically indicated:
 - unexplained drop in SpO₂
 - visible secretions
 - ventilator graphics reveal evidence of secretions
- c) In-line suctioning is preferred
- d) Always use separate suction tubing for oral suctioning and ETT suctioning. When possible use a separate suction canister also.
- e) Suction oral pharynx prior to ET tube suctioning.

- f) DO NOT routinely instill normal saline prior to suctioning.
- g) Insert the suction catheter only to the end of the ET tube to prevent airway trauma.
- h) Preoxygenate 30-60 sec prior to suctioning.

Ventilator Circuit

- a) Wear gloves when handling the vent circuit & draining the condensation.
- b) Drain condensation from the vent circuit q 2-4hrs; avoid draining toward the patient.
- c) Do not break the circuit to drain the water. Ventilator tubing should not be disconnected.
Maintaining a closed system prevents contamination of the ventilation system.
- d) Always drain the circuit prior to repositioning the patient.
- e) In-line suction catheter should be changed every 72 hours or sooner if noted to be visibly soiled.

Clean Equipment

- a) Clean respiratory equipment every 12 hours using saniwipes. Disinfect high touch surfaces i.e., Vent screen and knobs.
- b) Nursing will clean the bed space & equipment at the bedside at least every 12 hours
- c) Change in-line suction catheters, tubing and canisters every three days or when visibly soiled
- d) Ventilator circuit should be changed every month or when visibly soiled
- e) Change the resuscitation bag once a month or when visibly soiled

Documentation

1. Document all VAP implementation and prevention interventions in the patient record
2. Readiness to extubate criteria completed

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