

MECHANICAL VENTILATION - NICU

PURPOSE: To outline the management of invasively [with endotracheal tube (ETT) or tracheostomy tube] intubated NICU patients when treated with “conventional” or high frequency mechanical ventilation.

SUPPORTIVE DATA: The RN with support from the Respiratory Care Practitioner (RCP) is responsible for:

- Optimal respiratory therapy and care of every NICU patient
- Interdisciplinary training of NICU staff
- Airway maintenance and prevention of ventilator-associated pneumonia

The RN will collaborate with the Provider and Respiratory Care Practitioner (RCP) and is responsible for:

- Interdisciplinary planning and management of patient care

Therapy modalities via artificial endotracheal airway include:

- Pressure Support (PS)
- Synchronized Intermittent Mandatory Ventilation (SIMV)
- Continuous Positive Airway Pressure (CPAP)
- High Frequency Oscillatory Ventilation (HFOV)
- High Frequency Jet Ventilation (HFJV).

NICU Ventilator Associated Pneumonia (VAP) prevention consists of seven overall care components: hand hygiene and gloves, general practice considerations, patient positioning, oral/ nasopharyngeal care, artificial airway clearance, and ventilator support.

ASSESSMENT:

1. Assess the following a minimum of every two hours or as ordered by the provider:
 - Vital signs (VS)
 - Oxygen saturation via pulse oximeter
 - Signs/symptoms (S/S) respiratory distress:
 - Use of accessory muscles
 - Retractions
 - Nasal flaring
 - Respiratory pattern
 - Breath sounds
 - Symmetrical chest expansion
 - Secretions: quantity, color, character, odor
 - Transcutaneous PCO₂
 - Ventilator settings and readings (as applicable)
 - Peak Inspiratory Pressure (PIP)
 - Positive End expiratory Pressure (PEEP)
 - Pressure support (PS)
 - Set rate
 - Mean Airway Pressure
 - Hertz
 - Amplitude
 - Frequency, breath rate
 - Heated humidity temperature
 - Inspired oxygen

HAND HYGIENE &
GLOVES:

2. Perform hand hygiene before and after contact with infant and when in contact with any respiratory support equipment.
3. Wear gloves while performing tracheal/endotracheal tube, oral or nasopharyngeal care.

GENERAL PRACTICE
CONSIDERATIONS:

4. Assess the taping/ties/bar which hold(s) the ETT or trach tube in place for security/adhesion; notify the RCP **promptly** to replace taping/ties/bar as needed.
5. Collaborate daily with interdisciplinary team to assess the need for continued ETT intubation during morning medical rounds.
6. Ensure that wall suction set-up for oral/nasopharyngeal suctioning is separate from the wall suction set-up for the ETT/tracheal tube.
7. Replace in use wall suction canisters and tubing daily or more frequently as needed.
8. Discard after use, any remaining sterile water and/or saline employed for clearing the suction tubing.
9. Avoid skin care products with petroleum ingredients (e.g., lip balm).
10. Obtain serial sputum cultures as ordered for monitoring colonization.

PATIENT POSITIONING

11. Elevate head of bed (HOB) to 12 to 15 degrees according to the provider's discretion or unless contraindicated by provider's order.
12. Use a single linen neck/shoulder roll to prevent tube kinking or obstruction in the airway.
13. Reposition patient (supine, lateral or prone), a minimum of every 2 hours as condition allows/unless contraindicated.
14. Maintain the rotation of head/neck to less than 45 degrees from midline when the patient is in the supine position.

ORAL/
NASOPHARYNGEAL
CARE

15. Provide oral/nasopharyngeal care as needed every 12 hours and as needed with normal saline. This care is prioritized over routine care.
16. Provide developmentally supportive mouth care:
 - Pay attention to infant's cues
 - If infant becomes distressed, contain and comfort until stability is reestablished
 - Encourage rooting reflex in older infants
 - Follow tongue movements with gauze. Do not force gauze.
17. Change oral suction devices regulator daily on nights and as needed.

ARTIFICIAL AIRWAY
CLEARANCE

18. Suction the ETT only as clinically indicated. Clinical indications include but are not limited to:
 - Visible secretions
 - Unexplained drop in pulse oximetry
 - Unexplained rise in the transcutaneous carbon dioxide monitoring

- When the ventilator graphic display (if available) reveals evidence of secretions
19. Utilize a closed, in-line suction system.
 20. Maintain suction pressure between 80 and 100 mmHg.
 21. **Do not routinely instill normal saline during suctioning unless absolutely necessary.**
 - Instill a limited amount of sterile normal saline (according to the Ventilator Associated Pneumonia Prevention Bundle in the NICU Unit Structure Standards) into the artificial airway when the secretions are thick and tenacious.
 22. Rinse the closed in-line suction system with normal saline or sterile water after use.
- RESPIRATORY EQUIPMENT
23. Deposit used respiratory equipment in designated bins. Do not share disposable respiratory equipment between patients.
 24. Maintain oxygen flow off when not in use.
 25. Maintain FiO₂ at 0.21 on resuscitation bag when not in use unless sharing the flow meter with the nasal cannula at a higher FiO₂.
- SAFETY
26. Maintain resuscitation bag at bedside at all times. Store bags and masks outside the incubator, warmer or bed in a clean, non-sealed bag when not in use.
 27. Notify RCP as needed to ensure tubing and condensation traps are empty.
 28. Position patient or linens to prevent self-extubation.
- SEDATION
29. Administer sedation as ordered for:
 - Agitation/increased respiratory rate not related to hypoxia
 - Titrate/decrease sedation as ordered for weaning
- CAREGIVER EDUCATION:
30. Collaborate with RCP and instruct on the following:
 - Purpose of mechanical ventilation
 - Machine alarms
 - Patient's inability to audibly cry
 - Importance of VAP prevention
 - Hand hygiene
 - Airway management
 - Continued risk of aspiration or infection
- REPORTABLE CONDITIONS:
31. Notify provider for the following:
 - Acute change in respiratory status, e.g., unequal breath sounds possibly indicating pneumothorax
 - Acute deterioration in pulse oximetry saturation not relieved by increasing inspired oxygen or PIP
 - Apneic episodes, especially when associated with bradycardia
 - Blood gas values outside ordered parameters

ADDITIONAL
STANDARDS :

32. Refer to the following as indicated:
• Artificial Airway-ICU

DOCUMENTATION:

33. Document in accordance with unit standards for NICU in iView on Electronic Health Record
34. Document the time of suctioning, the amount, and quality obtained from the ETT or tracheal tube.
35. Document repositioning of patient.

Initial date approved: 07/11	Reviewed and approved by: Professional Practice Committee Nurse Executive Council Attending Staff Association Executive Committee	Revision Date: 02/16, 10/21
---------------------------------	---	--------------------------------

References

- California Perinatal Quality Care Collaborative (CPQCC). (2008). Neonatal hospital acquired infection prevention toolkit. http://www.cpqcc.org/quality_improvement/qi_toolkits/hospital_acquired_infection_prevention_rev_march_2008
- Centers for Disease Control and Prevention (CDC). (2003). Guidelines for preventing health-care-associated pneumonia. *MMWR*: 53: 1-35.
- Cernada, M., Brugada, M., Golombek, S., & Vento, M. (2014). Ventilator-associated pneumonia in neonatal patients: An update *Neonatology*, 105(2), 97-107.
- Goldsmith, J. P., & Karothkin, E. H. (2010). *Assisted Ventilation of the Neonate*. 5th edition.
- Wilken, R. W., et al. (2016). *Egan's Fundamentals of Respiratory Care*. 11th edition.

Consults:

LAC+USC Respiratory Therapy Department
LAC+USC Neonatal Intensive Care Nursing