Care of the Patient on a Ventilator

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Artificial Airways

A means to protect the airway
Artificial Airways

• Endotracheal Tubes (ET Tube or ETT)
  – Oral Intubation: tube inserted into the trachea through mouth & vocal cords.
  – Airway can be secured rapidly
  – Larger bore tube can be used
  – Easier to remove secretions
  – Bite block needed

Artificial Airways (cont’d)

• Nasal Intubation: tube passed through the nose, nasopharynx & vocal cords.
  – Is stable
  – Difficult to dislodge
  – Can be placed without visualizing larynx, so no head/neck manipulation needed
  – Disadvantage: only small tube can be used

Tracheostomy Tube

• Used if artificial airway will be needed for a long time (more than 4-6 weeks)
• Patient comfort maximized, Pt. able to eat and speak with certain types of trach tubes
• Suctioning is easier & work of breathing is less than with ETT
OUR GOAL TO PROTECT THE AIRWAY IS......

Intubate Early & Secure the Tube!!

Responsibilities

• Daily oral care
• Check skin under tube holder or tape
• Check position of E.T. tube via X-Ray
  -- 2 cm above carina
• Document length of tube @ teeth
  -- 22 - 24 cm for adult
Avoid Nosocomial Infections

- HOB @ 45 degrees
- Suction only if indicated
- Lavage only if indicated
- Sedation Holiday
- Early Weaning

Mechanical Ventilation

- Is the process by which oxygen enriched air is moved into and out of the lungs by mechanical means
- It is a way of supporting patients’ respirations until they have the ability to breathe independently

Indications

- Inability to oxygenate
- Inability to ventilate
- To decrease the work of breathing
Respiratory Criteria

• Mechanics
  - Respiratory Rate >35/min
  - Tidal Volume <4ml/kg
  - Inspiratory Force <25cmH2O
  - Vital Capacity <15ml/kg

Arterial Blood Gases

• ABG
  - PaO2 <50mmHg
  - PaCO2 >55mmHg
  - P(A-a)O2 approx.>300 (FiO2)
  - pH<7.20-7.30

Clinical Signs

• Clinical Signs
  - Increased work of breathing
  - Inability to clear secretions
  - Poor general clinical status
EARLY TYPE OF VENTILATORS....

Iron Lung

Rancho Los Amigos ICU (1950s)
Chest Curass

Features of the Ventilator

Face of the AVEA VIASYS used in ICU at LAC/USC
Ventilator: AVEA VIASYS

High Frequency Percussive Ventilator

MODES OF VENTILATION
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FEATURES

- **A/C** – Assist/Control
- **SIMV** – Synchronized Intermittent Mandatory Ventilation
- **PS** – Pressure Support

Volume-Control Ventilation [**A/C SIMV/PS**]

- Delivers predetermined volume of gas irrespective of lung pressures
- When volume is reached the inspiration is terminated
- The most common form of long-term ventilatory support
Pressure-Control Ventilation (PC) [A/C SIMV/PS]

• Gas flows into lungs until predetermined pressure reached
  – When pressure reached inspiration ends
• Tidal volume varies
• Ideal mode of vent to reduce risk of lung barotrauma i.e., ARDS, ALI, BPF

Pressure Regulated Volume Control (PRVC) [A/C SIMV/PS]

• Delivers a set tidal volume at lowest peak pressure level
• Delivers decelerating inspiratory flow
• Ideal for lung injuries or peds
• Ideal for patients with asthma
• Post op patients

Positive End Expiratory Pressure (PEEP)

• Airway pressure at the end of expiration remains positive
• Used with any mode of supportive ventilation
• Recruits alveoli and improves oxygenation
Airway Pressure Release Ventilation (APRV), Bi-Phasic

- Is an Inverse I:E ventilation with both inhalation & exhalation valve that are actively opened by patient
- Pt can be fully controlled on vent or breath spontaneously
- Used for ARDS or difficulty in weaning
- No chemical paralyzing needed

Continuous Positive Airway Pressure (CPAP/PS)

- Pt breathes spontaneously
- Airway pressures are positive throughout resp cycle
- Increases functional residual capacity, decreases shunting & work of breathing
  - Helps re-expand atelectatic lung
- Often used in weaning process
- PS can be implemented in order to augment spontaneous Vt

Weaning (Liberation)

- Is the process of the progressive withdrawal of mechanical ventilatory support and final extubation
- Respiratory Care Practitioner will carry out the weaning process and record the values onto the flowsheet for MD to evaluate
- Sedation holiday
Criteria for Weaning

• Patient should be hemodynamically, metabolically, and electrolytically stable
• No pharmacological paralysis or excessive sedation
• Respiratory rate < 25/min, tidal volume more than 4-6ml/kg

Weaning Methods

• SIMV/Pressure Support
• CPAP/Pressure Support
• Pressure Support/Volume Support
• T-piece

Nursing Be Aware

• Keep your auditory sense aware to any alarm that goes off on ventilator
• Always check your patient FIRST, then check machine and tubing
• NEVER turn off or silence alarms
Nursing Responsibilities

- Assessment of ETT, Trach Care, or Oral Care (Hygiene)
- RN must ensure that manual resuscitation bag is at the bedside
  - When ventilator function is in doubt, remove pt. from vent and bag with 100% O2 and notify RT & MD
- Auscultate (suction only as needed)
- Lavage only with thick tenacious secretions
- Inform MD of ABG results

Nursing Responsibilities

- Ventilator Settings
  - Check settings with orders and kardex at onset of shift
  - Know who your RCP is and phone #
  - Clarify discrepancies between orders and actual settings
  - Assess need for ABGs after any setting changes

Alarms

- High Pressure Alarm
  - High pressure with system, obstruction to incoming airflow
    - Tubing kinked, ETT occluded, ↑secretions, coughing, ↓lung compliance
- Low Pressure Alarm
  - Loss of pressure in system
    - Tube disconnected, cuff leak or underinflated
Respiratory Care Practitioner (RCP) Responsibilities

- Assessment of ETT, trach care & assist retape ETT
- Initial set-up
- Setting changes
- Equipment maintenance, assist in suctioning regime
- Monitoring, measuring, and recording ventilatory criteria at least every 2 hours and prn
- Teamwork!!

THANK - YOU

THE END...