Care of the Patient on a Ventilator

Joe Escudero, CRTT
Director of Respiratory Care Department
LAC-USC Medical Center

Respiratory Department

- On 5th floor, IPT 5CF
  Room #107
- (323) 409-7928

2

Artificial Airways

A means to protect the airway

3

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

5

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

6

OUR GOAL TO PROTECT THE AIRWAY IS……

7

Intubate Early & Secure the Tube!!

8

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

9

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

11

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 <25cmH20
  - -Vital Capacity <15ml/kg

13

Arterial Blood Gases

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

14

Clinical Signs

- Clinical Signs
  - -Increased work of breathing
  - -Inability to clear secretions
  - -Poor general clinical status

15

EARLY TYPE

OF VENTILATORS….

16

Iron Lung

17

Rancho Los Amigos ICU (1950s)

18

Chest Curass

19

Features of the Ventilator

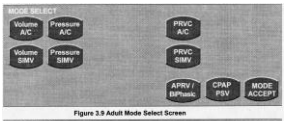

Figure 3.9 Adult Mode Select Screen

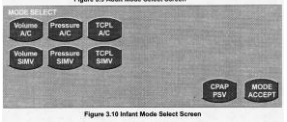

Figure 3.10 Infant Mode Select Screen

20

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

21

Ventilator: AVEA VIASYS

22

High Frequency Percussive Ventilator

23

MODES OF VENTILIATION

MODES OF VENTILIATION FEATURES

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

MODES OF VENTILIATION FEATURES

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

27

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 ie., ARDS, ALI, BPF

28

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

29

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

30

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

31

Continuous Positive Airway Pressure (CPAP/PS)

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

32

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

33

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

34

Weaning Methods

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

35

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

36

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

37

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

38

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

39

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!!

40

THANK - YOU

THE END…