



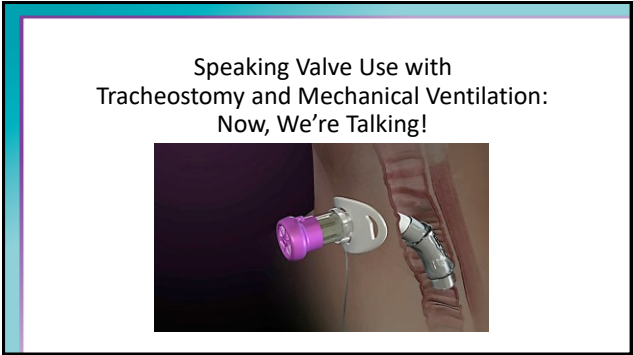
Speaking Valve Use with Tracheostomy and Mechanical Ventilation: Now, We're Talking!

Presented in 2025

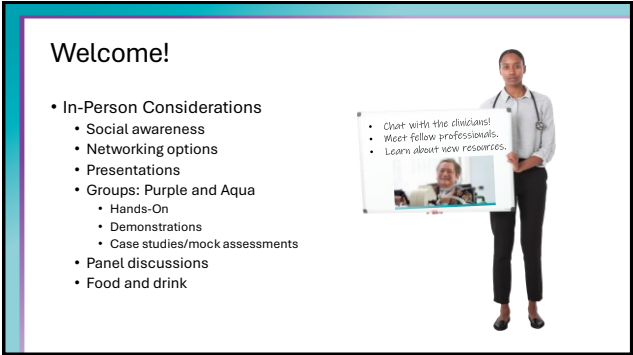
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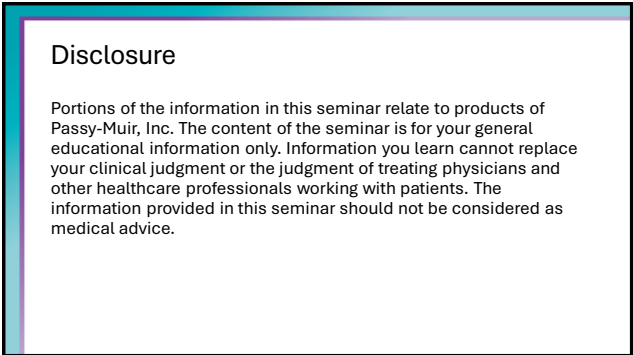
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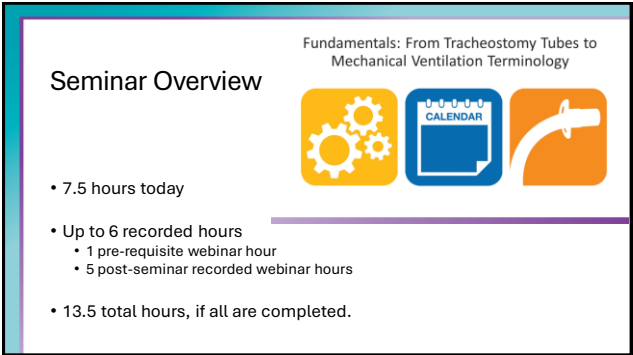
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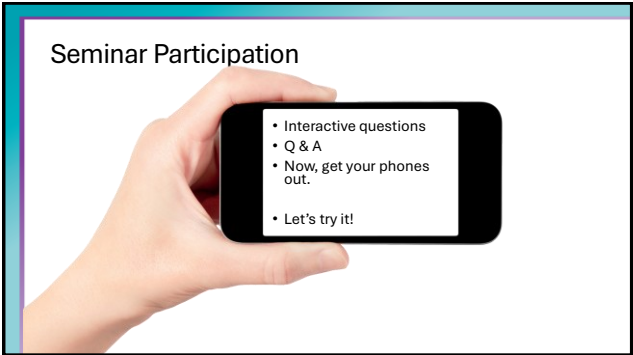
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slido




What is the actual color of the PMV 007?

① Start presenting to display the poll results on this slide.

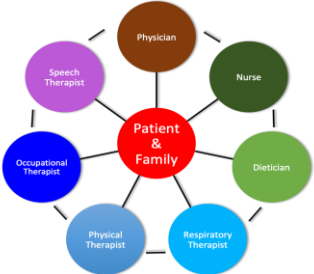
7

Assessment and Placement: Non-Ventilator




8

Interdisciplinary Airway Management Team



9

Begins in the ICU: Effects of Bed Rest



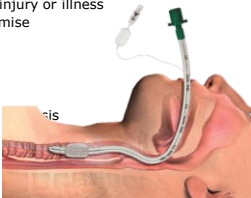
- The negative impact of bed rest is well known
- No evidence supports efficacy of bed rest
- Disuse atrophy at the cellular level begins within 4 hours of implementing bed rest
- Healthy adults, bed rest¹
 - Strength declined by 1 – 1.5% per day
 - Mood changes
 - Loss of coordination, balance and work tolerance
 - Casting: Strength declines by 25% in 7 day²

- Griffiths et al. Nutrition 1995; 11:428-432
- De Jonghe et al. CCM 2000; 5:309-315

10

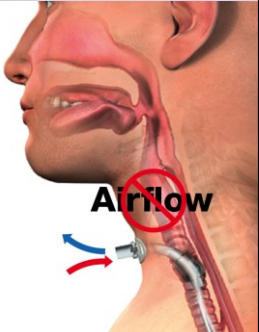
Endotracheal Tube Considerations

- Intubation
 - Why?
 - Respiratory compromise due to injury or illness
 - Potential for respiratory compromise
- Potential side effects
 - Mucosal injury
 - Injury to the vocal folds
 - Tracheal edema, ulceration, and stenosis



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Physiologic Changes after Tracheostomy

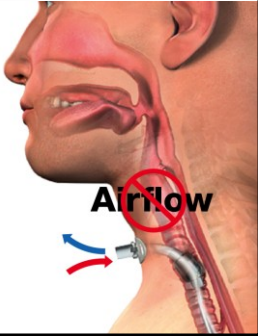


Respiration: Patient inhales and exhales through open trach tube. No airflow past inflated cuff

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Physiologic Changes after Tracheostomy


- Speech
- Smell
- Taste
- Sensation
- Reduced positive airway pressure
 - Poor secretion management
 - Reduced cough



13

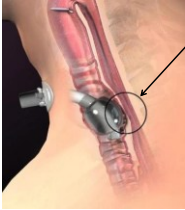
Cuff: Choices and Management

- Cuff up or down?
 - Purpose of cuff
 - Cuffs and aspiration
- Cuff pressures
 - 20 - 25 cmH₂O
 - Minimal leak
 - Minimal occlusion



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Clinical Complications of Cuff



- Esophageal impingement
- Backflow
- Necrosis and trauma
- Laryngeal tethering
- Late complications
 - Granuloma - stenosis
 - Tracheomalacia
 - Fistulae

15

Application of the PMV:
Non- Ventilator



16

For Your Health

Researchers: Medical errors now third leading cause of death in United States

My Article Explains How...


Highest rates of errors going up again, according to the study by researchers. Last year, medical errors were the third leading cause of death in the United States.

Their analysis, published in the BMJ, found that medical errors were the third leading cause of death in the United States.

Medical errors, a problem of long standing at the Johns Hopkins University School of Medicine, who led the research, said in an interview that the category includes everything from bad diagnosis to more serious errors such as communication breakdowns when patients are handed off from one department to another.


"It boils down to people doing from the care that they receive rather than the disease for which they are seeking care," Maki said.

such as communication breakdowns when patients are handed off from one department to another.



Published: May 3, 2016


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Reminder: Passy-Muir Valve




Bias-closed

No-leak

PMV 2001 (Purple color™)

What are the benefits of the Valve?

19



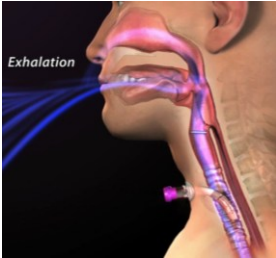
What is a benefit of using the Passy Muir Valve?

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20

Benefits of Closing the System with PMV

- Restores normal physiology
- Reconnects the upper and lower airway
- Providing a closed system
 - Communication
 - Smell and taste
 - Secretion management
 - Sensation
 - Cough
 - Swallowing
 - Positive airway pressure
 - Quality of life



21

Psychological Benefits

Communication with family

Participation in decision making

Reduced sense of isolation/ anxiety

Better sense of well-being

Communication with caregivers

• Freeman-Sanderson, A. L., Tagher, L., Shinn, M. S., & Berry, B. (2015). Quality of life improves for tracheostomy patients with return of voice: A mixed methods evaluation of the patient experience across the care continuum. *Intensive Critical Care Nursing*, 46, 10-16. doi:10.1016/j.iccn.2016.02.004

• Freeman-Sanderson, A. L., Tagher, L., Shinn, M. S., & Berry, B. (2015). An intervention to alter early speech in ventilated tracheostomy patients in an Australian intensive care unit (ICU): A randomized controlled trial. *Australian Critical Care*, 29(2), 114. doi:10.1016/j.aucc.2015.12.012


• Freeman-Sanderson, A. L., Tagher, L., Shinn, M. S., & Berry, B. (2015). Quality of life improves with return of voice in tracheostomy patients in intensive care: An observational study. *Journal of Critical Care*, 32, 186-191. doi:10.1016/j.jcc.2015.01.012

• Freeman-Sanderson, A. L., Tagher, L., Shinn, M. S., & Berry, B. (2015). Return of voice for ventilated tracheostomy patients in ICU: A randomized, controlled trial of early-targeted intervention. *Critical Care Medicine*, 44(5), 1075-1081. doi:10.1097/ccm.0000000000001659

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Impact on PEEP


- Closed System vs Open
 - Improved gas exchange
 - Improved oxygen saturation levels
 - Decreased risk of atelectasis
- "My patient is not tolerating cuff deflation trials"



23

Initiating the Assessment: Team Approach


- Have a plan: Who does what
- Block off the time
- Education
- Reassure the patient
- Perform good oral care
- Suctioning as needed
- Body position and posture
- Position of head, neck, and tracheostomy tube



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Patient Selection


- Awake and alert
- Medically stable
- Complete cuff deflation
- Manageable secretions
- Patent upper airway



25


Checklist: Take Baseline Measurements

- Oxygenation
- Vital signs
- Breath sounds
- Color
- Work of breathing
- Patient responsiveness




26

Education



27


Warning Label




28

Suctioning

- Competencies
- When to suction
- How often
- Oral and tracheal
- Secretions?
 - Color
 - Smell
 - Thickness



29




What is the best way to determine that the cuff is fully deflated?

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30


Deflate Cuff



31

Assess Upper Airway Patency

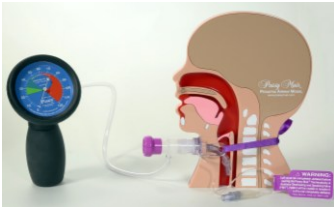
- Deflate cuff
- Ask patient to inhale
- Finger occlude and speak or cough on exhalation
- Transtracheal pressure measurements



32


Assessment for Placement

- Transtracheal pressure measurements
 - Back pressure
 - Air trapping
 - Assessing for patent upper airway



33

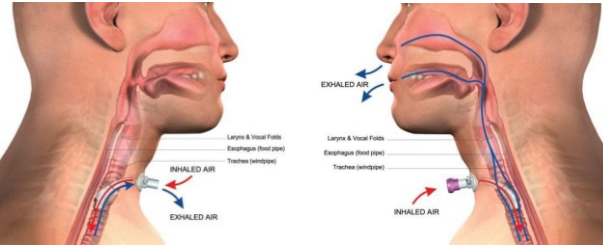
PMV Placement



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Airflow After Tracheotomy

Airflow with Closed System




35

Initial Placement: Coughing



36


Initial Placement: Voicing



37

Advantages of a Closed Respiratory System vs Open Tracheostomy

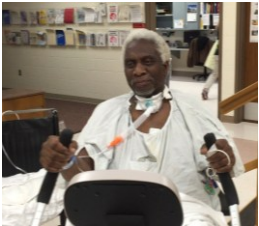
- Open tracheostomy
 - Reduced airflow
 - Reduced positive airway pressure
 - Reduction in the pressurized system
- Closed Respiratory System
 - Allows graded exhalation and pressure regulation
 - Feeding and Swallowing
 - Posture and balance
 - Upper extremity force/strength



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Pressurized System


- Restored or improved pressurized system:
 - Intraoral
 - Subglottic pressure
 - Respiratory – PEEP
 - Esophageal ??
 - Intrathoracic
 - Respiratory
- Leads to improved:
 - Feeding and swallowing
 - Cough and throat clear
 - Trunk support and postural control
 - Respiratory function



39


Wear Time

- Patient specific
 - Patient's cognitive status
 - Medical needs
- Minutes to hours
- Treatment plan



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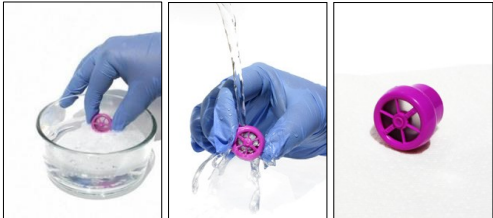
More Education



41


Care and Cleaning

- Average lifetime of 2 months




42

Decannulation:
Troubleshooting and Interventions



43


Pre and Post Decannulation



44


In Summary: What has been accomplished?

- Early intervention:
 - Avoid disuse atrophy
- Close the system to improve:
 - Phonation: access to vocal communication
 - Sensation and secretion management: cough and throat clear
 - Taste and smell
 - Time to weaning and decannulation




45

Thank you!
Any questions?



46

Breakout Sessions:
Tracheostomy Tubes and PMVs, Cuff
Management, and
Mock Assessments



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Tracheostomy Tubes and PMVs:
Purple Team




48

Cuff Management:
Aqua Team




49

Mock Assessments:
Purple and Aqua Team




50

Mock Assessment One




51



What were some signs of
distress that the patient was
showing?

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52




What are possible causes of
back pressure?

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Factors Affecting Expiratory Air Flow

- Size or type of tracheostomy tube
- Presence and degree of obstruction
- Edema
- Secretions
- Incomplete cuff deflation
- Tube position



54

Airway Obstruction



55

Troubleshooting:
Downsize or Different Brand Tube

Trach A

Trach B



56

Resolution



57



What was the resolution?

58

Mock Assessment Two: Low Level

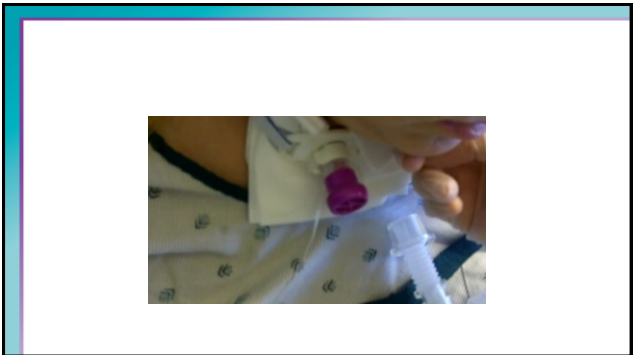


59



What are your primary considerations with a low-level patient?

60

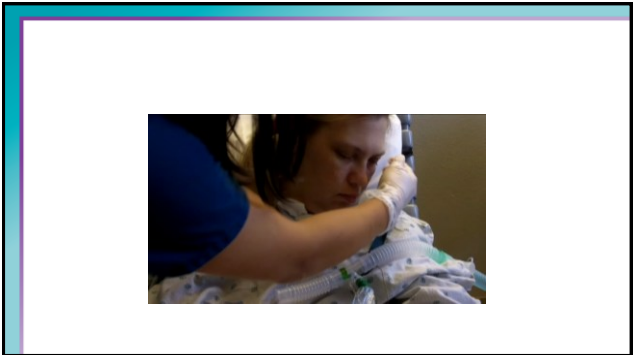


61



What could be some causes of her back pressure?

62

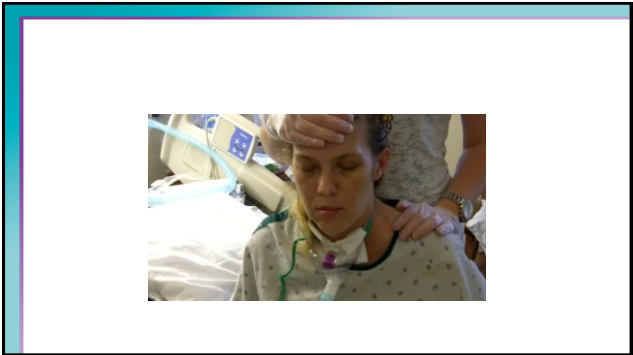


63



What would be your next step for therapy?

64



65




Why is using a PMV during ammonia testing beneficial?

66


Troubleshooting Expiratory Air Flow

- Excessive coughing?
- No voice?
- Anxiety?



67

Troubleshooting and Treatment



68

Transitioning and Troubleshooting

What if the patient cannot voice or has difficulty?

What are the steps to consider?

Step 1: Check the cuff status and patient positioning


Step 2: Reassess airway patency

Step 3: Assess the stoma/leak

Step 4: What to do next?


69

No Voice




70

Too Many Secretions



71

Cuff issue?



72

Questions to Determine Therapy

- What is diagnosis?
- Why do they have difficulty with:
 - Voice?
 - Breath support?
 - Language and/or cognition?
 - Dysarthria?
- What about swallowing?


73

Goals for treatment

- Wear time
 - Patient will wear the speaking Valve:
 - For ____ minutes to improve communication.
 - During ____-minute therapy session without need for Valve removal.
 - For ____-hour periods of time while awake.
- Other goal areas that impact wear time
 - Participate in conversation with audible voicing on ____ out of ____ sentences.
 - Complete ____ number of RMT tasks while wearing the speaking Valve.

74

Break: 15 Minutes (Lunch)




75

LUNCH



& LEARN

76

 Audience Q&A

77

Basics of Ventilator Application
of the No-leak Valve



1

Can Patients Drink While Ventilated?



2

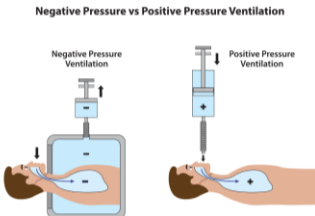
Indications for Invasive Mechanical
Ventilation

- Can no longer support with NIV
- Airway protection
- Hypercapnic respiratory failure
- Hypoxemic respiratory failure
- Cardiovascular distress
- Anticipated patient decline or impending transfer



3

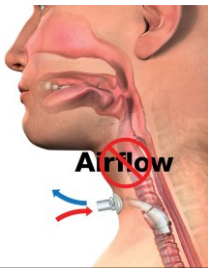
Positive Pressure Ventilation



4

Invasive Ventilation

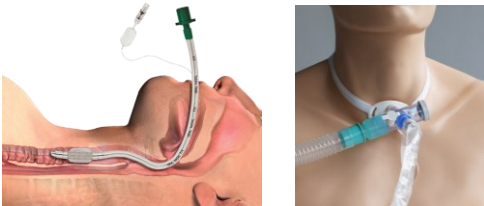
- Usually requires airway to be sealed with little to no leak present.
- Seal is achieved with a cuff at the end of the artificial airway.




5

Invasive Ventilation

- Endotracheal Tube
- Tracheostomy Tube




6




A drive through settings & modes of ventilation

7

Mode=who's driving?




- How is the breath controlled:
 - Full control
 - Assist control
 - Support only



8


Mandatory vs. Spontaneous Breathing

- **Mandatory breaths:**
 - Given by the vent at a set rate
- **Spontaneous breath:**
 - Started by the patient




9

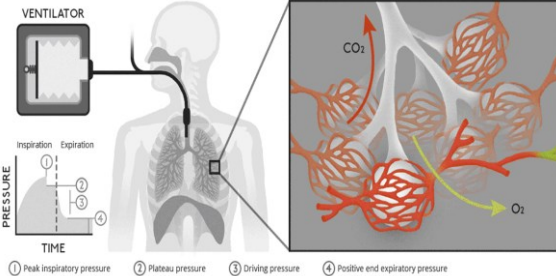
Settings=How the drive feels



- **Rate (RR)**-breaths per minute (like cruise control speed)
- **Tidal Volume (VT)**-size of each breath
- **Pressure**-force pushing air in
- **PEEP**- small amount of pressure left in the lungs at the end of exhalation, so they don't collapse
- **FiO₂** - percent of oxygen in the air given (room air is ~21%)



10




11

Conventional vs. Non-Conventional Ventilation

Conventional Ventilation	Non-Conventional Ventilation
<ul style="list-style-type: none">• Follows a normal inhalation exhalation (normal breathing)• Closely mirrors how one breathes without support	<ul style="list-style-type: none">• Does not follow normal breathing patterns• Used when lungs are damaged – air is changed to protect them

12




Modes of Ventilation

Compatible with PMV Use:

- A/C, VC, & PC
- SIMV
- CPAP/PS
- NIV

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Modes of Ventilation


Not recommended with PMV:

- PRVC
- AVAPS
- NAVA
- Other "auto" adjusted modes


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PRVC

- Vent delivers a set tidal volume
- Pressure adjusts automatically to achieve the target tidal volume
- Combines the benefits of volume and pressure control



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Measured Ventilator Parameters

- Exhaled Tidal Volume
- Exhaled Minute Volume
- Peak Inspiratory Pressure (PIP)
- Total Respiratory Rate
- Mean Airway Pressure
- PEEP

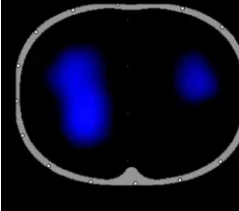
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Can Patients Eat While Ventilated?

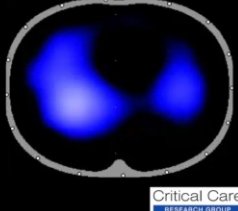


17

HFTP without Speaking Valve



HFTP with Speaking Valve



(Sutt et al. (2016). *Critical Care*. 20:91)

Critical Care RESEARCH GROUP

18

Steps For In-line Valve Placement

19

Why use a Passy-Muir Valve with patients who are mechanically ventilated?

- Verbal communication
- Improved lung recruitment and diaphragm involvement
- More rapid weaning from the ventilator
 - Rehabilitation tool
- Improved secretion management
 - More effective cough
 - Reduces need for suctioning
- Improves quality of life



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Step 1: Assessment

22

Patient Selection Criteria



- Awake and alert
- Hemodynamically stable
- Able to manage complete cuff deflation
- Manageable secretions
- Patent Airway

23

Establish Baseline: Assess Vital Signs and Work of Breathing

- Oxygenation
- Vital Signs
- Breath sounds
- Color
- Work of breathing
- Patient responsiveness



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Assess Ventilator Parameters

Three parameters that give you the general state of your patient's respiratory status:

1. FiO_2


2. PEEP

3. PIP



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Assess Ventilator Parameters



FiO_2


• Fraction of inspired Oxygen

• Room Air 21%

• Supplemental $\text{O}_2 > 21\%$

26

Assess Ventilator Parameters



PEEP


• Positive End-Expiratory Pressure

• Extra pressure left in the lungs at the end of exhalation that stents the alveoli open

• PEEP and FiO_2 work together to improve oxygenation

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Assess Ventilator Parameters



PIP (Peak Inspiratory Pressure)

• The max amount of pressure to deliver volume

• Sum of the inspiratory pressure required to deliver volume + PEEP

• PIP indicates the compliance of the lungs

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"Must Know" for PMV Use


• $\text{FiO}_2 \leq .50$

• $\text{PEEP} \leq 10 \text{ cmH}_2\text{O}$

• $\text{PIP} \leq 40 \text{ cmH}_2\text{O}$

• VTi & VTe

• Patient stability and ability to manage secretions and tolerate cuff deflation



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Step 2: Patient Preparation and Education

30

Team Approach

- Timing and tube selection
- Introducing a speaking valve
- When to downsize
- Plan of care
- Decannulation
- Impacts continuity of care
- Impacts safety, length of stay, and cost



31

Patient Preparation

- Body position and posture
- Position of head, neck, and tracheostomy tube



32

Pre-Placement, General Observations, and other Considerations

- Have a plan and block time
 - Pick a good time of the day
 - Reduce noise and interference
- Education
 - Reassure the patient
- Address pain issues
- Position the patient



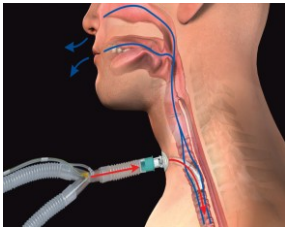
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Step 3: Assess For Airway Patency

34

Airway Patency Assessment With Mechanical Ventilation

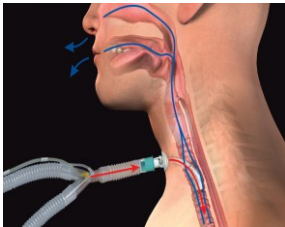
- Requires complete cuff deflation
- Assess the leak or airflow into the upper airway
- Use vent parameters to determine airway patency



35

Cuff Deflation and Mechanical Ventilation

- Set parameters do not change when cuff is deflated
- Cuff deflation generates less resistance to flow
- Ventilatory system is no longer sealed, there is a leak



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Settings in Volume Ventilation



- VT
- RR/f
- PEEP
- Inspiratory Time
- Trigger Sensitivity
- FiO₂
- Alarms

37

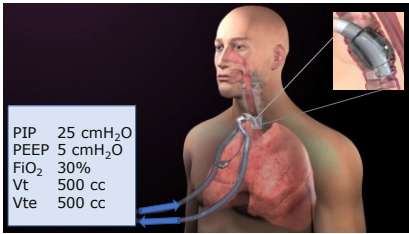
Ventilator Assessment

- Note Vent Settings:
 - Set Vt
 - PEEP
 - RR/f
 - FiO₂
- Note Vent Measurements
 - PIP
 - Exhaled Vt (Vte)
 - Total RR



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VC: Patient Assessment



39

Upper Airway Patency Assessment

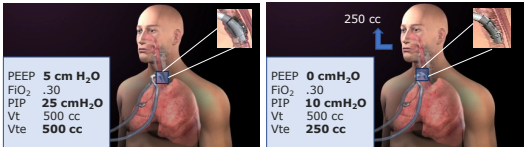
- Turn Down PEEP
 - PEEP down by 5
- Then,
 - Slow cuff Deflation



40

Upper Airway Patency

Cuff Inflated-Closed Circuit Cuff Deflated-Open Circuit



41


Upper Airway Patency Assessment



42

Settings in Pressure Ventilation


- Inspiratory Pressure
- RR/f
- PEEP
- Inspiratory Time
- FiO₂
- Trigger Sensitivity
- Alarms



43

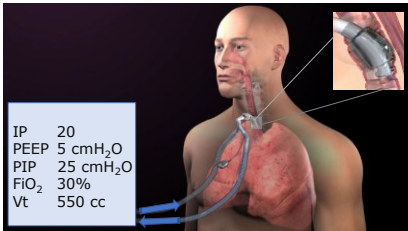
Ventilator Assessment

- Note Vent Settings:
 - Set IP
 - PEEP
 - RR/f
 - FiO₂
- Note Vent Measurements
 - PIP
 - Exhaled Vt (Vte)
 - Total RR



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PC: Patient Assessment



IP 20

PEEP 5 cmH₂O

PIP 25 cmH₂O


FiO₂ 30%

Vt 550 cc

45

Upper Airway Patency Assessment

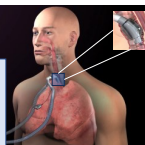
- Turn Down PEEP
 - PEEP down by 5
- Then,
 - Slow cuff Deflation



46

Upper Airway Patency

Cuff Inflated-Closed Circuit



PEEP 5 cmH₂O

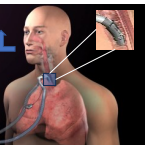
FiO₂ .30

PIP 25 cmH₂O

Vti 550 cc

Vte 550 cc

Cuff Deflated-Open Circuit



PEEP 0 cmH₂O

FiO₂ .30

PIP 20 cmH₂O

Vti 700 cc

Vte 330 cc

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Step 4: Assemble the Necessary Parts & Pieces

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8

Ventilator Connections



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In-line Placement of the PMV® 007 (Aqua color™)



50

In-line Placement of the PMV® 2001 (Purple color™)



51

Apply Pilot Balloon Warning Label



52

Step 5: Place the Valve In-line and Assess the Patient

53

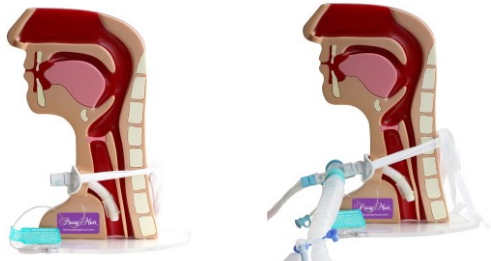
Factors Affecting Airway Patency

- Tracheostomy tube
- Cuff issues
- Airway obstruction



54

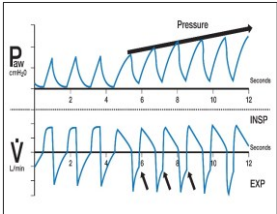
Importance of Tube Position



55

Troubleshooting

- PIP increases with each breath
 - Increased WOB is observed
 - High pressure limit alarms
- Valve is removed
 - A loud whooshing sound heard from the tracheostomy tube
- What could cause this?
- Recommendations?



56

Listen for Back Pressure



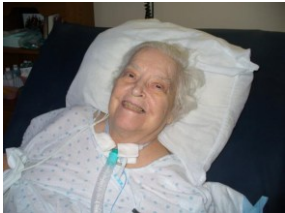
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Step 6: Adjust the Vent as Necessary

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Ventilator Assessment and Adjustments

- Adjust PEEP
- Evaluate sensitivity
 - Pressure vs. Flow Trigger



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Ventilator Assessment and Adjustments


- Volume compensation
 - Increase V_T in small increments to achieve pre-cuff deflation PIP



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Ventilator Assessment and Adjustments

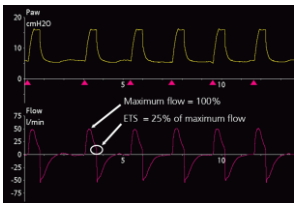
- Pressure Ventilation
 - May adjust to achieve audible voice and adequate ventilation



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Ventilator Assessment and Adjustments


- Pressure Support
 - Exp % sensitivity
 - Inspiratory cycle off
 - Set I-time
- Pressure Control
 - Set I-time



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Considerations with NIV

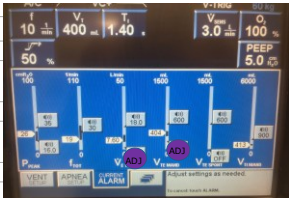
- Airway patency assessment should not be done in NIV
- Uses the same settings or as close as possible
- Maybe necessary to do a trial prior to cuff deflation and Valve placement



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Alarm Settings – Safe Practice


- Low exhaled Vt and Ve alarms
- Low pressure alarm
 - Set 5 to 10 cmH₂O below PIP
- High pressure alarm
 - Set 10 cmH₂O above PIP
- High respiratory rate
 - 10 to 15 above baseline



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Humidification

- Heat/Moisture Exchanger (HME) is ineffective
- Use with Heated Systems
- Remove PMV for medicated treatments



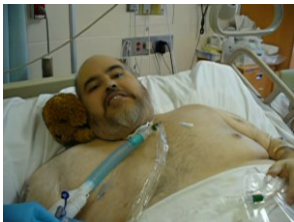
65

Ventilator Settings and Alarm Management



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Case Study



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Gil

- Ventilator settings:
 - A/C RR 8
 - V_T 700 cc
 - PIP 35 cmH₂O
 - PEEP 5 cmH₂O
 - F_{IO_2} .28
- Tracheostomy
 - 1 month
 - Size 8 Shiley XLT



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Cuff Deflation Assessment

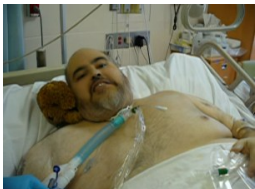
- Adjust PEEP
- Slow cuff deflation
- Ventilator:
 - Exhaled V_T 300 cc
 - PIP 12 cmH₂O
- Patient:
 - Weak cough
 - Voicing
- Should the Valve be placed in-line?



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Vent Changes Increase Success

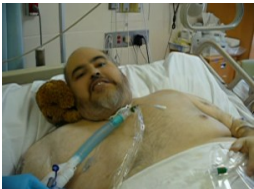
- Valve is placed in-line
- Assessment reveals:
 - Whispers only
 - Poor chest expansion
 - Increased RR
- What ventilator change could be made?



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Vent Changes Increase Success

- Vent change:
 - Increase V_T to meet but not exceed pre-cuff deflation PIP



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Gil



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**VITO
Demonstration**



73

**Breakout Sessions:
Ventilator Application and
Mock Assessments**



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Hands-On: Parts and Pieces



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**Mock Assessment:
Stacie**



76



What would you do next?

77

Stacie



78



What modes of ventilation are compatible with the Valve?

79

Stacie



80



Cuff is deflated without adjusting PEEP. What are your considerations?

81



What is the first step in removing the Valve?

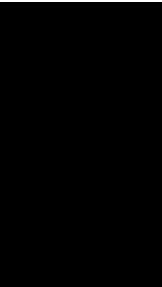
82

Stacie



83

Mock Assessment: 2

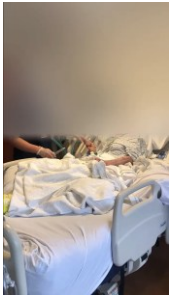


84



What issues did you see?

85



86



What would have been the correct order in removing the Valve?

87

Trachlore, Barriers, and More

- Panel Discussion – starting point:
 - You have to wait until a patient is weaned from the ventilator.
 - Our patients are too sick to use a Valve.
 - You need a fenestrated tracheostomy tube.
 - We have to keep the cuff inflated due to aspiration.
 - My patient cannot tolerate cuff deflation trials, so they are not ready for a Valve.
 - My patient speaks with a leak, so a Valve is not needed.
- What have you heard?

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Audience Q&A

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- Go to: <https://ep.passy-muir.com>
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- Click on the purple box
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 - Labeled "Enter Meeting Code Here"
- The meeting code is:

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