

Division of Pulmonary and Critical Care Medicine

# COVID-19 Bootcamp: Airway Management

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April 21, 2020



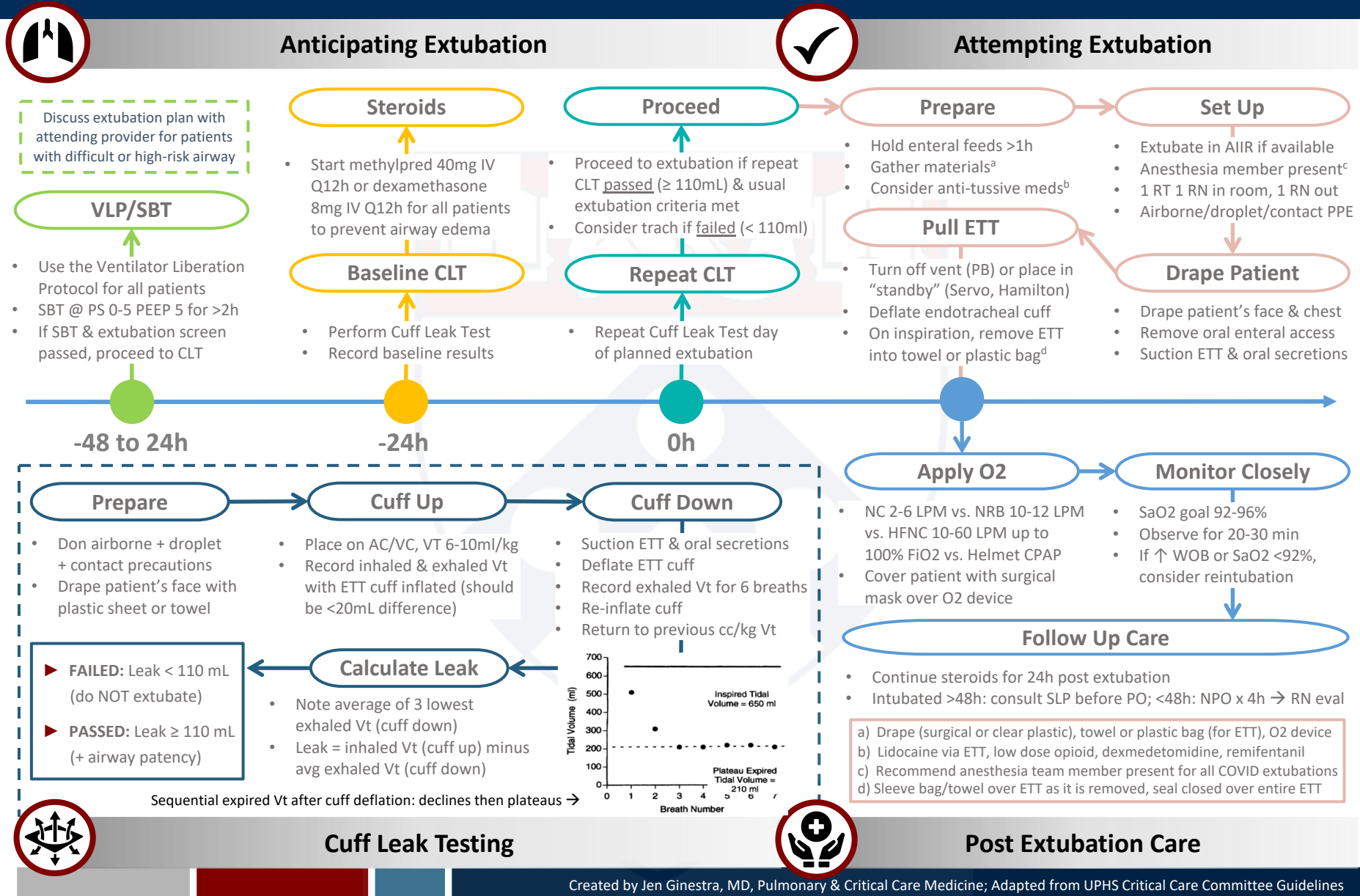


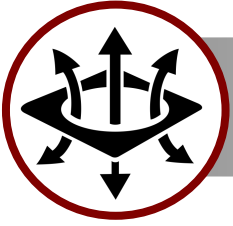
# Extubation



# Penn Medicine COVID-19 Clinical Guide: Extubation

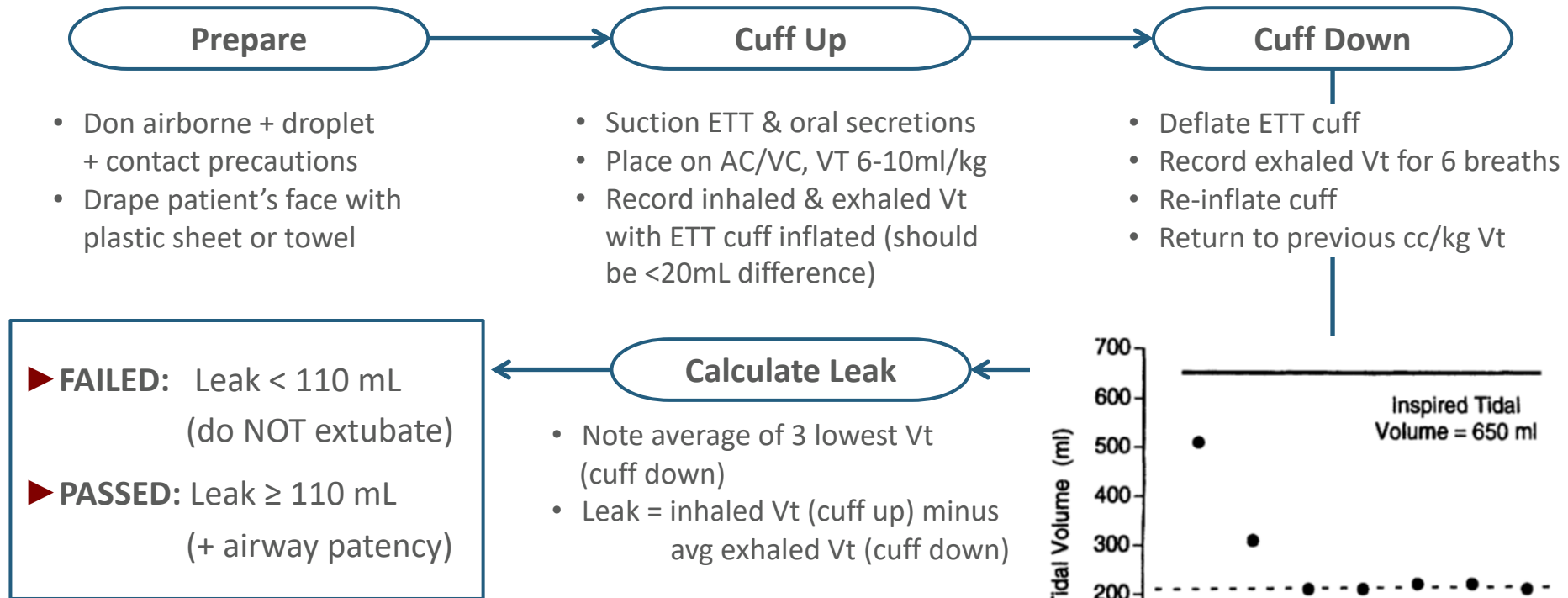
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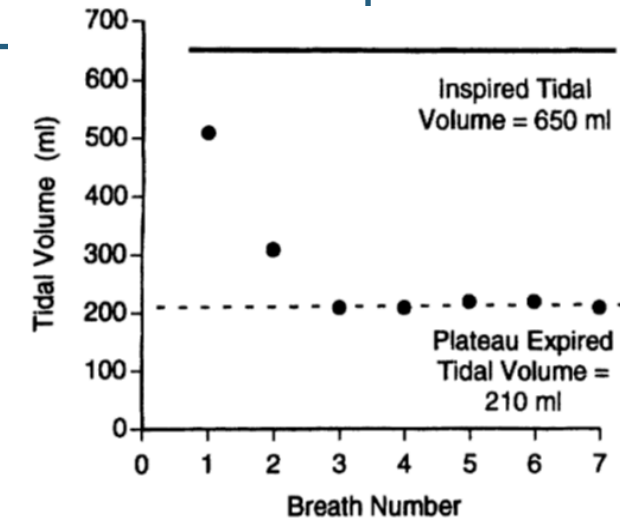
# Cuff Leak Testing

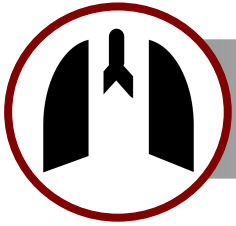
Failed CLT predicts risk of reintubation  
with 86% specificity, 63% sensitivity



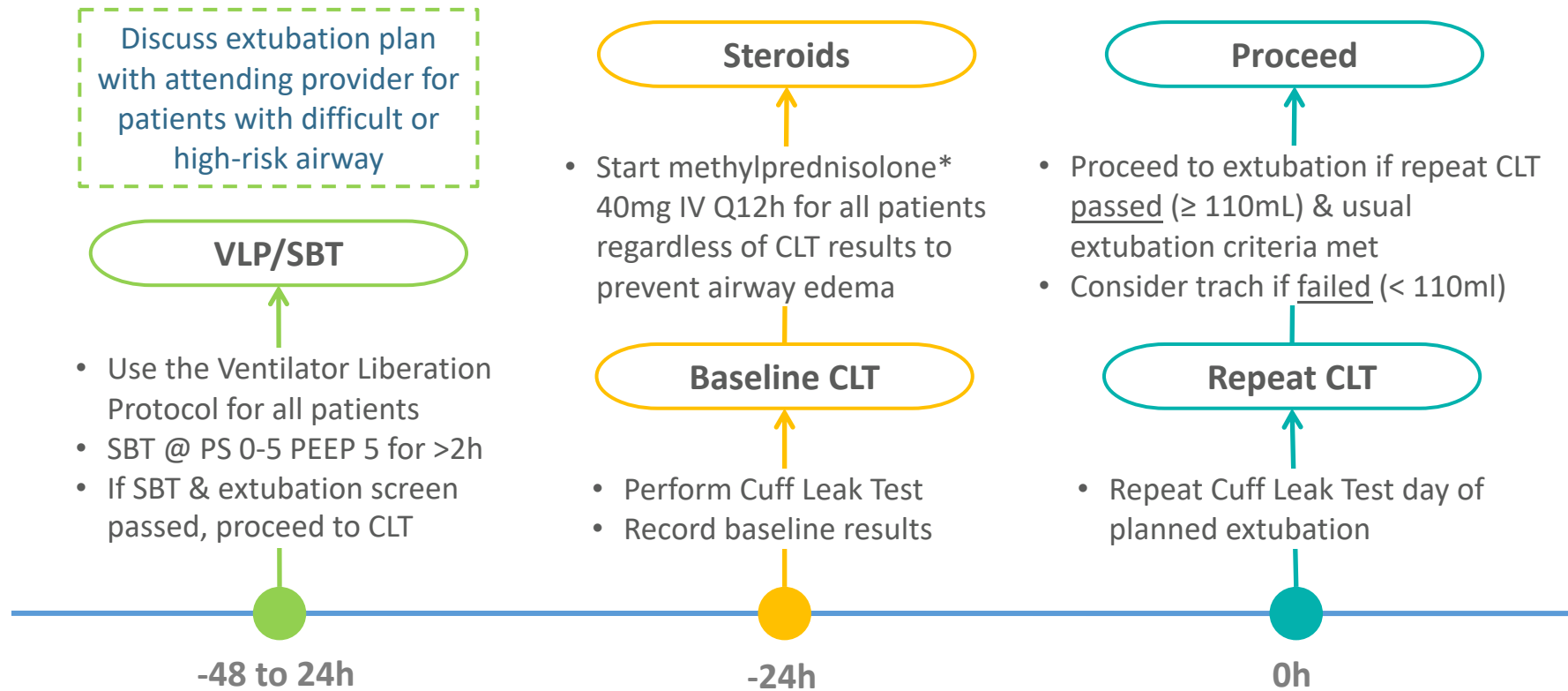
**Note:** Some studies also use >10% of the inhaled VT, or audible leak as additional criteria for positive leak. However, we would caution reliance on these criteria alone, especially in the era of low tidal volume ventilation.

**Note:** Can be falsely negative due to secretions around ETT, or large caliber ETT.





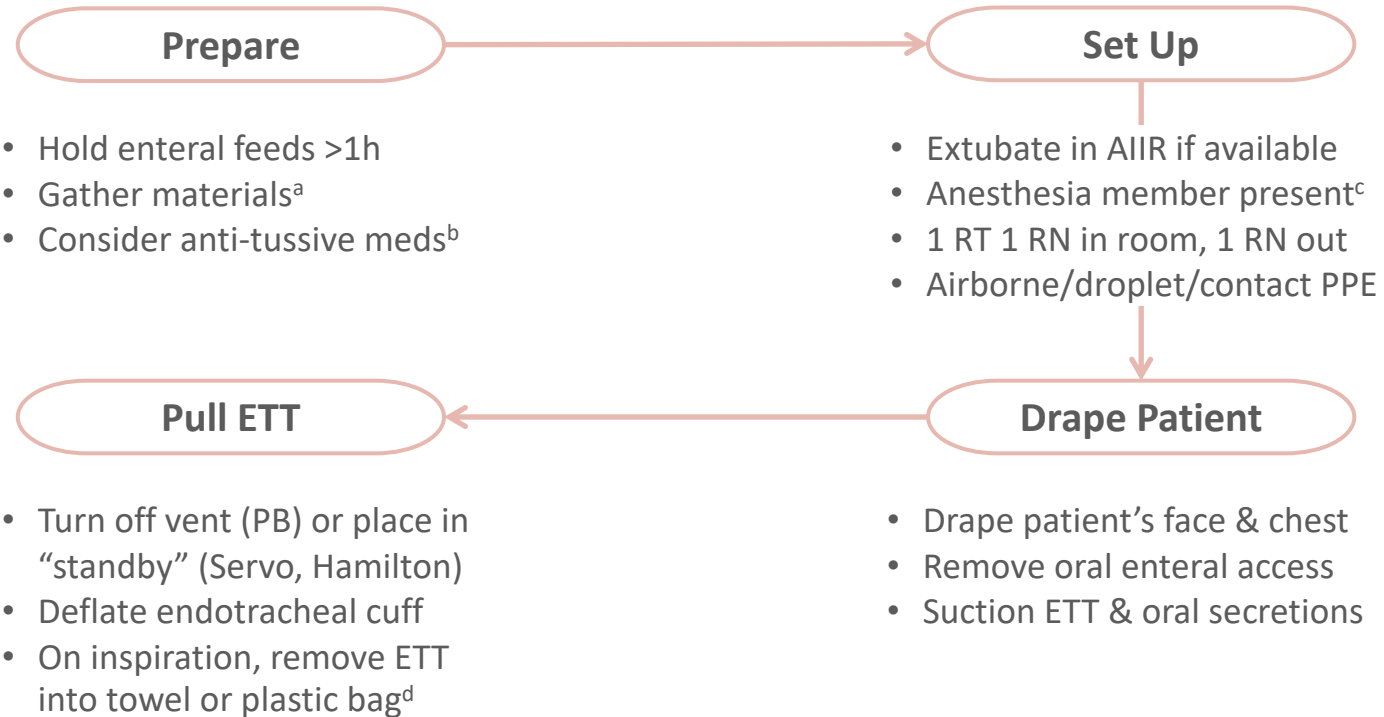
# Anticipating Extubation



\*Can also consider dexamethasone 8mg Q12



# Attempting Extubation



a) Drape (surgical or clear plastic), towel or plastic bag (for ETT), O2 device  
b) Lidocaine via ETT, low dose opioid, dexmedetomidine, remifentanyl

c) Recommend anesthesia team member present for all COVID-19 extubations  
d) Sleeve bag/towel over ETT as it is removed, seal closed over entire ETT



# Post Extubation Care

## Apply O2

- NC 2-6 LPM vs. NRB 10-12 LPM vs. HFNC 10-60 LPM up to 100% FiO<sub>2</sub>, or helmet CPAP
- Cover patient with surgical mask over O<sub>2</sub> device

## Monitor Closely

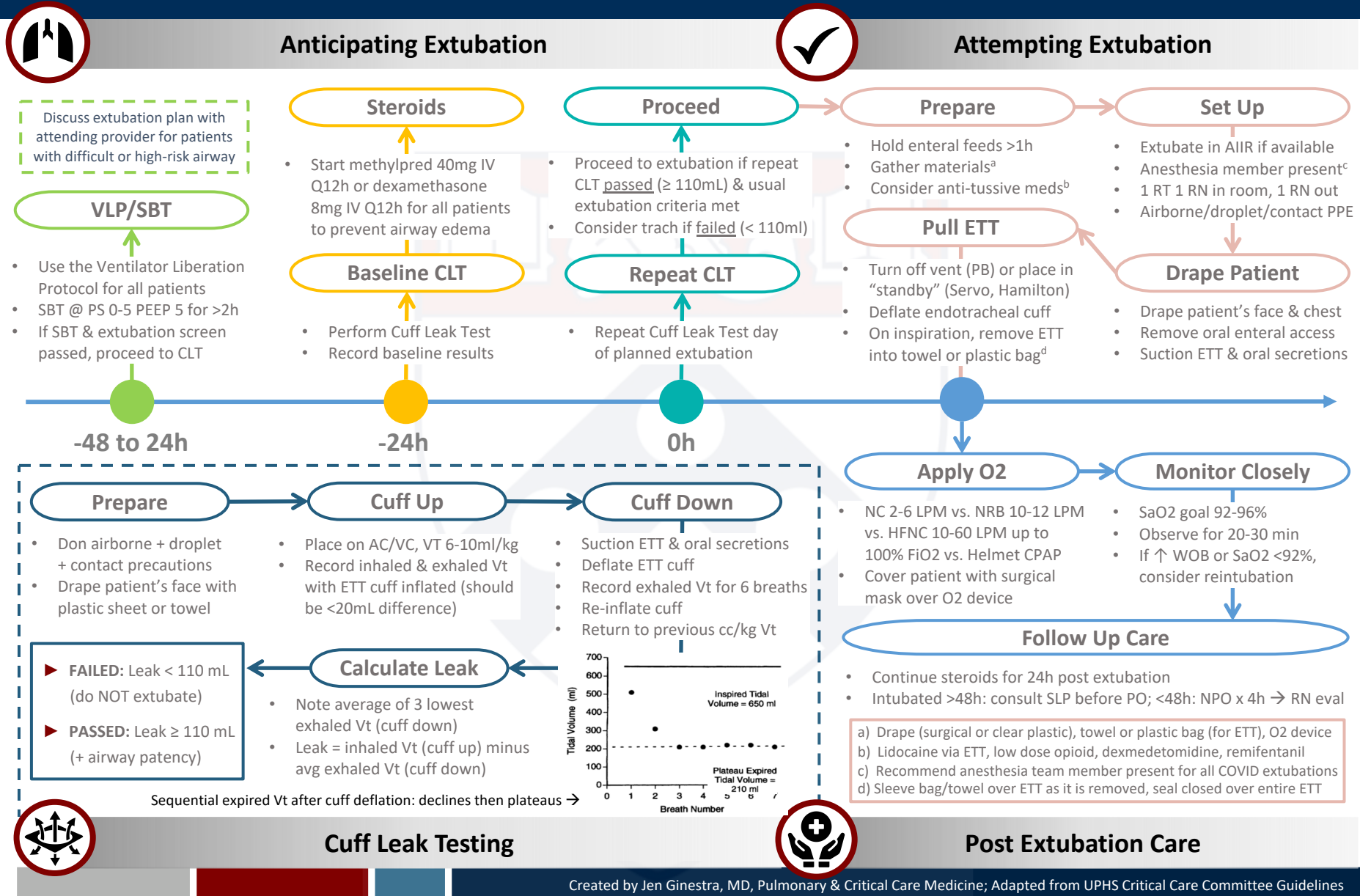
- SaO<sub>2</sub> goal 92-96%
- Observe for 20-30 min
- If ↑ WOB or SaO<sub>2</sub> <92%, consider reintubation

## Follow Up Care

- Continue steroids to complete 48-hour regimen
- Intubated >48h: consult SLP before PO
- Intubated <48h: NPO x 4h → RN eval

# Penn Medicine COVID-19 Clinical Guide: Extubation

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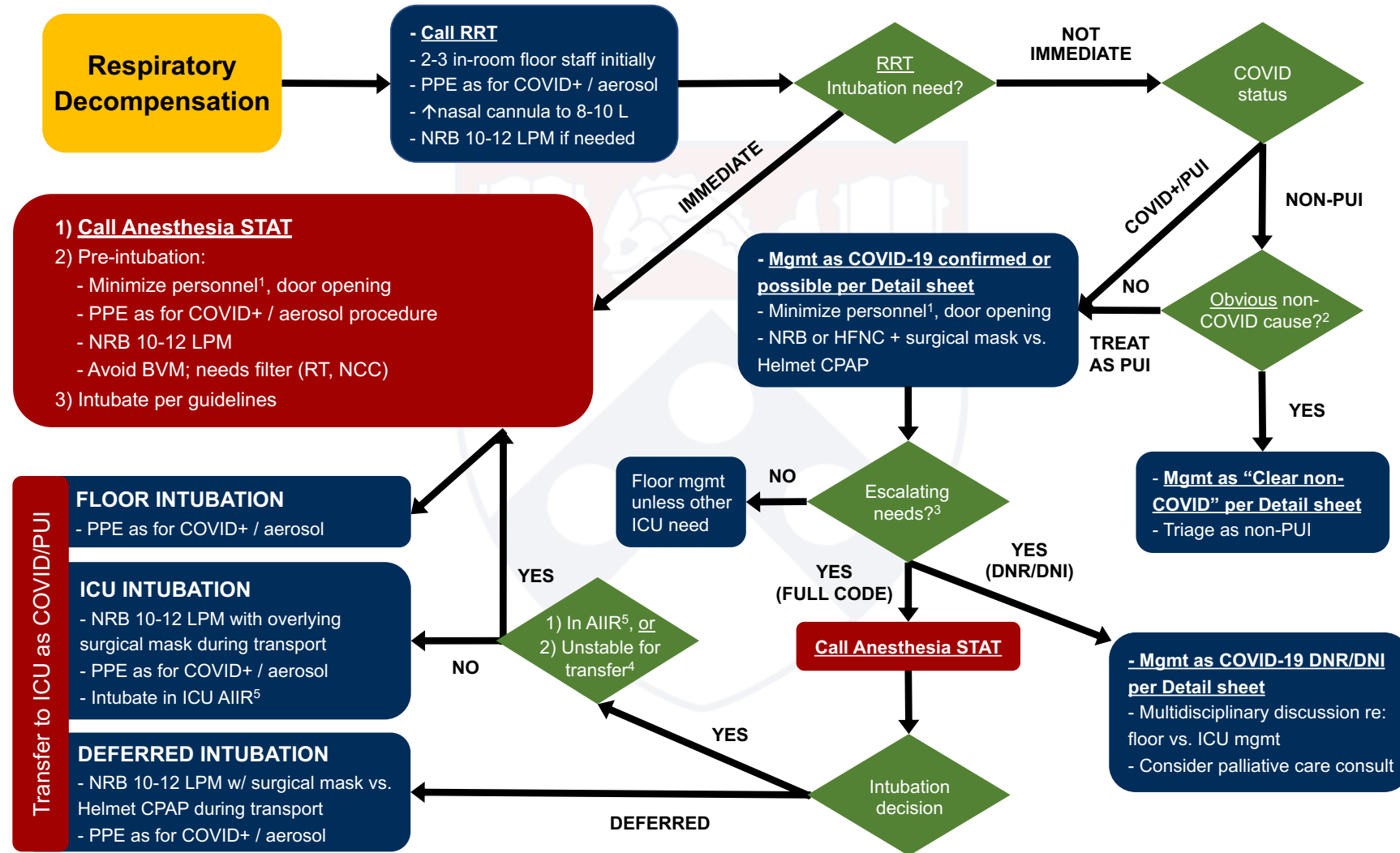




# Penn Medicine COVID-19 Clinical Guide: Respiratory Clinical Emergencies

See accompanying Detailed Respiratory Therapy Escalation sheet

See complete SharePoint guideline for details – Updated 4/20/20 – Recommendations may evolve rapidly – Do not save file – If printed, update frequently – See latest version [here](#)



¹Anesthesia (1-2); Nurse (1); RT (1); RRT provider (1)

²E.g. witnessed aspiration

³Persistent higher O₂ needs, ↑work of breathing

⁴Plan for ↑ transport time for PUIs

⁵Airborne Infection Isolation Room, i.e. negative pressure room

# Penn Medicine COVID-19 Clinical Guide: Detail Respiratory Therapy Escalation

See accompanying Decision Pathway for Respiratory Clinical Emergencies

See complete SharePoint guideline for details – Updated 4/20/20 – Recommendations may evolve rapidly – Do not save file – If printed, update frequently – See latest version [here](#)

COVID-19 STATUS			
Clear Non-COVID Etiology	COVID-19 Possible / PUI	COVID-19 Confirmed	
Upgrade to droplet + contact PPE	Upgrade to airborne + contact PPE given the likelihood of aerosol-generating interventions		
HYPOXEMIA (↑WOB or SaO <sub>2</sub> <92% on 6L LPM)			
Normal Management (HFNC, NRB, etc.)	Consider Early Intubation <i>given risk of rapidly progressive respiratory failure</i>		
	Trial HFNC Flow: 10-60 LPM – FiO <sub>2</sub> : up to 100%	Place surgical mask over nose/mouth & O <sub>2</sub> delivery device	
	-or- Temporize with NRB Flow: 10-12 LPM		
	-or- Trial Helmet CPAP Flow: 50 LPM – FiO <sub>2</sub> : up to 60% – PEEP: 5-10 HFNC as needed for breaks (e.g. during sleep)		
	Consider ICU transfer (see accompanying <u>Decision Pathway</u> )		
	If trial without intubation, REASSESS within 1 HR		
HYPERCAPNIA			
Trial NPPV* Healthcare workers wear N95 + face shield & minimize door opening until COVID testing neg (Call ID for expedited COVID testing)	Consider Early Intubation <i>given risk of rapidly progressive respiratory failure</i>		
	Trial NPPV* PS 5-10 – PEEP: 8-10 – FiO <sub>2</sub> : 60% (SaO <sub>2</sub> goal 88-92%)		
	Consider ICU transfer		
*Call NIV team for approval on medical floors (approval not needed in ED or ICU) Use non-vented mask + active ventilation circuit w/ exhalation filter Avoid patient transport on NPPV			
REASSESS → usual management	If trial, REASSESS within 1 HR		

## Stable Chronic Hypercapnia

Regardless of COVID-19 Status  
OSA only: No NPPV allowed for this indication  
COPD, OHS, NMD: contact NIV team for recs

## \*NIV Team Phone Numbers

HUP: 215-964-7480 CCH: 610-731-9736  
PMC: 267-591-3767 MCP: 732-672-6450  
PAH: 610-529-5171 chronic LGH: 412-491-7603  
215-498-6357 acute

## COVID-19 DNR/DNI

### Patients with restorative goals

Mgmt same as per table with the following modifications:

Opioid PO or IV PRN first line symptom mgmt

Engage multidisciplinary discussion to consider whether patient can be safely managed on floor despite high  $\text{FiO}_2$

Do NOT intubate

### Patients with comfort measures only goals

Supplemental O2 via NC up to 6 LPM  
Opioid PO or IV PRN first line symptom mgmt

## INTUBATION

All intubations, including ICU intubations should be called **overhead STAT**

See accompanying **Decision Pathway** for intubation, triage, and ICU transfer processes

For most patients, use  
**Low Stretch Protocol for ARDS**

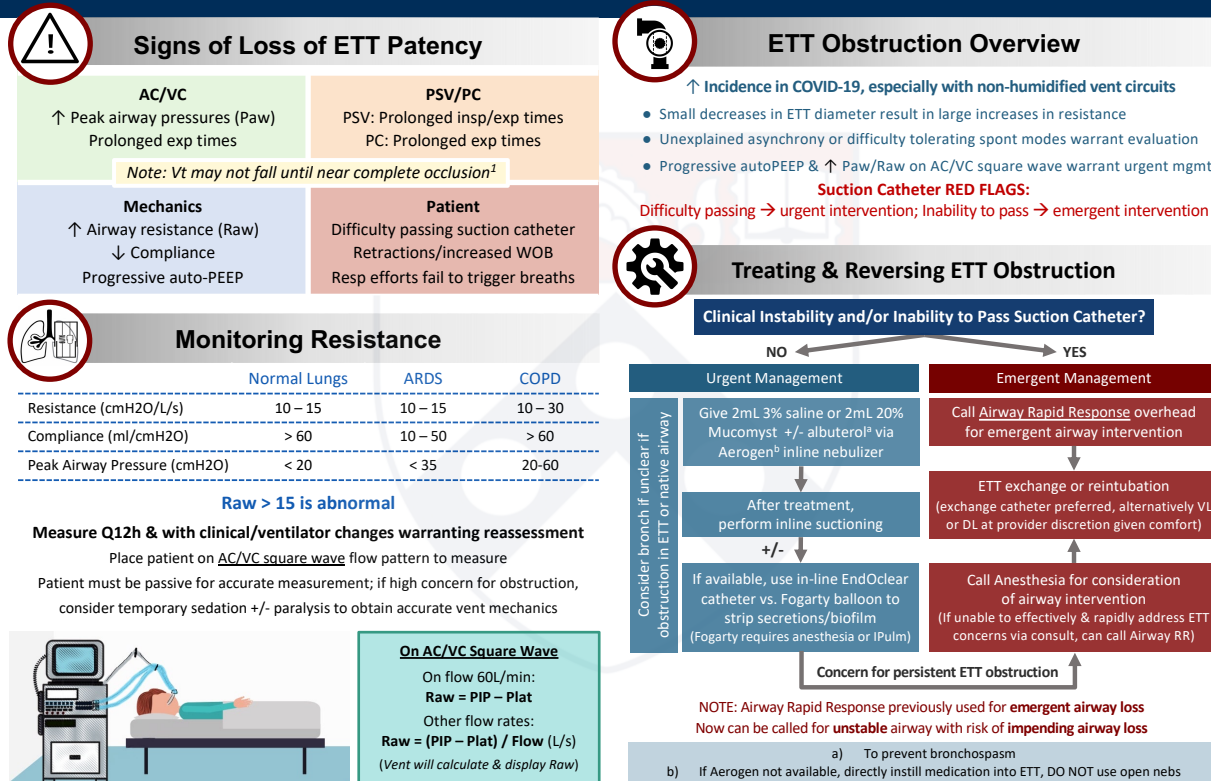
**$\text{SaO}_2 < 92\%$  or  $\text{pH} < 7.3$**   
despite maximal interventions

# Questions?

## Front Line Experience?

### Penn Medicine COVID-19 Clinical Guide: Endotracheal Tube Obstruction

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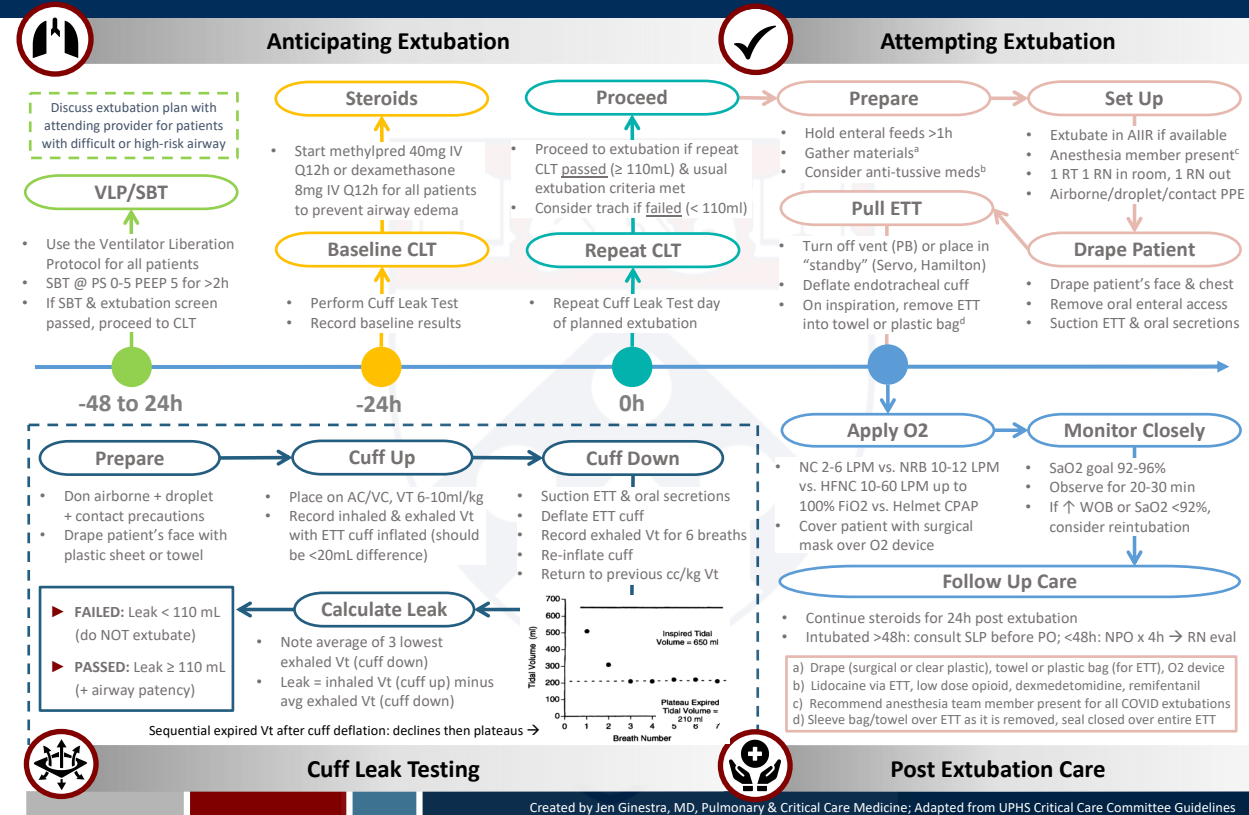


<sup>1</sup>Tung. Anesth Analog. 2002

Created by Jen Ginestra, MD, Pulmonary & Critical Care Medicine; Adapted from UPHS Critical Care Committee Guidelines

### Penn Medicine COVID-19 Clinical Guide: Extubation

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#### Cuff Leak Testing

Sequential expired Vt after cuff deflation: declines then plateaus →

**Prepare**

- Don airborne + droplet + contact precautions
- Drape patient’s face with plastic sheet or towel

**Cuff Up**

- Place on AC/VC, VT 6-10ml/kg
- Record inhaled & exhaled Vt with ETT cuff inflated (should be <20mL difference)

**Cuff Down**

- Suction ETT & oral secretions
- Deflate ETT cuff
- Record exhaled Vt for 6 breaths
- Re-inflate cuff
- Return to previous cc/kg Vt

**Calculate Leak**

- Note average of 3 lowest exhaled Vt (cuff down)
- Leak = inhaled Vt (cuff up) minus avg exhaled Vt (cuff down)

**FAILED:** Leak < 110 mL (do NOT extubate)

**PASSED:** Leak ≥ 110 mL (+ airway patency)

**NOTE:** Inspired Tidal Volume = 650 ml

<sup>1</sup>Tung. Anesth Analog. 2002

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