Ventilator Liberation and Tracheostomy

SAT and SBT, cuff leak and steroids, HFNC or NIV after extubation, stridor, trach care and NTSP emergencies

DAILY SCREEN: WAKE, THEN BREATHE

Ranges span ARDSNet and Wake Up and Breathe.

SCREEN	USUAL PASS MARK
Cause	Improving; own breathing efforts; no paralytic
Oxygenation	FiO_2 ≤0.40–0.50, PEEP ≤5–8, SpO_2 ≥88–90%
Circulation	No or low-dose vasopressor (Subirà 2019); no ischemia
Sedation	Passed SAT: awake, RASS −1 to +1

- SAT first; failed SAT: restart sedation at half dose, rescreen in 24 h.
- ABC trial (Girard 2008): SAT plus SBT added 3.1 ventilator-free days; 1-year mortality 44% vs 58%.
- Screen each morning, SBT before noon (AARC 2024); use a protocol and early mobility (ATS/CHEST 2017).

RUNNING THE SBT

- PS 5–8 cm H_2O (ATS/CHEST 2017), T-piece or CPAP (AARC 2024: either).
- 30–120 min; do not raise FiO_2.
- PS 8 for 30 min beat 2 h of T-piece, 82.3% vs 74.0% extubated (Subirà 2019); equal at high risk (Thille 2022).

FAIL THE SBT FOR	THRESHOLD
Breathing	RR >35 or <8; SpO_2 <88–90%; Vt <4 mL/kg PBW; pH <7.30
Circulation	HR >140 or 20% change; SBP >180 or <90; new arrhythmia
Distress	Agitation, drowsiness, sweating, accessory muscles, paradox

Failed: full support, find the cause, retry in 24 h.

EXAM TIP RSBI = RR ÷ Vt in liters; under 105 favors success (sensitivity 0.97, specificity 0.64; Yang and Tobin 1991). Not needed before an SBT (AARC 2024).

BEFORE THE TUBE COMES OUT

- Airway protection: follows commands, cough peak flow >60 L/min, manageable secretions (Salam 2004).
- Leak test for high stridor risk: traumatic intubation, >6 days, large tube, female, reintubation after unplanned extubation (ATS/CHEST 2017).
- Volume A/C, suction above the cuff, deflate; leak = set Vt − mean exhaled Vt; fail <110 mL (Miller and Cole 1996) or about 10–25% of Vt.
- Failed but otherwise ready: IV steroid ≥4 h before extubation; no retest (ATS/CHEST 2017).

Methylprednisolone 40 mg once 4 h before (Cheng 2011) or 20 mg every 4 h from 12 h before (François 2007); dexamethasone 5 mg every 6 h × 4 (Lee 2007).

AFTER EXTUBATION

ERS 2022: NIV over HFNC for high risk unless contraindicated.

PATIENT	SUPPORT	EVIDENCE
Low risk	HFNC over standard O_2	Reintubation 4.9% vs 12.2% (Hernández 2016)
High risk: >65, heart failure, COPD, obesity	NIV at once, HFNC between	ATS/CHEST strong; 11.8% vs 18.2% (HIGH-WEAN)
Hypercapnic in the SBT	NIV	Failure 15% vs 48% (Ferrer 2009)

SAFETY NIV prevents failure but does not rescue it: in established failure it delayed reintubation (12 vs 2.5 h) and raised ICU deaths (25% vs 14%; Esteban 2004).

- Failure: reintubation within 48–72 h (some trials: 7 days), 10–20%; mortality 43% vs 12% (Epstein 1997), higher if after 12 h (Epstein 1998).
- Early: stridor, secretions, aspiration. Later: fatigue, heart failure, encephalopathy.
- Stridor: sit up, nebulized epinephrine, IV methylprednisolone 20–40 mg or dexamethasone 5 mg; heliox buys time; worsening: reintubate early, smaller tube (Pluijms 2015).
- Swallow screen before oral intake.

TRACHEOSTOMY: TIMING AND DAILY CARE

TracMan (Young 2013): day 4 vs 10 or later, 30-day mortality 30.8% vs 31.5%; only 44.9% of the late group ever got one.

TUBE PART	NURSING POINT
Cuff	20–30 cm H_2O by manometer each shift (ICS: ≤25)
Inner cannula	Remove to clear a block; clean at least 8-hourly off vent
Fenestration	For speech; caution while ventilated
Subglottic port	Suction above the cuff before deflating

- Humidify always; clean stoma daily; foam dressing; two people for tie changes.
- Suction when needed: catheter under half the lumen, ≤15 s, no routine saline (AARC 2022).
- Speaking valve: cuff fully deflated, patient awake; remove for distress.
- Bedside: spare tubes (same size, one smaller), obturator, syringe, suction, bag, capnography.
- First elective change not before day 4 (surgical) or 7–10 (percutaneous) (ICS 2014).

BLOCKED OR DISPLACED TRACH (NTSP)

1. Call the airway expert; read the bedhead sign (green trach, red laryngectomy).
2. Look, listen, feel at mouth and stoma; capnography on the tube.
3. High-flow O_2 to face and stoma; no pulse: CPR.
4. Remove speaking valve or cap and inner cannula.
5. Suction catheter passes: suction, ventilate if apneic, reassess.
6. Won't pass: deflate the cuff; no better: remove the tube.
7. Oxygenate: bag-mask over mouth with stoma covered, or small mask or LMA on stoma.
8. Expert: uncut oral tube past the stoma, or 6.0 cuffed tube into it.

Laryngectomy: oxygenate and ventilate via the stoma only. Stoma under 7 days old: no blind reinsertion (false passage).

Sources (26) are listed with links at icubasics.com/sheets/vent-liberation.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.