

EVALUATING READINESS FOR EXTUBATION

When evaluating a patient for potential extubation, we suggest using a systematic approach, as outlined below, to guide decision-making.

1 Has the underlying cause of the patient's respiratory failure improved?

This is the most important question to consider!

2 Is the patient ready for a spontaneous breathing trial (SBT)?

All criteria should be met

- Making spontaneous respiratory efforts
- $\text{PaO}_2/\text{FiO}_2 \geq 200$
- $\text{PEEP} \leq 10$
- If on vasopressors, dose is low to moderate and not increasing
- Neurologic condition is stable

3 If patient meets criteria, perform SBT:

- Leave FiO_2 at the current value
- Set $\text{PEEP} = 0 \text{ cmH}_2\text{O}$
- Set pressure support = $0 \text{ cmH}_2\text{O}$

This is how we perform an SBT at our institution. However, other common settings include:

- $\text{PS} = 5 \text{ cmH}_2\text{O}$, $\text{PEEP} = 5 \text{ cmH}_2\text{O}$
- $\text{PS} = 0 \text{ cmH}_2\text{O}$, $\text{PEEP} = 5 \text{ cmH}_2\text{O}$

4 During the 30-60-minute SBT Monitor for the following:

- $\text{RR} > 35$ and signs of respiratory distress for more than 5 minutes
- $\text{SpO}_2 < 88\%$ for more than 2 minutes
- Increase or decrease in HR or BP $> 25\%$

If any of these criteria are met, return the patient to the ventilator.

At the beginning of the SBT, calculate the rapid shallow breathing index (RSBI):

- The role of the rapid shallow breathing index (RSBI):
 - $\text{RSBI} = \text{respiratory rate divided by tidal volume in litres}$
 - An $\text{RSBI} > 105$ may be a predictor of extubation failure
 - Patients with a high RSBI at the beginning of the SBT should be monitored more closely

5 If the patient passes the SBT, check the following:

Cuff leak test

Can provide information about airway edema and risk of post-extubation stridor. Presence of a cuff leak is associated with decreased re-intubation rates.

To perform:

- Thoroughly suction the oropharynx then deflate the endotracheal tube cuff
- Listen for an audible air leak when the patient breaths or coughs
- The cuff leak can also be quantified using volume loss on the ventilator → should be $> 110\text{mL}$ or $\sim 25\%$ of tidal volume

If no cuff leak is present:

- Methylprednisolone $40\text{mg IV} \times 1$ +/- diuresis as indicated
- Reassess in 6-8 hours → may consider extubation even without cuff leak if no improvement with above measures. However, ETT size is important. If ETT is size 7 or smaller and there is no cuff leak, be more concerned about risk of extubation failure and try to optimize further.

Ability to protect airway

- It is ideal to have a patient who is following commands with a good cough. However, patients with delirium may not follow commands reliably. If the patient is awake, moving spontaneously, and coughing well, this is likely sufficient.
- Secretions! → Heavy secretions requiring suctioning every hour with borderline LOC or severe deconditioning (which can occur quickly in frail or very sick patients) increases risk of failure.

Difficulty of initial intubation

Patients with difficult to manage airways for whom extubation success is felt to be borderline may need further medical optimization prior to extubation (e.g. diuresis, additional preparation and decision-making around timing of extubation).

6 Making the decision to extubate:

- It is important to consider the patient's overall clinical status and trajectory in addition to the objective data (SBT, RSBI, cuff leak)
- A typical re-intubation rate is 10-15% → it is important to discuss the plan for extubation failure, including any necessary clarification of goals of care
- Ensure equipment and/or personnel required to re-intubate are available, especially if the initial intubation was difficult
- Extubation is an aerosol-generating procedure → For patients with COVID-19, ensure proper PPE and isolation precautions are used