

Ventilator Wean & Extubation Readiness

Pathway Purpose: This pathway provides clear guidelines for ventilation weaning and assessment, led by respiratory care practitioners. It is designed to be applied consistently once the patient's underlying reason for ICU admission is resolving or resolved.

Criteria for Ventilator Wean and Extubation Readiness Test

Determine eligibility to enter the pathway **daily** with medical team input and order set placement.

Does the patient meet the following inclusion criteria?

Ventilator Wean

Extubation Readiness Test

Inclusion Criteria for Ventilator Wean (assessed daily & meets ALL criteria):

- Stable on conventional ventilation
- $\text{FiO}_2 \leq 40\%$ for at least 6 hours
- No scheduled or active neuromuscular blockade
- SBS ≥ -1 or RASS ≥ -2
- Underlying reason for ICU visit resolved or improving

Exclusion Criteria (meets any criteria):

- Neonates <30 days old
- Infants with single ventricle shunted physiology
- Patients currently on VA or VV ECMO
- Patients at high risk for weaning-related complications (see [appendix](#))

Yes, meets criteria

[Proceed to Weaning Phase](#)

Inclusion Criteria for Extubation Readiness Test (assessed daily & meets ALL criteria):

- **Ventilator Wean parameters met**
- No escalation of inotropic support within the past 12 hours
- Sternum closed
- Target spontaneous Vt and RR ranges met
- $\text{FiO}_2 \leq 40\%$ unless approved by the medical team
- Gag or cough present with suctioning
- **Requires Provider Approval**
- Dopamine >5 mcg/kg/min or Epinephrine > 0.05 mcg/kg/min
- Large volume secretions, or bloody secretions ([see appendix on page 5](#))
- Concerns from RN or RCP about neurological status
- Planned procedure requiring general anesthesia or significant sedation within the next 24 hours

Or

For procedural/ short-term intubation and when Ordered by provider

Yes, meets criteria

[Proceed to ERT](#)



Ventilator Wean & Extubation Readiness

Ventilator Wean for PICU and CVICU

Attention: Prior to initiating Ventilator Weaning Pathway, switch to PC/VC-SIMV, PC-PSV or CPAP/PS and optimize Pressure Control / Tidal Volume and Pressure Support levels with provider team support.

Setting	Target	STOP Parameters	Comments
Pressure Support (PS)	4-6 mL/kg	ETT size < 4.0 4.0 – 5.0 ≥ 5.0 PS 10 8 6	PS should be optimized prior to weaning additional support
Tidal Volume (VT)	6-8 mL/kg	Ensure VC and PC breaths remain within target volume delivery	PIP must be < 25 cmH ₂ O with target tidal volume delivery to initiate the weaning pathway
Pressure Control (PC)			

Begin Ventilator Wean Pathway: Parameters and Frequency

RCP to prioritize wean of RR to STOP parameter before proceeding to wean PEEP

Setting	Weaning parameter	Frequency	Stop Parameters	Comments	Goals
Respiratory Rate (RR)	2-6 breaths per minute	2-4 hrs	< 6 mo: 10-20 bpm 6 mo – 2 yrs: 5-15 bpm >2 yrs: 5-10 bpm	Wean to low end of normal RR for age (see age-related vital sign reference ranges and stop parameters)	Maintain EtCO ₂ within pre-set target range
PEEP (positive end-expiratory pressure)	1 – 2 cmH ₂ O	4-8 hrs	Assess changes in VT with PEEP adjustments and consider lowering PIP if overventilated.		Oxygenation Maintain FiO ₂ < 40% to keep SpO ₂ within the preset target range

Did the patient meet target wean parameters?

Yes

Continue to ERT Assessment

Fail Wean - No

Re-evaluate in 6hrs

Pause & return to prior settings

Ventilator Wean & Extubation Readiness

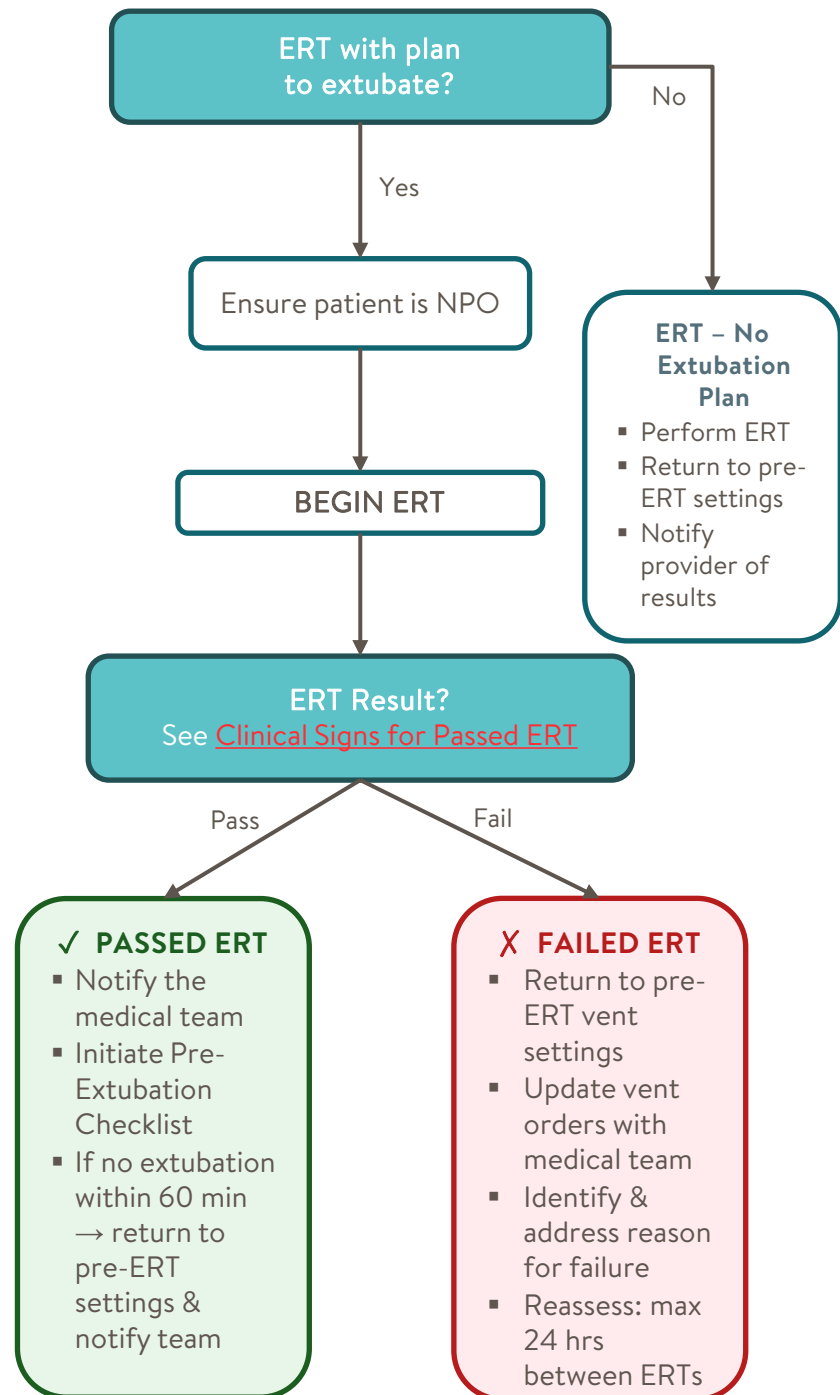
Extubation Readiness Test (ERT) for PICU and CVICU Assessment and Procedure

Daily cuff leak tests are required for all ERT patients. A negative test is not a strong predictor of failure but should prompt discussion with the medical team. Consider pre-extubation dexamethasone (24 hours prior) or post-extubation racemic epinephrine as appropriate.

PERFORMING AN ERT

1. Maintain current FiO₂ and PEEP settings.
2. Switch ventilator mode to CPAP/PS.
3. Set PS based on ETT size (see Target Ranges & Goal Settings, p.4).
4. RCP remains at bedside for a minimum of 15 minutes to assess early response.
5. If favorable clinical signs at 15 min, RCP/RN notifies medical team to prepare the Pre-Extubation Checklist (p.4).
6. Total trial time: 30–60 minutes.
7. Obtain blood gas at end of trial (if appropriate) before returning to rest ventilator settings.
8. Document pass/fail outcome; include reason for failure if applicable (see appendix).

ERT DECISION PATHWAY



Ventilator Wean & Extubation Readiness

Ventilator Wean Extubation Readiness Test for PICU and CVICU Additional Guidelines

Pressure Support & Respiratory Rate Target

Pressure Support		Age-related Vital Sign Reference Ranges	
ETT Size (ID)	Pressure Support (cm H ₂ O)	Age	Respiratory Rate (bpm)
< 4.0	10	1 – 6 mo	25 – 50
4.0 – 4.5	8	6 – 12 mo	25 – 40
≥ 5.0	6	1 – 3 yrs	20– 35
--	--	4 – 5 yrs	20– 30
--	--	≥ 5 yrs	Pediatric Vital Signs and Monitoring Parameters

Pre-Extubation Checklist

- ✓ Confirm patient has been NPO for at least 4 hours
- ✓ Adjust or discontinue sedation as appropriate, per medical team
- ✓ Perform a cuff leak test if not already completed
- ✓ Determine eligibility for extubation to nasal cannula or other support
- ✓ Gather necessary supplies:
 - Intubation cart and ETT securement device
 - Resuscitation bag and appropriately sized mask (plus backup size)
 - Oral suction catheter and Yanker
 - 10 mL syringe
- ✓ If applicable, plan for a blood gas 30 minutes after extubation

Clinical Signs for Passed ERT

Parameter	Criteria
SpO ₂	Oxygen saturation remains within the pre-set range. Temporary declines (<15 min) that improve with suctioning or intervention may be acceptable at the discretion of the RCP, RN, or medical team.
Tidal Volume	Spontaneous tidal volume > 4 mL/kg without signs of increased work of breathing (e.g., nasal flaring, accessory muscle use, or retractions)
Respiratory Rate	No increase >30% from baseline, sustained for ≥15 minutes
EtCO ₂	No increase >10 mmHg from pretest value, sustained for ≥15 minutes
Respiratory Distress	No new or worsening signs of distress. Assessment is at the discretion of the RCP, RN, and/or provider. Consider whether the child appears more uncomfortable than at baseline.
Heart Rate	Maintains within ±20% of pretest baseline without new or worsening arrhythmias. Changes >20% do not automatically indicate failure but should be discussed with the medical team.
Cerebral NIRS	Stays within ±10% of baseline. Drops >10% are not considered a true failure but should prompt discussion with the medical team.

Hemodynamics and Acid Base Ranges

Parameter	Target Range	Comments
ABG/VBG/CBG	Arterial pH: 7.35–7.45 Capillary or Venous pH: 7.25–7.35	Use of blood gases during weaning or ERT is at the discretion of the provider team.
EtCO ₂	35–55 mmHg	Mild hypercapnia (>50 mmHg) may be acceptable if due to contraction alkalosis from diuresis. Discuss with the medical team before advancing weaning.
SpO ₂	Within preset target range per patient-specific orders	Temporary declines (<15 minutes) that improve with suctioning or interventions may be acceptable, at the discretion of the RCP, RN, or medical team.
Heart Rate	Within ±10% of pre-wean baseline	Refer to Pediatric Vital Signs and Monitoring Parameters Policy . Use Pediatric Vital Sign Parameters in the absence of unit specific or provider specific parameters to set bedside monitor alarms and notify providers when patient vitals are outside of ranges listed in the policy.

Ventilator Wean & Extubation Readiness Pathway

Pathway Measure	Baseline	Target
Total number of patient ventilator hours in PICU and CVICU	113 hours	102-90 hours
Unplanned extubations		
Reintubation	TBD	TBD
ICU Days and/or Hours	N/A	N/A

References:

1. Mehta S, Martin K, McGowan N, et al.. Ventilator-Weaning Pathway Associated With Decreased Ventilator Days in Pediatric Acute Respiratory Distress Syndrome*. Critical Care Medicine. 2021; 49 (2): 302-310. doi: 10.1097/CCM.0000000000004704.
2. Randolph AG, Wypij D, Venkataraman ST, et al. Effect of Mechanical Ventilator Weaning Protocols on Respiratory Outcomes in Infants and Children: A Randomized Controlled Trial. JAMA. 2002;288(20):2561–2568. doi:10.1001/jama.288.20.2561

Appendix

Appendix

1.1 Exclusion Criteria (CVICU)

1.1.1 Neonates and infants < 3 months of age may be excluded from this pathway if deemed inappropriate by medical team.

1.1.2 Infants with single ventricle shunt physiology (parallel circulation)

1.1.3 Alternative ventilation modalities such as HFOV and APRV

1.1.4 Patients at high risk for complications would not be appropriate candidates for this pathway.

1.1.4.1 Chronic lung disease with diminished lung capacity

1.1.4.2 Anatomic obstruction of the airways

1.1.4.3 Pulmonary hypertension

1.1.4.4 Anticipated need for inhaled nitric oxide (iNO) post extubation

1.2 Documentation

1.2.1 Pre and post ventilator assessment to be documented in EPIC with any ventilator changes made. Documentation to include but not limited to measured RR, Spontaneous tidal volume, and minute ventilation.

1.3 Frequent suctioning, large amounts of secretions, or the presence of bloody secretions

1.3.1 Determination is subject to bedside RCP and RN's discretion. Secretion burden that may impair successful extubation should be addressed with the medical team prior to an ERT.