Pediatric Intensive Care Unit
Ventilator Weaning Protocol

PURPOSE:
To facilitate weaning of mechanically ventilated pediatric patients in the Pediatric Intensive Care Unit. The protocol guidelines will be administered by the Pediatric Respiratory Care Services department.

GUIDELINES:
- All ventilated patients will be continuously monitored by EtCO2 and SpO2.
- An initiation order for the weaning protocol will be entered into the electronic medical record by a PICU physician.
- An initial blood gas (arterial, venous, or capillary) should be obtained to correlate EtCO2 and SpO2 (if correlation is not already confirmed).
- Sensitivity should be set to flow trigger.
- A waiting period of one to four hours should be given after neuromuscular blockade (NMB) has been discontinued.
- The respiratory therapist may begin weaning trials once the dynamic peak inspiratory pressure is \( \leq 35 \text{ cmH}_2\text{O} \) on a set PEEP of \( \leq 10 \text{ cmH}_2\text{O} \).

INITIATION SETTINGS:

Mode: SIMV/PRVC Pressure Support

Tidal Volume:
- 5-7 ml/kg delivered (based on ideal body weight)

Pressure Support:
- 10 cmH2O for ETT 3-3.5
- 8 cmH2O for ETT 4-4.5
- 6 cmH2O for ETT \( \geq 5.0 \)

Inspiratory Time:
- Infant: 0.6 sec.
- Child: 0.75 sec.
- Adolescent: 1.0 sec.

PEEP:
- \( \leq 10 \text{ cmH}_2\text{O} \) (based upon CXR)
- Titrate to keep SpO2 \( \geq 92\% \)*

FiO2:
- Titrate to keep SpO2 \( \geq 95\% \)*

*based on clinical diagnosis and history of patient, the physician may adjust the oxygen saturation parameters
WEANING:

1. Wean FiO₂ every 30 minutes as tolerated to maintain a SpO₂ ≥ 93%, hold FiO₂ at 30%.
2. Wean SIMV rate 2-4 bpm every 30 min as tolerated to maintain an EtCO₂ < 55 mmHg.
   a. To minimum rate of 8 bpm for patients 5 years old and younger.
   b. To minimum rate of 4 bpm for patients >5 years old.
3. Wean PEEP by 1 cmH₂O every hour for SpO₂ > 93%. Hold at 6 cmH₂O.
4. Wean tidal volume 3-5 mL Q1 every hour for EtCO₂ < 55 mmHg, to achieve a delivered tidal volume of 5-7 mL/kg.

MONITORING (WEANING PHASE):

Acceptable patient parameters:

Respiratory rate (breaths per minute):
- Infants-6 months: 20-60
- 6 months-2 years: 15-45
- 5 – 12 years: 10-35

Mean Arterial Blood Pressure:
- 0-1 year: > 45 mmHg
- 1-5 years: >50 mmHg
- 5-12 years: >55 mmHg
- 12-18 years: >60 mmHg

SPONTANEOUS BREATHING TRIAL READINESS PARAMETERS:

- Set tidal volume: 5-7 mL/kg
- Spontaneous tidal volume: ≥ 4 mL/kg
- FiO₂ ≤ 50%
- Spontaneous respirations within acceptable parameters
- Acceptable mean arterial blood pressure
- Stable hemodynamically (1-2 vasopressors with no increase in rate for last 12 hours)
- SpO₂ 93% or greater
- EtCO₂ <55 mmHg
- PEEP ≤ 6 cmH₂O
- Sedation score of 8-12
- Adequate cough and/or secretion management
- Acceptable blood gas within last 12 hours
- Acceptable hemoglobin and hematocrit
- ETT leak with 25 cmH₂O, notify physician if there is not a leak

Notify physician that patient meets criteria for spontaneous breathing trial. An order to hold enteral feeds will need to be entered into the electronic medical record by a physician if extubation is anticipated. A patient will need to be NPO for at least 4 hours prior to an elective extubation.
SPONTANEOUS BREATHING TRIAL SETTINGS:

MODE: Pressure Support/CPAP

Pressure Support:
10 cmH2O for ETT 3-3.5
8 cmH2O for ETT 4-4.5
6 cmH2O for ETT ≥ 5.0

PEEP: ≤6 cmH2O

FiO2: 50% or less (FiO2 may be increased up to 10%)

MONITORING (SPONTANEOUS BREATHING TRIAL):

Acceptable patient parameters:

Respiratory rate (breaths per minute):
- Infants-6 months: 20-60
- 6 months-2 years: 15-45
- 5 – 12 years: 10-35

Mean Arterial Blood Pressure:
- 0-1 year: > 45 mmHg
- 1-5 years: >50 mmHg
- 5-12 years: >55 mmHg
- 12-18 years: >60 mmHg

If a successful spontaneous breathing trial is performed for ≥ 4 hours, the respiratory therapist should notify the physician of patient readiness for extubation. An order must be entered into the electronic medical record for extubation.

Unacceptable patient parameters:

Spontaneous breathing trial will be terminated for the following:
- SpO2 < 88% after 10% increase in FiO2
- Respiratory rate:
  - > 50 bpm for children >0-3 years of age
  - > 40 bpm for children >3-8 years of age
  - > 30 bpm for children >8 years of age
- Spontaneous VT of less than 4 ml/kg
- Respiratory distress indicated by accessory muscle use, diaphoresis or significant dyspnea
- Hemodynamic instability
- ETCO2> 55mmHg

If patient fails a spontaneous breathing trial, then place on previous settings and screen again every six hours between 7 am-7 pm up to a maximum of 2 per day.