

extubation in pediatrics

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- A 3 y/o boy with imp: pneumonia . The pt was intubated 2d ago
 Set up of ventilator :
 - ► Mode : SIMV TV : 8cc/kg RR : 30 PEEP : 7 Fio2: 70%
- ► ABG :
 - ▶ PH: 7.4 Pco2: 45 Po2: 60 Hco3: 25 O2sat: 92%
- ► HR : 125 BP : 85/43 Capillary filling : ok



Definitions

► <u>Weaning :</u>

The transition from ventilatory support to completely spontaneous breathing

Extubation :

The removal of the endotracheal tube

extubation failure :

- ► Early
- Intermediate
- ► late

Course of Mechanical Ventilation



Weaning and Pre extubation

The best approach for all patients is to question every day:

► Why are they receiving MV?

Do they actually still need to be ventilated?

Do they require the current levels of support?

When a child is on MV the process of weaning starts right after intubation

The length of weaning



► fluid status





Pulmonary hypertension

Differences in diaphragmatic function

Essential parameters for extubation

Resolution of the etiology of intubation

Decreased FIO2 and decreased PEEP

Respiratory rate age-appropriate

No acidosis or hypercapnia



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Essential parameters for extubation

- Peak inspiratory pressure <20 cm H2O</p>
- Stable at delivered tidal volume of 4–6 ml/kg
- Adequate respiratory muscle function
- No worsening chest imaging



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Essential parameters for extubation

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Hemodynamic stability without evidence of shock

► GCS ≥11

Manageable airway secretions

Acceptable serum potassium, magnesium, and phosphorous concentrations

Ready for weaning trial and extubation

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Spontaneous Awakening Trials (SAT)

Spontaneous Breathing Trial (SBT)

Spontaneous Awakening Trials

Sedation should be reduced carefully

Have the nurse or physician remain at the bedside



Spontaneous Awakening Trials

If patient fails SAT

restart sedation

- Anxiety, agitation, or pain
- ▶ SpO 2 <88%
- Respiratory distress
- Acute cardiac arrhythmia

Spontaneous Breathing Trial

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If patient passes the SAT assess the patient for spontaneous breathing trial

Pressure support



Spontaneous Breathing Trial

1) Pressure support:

The pressure support level is to be gradually reduced, titrated to

- ► RR
- patient comfort

• A level of 5–8 cm H 2 O pressure support is considered to overcome the tube resistance



T-piece:

Patients are disconnected from the ventilator

Made to breathe humidified oxygen—air mixture for 30– 120 min





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Spontaneous Breathing Trial

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3)flow by :

the patient is still attached to the ventilator

ventilating pressures, rate, and tidal volume are set to zero

Criteria for Extubation Readiness Test Failure

Proposed Criteria for Failure During 2 Hours on CPAP or T-piece

Clinical Criteria:

- Diaphoresis
- Nasal flaring
- Increasing respiratory effort
- Tachycardia (increase in HR >140 bpm)
- Cardiac arrhythmias
- ► Hypotension
- Apnea

Criteria for Extubation Readiness Test Failure

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Laboratory Criteria:

- Increase of PCO2 > 10 mmHg
- Decrease of arterial pH < 7.32</p>
- Decline in arterial pH > 0.07
- PaO2 < 60mmHg with an FiO2 > 0.40 (P/F O2 ratio < 150)</p>
- ► SpO2 declines > 5%

Criteria for Extubation Readiness Test Failure

SBT should be terminated

SBT should be tried at least once in 24 h



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At the end of the succussed trial, the patient is considered for extubation



Pre extubation



Nocturnal rest with full ventilatory support

Ensure adequate nutrition in days leading to extubation

Avoid excessive intravascular volume

Treat any infections and avoid fever

Pre extubation

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Avoid obstipation, urinary retention, gastric distension, musculoskeletal pain, and severe anemia

If significant pleural effusion is present, consider tapping before extubation

Avoid chemical imbalances

Manage secretions aggressively

- A few more criteria should be fulfilled before extubation:
 - Adequate cough reflex

extubation

- Secretions should not be copious
- No radiological or surgical procedure
- Extubation should not be done at the end of the day



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Equipment for extubation:



Suction

mask and ambo

syring to deflate cuff

- ► Neb epinephrine
- Nasal cannula/mask





Intubation trolley:

Laryngoscope and 2 blades

▶ Bougie

► ETT correct size

► Sedation





Extubation steps :

Preoxygenation

► suction

Position the patient on upright sitting position

Aspirate NGT





Extubation steps :

Apply positive pressure , deflate the cuff ,remove tube

▶ If an orogastric tube is present, it is also removed alongside the ETT

Provide 100% oxygen

Check airway patency and adequacy of breathing

Post extubation



The patient should be observed closely for signs of extubation failure and repeat ABG after 1h



Risk factors for extubation failure :

► Age < 24 months

- Syndromic condition
- Chronic respiratory and neurologic disorder
- Duration of ventilation
- Severity of underlying lung disease
- Intravenous sedation
- Male sex
- Reintubation
- Weak cough



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Extubation failure

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► <u>failure as mentioned below:</u>

- ▶ Tachypnea for 2 h
- ► Tachycardia
- Clinical signs of increased work of breathing
- Oxygenation failure
- Hypercapnia and acidosis

Management of extubation failure:

Manual CPAP

High flow nasal oxygen

Drug

► NIV

Reintubation





Extubation of patients with COVID

Noninvasive ventilation and high-flow nasal oxygen, are relatively contraindicated

Extubation should ideally take place in a negative pressure room

All non-essential staff should exit the room

Personal protective equipment (PPE) with airborne precautions is required during extubation

Extubation of patients with COVID

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Limit the need for subsequent staff interactions with:

- Prophylactic anti-emetics
- Adequate analgesia
- Antitussive drugs

mask over tube technique







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