# Irish Paediatric Acute Transport Service

# Clinical Guideline

| Document Details | |
|---|---|
| **Document Type:** | Clinical Guideline |
| **Document Name:** | Guideline for ventilated Paediatric patients in an adult ICU |
| **Document Location:** | IPATS Clinical Guideline Database |
| **Version:** | 1 |
| **Effective From:** | December 2018 |
| **Review Date:** | December 2021 |
| **Author:** | Dr Cathy Gibbons - Clinical Lead IPATS |
| **Approved by:** | Dr Dermot Doherty – Clinical director CCRS<br>Dr David Menzies – Clinical Lead MICAS |
| **Related Documents:** | |

The Irish Paediatric Acute Transport Service (IPATS) has produced this clinical guideline. It has been designed for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.

This guideline represents the views of IPATS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

# Guideline for Ventilated Paediatric Patients in an Adult ICU

***All patients should be discussed with PICU (*1890 213 213)**

**A child should only be cared for in an adult ICU in exceptional circumstances**

## Airway & Ventilation Management

- Ventilation circuit must be humidified**.** In children <15Kg – small (15mm) circuit must be used. ETC02 monitoring as standard
- Oral intubation in 1st instance. Cuffed ETT if high airway pressures/Head injury/Aspiration risk. See size chart.
- IPATS/PICU 'Trouser' taping as per policy available. Suction catheter sizing = 2x size of ETT (Size 4.0 ETT = size 8F catheter)

## Normal Respiratory Compliance

- Mode is ventilator dependent. Pressure control/PS or PRVC standard modes in paediatric ventilation
- PEEP 5cmH20
- PIP to move chest, aim Tv 6-8ml/kg/min
- Ti 0.6-0.8s (typical I:E ratio 1:2)
- RR: Neonate 30-35, infant/Child 20-30, Adolescent 15-20
- Fi02: To achieve SaO2 >94%
- pC02 4.5-6KPa
- Contact PICU if questions/difficulties arise

## Paediatric Respiratory Distress Syndrome

**(Difficult oxygenation/ventilation/Poor compliance)**

- Increase PEEP (7-10cmH20)
- Aim for Tv of 5-7ml/kg/min
- Keep PIP <30cmH20 where possible
- Accept Sa02 >88%
- Permissive hypercapnoea –accept pH >7.25
- Consider neuromuscular blockade / prone position
- Consider physiotherapy (if available)
- Contact PICU if questions/difficulties arise

## Cardiovascular Support

- See APLS guidelines for age appropriate HR/BP normograms
- Signs of adequate cardiac output include: Stable haemodynamics/Normal lactate/CRT<3s and U.O>1ml/kg/hr
- Fluid boluses – 20ml/kg aliquots of 0.9% NS/Hartmanns (10ml/kg in trauma/head injury or cardiac illness)
- Once ≥60ml/kg fluid given, central access (IO/CVC) and inotropic support will likely be required to complement resuscitation
- Follow paediatric sepsis guidelines if shock related cardiovascular instability present & discuss with PICU
- In general: First line inotrope in cold shock = Adrenaline. First line inotrope in warm shock = Noradrenaline
- For sedation related hypotension, consider reducing sedation or changing to more cardio-stable medications before inotropic support or aggressive fluid resuscitation

## Sedation & Analgesia

- Standard sedation (titrate up): **Infants < 3/12:** Morphine infusion 10-30mcg/kg/hr (+/- 20mg/kg chloral hydrate q6hr PRN)
  **All others:** Morphine infusion 10-30mcg/kg/hr + Midazolam infusion 1-5mcg/kg/min
- Loading doses of each infusion (50mcg/kg) recommended before starting (if patient haemodynamically stable). This achieves a more rapid steady state. Propofol is **not** used routinely in children outside of the ambulance/theatre environment
- Muscle relaxation is **not** routine in PICU. May be beneficial in ARDS. Is frequently used during transfer to reduce risk of ETT dislodgment.

## Fluids & Nutrition

- All children require a NG tube (orogastric in head injury)
- Continuous enteral feeding preferred unless transport imminent (patients should ideally be fasted 4hr before & during transport)
- Fluid restrict all critically ill children (whether IV/Enteral) to **80%** of maintenance. 100% maintenance calculation is as follows:
  - <10Kg = 4ml/kg/hr
  - 10-20Kg = 40ml + 2ml/kg/hr for every Kg >10
  - >20Kg = 60ml + 1ml/kg/hr for every Kg >20 (max 2.5L)
- Standard IV Fluids: Infants <3/12: 0.9% NaCl + Dex 10%. >3/12: 0.9% NaCl + 5% Dex.
- Monitor blood glucose regularly and aim for a blood glucose of 4-10mmol/L. If hyperglycaemic reduce dextrose intake. Do not start insulin for hyperglycaemia in an non-diabetic child without discussion with PICU – high risk of hypoglycemia
- Keep Hb >8g/dl. If critically unwell keep >10g/dl. Minimal sampling volumes should be used to reduce iatrogenic anaemia risk

## Lines and Catheters

- Avoid urinary catheters unless muscle relaxed, shocked or in urinary retention. Please weigh nappies for accurate balances
- Arterial access is not a requirement. Can be challenging in paediatrics. USS guided approach carries high success rate. Required only if concerns for shock or respiratory distress i.e. on inotropes / Fi02 >60% or difficult ventilation. Avoid brachial artery cannulation
- Indication for CVC: Inotrope infusions / multiple infusions / inadequate peripheral access. IO acceptable x24hr

# Guideline for Ventilated Paediatric Patients in an Adult ICU
## *References*


1. Paediatric Critical Care: Child Ventilated in Adult ITU – Clinical Guideline. South Thames Retrieval Service https://www.evelinalondon.nhs.uk/resources/our-services/hospital/south-thames-retrieval-service/Child-ventilated-in-adult-ICU-2017.pdf.

2. Pediatric Acute Respiratory Distress Syndrome: Consensus Recommendations From the Pediatric Acute Lung Injury Consensus Conference. Pediatr Crit Care Med. 2015 Jun; 16(5): 428–439.doi:10.1097 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5253180/

3. Advanced Paediatric Life Support – A practical approach to emergencies 6th Edition. Wiley Blackwell.

4. Ultrasound Guided Arterial Cannulation for pediatrics. Aouad-Maroun M[1], Raphael CK, Sayyid SK, Farah F, Akl EA. Cochrane Database Syst Rev. 2016 Sep 14;9:CD011364 https://www.ncbi.nlm.nih.gov/pubmed/27627458

5. Central venous access in children: indications, devices, and risks. Ares G[1], Hunter CJ. Curr Opin Pediatr 2017 Jun;29(3):340-346 https://www.ncbi.nlm.nih.gov/pubmed/28323667

6. IPATS Airway & Intubation Guide 2018. (Link required to website)

7. IPATS Melbourne ETT strapping Guideline (Link Required to website)

8. American College of Critical Care Medicine Clinical Practice Parameters for Hemodynamic Support of Pediatric and Neonatal Septic Shock. Davies et al. Critical Care Medicine; June 2017 – Volume 45 – Issue 6 – p1061-1093 https://journals.lww.com/ccmjournal/Fulltext/2017/06000/American_College_of_Critical_Care_Medicine.18.aspx

9. Update on pediatric sepsis: A review. Tatsuya Kawasaki. Journal of intensive care 2017 5:47 https://jintensivecare.biomedcentral.com/articles/10.1186/s40560-017-0240-1