Clinical Guideline

WATCh – MANAGEMENT OF VENTILATED CHILDREN IN GENERAL INTENSIVE CARE UNITS

SETTING	Wales and West Acute Transport for Children (WATCh)
FOR STAFF	WATCh Team, South West and Wales District General Hospital medical and nursing teams.
PATIENTS	Children <16 years old requiring invasive mechanical ventilation outside a Paediatric Intensive Care Unit

GUIDANCE

Children who require intensive care (including invasive respiratory support) should be transferred to a Paediatric Intensive Care Unit (PICU) for ongoing management. However, it is recognised that in exceptional circumstances this transfer will be delayed. This document gives outline guidance on how to manage these patients outside a specialist PICU. All of these patients should be discussed with the WATCh team at least twice a day and more frequently if concerns arise.

GLOSSARY

CXR	Chest X-ray
$EtCO_2$	End tidal carbon dioxide
ETT	endotracheal tube
Hb	Haemoglobin
I:E ratio	inspiratory to expiratory ratio
IV	intravenous
NPA	Naso-pharyngeal aspirate (viral culture)
PEEP	positive end expiratory pressure
PIP	peak inspiratory pressure

RELATED DOCUMENTS	WATCh intubation checklist WATCh securing and management of endotracheal tubes
AUTHORISING BODY	WATCh Governance Group
SAFETY	Call the WATCh team for advice and support
QUERIES	0300 0300 789

MANAGEMENT OF VENTILATED CHILDREN ON GENERAL ICUs

Please refer all children requiring/receiving intensive care to WATCh on **0300 0300 789** and discuss twice a day

INTUBATION

Consider use of cuffed ETT if high ventilatory pressures anticipated / needed

If using cuffed ETTs ensure the cuff is inflated – do not leave cuffs deflated as this can cause pressure necrosis.

DO NOT cut tubes to calculated length, particularly for children with upper airway obstruction e.g. croup. Smaller tubes are shorter which makes securing more difficult

Remember to site a nasogastric tube at the time of intubation

Ensure CXR is performed post intubation – ETT position at lower border of T2 (or midway between clavicles and carina).

VENTILATION

Initial settings:

iTime	0.6 – 1.0 s (age dependent: e.g. neonates 0.6s; 1s by 1 year of age. Maintain I:E ratio < 1:1)
Rate	Age appropriate rate (e.g. neonate 30-35 bpm; 20-24 bpm by 1 year of age)
Pressures	PEEP 6cm H_2O / PIP 20-25cm H_2O (Monitor Vt – aim less than 10mL/kg)

Titrate FiO_2 as required to keep O_2 saturations between 92 and 95%

Target pH above 7.25 and accept high $EtCO_2$ if pH is in target range

Monitor with O_2 saturations, $EtCO_2$ and intermittent blood gases (capillary sampling may be useful)

Actively wean ventilation within target parameters as tolerated

Consider extubation to high flow support e.g. Airvo™ or Vapotherm™

CARDIOVASCULAR SUPPORT

Non-invasive blood pressure monitoring is adequate if the child is not shocked

If shocked: -

Give adequate fluid resuscitation (up to 40mL/kg of 0.9% Sodium Chloride / Plasma-Lyte 148 / Hartmann's) and reassess

Cautious fluid boluses in children with suspected impaired cardiac function / hepatomegaly

Transfuse if Hb < 70g/L (100g/L in children with cyanotic congenital heart disease)

- Volume required (packed cells) = 5 x weight x desired rise in Hb to a maximum volume of **20mL/kg**

Inotropes – please refer to WATCh Drug Sheet – usual dose range:

- Adrenaline 0.02 - 0.3 mcg/kg/min (different dilution strengths for peripheral and central administration)
- Noradrenaline 0.02 - 0.3 mcg/kg/min (only via central access)
- Dopamine 5 – 10mcg/kg/min (different dilution strengths for peripheral and central administration)

SEDATION / ANALGESIA / MUSCLE RELAXANTS

Neonates (<28 days): Morphine infusion 10-40 mcg/kg/h. If possible, give enteral feeds and then can supplement with enteral sedation: Chloral Hydrate 30-50mg/kg 6 hourly; or Promethazine 0.5-1 mg/kg 6 hourly (max 25mg).

Infants (>28 days) and older children: Morphine infusion 10 – 40mcg/kg/h with Midazolam infusion 50-100 mcg/kg/h (can be run at a higher rate short term e.g. 200mcg/kg/h).

Routine use of **muscle relaxants** is not indicated but continuous infusions may be beneficial in children with high ventilatory requirements or who are clinically unstable e.g. Rocuronium 600 – 1200mcg/kg/h.

FLUIDS / FEEDS / ELECTROLYTES

Restrict fluid intake to 80% calculated maintenance (based on WATCh drug sheet) in most cases.

Age appropriate enteral feeds at the earliest opportunity.

Insert a urinary catheter and aim for urine output of 1-2 mL/kg/h.

If IV route required, give maintenance as Plasma-Lyte + 5% Glucose or as per local policy; monitor electrolytes at least daily; titrate potassium in fluids according to serum potassium (up to 40mmol potassium /L peripherally).

Consider Furosemide 0.5 - 1mg/kg 8 hourly IV if fluid balance positive (please discuss with WATCh Consultant).

ANTIMICROBIALS

Admission screening should include blood cultures, CRP and FBC

If admission secondary to respiratory presentation send NPA (viral PCR) and ET aspirate

Antimicrobial choice is dependent on local policy and guided by previous positive cultures in at risk children

Review need for ongoing antimicrobials after 48 hours and discontinue if possible.