

Clinical Guideline

WATCH – MANAGEMENT OF SHOCK IN A CHILD WITH KNOWN OR SUSPECTED HEART DISEASE

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	Infants and children presenting to district general hospitals in shock who are known or suspected to have congenital or acquired heart disease

GUIDANCE

This outlines the clinical management of children in shock who are known or suspected to have heart disease. For management of the collapsed infant of unknown cause, see “Management of the Collapsed Infant”. A summary guideline can be found on page 2 and is available on the WATCH website (www.watch.nhs.uk).

GLOSSARY	ALCAPA Anomalous left coronary artery from the pulmonary artery AVSD atrioventricular septal defect CPAP continuous positive airway pressure IO intraosseous UVC umbilical venous catheter
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RELATED DOCUMENTS	Management of the Collapsed Infant (WATCH guideline) WATCH intubation checklist WATCH securing and management of endotracheal tubes
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AUTHORISING BODY	WATCH governance group
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SAFETY	Call the WATCH team for advice and support at the earliest opportunity. They will set up a conference call with the appropriate paediatric cardiology service.
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QUERIES	0300 0300 789
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MANAGEMENT OF SHOCK IN A CHILD WITH KNOWN OR SUSPECTED HEART DISEASE

Contact the **WATCH** team as soon as possible on 0300 0300 789; they will set up a conference call with the appropriate paediatric cardiology service.

If available, echocardiography should be performed as early as possible as this can be invaluable in establishing a diagnosis and guiding management. The following advice assumes echocardiography is not immediately available.

CAUSES	INTUBATION AND VENTILATION
<p>Structural:</p> <ul style="list-style-type: none"> - duct dependent circulation (usually <1 month old) <ul style="list-style-type: none"> - pulmonary – e.g. pulmonary stenosis/atresia, tetralogy of Fallot (unresponsive hypoxia) - systemic – e.g. coarctation of the aorta, hypoplastic left heart syndrome (poor perfusion) - both – transposition of the great arteries - large systemic to pulmonary shunt <ul style="list-style-type: none"> - intracardiac e.g. AVSD, extracardiac e.g. arteriovenous malformation <p>Functional:</p> <ul style="list-style-type: none"> - Myocarditis/cardiomyopathy (including ALCAPA) - Arrhythmia (ECG recommended) - Systemic cause (e.g. sepsis) - Pulmonary hypertension 	<p>Positive pressure respiratory support will usually improve the clinical condition via cardiopulmonary interactions and reduction of metabolic demand. As a temporising measure, consider non-invasive respiratory support/CPAP (either mechanical or hand delivered e.g. anaesthetic circuit).</p> <p>However, anaesthesia for intubation may precipitate collapse due to abrupt reduction in afterload, direct negative inotropic effects or anaesthetic agents, and reduction of endogenous catecholamines.</p> <p>Indications for intubation include apnoea, persistent desaturation, poor perfusion, unresponsive hypotension or acidosis, or severe end organ dysfunction (including reduced conscious level).</p> <p>Discuss the case with the WATCH consultant and assemble an appropriately briefed senior team – it may be appropriate to wait for the arrival of the WATCH consultant if the child is relatively stable and travel times are short.</p> <p>Before induction of anaesthesia, draw up fluid boluses, resuscitation doses of Adrenaline (0.1 mL/kg of 1:10000 solution) and dilute adrenaline, the resuscitation dose of Adrenaline diluted to 10mL with 0.9% NaCl.</p> <p>For induction we recommend smaller doses of Ketamine (1mg/kg) and/or Fentanyl (1 microgram/kg) and full dose Rocuronium (1mg/kg). Drugs may take longer than usual to take effect in the low cardiac output state.</p> <p>In the absence of invasive BP monitoring, designate a team member to monitor the pulse and administer 0.5-1mL aliquots of dilute adrenaline as required. This monitoring should continue after the endotracheal tube is sited; it is not uncommon for hypotension to worsen after airway manipulation ceases.</p> <p>For infants with a “balanced circulation” take care not to over-ventilate or over-oxygenate when hand-ventilating after intubation as this can precipitate circulatory collapse.</p> <p>Maintain sedation with infusions of either Morphine (start at 20 microgram/kg/h) or Fentanyl (5 microgram/kg/h – preferred in pulmonary hypertension). Outside the neonatal period add Midazolam (up to 100 microgram/kg/h, avoid bolus doses). To reduce oxygen demand, maintain muscle relaxation with a Rocuronium infusion.</p>
RESUSCITATION	
<p>Ensure minimum of 2 vascular access points (peripheral, IO, UVC).</p> <p>For most patients, administer supplemental oxygen to maintain saturations at either >93% or at the patient’s normal target oxygen saturations (for patients with known congenital heart disease).</p> <p>For a minority of patients (described as having a “balanced circulation” – these will have complex congenital heart disease and almost invariably be <6 months old) too much supplemental oxygen can cause blood to be shunted from the systemic to pulmonary circulation, precipitating collapse. If this is a concern, use oxygen to maintain saturations >70% and seek specialist advice.</p> <p>For undiagnosed neonatal collapse or known duct-dependent heart disease, start Dinoprostone infusion at 5 nanogram/kg/min if clinically well or 20 nanogram/kg/min if unstable or absent femoral pulses.</p> <p>Treat hypotension</p> <ul style="list-style-type: none"> - cautious fluid resuscitation - give up to 20mL/kg crystalloid in 5mL/kg boluses, assessing for response between each. If respiratory distress or hepatomegaly increase, stop fluid. - intravenous inotropes given via central or peripheral line – preferably adrenaline (start at 0.05 microgram/kg/min). - diuretics should not be used in shock/hypotension in this setting 	