

Clinical Guideline

**WATCH – TACHYARRHYTHMIA MANAGEMENT IN CHILDREN**

<b>SETTING</b>	Wales and West Acute Transport for Children
<b>FOR STAFF</b>	WATCH Team, South West and Wales District General Hospital medical and nursing teams.
<b>PATIENTS</b>	Children requiring emergent treatment for a tachyarrhythmia

**GUIDANCE**

This guidance offers advice for the WATCH team and DGH staff treating children with a cardiac arrhythmia. It highlights the likely presentation, early management and treatment options when managing a child with a tachyarrhythmia. A summary guideline is on page 2 and is available on the WATCH website ([www.watch.nhs.uk](http://www.watch.nhs.uk)).

Glossary:

IV – Intravenous	IO – Intraosseous
ECG – Electrocardiogram	APLS – Advanced Paediatric Life Support

<b>REFERENCES</b>	<ol style="list-style-type: none"> <li>Dubin (2021) Management of Supraventricular Tachycardia (SVT) in Children [accessed 01/06/23]</li> <li>APLS (2016)</li> </ol>
<b>RELATED DOCUMENTS AND PAGES</b>	<a href="#">BRHC Clinical Guideline – Supraventricular Tachycardia (SVT) – Emergency Management</a>
<b>AUTHORISING BODY</b>	WATCH Clinical Guideline Group Cardiology Department – BRHC Paediatric Intensive Care / WATCH Pharmacist - BRHC
<b>SAFETY</b>	<p>Refractory tachyarrhythmia should be discussed with the WATCH team and a tertiary cardiologist</p> <p>Amiodarone has differences in licensing between makes due to benzyl alcohol/polysorbate content (excipients). Both can cause hypotension (due to histamine release)</p> <ul style="list-style-type: none"> <li>Benzyl alcohol - associated with fatal toxic syndrome in preterm neonates. Should only be used in neonates if no alternative</li> <li>Polysorbate 80 - can cause anaphylaxis</li> </ul>
<b>QUERIES AND CONTACT</b>	0300 0300 789

Document Change Control				
Date of Version	Version Number	Lead for Revisions	Type of Revision	Description of Revision
July 23	2.2	WATCH Clinical Guideline Group	Major	Drug dose and administration

# TACHYARRHYTHMIA MANAGEMENT IN CHILDREN

PRESENTATION		EARLY MANAGEMENT
<b>Infant:</b> Poor feeding, lethargy, irritability, pallor, diaphoresis	<b>Child:</b> Palpitations, dizziness, chest pain, syncope, diaphoresis exercise intolerance, fatigue	Recognition of the child in shock (poor perfusion, hypotension, decreased conscious level) Stabilisation of ABC: <ul style="list-style-type: none"> <li>➤ O<sub>2</sub> titrated to maintain SpO<sub>2</sub> where expected for the child (caution in balanced circulation)</li> <li>➤ IV/IO access, bloods for U&amp;E, FBC and a blood gas</li> <li>➤ 12 lead ECG and record rhythm strip during treatment</li> <li>➤ Active temperature management</li> <li>➤ Optimise electrolytes (K<sup>+</sup> &gt;4, ion Ca &gt;1, Mg &gt;1)</li> <li>➤ Defibrillator pads on prior to treatment</li> <li>➤ Consultant Anaesthetist /Paediatrician available for intubation – laryngoscopy may cause vagal stimulation</li> <li>➤ Conference call with WATCH (<b>0300 0300 789</b>)</li> </ul>
POSSIBLE CAUSES		
Life-threatening primary arrhythmias are uncommon in children. Exclude primary pathologies: Hypoxia / Sepsis / Ingestion / Cardiac Surgery		
Atrial or ventricular tachycardia causes include: structural abnormalities, Wolf-Parkinson-White, myocarditis, renal disease, hypokalaemia, hypomagnesaemia, long QT syndrome, and hyperthyroidism.		

## TREATMENT OPTIONS

Adenosine IV/IO	Amiodarone IV/IO	Magnesium IV/IO	Vagal Manoeuvre
<p><b>Seek Cardiology advice for dosing above 300micrograms/kg</b></p> <p>Rapid injection then rapid flush of 0.9% NaCl in a large upper limb vein. Give doses 1-2 mins apart, increased in steps as follows;</p> <ol style="list-style-type: none"> <li>1. 100micrograms/kg</li> <li>2. 200micrograms/kg</li> <li>3. 300micrograms/kg</li> </ol> <p><b>12mg max per single dose</b></p>	<p><b>Seek WATCH/Cardiology advice prior to administration</b></p> <p><b>Acute side effects</b> potentiated by low calcium include bradycardia, hypotension and depressed cardiac function</p> <ul style="list-style-type: none"> <li>• Stable VT / SVT - infuse 25 micrograms/kg/min for 4 hours, followed by an infusion at 10-15 micrograms/kg/min (max 1.2g/day)</li> <li>• VT/SVT with shock – 5mg/kg infused over 30 minutes</li> </ul> <p><b>Administer via central access preferably (or if not use large peripheral vein and dilute to 600micrograms/mL)</b></p>	<p>25-50mg/kg (max 2g)</p> <p>Give over 10 -15 minutes</p>	<p><b>Infant</b> - facial immersion in iced water for 5 seconds or glove filled with iced water for 20 seconds held to face</p> <p><b>Older child</b> - Valsalva e.g. blow through straw / syringe</p>

## SUPRAVENTRICULAR TACHYCARDIA (SVT) – associated with Wolf-Parkinson-White Syndrome

ECG	Patient stable	Cardiogenic Shock
Abrupt rate changes P waves absent/abnormal Narrow QRS HR not variable Infants: rate usually >220bpm Children: rate usually >180bpm	<ol style="list-style-type: none"> <li>1. Vagal manoeuvre</li> <li>2. Adenosine</li> <li>3. If no sustained response to adenosine consider DC Shock / amiodarone infusion</li> </ol>	<ol style="list-style-type: none"> <li>1. Adenosine while preparing to intubate.</li> <li>2. Intubate and ventilate</li> <li>3. Synchronised DC Shock 1-2J/kg</li> <li>4. Amiodarone infusion</li> </ol>

## ATRIAL FLUTTER – associated with dilated right atrium, atrial surgery

ECG	Patient stable	Cardiogenic Shock
Narrow QRS Regular atrial activity 240-360bpm Flutter waves (sawtooth) in lead II & III	<ol style="list-style-type: none"> <li>1. Vagal manoeuvre</li> <li>2. Adenosine may disclose the flutter wave but will not terminate the tachyarrhythmia.</li> <li>3. Amiodarone infusion</li> </ol>	<ol style="list-style-type: none"> <li>1. Intubate and Ventilate</li> <li>2. Synchronised DC shock 1-2J/kg</li> <li>3. Amiodarone infusion</li> </ol>

## VENTRICULAR TACHYCARDIA (VT) NB: IF PULSELESS FOLLOW SHOCKABLE CARDIAC ARREST ALGORITHM

ECG	Patient stable (with pulse)	Cardiogenic Shock (with pulse)
Rate 120-300bpm Broad QRS VA dissociation	<ol style="list-style-type: none"> <li>1. Magnesium - if torsade de pointes morphology</li> <li>2. Amiodarone infusion</li> <li>3. Consider synchronous DC Shock</li> </ol>	<ol style="list-style-type: none"> <li>1. Intubate and Ventilate</li> <li>2. Synchronised DC Shock 1-2J/kg</li> <li>3. Amiodarone infusion</li> </ol>

## SEDATION AND INTUBATION FOR DC CARIOVERSION

*A combination of the below will provide deep sedation or general anaesthesia (reduced doses in the presence of shock)*

Ketamine	Fentanyl	Rocuronium
1-2mg/kg IV/IO	1-2micrograms/kg IV/IO	1mg/kg IV/IO

## ONGOING MANAGEMENT

**For treatment outside of APLS, please discuss immediately with WATCH and Cardiology teams before proceeding**

- Intubate and ventilate to reduce the workload of the left ventricle and optimise oxygenation.
- After discussion with Cardiology continue maintenance amiodarone infusion of 10-15micrograms/kg/min.
- Consider IV calcium to prevent and treat side effects of amiodarone.
- Inotropic support for decreased cardiac output (adrenaline).
- Sedate and muscle relax +/- active cooling to reduce metabolic demand.
- Move child to an appropriate setting whilst awaiting the WATCH Service.