University Hospitals of Leicester NHS Trust
Nottingham University Hospitals NHS Trust

CoMET Guidelines: Cardiac arrhythmias

This guideline is for use by healthcare staff, at CoMET undertaking critical care retrieval, transport and stabilization of children, and young adults.

CoMET is a Paediatric Critical Care Transport service and is hosted by the University Hospitals of Leicester NHS trust working in partnership with the Nottingham University Hospitals NHS Trust.

The guidance supports decision making by individual healthcare professionals and to make decisions in the best interest of the individual patient.

This guideline represents the view of CoMET, and is produced to be used mainly by healthcare staff working for CoMET, although, professionals, working in similar field will find it useful for easy reference at the bedside.

We are grateful to the many existing paediatric critical care transport services, whose advice and current guidelines have been referred to for preparing this document. Thank You.

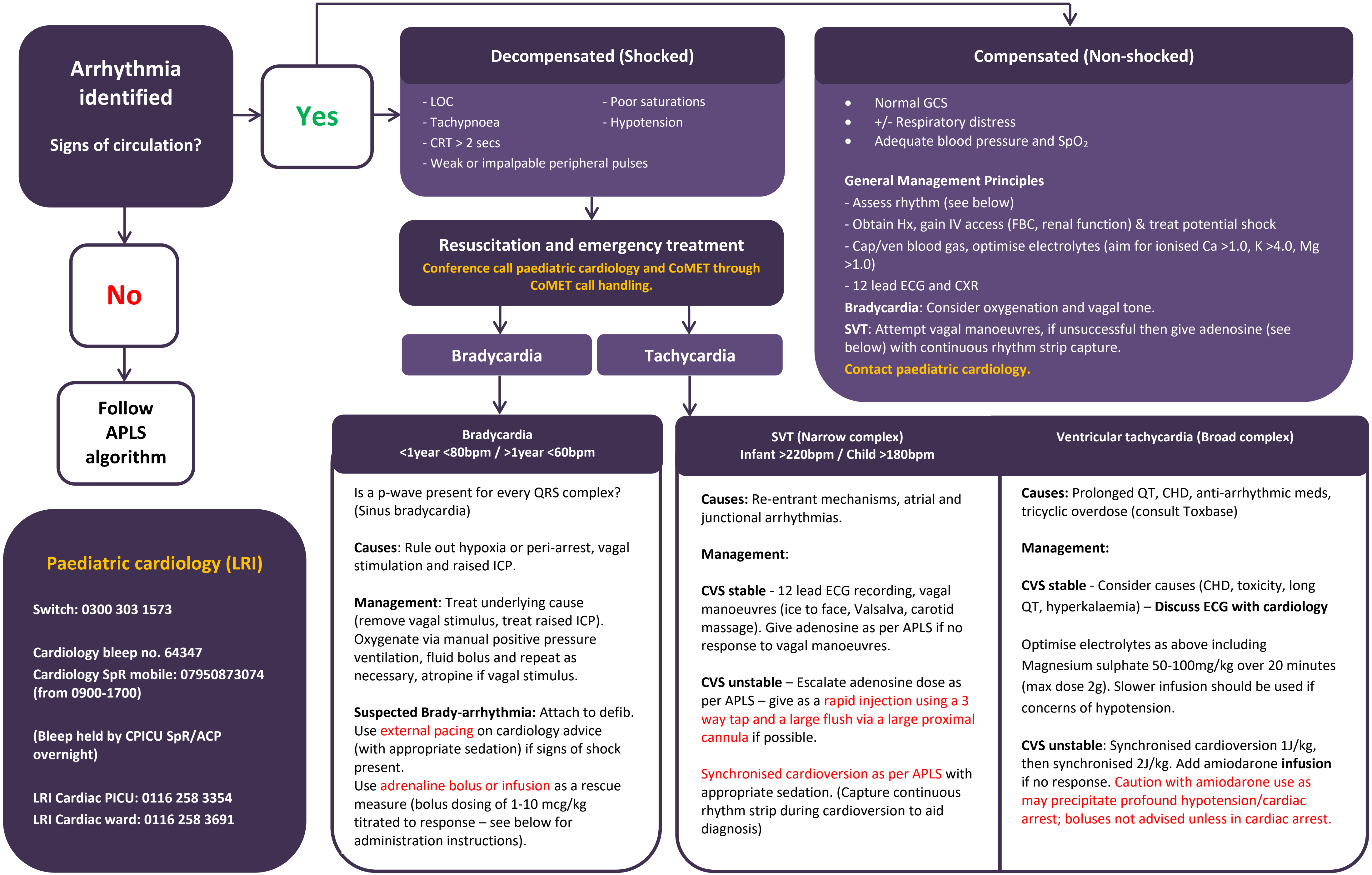
Executive Lead/ Medical Director:	**Andrew Furlong (LRI, UHL – andrew.furlong@uhl-tr.nhs.uk)**
Author:	**Nick Searle - Transport/CPICU Nurse, COMET** **Nicholas.searle@uhl-tr.nhs.uk** **Dave Bird – PICU/CoMET Consultant** **David.Bird@nuh.nhs.uk**
Guideline Lead:	**Zoha Mohammad – CICU/CoMET Consultant** **mohammad.zoha@uhl-tr.nhs.uk** **Rebecca Etherington - CoMET Transport Nurse** **Rebecca.etherington@uhl-tr.nhs.uk**
Clinical Lead:-	**Georgina Harlow – CoMET Head of Service** **Gharlow1@nhs.net** **Georgina.harlow@uhl-tr.nhs.uk**
Approved By:	**Policy & Guidelines Committee**
Date of Latest Approval:	**21st November 2024**
Version:	**(1)**
Next Review Date:	**November 2026**
Trust Reference Number	**B5/2025**

Education and Training

1. Annual Transport team update training days
2. Workshops delivered in Regional Transport Study days/ Outreach

Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Incident reporting	Review related Datix	Abi Hill – Lead Transport Nurse abi.hill@uhl-tr.nhs.uk	Monthly	CoMET Lead Governance Meeting
Documentation Compliance	Documentation Audit	Abi Hill – Lead Transport Nurse abi.hill@uhl-tr.nhs.uk	3 Monthly	CoMET Lead Governance Meeting



Arrhythmia identified

Signs of circulation?

No → **Follow APLS algorithm**

Yes →

Decompensated (Shocked)

- LOC
- Tachypnoea
- CRT > 2 secs
- Weak or impalpable peripheral pulses
- Poor saturations
- Hypotension

Compensated (Non-shocked)

- Normal GCS
- +/- Respiratory distress
- Adequate blood pressure and SpO_2

General Management Principles

- Assess rhythm (see below)
- Obtain Hx, gain IV access (FBC, renal function) & treat potential shock
- Cap/ven blood gas, optimise electrolytes (aim for ionised Ca >1.0, K >4.0, Mg >1.0)
- 12 lead ECG and CXR

Bradycardia: Consider oxygenation and vagal tone.

SVT: Attempt vagal manoeuvres, if unsuccessful then give adenosine (see below) with continuous rhythm strip capture.

Contact paediatric cardiology.

Resuscitation and emergency treatment

Conference call paediatric cardiology and CoMET through CoMET call handling.

Bradycardia | **Tachycardia**

Bradycardia
<1year <80bpm / >1year <60bpm

Is a p-wave present for every QRS complex? (Sinus bradycardia)

Causes: Rule out hypoxia or peri-arrest, vagal stimulation and raised ICP.

Management: Treat underlying cause (remove vagal stimulus, treat raised ICP). Oxygenate via manual positive pressure ventilation, fluid bolus and repeat as necessary, atropine if vagal stimulus.

Suspected Brady-arrhythmia: Attach to defib. Use external pacing on cardiology advice (with appropriate sedation) if signs of shock present.
Use adrenaline bolus or infusion as a rescue measure (bolus dosing of 1-10 mcg/kg titrated to response – see below for administration instructions).

SVT (Narrow complex)
Infant >220bpm / Child >180bpm

Causes: Re-entrant mechanisms, atrial and junctional arrhythmias.

Management:

CVS stable - 12 lead ECG recording, vagal manoeuvres (ice to face, Valsalva, carotid massage). Give adenosine as per APLS if no response to vagal manoeuvres.

CVS unstable – Escalate adenosine dose as per APLS – give as a rapid injection using a 3 way tap and a large flush via a large proximal cannula if possible.

Synchronised cardioversion as per APLS with appropriate sedation. (Capture continuous rhythm strip during cardioversion to aid diagnosis)

Ventricular tachycardia (Broad complex)

Causes: Prolonged QT, CHD, anti-arrhythmic meds, tricyclic overdose (consult Toxbase)

Management:

CVS stable - Consider causes (CHD, toxicity, long QT, hyperkalaemia) – **Discuss ECG with cardiology**

Optimise electrolytes as above including Magnesium sulphate 50-100mg/kg over 20 minutes (max dose 2g). Slower infusion should be used if concerns of hypotension.

CVS unstable: Synchronised cardioversion 1J/kg, then synchronised 2J/kg. Add amiodarone **infusion** if no response. Caution with amiodarone use as may precipitate profound hypotension/cardiac arrest; boluses not advised unless in cardiac arrest.

Paediatric cardiology (LRI)

Switch: 0300 303 1573

Cardiology bleep no. 64347
Cardiology SpR mobile: 07950873074 (from 0900-1700)

(Bleep held by CPICU SpR/ACP overnight)

LRI Cardiac PICU: 0116 258 3354
LRI Cardiac ward: 0116 258 3691

Pharmacological guidance

Synchronised cardioversion	DC Shock	With appropriate sedation + analgesia (e.g. IM/IO Ketamine if delay in IV access + airway management) – IV access attempts must not delay cardioversion if signs of shock are present. **1st shock:** 1 J/kg **2nd shock:** 2 J/kg, consider up to 4 J/kg	**Amiodarone**	IV/IO	IN CARDIAC ARREST WITH SHOCKABLE RHYTHM ONLY - 5 mg/kg by slow BOLUS before 3rd cardioversion, preferably via central venous catheter. If administering via peripheral venous catheter, flush liberally with sodium chloride 0.9% flush. DO NOT bolus unless in cardiac arrest as can precipitate profound hypotension or cardiac arrest. If requested, seek administration guidance direct from cardiology, cardiac PICU or CoMET consultant.
Adenosine	IV/IO	Dose via rapid injection using a 3-way tap and a large flush via a large proximal cannula. Seek cardiology advice if maximum single dose reached and arrhythmia persists. **Up to 1 year:** 150 mcg/kg, increase 50–100 mcg/kg every 1–2 min. Maximum single dose: Neonates 300 mcg/kg, Infants 500 mcg/kg. **1–11 years:** 100 mcg/kg increase 50–100 mcg/kg every 1–2 min. Maximum single dose: 500 mcg/kg (max. 12 mg). **12–17 years:** Initially 3 mg, followed by 6 mg after 1–2 minutes if required, followed by 12 mg after 1–2 minutes if required	**Magnesium Sulphate**	IV/IO	**Neonate:** 100mg/kg **Child:** 50 mg/kg. Maximum per dose 2 g to be given over 10–15 min or slower in case of hypotension may be repeated if necessary.
Adrenaline	IV/IO	Arrest dose of 10 mcg/kg repeated as necessary (0.1 ml/kg of 1:10,000) **Alternative -** Repeated smaller doses of 1 microgram/kg titrated to effect. Dilute 0.1 ml/kg of 1:10,000 in 10 ml normal saline to give a solution of 1 microgram/kg/ml. Give 1 ml (1 microgram/kg) boluses.	**Ketamine**	IV/IO/IM	**IM injection:** **Neonate:** 4 mg/kg, adjusted according to response, a dose of 4 mg/kg usually produces 15 minutes of surgical anaesthesia. **Child -** 4–13 mg/kg, adjusted according to response, a dose of 10 mg/kg usually produces 12–25 minutes of surgical anaesthesia **IV/IO injection:** **Neonate:** 1–2 mg/kg, a dose of 1–2 mg/kg produces 5–10 minutes of surgical anaesthesia. **1 month–11 years:** 1–2 mg/kg, adjusted according to response, a dose of 1–2 mg/kg produces 5–10 minutes of surgical anaesthesia. **12–17 years:** 1–4.5 mg/kg, adjusted according to response, a dose of 2 mg/kg usually produces 5–10 minutes of surgical anaesthesia.
Atropine	IV/IO	**Neonate:** 10-20mcg/kg **Child up to 11 years:** 20 mcg/kg. **12-17 years:** 300–600 mcg total dose, larger doses may be used in emergency.			

Reference

1. APLS guidelines (2006) *The child with an abnormal pulse rate or rhythm,* Ch 10. [online] Microsoft Word - Ch10_Abnormal_rate_or_rhythm.doc (alsg.org)
2. Evelina London Clinical Guidelines Committee (2022) Cardiac Arrhythmias: Clinical guidance [online] Paediatric Intensive Care Unit (evelinalondon.nhs.uk)
3. Resuscitation Council guidelines (2021) Paediatric cardiac arrhythmias [online] Paediatric Cardiac Arrhythmias Algorithm 2021.pdf (resus.org.uk)