



Clinical Practice Guideline

Guideline coverage includes NICU KEMH, NICU PCH and NETS WA

# Arrhythmias

This document should be read in conjunction with the [Disclaimer](#)

Neonatal arrhythmias are relatively common, especially supraventricular tachycardias. These arrhythmias may or may not be associated with underlying structural heart problems.

Post-operative arrhythmias usually occur in those that have had open cardiac surgery. If an arrhythmia is suspected, rapidly assess the infant for signs of respiratory or cardiac decompensation.

Immediately run a rhythm strip from the bedside monitor and perform a blood gas to determine acid base, electrolyte, PGL and haemoglobin status. If the child is stable perform a 12-lead ECG. It is also important to perform a 12-lead ECG after the rhythm returns to normal.

All arrhythmias should be discussed with the duty NICU consultant.

## Narrow Complex Tachyarrhythmia

### Sinus Tachycardia

Most common tachycardia. Heart rate between 180-220. Can be difficult to differentiate from an SVT.

- Low cardiac output due to hypovolaemia/cardiac tamponade.
- Respiratory e.g. pneumothorax
- Seizures: other signs may not be obvious. Consider in at risk situations.
- Pain/agitation especially post op (normal BP, lactate, urine output)
- Fever and/or sepsis.
- Drugs e.g. Caffeine

**Treatment:** Correct the underlying cause.

### Supraventricular Tachycardia

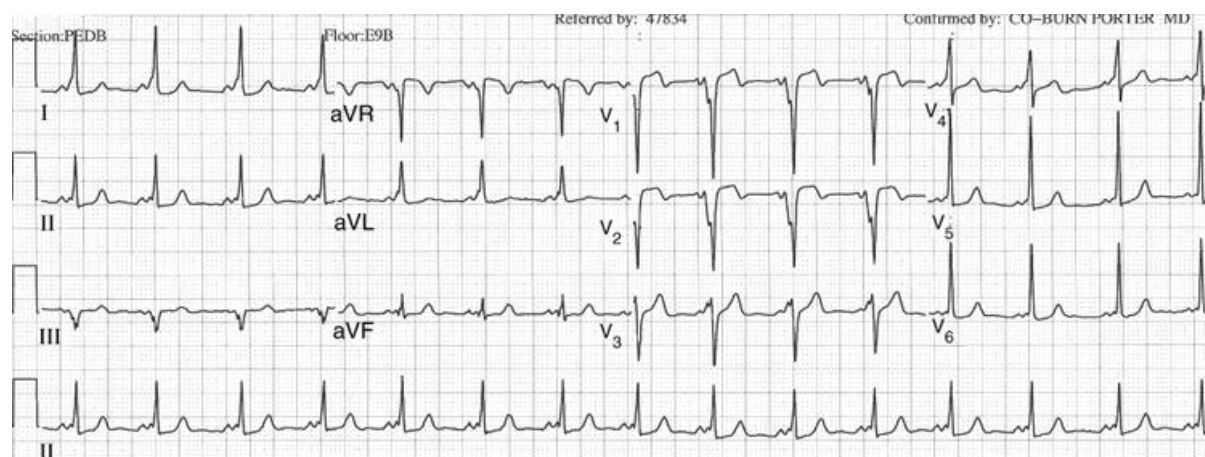
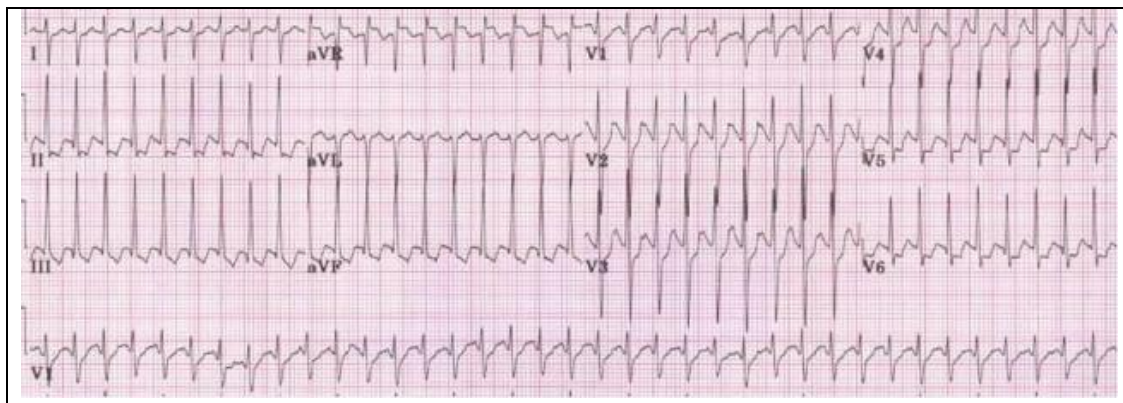
#### Causes

An atrial ectopic site which has a faster intrinsic rate than the sinus node.

Re-entry in which there are two routes for conduction: the normal atrioventricular node-His-Purkinje system and the other is an *accessory pathway* e.g. Wolff-Parkinson-White syndrome (see figure below)

#### Characteristics

- Sudden onset/offset.
- Rate constant and regular ~240bpm.
- The QRS is narrow, and P waves, if discernible, are related to the QRS.



WPW ECG. Delta waves in leads I, II, aVR, aVL, V1-6.

### SVT Treatment:

Type of initial therapy depends on the presence or absence of SHOCK (Clinical findings and metabolic acidosis). See the **SVT algorithm in NICU** in the [Arrhythmia and Cardiac Arrest on NICU: Treatment Algorithms](#) guideline.

If no signs of shock

- Vagal e.g. Ice to face.
- [Adenosine](#)
- **Synchronous** cardioversion (see [Cardioversion and Defibrillation](#) guideline).
- Amiodarone/Digoxin (after discussion with cardiologist).

### Jet (Junctional Ectopic Tachycardia)

- Unusual as a spontaneous SVT in neonates.
- More common following open cardiac surgical repair of Tetralogy of Fallot, VSD, AVSD, Truncus Arteriosus and TAPVD.
- Usually within 72 hours of operation, more likely with fever.
- Narrow complex, rate usually regular at 180-250 bpm.
- Beat to beat variability in blood pressure.
- AV dissociation, ventricular rate > atrial rate.
- Haemodynamic instability due to loss of AV synchrony.



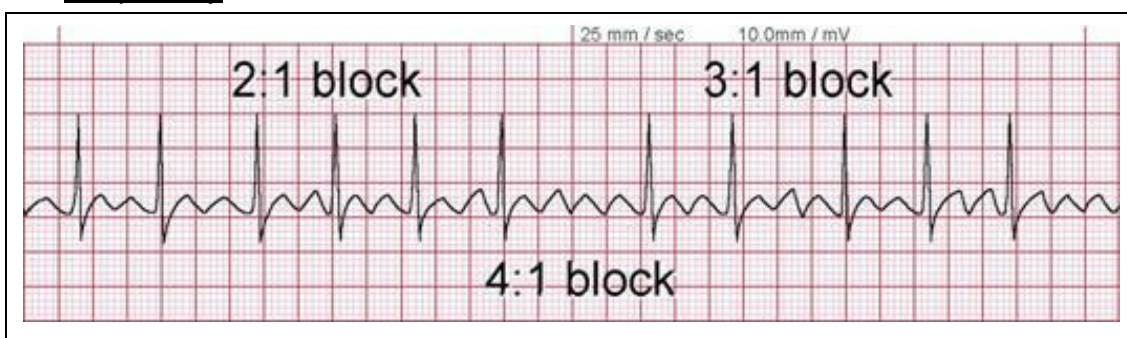
### Treatment:

- Whole body cooling.
- Avoidance of adrenergic (catecholamines) or vagolytic (e.g. Pancuronium) drugs.
- Correction of any electrolyte imbalance.
- Magnesium.
- Anti-arrhythmic drugs e.g. Amiodorone.
- Pacing (note: wires usually placed at surgery in at risk procedures and left in place for 3 days post op).
- ECMO.

**If suspected, consult PICU consultant/cardiologist and neonatologist immediately.**

### Atrial Flutter

- Uncommon (unless associated with right atrial problems).
- Variable AV block.
- Saw tooth/irregular baseline.
- Adenosine may be used as a diagnostic tool by a cardiologist to determine if the narrow complex tachycardia is an SVT or flutter; with flutter adenosine will temporarily slow the ventricular rate



### Treatment:

- Synchronised low dose (0.5J/kg) Cardioversion (see [Cardioversion and Defibrillation](#) guideline).
- Preventative treatment is not usually required; Amiodarone can be used.
- Avoid atropine like drugs, avoid agitation, keep prone.

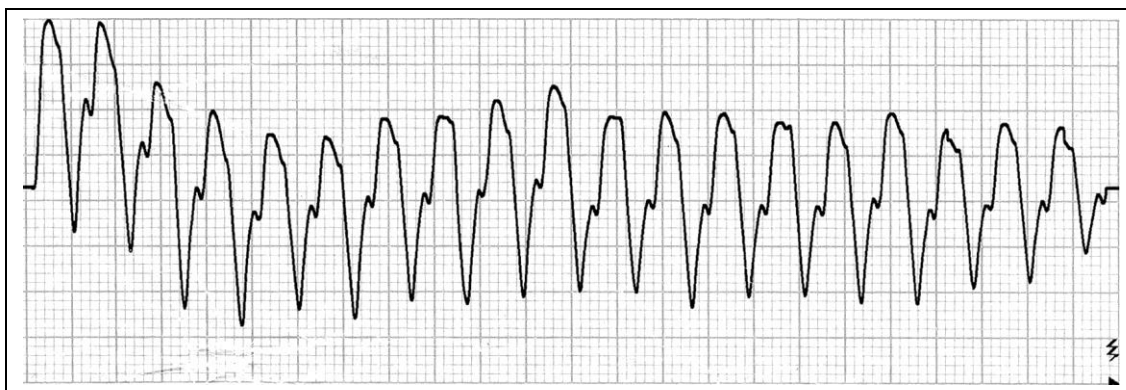
## Broad Complex Tachycardia

### Ventricular Tachycardia (VT)

- Unusual in neonates.
- Haemodynamic compromise common.
- Can be idiopathic and relatively benign.
- Low and high potassium and low calcium &/or magnesium levels may be a factor
- Associated with myocardial ischemia or residual cardiac defects.
- Long QT syndrome in unexpected VT.
- ECG usually diagnostic - AV dissociation.
- No response to adenosine.

#### Treatment:

- See the [Arrhythmia and Cardiac arrest on NICU: Treatment Algorithms](#).
- **Urgent treatment** depends on 2 simple clinical features: are pulses present; if yes is shock present.
- If pulses present and no shock consider [Amiodarone](#) 5mg/kg –as first line or if VT is resistant to shock.
- Immediate synchronous Cardioversion if **pulseless/shock**- commence at 4J/kg (ensure adequate analgesia/sedation).
- Lignocaine 1mg/kg may have role in prophylaxis of recurrent VT/VF.
- Magnesium sulphate may be useful in ventricular tachyarrhythmias, particularly Torsades de Pointes, but infuse slowly as has potential pro-arrhythmic action.

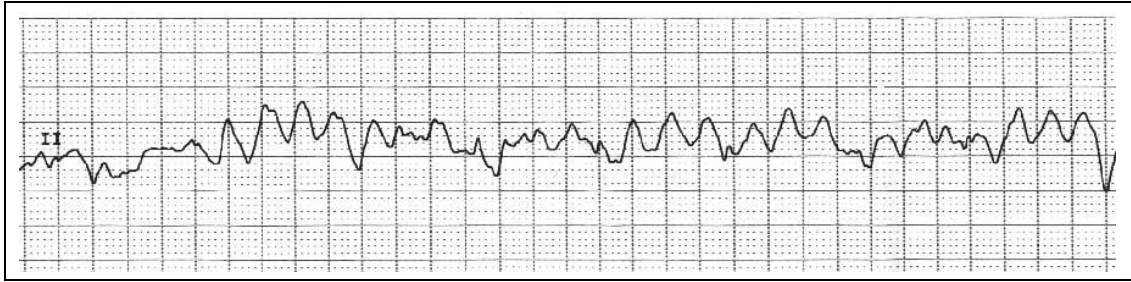


### Ventricular Fibrillation (VF)

- Uncommon and usually terminal event; more likely in:
  - Severe hypertrophy or myocardial disease.
  - Severe electrolyte disturbance.
  - Prolonged QT interval.
  - Wolf-Parkinson-White Syndrome.
- May also result from degeneration of haemodynamically unstable SVT or VT.

#### Treatment:

- See the [Arrhythmia and Cardiac arrest on NICU: Treatment Algorithms](#)
- Cardioversion (unsynchronised) - commence at 4J/kg.
- Anaesthesia/sedation usually not required as patient unconscious.



## Bradyarrhythmias

### Sinus (Baseline) Bradycardia

- P wave before every QRS.
- HR 80-100 very common.
- Usually associated with normal SaO<sub>2</sub>.
- Usually post perinatal stress and not of concern but may be associated with raised potassium, raised intra cranial pressure, hypothyroidism, drugs (before and after birth).
- Slow rate disadvantageous in immediate post-op period.

#### Treatment:

- Underlying cause if present.
- May be atrial paced if wires in situ (in PICU).

### AV Block

#### Second degree

- Not every P wave conducted.
- May be associated with underlying heart disease.

#### Third degree

- P and QRS waves completely dissociated.
- Ventricular rate is 40-80 with little variation.
- Can be associated with underlying structural heart disease.
- Maternal SLE with neonatal His bundle fibrosis
  - Maternal antibodies anti Ro or La
  - Mother maybe asymptomatic (undiagnosed)
  - Heart failure can develop if HR <50
  - Treatment is with Isoprenaline infusion.
  - Permanent pacemaker may be required



#### Post open cardiac surgery

- Exclude electrolyte disturbance, may require pacing with intra cardiac wires.

## Related WNHS policies, procedures and guidelines

Neonatal Clinical Guidelines [Arrhythmias and Cardiac Arrest on NICU: Treatment Algorithms](#)  
[Cardioversion and Defibrillation](#)

Neonatal Medication Protocol [Adenosine](#)

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