

## Supraventricular Tachycardia – Management in Newborn Intensive Care Unit (NICU)

### Protocol Responsibilities and Authorisation

<b>Department Responsible for Protocol</b>	Neonatal Intensive Care Unit
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<b>Document Owner Title</b>	Clinical Director
<b>Target Audience</b>	Nurse Practitioner, Clinical Nurse Specialist, Registrar, Senior Medical Officers, and Registered Nurses
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### Protocol Review History

Version	Updated by	Date Updated	Summary of Changes
1	Fraser Maxwell & Joyce Mok	April 2015	First version
2	Fraser Maxwell & Joyce Mok	Oct 2019	Include suggestions from pharmacist

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**Supraventricular Tachycardia – Management in Newborn Intensive Care Unit (NICU)**

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**1 Overview****1.1 Purpose**

To provide practical suggestions for the assessment and management of supraventricular tachycardia in the newborn

**1.2 Background**

Supraventricular tachycardia (SVT) can be defined as an abnormally rapid heart rhythm originating above the ventricles, often (but not always) with a narrow QRS complex; it conventionally excludes arterial flutter and arterial fibrillation.

**Supra-ventricular Tachycardia (SVT)**

SVT is common in infancy and childhood with an incidence between 1:250 to 1:1000. In 90% of cases it is due to a re-entrant rhythm and usually occurs in otherwise normal children.

30-40% of children presenting with new onset SVT do so in the first few weeks after birth. SVT can often be tolerated for many hours; early signs may be subtle until they develop haemodynamic compromise. They may have poor feeding, tachypnoea, pallor, sweating, lethargy and irritability. Later signs and symptoms reflect the degree of congestive heart failure. In rare instances SVT may have been present for days in a young infant.

Relevant history, physical examination and investigation are important; however effective intervention must not be unduly delayed. Early consultation with paediatric cardiologists is desirable and is mandatory for patients with complex congenital heart disease.

**1.3 Scope**

Nurse Practitioner, Clinical Nurse Specialist, Registrar, Senior Medical Officers and Registered Nurses in NICU

**1.4 Patient group**

Newborn infants

**2 Clinical Management****2.1 Equipment**

- Cardiorespiratory monitor
- Face flannels
- Ice cubes
- Water
- Bath towel
- Medication if needed and prescribed, e.g. adenosine.
- Defibrillator (if patient is in shock)

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### 2.2 Protocol

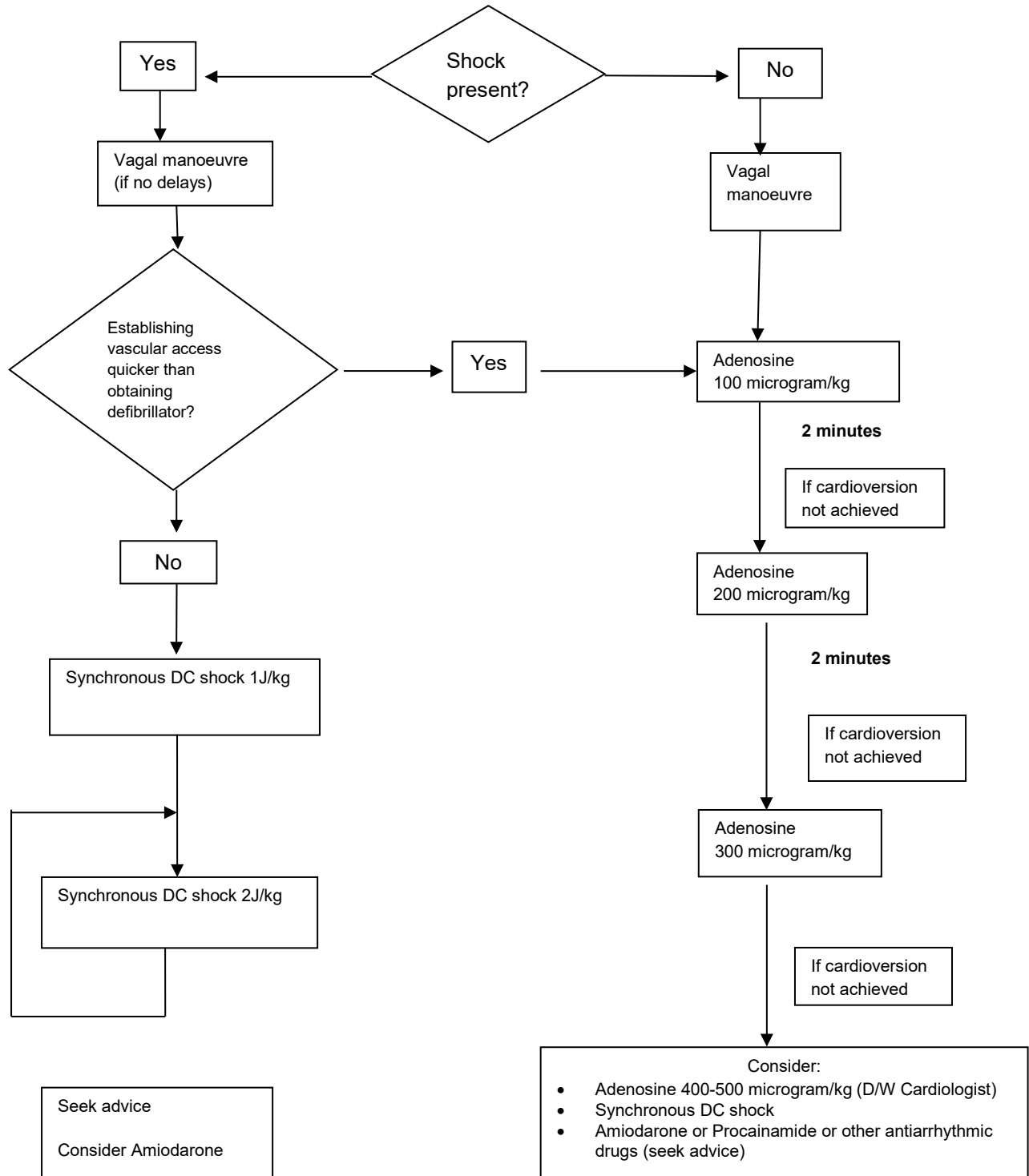
#### 2.2.1 Recommended Approach

- i) A, B, C assessment.
  - Is the child in shock?
- ii) 12 lead ECG.
  - Is there a tachyarrhythmia?
  - Broad or narrow complex?
  - P-waves?
- iii) Institute appropriate management (see below).
- iv) Concurrently consider underlying causes / precipitating factors.
- v) Review diagnosis if management unsuccessful.
- vi) Repeat 12 lead ECG.
- vii) Arrange appropriate ongoing care and follow-up.

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### 2.2.2 SVT Algorithm

**Note:** If cardioversion achieved at any point along the algorithm, do not proceed further along algorithm.



Adapted from APLS Australia 2017

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### 2.2.3 Interpretation of ECG

- i) Determine heart rate. One useful method is to count the number of RR intervals in six large squares then multiply by 50. Infants less than 1 year of age, the normal rates are 110-160/min.
- ii) Is it the tachycardia wide or narrow complex? A QRS duration of >0.10 second at rates above 200 defines this – see chart below for normal durations.

#### Normal QRS duration: Average (and upper limits) for age:

	0 - 1 month	1 - 6 months	6 - 12 months
Seconds	0.05	0.05	0.05
	(0.07)	(0.07)	(0.07)

- iii) Can you identify P waves and what is their relationship to the QRS complex? They may be absent, hidden or inverted. There may be atrioventricular (AV) dissociation.

**It is best to assume a broad complex tachycardia is due to ventricular tachycardia (VT) rather than SVT with aberration.** The latter is much less common in children. Separating sinus tachycardia from SVT can be difficult. If the child looks very sick, has a variability in heart rate, has a rate <220 bpm and a normal P axis, sinus tachycardia is more likely. Conversely a 'fixed' heart rate >220 bpm in a relatively well looking child with a superior P axis is more likely to be due to SVT.

***Tachyarrhythmia needs exclusion if a newborn or infant has a heart rate >200 beats/minute. Cardiac monitors are not very accurate for heart rates above 200.***

### 2.2.4 Vagal manoeuvres

Vagal manoeuvres should be prescribed on an **individual** basis because each baby's response to treatment will be a little different.

- Wet flannel
  - Wet a flannel in ice water and apply over the infant's face, and remove the flannel as soon as the rhythm has reverted to sinus. This elicits the diving reflex, frequently interrupting the arrhythmias.
- Facial immersion in ice water
  - Performed by Nurse Practitioner/Clinical Nurse Specialist/medical staff.
  - Nurses may initiate this technique when the diagnosis of SVT has clearly been made and there are recurrences of SVT.
  - Monitor baby's heart rate continuously by a cardiac monitor
  - Wrap arms in a towel
  - Immerse baby's face in ice water and take the baby's face out of the water as soon as the rhythm has reverted to sinus.
  - If there is no response within 5 seconds take the face out of the water and repeat the process once the baby has had a breath.

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- It is unnecessary to occlude the nostrils. This technique is safe and 90% effective in terminating a tachycardia.
- Explain carefully to the parents what you are doing. The baby will not drown!

Monitor continuously: the electrocardiographic pattern seen during termination of the tachycardia can help determine its mechanism.

### 2.2.5 Medication

#### IV Adenosine

This is the drug of first choice for narrow complex tachyarrhythmia. This is both therapeutic and sometimes diagnostic. Technique is important due to a very short half-life.

- i) Give through a large vein (antecubital fossa) using a three way tap close to the cannula.
- ii) Give adenosine on one port by rapid IV push.
- iii) Follow immediately with rapid push of 5ml of sodium chloride 0.9% through other port.
- iv) The initial dose is 100microgram/kg. If not successfully cardioverted to sinus rhythm, the dose should increase in steps (200microgram/kg and if necessary then 300microgram/kg).
- v) Discuss with cardiologist if not successfully cardioverted at 300microgram/kg.
- vi) Record rhythm strip throughout (can use the defibrillator for this purpose) as may help later with diagnosis.

#### Note:

Infants will frequently cry. The drug works by temporarily blocking the AV node, and on ECG you frequently see a brief period of asystole before sinus rhythm returns.

If the technique is correct and the child does not revert to sinus rhythm after the maximum dosage, you should **REVIEW THE DIAGNOSIS**. It is likely that you are dealing with an atrial (non-junctional) tachyarrhythmia e.g. atrial flutter.

### 2.2.6 On-going care

- 12 lead ECG
- Long-term follow-up
- Consider differential diagnosis, underlying causes/precipitating factors.
- Other modes of treatment include other antiarrhythmic drugs, e.g. amiodarone, propranolol, flecainide. Seek advice from a Paediatric Cardiologist before initiating any of these treatments.
- Cardioversion – Synchronised DC cardioversion is very uncommonly required. Ideally this should be under general anaesthetic or sedation. Seek advice from a Paediatric Cardiologist.

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### 3 Audit

#### 3.1 Criteria

- There is evidence the neonate has had a 12 lead ECG prior to treatment.
- Vagal manoeuvres are carried out as per 2.2.4
- There is documented evidence of ongoing care as per 2.2.6

### 4 Evidence base

#### 4.1 References

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