



LRI Children's Hospital

Exchange Transfusion for Paediatric Sickle Cell Disease

Staff relevant to:	Paediatric haematology teams, Paediatric medicine, Paediatric Intensive Care
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Written by:	K. Kotecha
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1. Introduction and Who Guideline applies to

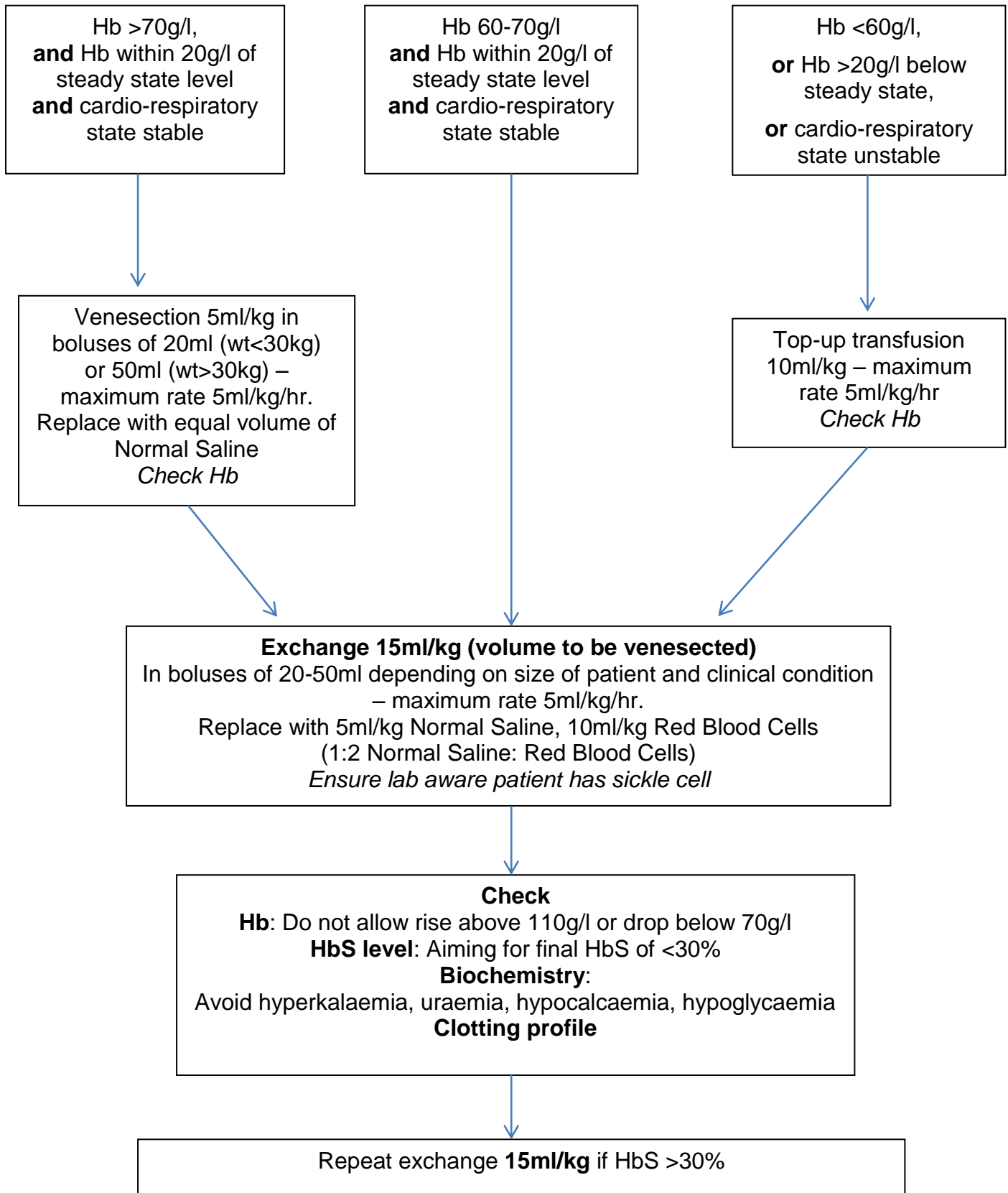
Concise guideline for exchange transfusion procedure.

Relates to Paediatric haematology teams, Paediatric medicine, Paediatric Intensive Care

These guidelines are based on:

- National Haemoglobinopathy Peer Review Standards 2014

2. EXCHANGE TRANSFUSION PROTOCOL FOR PAEDIATRIC SICKLE CELL DISEASE



2.1 ACUTE LARGE VOLUME EXCHANGE TRANSFUSION AND PARTIAL EXCHANGE TRANSFUSION

1) Acute Large Volume Exchange Transfusion

- a. Consists of removing the patient's own blood and replacing it with an equal volume of transfused red blood cells (RBCs) and normal saline (NS)

- b. *Aims:*

To rapidly reduce % of sickle cells in the circulation to <30%

To maintain steady state blood volume during procedure (isovolaemic)

Ensure Hb no more than 110g/l throughout procedure

Indications:

Urgent: Acute chest syndrome (ACS), new cerebrovascular event, girdle syndrome, multi-organ failure

Elective: Pre high risk surgery

2) Partial Exchange Transfusion

Similar principle as with acute large volume exchange transfusion, usually no more than 15mls/kg is required. Used for chronic exchange transfusion program.

2.2 PRE-EXCHANGE CHECKLIST

- Ensure availability of trained personnel and facilities. For urgent indications discuss with Childrens Intensive Care Unit (CICU). Close liaison between CICU and haematology is essential
- Obtain informed consent from parents before starting procedure explaining the purpose and risks
- FBC, reticulocyte count, HbS%, U&E, LFT, crossmatch (liaise with transfusion laboratory for history of red cell alloantibodies, previous transfusion requirement and extended red cell phenotype), Hep B Sag, Hep C Ab, HIV I+II Ab (if not done previously), capillary/arterial blood gas
- Initially **start with 15ml/kg**, provided Hb 60-70g/l and within 2g of steady state. Usually a second 15ml/kg exchange is required (30ml/kg in total)
- Each unit of red blood cells must be used within 4 hours of commencing transfusion
- Ideally the blood should be less than 7 days old and sickle negative. Do not delay in an emergency

2.3 PROCEDURE

Two large bore access lines are required (peripheral venous, central venous or arterial for venesection only) for simultaneous venesection/infusion

Single access may be used in the discontinuous technique with alternating withdrawal of blood and infusion. This should be reserved for patients where it is difficult to gain 2 access lines.

Blood is exchanged in aliquots according to the patient's weight and clinical condition – provided the patient is cardiovascularly stable, aliquots of 20mls should be used in patients <30kg or 50mls in those >30kg.

Each aliquot for removal of blood should not exceed 5% of the child's circulating volume (80mls/kg). Take care in children <5kg.

For an isovolaemic exchange, a total of 15ml/kg of patient's blood is to be exchanged with 5ml/kg of NS and 10ml/kg RBC (**1:2 NS: RBC**).

Start by venesectioning the patient's blood from cannula A as aliquot 1 (OUT) and then infuse the NS then RBC sequentially (discontinuous) or concurrently (continuous) into cannula B as aliquot 1 (IN) according to table below. Use infusion rates of no more than 100-150mls/hr or maximum of 5ml/kg/hr. Do this in turns until the exchange is completed.

	OUT (cannula A)	IN (cannula B)
Aliquot 1	20ml	20ml NS
Aliquot 2	20ml	20ml RBC
Aliquot 3	20ml	20ml RBC
Aliquot 4	20ml	20ml NS
Aliquot 5	20ml	20ml RBC
Aliquot 6	20ml etc	20ml RBC etc
Continue until Total IN = Total OUT	15ml/kg	15ml/kg

Examples:

Child 1, wt=30kg, Hb 80g/l

1. Initially venesection 5ml/kg = 150ml, replace with NS
2. Venesection 15ml/kg = 450ml, replace with 150ml NS and 300ml RBC (1:2 NS: RBC)

Child 2, wt=20kg, Hb 65g/l

1. Venesection 15ml/kg = 300ml, replace with 100ml NS and 200ml RBC (1:2 NS: RBC)

Monitor BP, pulse, O₂ saturations every 15 minutes and temperature hourly throughout the procedure.

Keep strict fluid balance chart throughout procedure as these unwell patients may require additional maintenance fluids.

Repeat bloods post exchange:

- Ensure Hb is >70g/l and <110g/l
- Beware of hyperkalaemia/hypocalcaemia/hypoglycaemia
- Ensure normal clotting
- The total HbS% should be <30% and a 30ml/kg exchange is usually required to achieve this
- In a stable child following a 30ml/kg exchange, leave a 4-6-hour break if further exchange is required. Very unwell children may require continuous exchange

For those on regular exchange programmes, a single 15ml/kg exchange is usually adequate.

3. Education and Training

Regular teaching provided in Paediatric Specialist Trainees Regional Training days and nursing training programmes.

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
100% adherence to policy	Retrospective audit	Dr K Kotecha	Annual	As this occurs infrequently, all episodes will involve the haemoglobinopathy teams

5. Supporting References

- National Haemoglobinopathy Peer Review Standards 2014

6. Key Words

Sickle cell, pain, acute chest syndrome, stroke, transfusion

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs. As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Dr K Kotecha - Consultant	Executive Lead Chief Nurse
Details of Changes made during review: No changes made	