

## EXCHANGE TRANSFUSION

*This Local Operating Procedure is developed to guide safe clinical practice in Newborn Care Centre (NCC) at The Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this Local Operating Procedure.*

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### INTRODUCTION

Replacing an infant's blood volume with correctly cross-matched blood can be an essential part of the management of severe Haemolytic Disease of the Newborn.

#### 1. AIM

- To perform the exchange transfusion procedure correctly and safely

#### 2. PATIENT

- Newborns

#### 3. STAFF

- Medical and nursing staff

#### 4. EQUIPMENT

- Hat, mask, sterile gown
- Surgical Gloves and goggles
- Cross-matched blood/packed cells
- Vygon exchange transfusion set (Ref.275.00)
- Sterile plastic drape (L)
- Extension Set (WB35000) (for use with Biegler Dry Heat Infusing Warmer)
- Blood & Infusion Warmer (Biegler BW 485L)
- Pathology tubes for biochemistry and haematology
- Exchange transfusion record charts
- Cardiopulmonary monitor
- Oximeter
- Servo control probe and skin probe cover
- Consent form for parents
- NSW Newborn Screen Card
- Neutral detergent
- Antiseptic solution: Chlorhexidine Acetate Aqueous solution 0.05%w/v (Blue solution)

#### NOTE:

##### Blood and Plasma from Blood Bank

- Packed Red Blood Cells (RBCs) less than 5 days old
- Compatible packed RBCs (Type O rhesus negative for rhesus incompatibility and Type O rhesus specific for ABO incompatibility), cross-matched against mother (or infant if maternal sample not available)
- 10% dilution of RBCs with FFP or Albumin is recommended  
eg. 90mL RBC + 10mL FFP or Albumin  
(Refer to Appendix 1 for instructions on dilution)
- Medical Staff is to re-constitute the blood with nurse assisting

##### Volume of RBCs and FFP to be prescribed

- Estimated SINGLE VOLUME EXCHANGE = 85mL x weight (kg)
- Estimated DOUBLE VOLUME EXCHANGE = 85mL x 2 x weight (kg)

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**EXCHANGE TRANSFUSION cont'd**

**5. CLINICAL PRACTICE**

**Procedure:**

1. Ensure the procedure is explained to parent/s. Obtain a written consent.
2. Transfer the infant to Level 3 if in Level 2.
3. Perform a "time-out" on the infant with the infant's primary nurse.
4. Place the infant on an open bed for the procedure.
5. Ensure:
  - Patent vascular access is established and correctly secured for the procedure.
  - Another PIVC access is infusing a maintenance intravenous solution.
6. Prescribe pathology request forms for pre-exchange SBR and biochemistry.

**Preparation**

7. Attach temperature probe and set it on servo control.
8. Attach cardio-respiratory monitor and oximeter to infant. Set alarm limits as appropriate for the infant.
9. Nurse the infant in a comfortable position.
10. Check with the Medical Officer:
  - The infant's ID band
  - The parenteral fluid chart prescription
  - The bag of blood and the Blood and Blood Products Administration Form together with the NSW Health Pathology Blood Bank Form
    - Name of infant
    - MRN
    - CMV Negative
    - Irradiated
    - Blood group – Patient and Product
    - Expiry date and time
    - Product number of blood
11. Sign the appropriate charts.
12. Take a set of infant's clinical observation prior to commencement of procedure:
  - Axilla temperature
  - Heart rate
  - Respiratory rate
  - Oximetry reading
  - Arterial blood gas (if required)
  - Girth measurement
13. Clean the work-surface of the procedure trolley.
14. MO to perform a surgical scrub and put sterile gloves on.
15. RN to assist the MO to prepare equipment:
  - Drape the work surface area with the sterile plastic sheet
  - Open the Vygon exchange transfusion set on the sterile plastic sheet (Picture 1 & 2)
  - Connect blood giving set (with filter) to heating tubing (Picture 3)
  - Connect heating tube to 4-way tap (Picture 4)
  - Connect plastic tubing for waste bag to 4-way tap (Picture 5)
  - Pass the spike-end of the blood giving set to the RN to connect to the bag of blood (Picture 6)
16. Prime the blood giving set with blood (Picture 7).
17. Connect power cable to power supply and switch on. A short beep sounds and the standby LED lights up (Picture 8 – No. 1).

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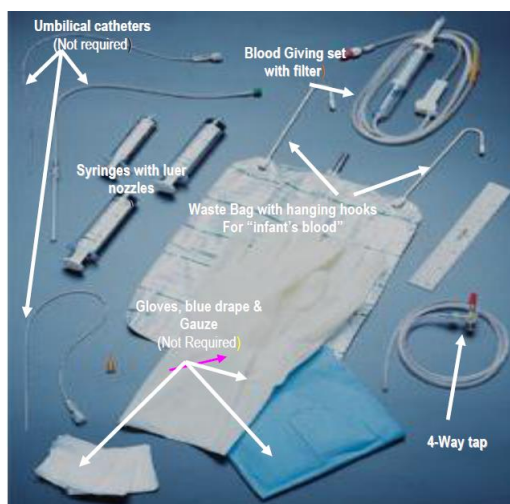
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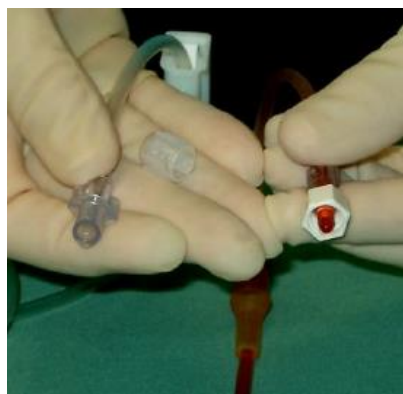
18. Position the heating tube in the groove of the heat exchanger. Coil heating tubing from rear of heat exchanger in a forward direction and without tension in a clockwise direction – x 4 coils ONLY.
19. Adjust the desired temperature to 37°C. Use buttons ▲ and ▼ (Picture 8 – No. 2) in Standby mode to adjust temperature.
20. Press ● (Picture 8 – No. 3) to start the heating.
21. Check the temperature reading on the BW 458L is at 37°C during the procedure (as per Prince of Wales Hospital Blood Bank, Ext 29041).
22. Connect a 5mL syringe to the nozzle of the 4-way tap that has a “flag” (Picture 9).
23. Check that there is no trapped air in the exchange line.
24. Commence exchange transfusion procedure.



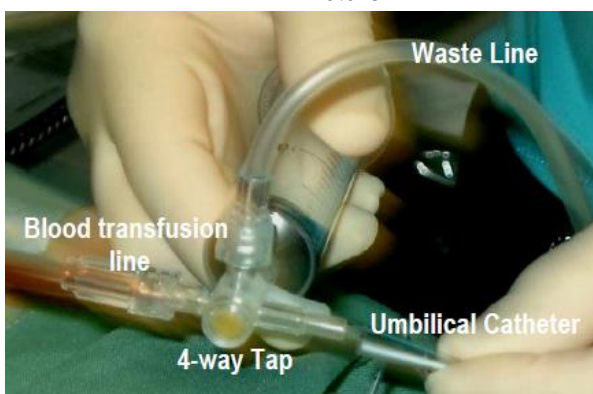
Picture 1



Picture 2



Picture 3



Picture 4

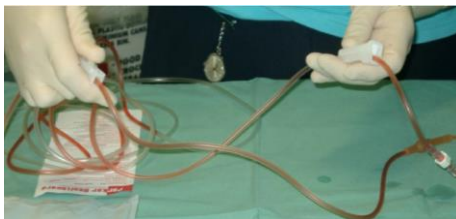
**EXCHANGE TRANSFUSION cont'd**



Picture 5



Picture 6



Picture 7



Picture 8



Picture 9

**Exchange Transfusion**

***Single Access (Appendix 1)***

25. Turn 4-way tap in a clockwise direction to the umbilical catheter.
26. Draw blood sample for serum bilirubin, serum electrolytes, haemoglobin measurement and NSW Newborn Screen (if not previously collected) via 5 mL syringe.
27. Turn 4-way tap to OFF position. Disconnect.
28. Give specimen to RN/RM to put in the appropriate pathology bottles. Send pathology samples immediately to pathology. Ensure samples are marked "urgent" on the pathology forms.
29. Attach 20 mL syringe to 4-way tap to start exchange procedure.
30. Turn 4-way tap in a clockwise direction: OPEN to the umbilical catheter.
31. Withdraw 5mL of infant's blood into 20mL syringe.
32. Turn 4-way tap (clockwise direction) to the waste line and discard blood.
33. Turn 4-way tap in a clockwise direction to the blood bag and draw 5mL of new blood into the 20 mL syringe.
34. Turn 4-way tap in a clockwise direction to the umbilical catheter. Push slowly the new blood into the umbilical catheter. Wait of 2-3 seconds.
35. Continue to withdraw and infuse blood until the procedure is complete.

***Double Access (Appendix 2)***

36. Establish an arterial access: umbilical or radial.
37. Attach a 3-way tap to umbilical catheter or radial access device and infusion line from blood bag.
38. Establish a venous access for withdrawing the infant's blood.
39. Attach a 3-way tap to the venous access, a 20mL syringe and tubing from waste-bag to 3-way tap.

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40. Draw blood sample from venous access for serum bilirubin, serum electrolytes, haemoglobin measurement and NSW Newborn Screen (if not previously collected) via 5mL syringe.
41. Turn 3-way tap to OFF position. Disconnect syringe of blood.
42. Give specimen to RN/RM to put in the appropriate pathology bottles. Send pathology samples immediately to pathology. Ensure samples are marked "urgent" on the pathology forms.
43. Start exchange procedure.
44. Set infusion rate of new blood via an infusion pump over 4 hours.
45. Turn 3-way tap on venous access in a clockwise direction OPEN to infant.
46. Withdraw 5mL of blood, turn 3-way tap OFF to infant and OPEN to waste-bag port.
47. Discard infant's blood into waste-bag.
48. Turn 3-way tap on venous access in a clockwise direction back to OPEN to infant.
49. Withdraw 5mL of blood, turn 3-way tap OFF to infant and OPEN to waste-bag port.
50. Continue procedure until exchange procedure is completed.

**NOTE:**

5mL aliquot of infant's blood may gradually be increased to 15mLs if there is no cardiac arrhythmias or adverse effect on the infant.

**Assistant's Responsibility/les during the Procedure (Appendix 3)**

51. Record the amount of blood taken from infant for pathology on Exchange Blood Transfusion Observation Chart.
52. Record the amount of blood removed and infused on the blood exchange Chart.
53. Monitor and record infant's vital signs on Exchange Transfusion record:
  - 15 minutely readings from the monitor of:
    - Heart rate
    - Respiratory rate
  - Hourly readings of:
    - Servo temperature
    - Temperature of blood & infusion warmer (Biegler BW685) – maintain at 37°C
    - Blood pressure (cuff reading)
    - Hourly saturation reading
54. Observe infant's behaviour during the procedure.

**Mixing Plasma and Blood via Single Access Exchange Transfusion Set using Umbilical Access (Appendix 1)**

55. Attach the bag of plasma and blood to the Y-filter set.
56. Mix the RBCs and FFP (See note on page 1) in the burette.
57. Connect burette to the infusion line.
58. Connect warming circuit to the infusion line.
59. Prime the infusion line and attach to 4-way tap.
60. Prime 4-way tap and attach to the umbilical catheter.
61. Attach waste-line to 4-way tap.
62. Connect 5mL luer syringe to the 4-way tap connection that has a "flag".
63. Check for trapped air in the line.
64. Commence exchange transfusion procedure.

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**On Completion of Exchange Procedure**

65. Detach the transfusion set from access.
66. Provide a maintenance infusion to the access to maintain patency.
67. Remove all sterile drapes.
68. Dispose blood pack in contaminated waste bin.
69. Remove and dispose sharps.
70. Discard disposable equipment.
71. Ensure line access is secured.
72. Check access sites for bleeding.
73. Clean work surface area.

**Post Exchange Transfusion**

74. Monitor infant's BSL immediately post-exchange.
75. If stable, monitor infant as per unit protocol.
76. Measure infant's girth and record in observation chart.
77. Auscultate and assess for bowel sounds.
78. Observe all stools for blood.
79. Maintain a strict intake and output record.
80. Ensure phototherapy lights are on the infant.
81. Inform parent/s of the completed procedure.
82. Invite parent/s to visit the infant.

**6. DOCUMENTATION**

- eMR nursing notes
- Neonatal Observation Chart
- Central Line Surveillance Form (if umbilical access was inserted)
- NICUS database
- Exchange transfusion procedure chart

**7. RELATED POLICIES/PROCEDURES/CLINICAL PRACTICE LOP**

- Intravenous Cannula - Intravenous Cannula Insertion

**8. RISK RATING**

- Medium

**9. NATIONAL STANDARD**

- Standard 1 Governance for Safety and Quality in Health Service Organisations
- Standard 3 Preventing and Controlling Healthcare Associated Infections
- Standard 5 Patient Identification and Procedure Matching
- Standard 7 Blood and Blood Products

**10. ABBREVIATIONS AND DEFINITIONS OF TERMS**

NCC	Newborn Care Centre	CMV	Cytomegalovirus
RBC	Red Blood Cells	MO	Medical Officer
FFP	Fresh Frozen Plasma	RN/RM	Registered Nurse / Registered Midwife
PIVC	Peripheral intravascular catheter	BSL	Blood Sugar Level
MRN	Medical Record Number		

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July 2018

**EXCHANGE TRANSFUSION cont'd**

**11. REFERENCES**

- NSW Health Policy Directive PD2005\_406, Consent to Medical Treatment – Patient Information, Publication Date: 27th January 2005.
- NSW Health Policy Directive PD2017\_032. Clinical Procedure Safety. Publication Date: 22nd September 2017.
- NSW Health Guideline GL2016\_027. Neonatal - Jaundice Identification and Management in Neonates  $\geq$  32 Weeks Gestation. Publication Date: 17th November 2016.
- POWH/RHW/Community Health Services Clinical Business Rule POWH CLIN018. Blood Component Management and Administration. Publication Date: September 2017.

**12. AUTHOR**

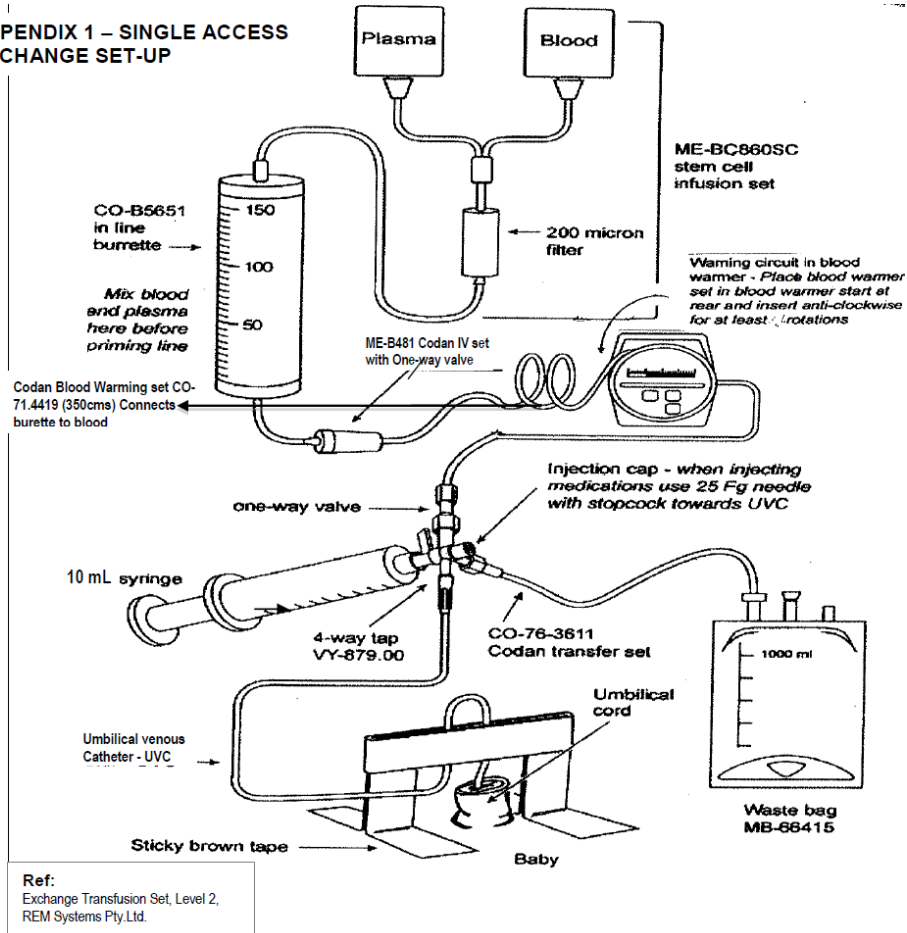
Primary	2005	KB Lindrea (CNC)
Revised	8/4/2013 18/7/2018	KB Lindrea (CNC), NCC Policy/Procedure Working Group KB Lindrea (CNC)

**REVISION & APPROVAL HISTORY**

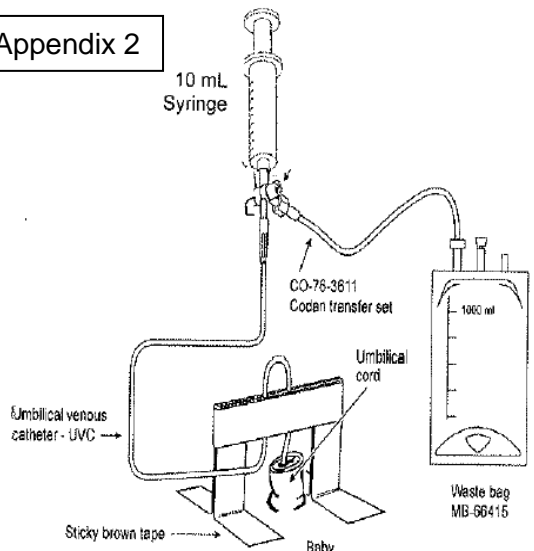
July 2018 Revised and Approved NCC LOPs Committee  
April 2013 Revised and Approved NCC Policy/Procedure Working Group  
2005 Primary

**FOR REVIEW: 2021**

**APPENDIX 1 – SINGLE ACCESS EXCHANGE SET-UP**



**Appendix 2**



**Removing blood from infant via an Umbilical arterial access.**

**Transfusing infant with fresh blood**

