

## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### Procedure Responsibilities and Authorisation

|  |   |
|--|---|
| <b>Department Responsible for Procedure</b>  | Neonatal Intensive Care Unit  |
| <b>Document Facilitator Name</b>   | Shona Barker  |
| <b>Document Facilitator Title</b>  | Nurse Educator  |
| <b>Document Owner Name</b>   | Jutta van den Boom  |
| <b>Document Owner Title</b>  | Clinical Director   |
| <b>Target Audience</b>   | Nurse Practitioners, Clinical Nurse Specialist, Registrar, Nurses, Senior Medical Officer |
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### Procedure Review History

| Version | Updated by                          | Date Updated | Summary of Changes  |
|---------|-------------------------------------|--------------|---|
| 1       | Phil Weston                         | Nov 2011     |   |
| 2       | Phil Weston                         | Feb 2016     |   |
| 3       | Phil Weston                         | Dec 2016     | Dosage  |
| 4       | Phil Weston                         | Sep 2019     | Change of threshold for transfusion   |
| 4.1     | Phil Weston                         | Dec 2019     | Simplification of threshold for top-up transfusion table  |
| 4.2     | Jutta van den Boom                  | June 2020    | Change in irradiation indications, title change   |
| 5       | Jutta van den Boom and Shona Barker | Oct 2020     | Combine the medical and nursing procedure; remove aliquot   |
| 5.1     | Shona Barker                        | Jan 2021     | S2.2.2 Add correct name of tubing used for infusion on equipment list: Alaris TM extension set (with pressure disc)<br>S2.2.3 (B) Add under administration: Connect the blood filter then blood-giving set to the blood bag |

## Blood Transfusion in Newborn Intensive Care Unit (NICU)

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### 1 Overview

#### 1.1 Purpose

- To provide guideline on the threshold and dosage of transfusion to infants in NICU
- To outline the specific procedure for transfusion of blood products for infants in NICU
- This procedure is based on best practice guidelines according to Lippincott Procedures
- Infusion is ideally given via peripheral IV
- Under the direction of NICU Consultant blood may be administered via UAC
- Occasionally, under the direction of NICU Consultant and when no other vascular access is available UVC or CVAD may be used for blood transfusion (using sterile technique)

#### 1.2 Scope

Waikato District Health Board (DHB) medical and nursing staff working in NICU

#### 1.3 Patient / client group

Babies and infants in New Born Intensive Care Unit

#### 1.4 Exceptions / contraindications

Parental, cultural or religious reasons for declining consent

**Note:** If parents decline blood transfusion for their baby, they must sign the [Medical Directive for patients who refuse blood transfusions \(including Jehovah Witnesses\)](#) form (G3825HWF)

#### 1.5 Definitions and acronyms

|                        |  |
|------------------------|--|
| <b>Blood</b>           | Blood products that consist of red cells, platelets, fresh frozen plasma, cryoprecipitate and albumin.                             |
| <b>CMV</b>             | Cytomegalovirus  |
| <b>CNS</b>             | Clinical Nurse Specialist  |
| <b>CNS</b>             | Clinical Nurse Specialist  |
| <b>CVAD</b>            | Central Venous Access Device   |
| <b>FiO<sub>2</sub></b> | Fraction of inspired oxygen (inspired oxygen percentage)   |
| <b>Infusion</b>        | Blood is given by an infusion for volume replacement over half to one hour or for top up transfusion over 2-3 hours as prescribed. |
| <b>IV</b>              | Intravenous  |
| <b>NICU</b>            | New Born intensive Care Unit   |

## Blood Transfusion in Newborn Intensive Care Unit (NICU)

|             |                                  |
|-------------|----------------------------------|
| <b>NNP</b>  | Neonatal Nurse Practitioner      |
| <b>SCID</b> | Severe combined immunodeficiency |
| <b>UAC</b>  | Umbilical Arterial Catheter      |

## 2 Clinical management

### 2.1 Medical Management

#### 2.1.1 Competency required

- NNP, CNS, Registrars, Senior Medical Officers and RN's with Waikato DHB generic IV certification and blood product certification

#### 2.1.2 Medical Procedure

##### Threshold for top up transfusion

Table 1: Threshold for top up transfusion

| Age (d) | Vent | CPAP or O2 | Air, no support  |
|---------|------|------------|------------------|
| <8      | 120  | 100        | 100              |
| 8-14    | 100  | 100        | 85               |
| >14     | 100  | 85         | 85 if retics<100 |

The new British Committee for Standards in Haematology (BCSH).

<https://www.transfusionguidelines.org/transfusion-handbook/10-effective-transfusion-in-paediatric-practice/10-2-neonatal-transfusion>

#### Cross-matching

The requirements for compatibility testing are simpler than in the past, assuming that the maternal antibody screen is negative, the requirements are:

**First Transfusion:** Mother's blood (if available and must have been processed at Waikato Hospital Laboratory) and baby's blood (mandatory). Send along with Group and Screen form

#### Subsequent Transfusions

- Further blood samples are not required until 4 months of age for the current admission only
- Complete the Waikato DHB [Blood Product Request form](#) (P0003FXS). Send this form via the Lamson Transport System to the Blood Bank, and phone simultaneously to make the order verbally. Blood will be sent via the Lamson when it is available
- If maternal antibody screen is positive at the outset then re-cross-matching for each unit may be necessary. Blood Bank will advise

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### Parental consent

Medical staff, NNP or CNS to discuss with parents and gain consent for blood transfusion before administration of any blood product. The consent may be written by completing [Consent for use of all blood components and blood products form](#) (T1528HWF). If verbal, consent form to be signed at the earliest opportunity

### Dose

The usual volume administered is 10 ml/kg as an infusion over 2 hours. Although higher volumes can be considered depending on clinical situation

### Prescriptions

Blood must be prescribed by NNP/CNS or medical staff on the NICU Stat Treatment Sheet (T1695HWF)

### 2.1.3 Special considerations to reduce risks of potential complications

#### Graft versus host disease

- The following categories of babies require the blood to be irradiated:
  - Congenital cellular immunodeficiency state, e.g. SCID
  - Possibility of 22q11 syndrome (until genetics is declared normal)
  - Previous intra-uterine transfusions (irradiation out to 6 months of age is indicated)
  - Exchange or reduction transfusion where the requirement to irradiate will not unduly delay transfusion
- To request irradiated blood Prescriber to complete the [Notification of a Special Blood Component Requirement form](#) (111F047)
- Irradiation takes place in Auckland and there will be a delay in getting the blood of 4 hours
- In an emergency, there is the option to request an adult unit of irradiated blood that is on site at Waikato Hospital

#### Cytomegalovirus

Blood Bank will endeavour to provide CMV-safer blood components for babies with birth weight < 1500g. This is achieved with the use of pre-storage leucodepletion or the selection of CMV antibody negative blood products. Neither method alone or in combination can completely avoid transmission

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### 2.2 Nursing Management

#### 2.2.1 Competency required

RN with Waikato DHB generic IV certification and blood product certification

#### 2.2.2 Equipment

- Sterile paper guard
- Sodium Chloride 0.9% plus syringe for flush
- Blood filter
- BD™ syringe of appropriate size for volume of blood being transfused
- Bag access device
- Alaris™ extension set (with pressure disc)
- Syringe pump
- Non sterile gloves (for IV or UAC access)
- Alcohol-Chlorhexidine wipes
- If administered via CVAD – sterile supplies; sterile packs, mask, cap, gloves

#### 2.2.3 Nursing Procedure

##### Pre-Administration

- Baseline observations of temperature, heart rate, respiratory rate and blood pressure (BP) will be taken and recorded within 60 minutes before transfusion starts
- Obtain parental consent as per Section 2.1.2
- Check validity of group and screen
- Inspect IV site and check for patency to ensure access
- Check prescription is correctly charted

##### Requesting Blood

- Send Blood product request form to blood bank via Lamson System

##### Checking and administering

###### A. Checking prior to administration

Refer to and complete Waikato DHB [Blood administration checklist](#)

###### B. Administration for all routes

- Perform hand hygiene and assemble equipment on paper guard
- Wear appropriate gloves (non-sterile gloves for IV route)

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

- Connect the blood filter then blood-giving set to the blood bag
  - Draw up blood (prescribed amount plus volume for priming) in syringe and prime the Alaris™ extension set (with pressure disc) with blood, ensuring no air in line
  - Stop any infusion that is running via that route
  - **Critical medications i.e. Inotropes and sedation must not be stopped, therefore alternative access must be used for blood transfusion**
  - Flush the IV luer with sodium chloride 0.9% to clear the line of any infusion that is incompatible with blood
  - Do not give blood via white pall filter, add a double Smartsite™ extension set as needed
  - Place syringe into syringe pump and programme into Guardrails™ as prescribed, 2 RN's must check guardrails set correctly under Blood Product programme and infusion to be correct route as prescribed
- Note:** The current Guardrails™ set on the syringe pump is for red cells only, for other blood products, set the infusion rate “volume over time”
- Transfusion must not exceed 4 hours (from leaving the Blood Bank)

### C. Intravenous (IV) Route - preferred option

- Connect the blood infusion line to the infant's IV
- Start infusion as prescribed using Guardrails™
- Once infusion complete flush the IV luer with sodium chloride 0.9%

### D. UAC - under the direction of NICU Consultant

- If UAC is used for blood infusion, set the current UAC infusion of heparinised saline “Stand By”
- Flush UAC with sodium chloride 0.9%
- Attach Blood transfusion to UAC. Turn tap on to baby and off to heparinised saline. Turn blood transfusion on at set rate as prescribed
- On completion of infusion flush UAC with sodium chloride 0.9% and restart infusion of heparinised saline

### E. CVAD/UVC – under the direction of NICU Consultant

- Discussion with NICU SMOs regarding administration time – considering babies condition and medication infusion.
- Two person sterile technique
- Flush the line with sodium chloride 0.9% before commencing transfusion
- Start infusion as prescribed using guard rails
- Once transfusion complete flush line with sodium chloride 0.9% as prescribed

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### 2.2.4 Monitoring and documentation during infusion

- Baseline observations of temperature, heart rate, respiratory rate and blood pressure (BP) will be taken and recorded within 60 minutes before transfusion starts
- Remain at the bedside for the first 15 minutes of the commencement of the blood transfusion
- Record temperature, heart rate, BP and pain and sedation score at 15 min, and then every 30 min during transfusion and on completion of transfusion
- Monitor IV site every 30 minutes, monitor for signs of infiltration and phlebitis - see Appendix 1. Record pain and sedation score every 30 minutes. Refer to [Neonatal pain and sedation: Assessment and nursing management in Newborn Intensive Care Unit \(1684\)](#)
- Ensure Guardrail™ pressure alarm set appropriately. Monitor pressures closely and report to NNP/CNS/Registrar any fluctuations or concerns, e.g. if pressure is rising

### 2.2.5 Transfusion reaction

| Type of reaction            | Symptoms and signs   |
|-----------------------------|--|
| <b>Febrile</b>              | 1. Pyrexia, rigors   |
| <b>Circulatory Overload</b> | 1. Increase in blood pressure, heart rate and respirations.<br>2. Pulmonary oedema, dyspnoea, increase in urinary output |
| <b>Allergic</b>             | 1. Urticaria, facial oedema, dyspnoea, hypotension<br>2. TRALI (Transfusion associated lung injury)                      |
| <b>Haemolytic</b>           | 1. Collapse with hypotension.<br>2. Shock, pyrexia, rigors, haemoglobinuria, haemoglobinaemia, oliguria, later uraemia.  |
| <b>Infected Blood</b>       | 1. Pyrexia, profound collapse and shock, pallor, dyspnoea, low blood pressure, rapid pulse                               |

(Starship, 2020).

### 2.2.6 Management of Transfusion Reactions

#### STOP THE INFUSION IMMEDIATELY

- The Nurse contacts the Registrar/NNP/CNS immediately – NNP/CNS/Registrar to inform SMO
- Rapid clinical assessment and medical review with treatment as clinically indicated
- Monitor and record vital signs- temperature, heart rate and BP



## Blood Transfusion in Newborn Intensive Care Unit (NICU)

- Maintain patency of cannula using a new giving set and sodium chloride 0.9%
- Check swing label and recipient ID information is correct
- **Inform parents ASAP**
- NPP/CNS/Registrar to call Blood Management CNS and notify Blood Bank immediately to discuss urgency of follow-up tests and further transfusion needs
- Consider need for blood cultures if sepsis suspected. Blood gases if respiratory distress present. Urine check for Haemoglobinuria
- Complete Acute Transfusion Reaction (ATR) form available on Everything Blood <https://www.nzblood.co.nz/assets/Transfusion-Medicine/PDFs/111F009.pdf>
- Send blood unit and IV set, EDTA sample (if medically directed) and ATR form to Blood Bank
- Complete Datix and document in clinical notes

### 2.3 Potential complications

- Graft versus host disease
- Cytomegalovirus infection
- IV Extravasation

### 2.4 After care

- Dispose of used blood and blood giving set into the biohazard bin in NICU – **you do not need to return this to Blood Bank**

## 3 Patient information

- Fresh blood components: [Your guide to blood transfusion](#) NZBCL105 06/13
- [Parent information for transfusion in children](#) (C1806HWF)

## 4 Audit

- The threshold for top-up transfusions meets 2.1.2. - #1
- Documented monitoring of the recipients physiological statement meets 2.2.2 - #4
- Monitor transfusion incidents

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### 5 Evidence base

#### 5.1 Bibliography

Starship Child Health (2018). *Blood products - red cell transfusion in the neonate*. Retrieved on 29<sup>th</sup> October 2020 from <https://www.starship.org.nz/guidelines/blood-products-red-cell-transfusion-in-the-neonate>

#### 5.2 Associated Waikato DHB Documents

- Waikato DHB [Everything Blood](#) site
- Waikato DHB [Informed Consent](#) policy (Ref. 1969)
- Waikato DHB NICU Medical procedure: [Intravenous Immunoglobulin in Neonates in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1607)
- Waikato DHB NICU Medical procedure: [Platelets use in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1608)
- Waikato DHB NICU Medical procedure: [Albumin 20% use in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1644)
- Waikato DHB NICU Medical procedure: [Blood transfusion: Threshold for top up in Newborn Intensive Care Unit](#) (Ref: 1645)
- Waikato DHB NICU Medical procedure: [Cryoprecipitate use in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1647)
- Waikato DHB NICU Medical procedure: [Fresh Frozen Plasma \(Leucocyte Depletion\) Usage in NICU](#) (Ref. 3198)
- Waikato DHB NICU Medical procedure: [Exchange and Reduction Transfusions in Neonates](#) (Ref. 1646)
- Waikato DHB NICU Nursing procedure: [Arterial Lines in Neonates – Sampling, Nursing Management and Removal](#) (Ref. 1638)
- Waikato DHB NICU nursing procedure: [Central Venous and Umbilical Venous Line Management in NICU](#) (Ref. 4936)
- Waikato DHB NICU Nursing procedure: [Exchange Transfusion and Reduction Exchange transfusion– Nursing management in Neonatal Intensive Care Unit \(NICU\)](#) (Ref. 2616)
- Waikato DHB NICU Nursing procedure: [Neonatal pain and sedation: Assessment and nursing management in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1684)

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## Blood Transfusion in Newborn Intensive Care Unit (NICU)

### Appendix A: Phlebitis score

**REVIEW**

## KNOW YOUR IV LINES

| SIGNS   | SCORE    | ACTION                           |
|---|----------|----------------------------------|
| Redness, exudate, swelling or venous cord     | <b>3</b> | <b>REMOVE and MEDICAL REVIEW</b> |
| Pain or tenderness                            | <b>2</b> | <b>REMOVE</b>                    |
| Not on IV therapy and PIVC no longer required | <b>1</b> | <b>REMOVE</b>                    |
| No pain or tenderness                         | <b>0</b> | <b>CONTINUE TO REVIEW</b>        |