

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

Procedure Responsibilities and Authorisation

Department Responsible for Procedure	NICU
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Target Audience	Nurses
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Procedure Review History

Version	Updated by	Date Updated	Summary of Changes
4	Tricia Ho	July 2010	3-yearly update
5	Joyce Mok	Nov 2013	3-yearly update
6	Joyce Mok	Mar 2016	Included updated procedures and forms according to Waikato DHB Blood Resources. Combine two procedures on blood transfusion (4822 and 0431) into one document.
7	Joyce Mok	Mar 2019	3-yearly update
7.1	Joyce Mok	Sep 2019	Include changes in the top-up transfusion threshold updated by Dr P. Weston, NICU SMO: <i>Blood Transfusion: Threshold for top up in NICU (1645)</i> . The new threshold uses the haemoglobin levels as opposed to haematocrit, which was used in the previous medical protocol document.
7.2	Joyce Mok	Jan 2020	<ul style="list-style-type: none"> Remove table for threshold and replace with a link to <i>Blood Transfusion: Threshold for top up in NICU (1645)</i>. Section 1.7 – Dose: Updated 10-15ml/kg

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

Contents

1	Overview	3
1.1	Purpose.....	3
1.2	Scope.....	3
1.3	Patient group	3
1.4	Exceptions / contraindications	3
1.5	Definitions	3
1.6	Threshold for transfusion	4
1.7	Dose.....	4
1.8	Special requirements to minimise risk of complications	4
2	Clinical Management	4
2.1	Competency required	4
2.2	Equipment.....	4
2.3	Procedure	5
2.4	Potential complications	12
3	Audit.....	12
3.1	Indicators	12
4	Evidence base	12
4.1	References.....	12
4.2	Associated Waikato DHB Documents	12

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

1 Overview

1.1 Purpose

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.

Aliquots or infusion is given via peripheral intravenous (IV) site.

Under the direction of NICU Consultant, blood may be administered via umbilical arterial catheter (UAC).

Occasionally, under the direction of NICU consultant and when no other vascular access is available, umbilical venous catheter (UVC) or Central Venous Line (CVL) may be used for blood transfusion (using non touch aseptic technique).

1.2 Scope

Waikato District Health Board (DHB) staff working in NICU

1.3 Patient group

Babies and infants in NICU

1.4 Exceptions / contraindications

Parental, cultural or religious reasons

Note: If parents decline blood transfusion for their baby, they must sign *the Medical Directive for patients who refuse blood transfusions (including Jehovah Witnesses) G3825HWF*. This form is available on intranet: Everything Blood

1.5 Definitions

Blood	Blood products that consist of red cells, platelets, fresh frozen plasma, cryoprecipitate and albumin.
Aliquots	Blood is given intermittently whereby the prescribed amount is divided into 3 or 4 portions and each portion is administered as a slow push over 5-10 minutes at hourly interval until the transfusion is completed.
Infusion	Blood is given by an infusion for volume replacement over half to one hour <u>or</u> for top up transfusion over 3-4 hours as prescribed.
DOB	Date of Birth
NHI	National Health Index number
NNP	Nurse Practitioner
CNS	Clinical Nurse Specialist
FiO₂	Fraction of inspired oxygen (inspired oxygen percentage)

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

Hct	Haematocrit
Slow push	An IV “slow push” or “bolus” is a slow injection of fluid/medication into a vascular access line.

1.6 Threshold for transfusion

- Refer to Waikato DHB NICU medical procedure: [Blood transfusion: Threshold for top up in Newborn Intensive Care Unit](#) (Ref: 1645)

1.7 Dose

- The usual volume administered is 10-15 mL/kg.
- Exceptions: exchange transfusion and severe acute blood loss.

1.8 Special requirements to minimise risk of complications

1. Transfusion-associated graft-versus-host disease

- All newborn babies below 1250g body weight should receive irradiated blood and in any other newborn where concerns about immunocompetence exist.
- Indicate on the request form that irradiated blood is required.
- For top-up transfusions, Blood Bank will irradiate up to seven day old blood, and it must be used within five days of irradiation.

2. Cytomegalovirus (CMV)

Blood bank will endeavour to provide CMV-negative blood for all purposes in NICU. The use of blood filter acts as a further protective mechanism.

2 Clinical Management

2.1 Competency required

Registered nurse who has completed orientation and training and achieved Waikato DHB generic IV certification

2.2 Equipment

- Compatible and prescribed blood product
- Sterile paper guard
- Blood-giving set or giving set according to type of blood product (refer to Waikato DHB intranet: *Everything Blood: Information and quick guides on giving blood products*)
- Sodium Chloride 0.9% for flush

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 4 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

- Non-sterile gloves, via IV or Umbilical Arterial Catheter (UAC)
- Alcohol-Chlorhexidine wipes
- Blood Bank request form
- Blood administration checklist
- Signed consent form
- Prescription charts

For aliquots

- Bag access device
- Syringes of appropriate size (e.g. 2ml, 5ml, 10ml)

For infusion

- 3-way tap
- Long wide bore extension set or long extension set
- Syringes of appropriate size (e.g. 10ml, 30ml, 60ml)
- Syringe pump

Administration via CVL/UVC

- If administered via CVL/UVC – sterile packs, mask & cap, etc. - use non touch aseptic technique as per NICU Nursing Procedure: *Central venous and umbilical venous line management (4936)*

2.3 Procedure

2.3.1 Before Transfusion:

1) Parental consent

- Nurse Practitioner (NNP)/Clinical Nurse Specialist (CNS)/ medical staff discuss with parents and gain consent for blood transfusion before administration of any blood product. The consent may be written or verbal. If verbal, consent form to be signed ASAP.
- Give parents the pamphlet “Your Guide to Blood Transfusion”.
- It is the responsibility of the nurses involved in the administering blood products that informed consent has been obtained according to Waikato DHB *Informed Consent Policy (1969)*, and *Consent for use of blood components and products (T1528HWF)* has been signed.
- Consent for blood is generally valid for 6 months.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM	Department:	NICU				
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 5 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

Special notes:

- Some religions including Jehovah's Witnesses and Christian Scientists include teachings that prohibit transfusion therapy, although some believers of these and other faiths may accept some fractioned blood products. Refer to "*Medical directive for patients who refuse blood transfusions (including Jehovah's Witnesses)*" on Waikato DHB intranet: "Everything Blood" for information.
- Provide the opportunity for parents to discuss their beliefs regarding blood transfusion.

2) Inspect IV site and check for patency to ensure access.

3) Obtaining blood from Blood Bank

- Contact Blood Bank to ensure the required blood component is ready.
- Ensure the Blood Bank Request Form contains the patients' name, DOB, NHI, prescribed blood products and the name of the prescriber.
- Nurse can fill in the request form if medical staff/NNP/CNS is busy provided the blood has been prescribed.
- Send the completed *Blood Bank Request Form* via the Lamson delivery system to Blood Bank. In emergency, phone Blood Bank.
- The request form is retained by Blood Bank.
- A new *Blood Bank Request Form* is required for each transfusion.
- Blood will be delivered via Lamson delivery system.
- When annunciator shows "BLOOD" on its screen, collect blood from NICU Lamson system.
- Commence blood transfusion within 30 minutes and finish within 4 hours of issue.
- Blood is NEVER stored in NICU to reduce chance of bacterial growth and decrease risk of wastage.
- If, for any reason, the transfusion is not to proceed and it is returned within 30 minutes, the Blood Bank will accept the product for future issue to the patient. If not returned to Blood Bank within this 30 minute period, the product will be discarded by Blood Bank.

Note: If Lamson system is not working, request attendant via Customer Portal to send form and/or collect blood.

4) Pre-transfusion monitoring

- Check infant's temperature.
- Commence continuous cardiorespiratory monitoring and document observations prior to commencement of transfusion.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 6 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

5) Bed-side checking

- Confirm the baby's identity (ID) in the presence of another nurse who is the 2nd independent checker at the bedside.
- Use a two-person independent verification at patient's bedside to match the blood product to the prescribed order, and the patient to the blood product.
- The nurse who is the transfuser and the nurse who is the checker must independently check the information: compare the name and NHI on baby's identity label with those on the blood bag.

6) Checking of blood component: use the *Blood Administration Checklist*.

- Confirm infant's blood group in the clinical notes or on the computer.
- Check the ID bracelet against the prescription on Stat Prescription Chart, General Treatment Form and the consent form.
- Check the blood component type against the prescription.
- The transfuser and the checker must independently compare the information:
 - Compare the name and identification number on the baby's ID bracelet with those on the blood bag label.
 - Check the blood bag identification number, ABO blood group, Rh compatibility, interpretation of compatibility testing,
 - Check the blood is CMV negative and irradiated
 - Compare the patient's blood bank identification number with the number on the blood bag.
 - Check the expiration date on the blood bag, and observe for leaks, abnormal colour, clots, excessive air or bubbling, and unusual odour. Return expired or abnormal blood to the blood bank.
- After checking all of the identifying information both the transfuser and the checker sign on the *Blood Administration Checklist* and Stat Prescription Chart to indicate that the identification was correct and the name of the person starting the transfusion.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM	Department:	NICU				
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 7 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

2.3.2 Transfusion by aliquots

1) Drawing up aliquot

- Calculate the hourly volume to be infused.

Note: Blood is prescribed to be given over 3-4 hours: the transfusion is not to exceed 4 hours (from leaving Blood Bank).
- Perform hand hygiene and put on non-sterile gloves.
- Assemble equipment on paper guard.
- Connect blood bag to the blood-giving set and bag access device.
- Prime lines with blood.
- Clean access port with alcohol-chlorhexidine wipe for 15 seconds before and after accessing port.
- Wait 15 seconds for it to dry.
- Draw up the volume of prescribed amount in a syringe, and two registered nurses (RN) to check the volume.
- Ensure no air bubbles in syringe.
- Close clamp on the blood-giving set.

2) Giving aliquot

- Stop any infusion that is running via that route.
- Flush the IV luer / UAC with sodium chloride 0.9% to clear the lines of any infusion that is incompatible with blood.
- Do not give blood via the white pall filter.
- Add a double Smartsite™ extension set to the IV luer as needed.
- Turn the Smartsite™ or 3-way onto the baby.
- Give each aliquot slowly via the IV or UAC line over 5-10 minutes to avoid fluid overload.
- Transfuse slowly to prevent transfusion hypothermia from blood that has not been allowed to warm adequately.
- Give each aliquot at hourly interval.
- Flush the IV/UAC with sodium chloride 0.9% after each aliquot to clear the line of blood and maintain patency.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 8 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

2.3.3 Transfusion by infusion

1) Prepare infusion

- Perform hand hygiene and put on non-sterile gloves
- Assemble equipment on paper guard.
- Set up equipment for blood transfusion as follows:
 - Connect the blood bag to the blood-giving set.
 - Connect a 3-way tap to the blood-giving set.
 - Connect an appropriate size syringe to the side port of the 3-way tap
 - Connect long extension set to the straight port of 3-way tap.
- Draw up blood (prescribed amount + volume for priming) in syringe and prime the long extension set with blood.
- Ensure no air bubbles in the lines.
- Close clamp on blood-giving set.
- Place syringe on syringe pump.
- Calculate hourly volume to be infused, 2 RNs must check the set rate is correct.

Note:

- Blood may be prescribed as volume to be given over half to one hour or for top up transfusion by infusion over 3-4 hours depending on the condition of the infant.
- Transfusion must not exceed 4 hours (from leaving the Blood Bank).

2) Giving infusion

- Stop any infusion that is running via that route.
- If UAC is used for blood infusion, set the UAC infusion pump to “Stand By”.
- If IV line is used for blood infusion, do not give blood via the white pall filter, and add a double Smartsite™ extension set as needed.
- Flush the IV luer/UAC with sodium chloride 0.9% to clear the lines of any infusion that is incompatible with blood.
- Connect the blood infusion line to the infant’s UAC/IV.
- Ensure the 3-way tap is off to the blood-giving set.
- Turn the 3-way tap to the infusion line and syringe.
- Turn the 3-way tap on to the baby.
- Start infusion at the set hourly rate as calculated.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 9 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

2.3.4 Monitoring and documentation during transfusion

1) Monitoring and observations

- **When using the UAC for transfusion:**
 - **Ensure the infant and the lines are monitored visually throughout the transfusion to detect complications** such as loose connections and bleeding if UAC alarms are turned off.
 - **Ensure the alarm is turned back on as soon as the aliquot/infusion has competed.**
- **All babies (in any nurseries)** who are receiving blood transfusion must have the alarms of their monitor set at the appropriate limits to alert nurses to any changes in infant's condition.
 - Continuous cardio-respiratory and saturation monitoring.
 - Hourly observation and documentation of heart rate, respiratory rate and SpO₂.
 - 2-hourly checking and documentation of axillar temperature.
 - Observe the infant frequently during transfusion for any signs of reactions, especially during the first 15 minutes of transfusion.
 - Document the time and hourly volume of blood transfused in the fluid balance chart.

Note: For babies in Nursery 6 and Nursery 7

- Use the Philips™ MP30 monitor for continuous monitoring.
- Continue monitoring for 4 hours after transfusion has completed.
- During aliquots, check the IV site throughout the procedure for signs of infiltration, redness, swelling, tenderness.
- During infusion, check the IV site at a minimum of every 10-15 minute for signs of infiltration, redness, swelling, tenderness.
- If there are signs of infiltration or reactions occurring, stop the transfusion and inform medical staff/CNS/NNP immediately.
- Report and document any concerns:
 - Alternations in respiratory patterns are good indicator of circulatory overload in neonate.
 - Alterations in temperature (febrile reactions): the neonate is less likely to develop pyrexia, than an adult, as a response to blood transfusion.
 - Skin rash (allergic reactions).

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 10 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

2.3.5 After transfusion

1) Maintain line patency

- Perform hand hygiene and put on non-sterile gloves.
- If UAC is used
 - Ensure the 3-way is turned off to infant.
 - Disconnect blood extension set (infusion) or syringe (aliquot).
 - Flush UAC and restart the infusion of heparinised sodium chloride solution as prescribed.
- If IV luer is used:
 - Flush the IV luer to ensure all residual blood is clear from the line, and if required, restart IV infusion as prescribed.

2) Documentation

- Remove the blood bag label from blood product and attach to *Blood Administration Checklist* when transfusion is completed.
- Record the total volume transfused and time of commencement and completion on the *Blood administration checklist*.

3) Monitoring and observations

- Monitor continuously for 4 hours post transfusion to detect possible delayed transfusion reaction.
- Observe and document hourly infant's vital signs
- Check with medical staff/CNS/NNP when IV cannula can be removed.
- Generally it can be removed 24 hours later, after a post-transfusion complete blood count (CBC) has been checked to ensure infant's adequate response to transfusion and to avoid the need for reinsertion of cannula if further transfusion is required.

4) Return of used blood

- Place used unit of blood with the blood giving set into a sealed biohazard bag.
- Place bag in the blood product "out tray" in the office.
- Bag will be collected by the attendant to be returned to the Blood Bank where it will be stored for 48 hours then disposed of.
- Do not send the used blood through the Lamson system to the Blood Bank.
- Dispose of the syringe and lines into designated container.
- Perform hand hygiene.

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 11 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

2.4 Potential complications

- Transfusion-associated graft-versus-host disease
- CMV
- Transfusion-transmitted infections: bacterial, viral or parasitic
- Circulatory overload
- Necrotising enterocolitis
- Delayed or acute transfusion reaction: haemolytic, allergic or febrile reactions

3 Audit

3.1 Indicators

- A signed consent form is evident in the clinical records of 100% of the infants/babies receiving blood transfusions
- The physiological monitoring and observation of infants/babies receiving blood aligns with this procedure.
- The calculation of infusion rate is checked by two nurses 100% of the time

4 Evidence base

4.1 References

- Watson, D. & Hearnshaw, K. (2010). Understanding blood groups and transfusion in nursing practice. *Nursing Standard*, 24(30), 41-48.
- Australian and New Zealand Society of Blood Transfusions Ltd and Royal College of Nursing Australia (2011). *Guidelines for the administration of blood products* (2nd edition). Sydney: Australian and New Zealand Society of Blood.

4.2 Associated Waikato DHB Documents

- Waikato DHB [Everything blood](#) site
- Waikato DHB (2019) policy: [Informed Consent](#) (Ref. 1969)
- Waikato DHB Medical Procedure: [Immunoglobulin Use in Neonates](#) (Ref. 1607)
- Waikato DHB 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 Medical Procedure: [Cryoprecipitate use in Newborn Intensive Care Unit \(NICU\)](#) (Ref. 1647)

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 12 of 13

Blood transfusions by aliquots or infusion - Nursing Management in Newborn Intensive Care Unit (NICU)

- Waikato DHB Medical Procedure: [Fresh Frozen Plasma \(Leucocyte Depletion\) Usage in NICU](#) (Ref. 3198)
- Waikato DHB Medical Procedure: [Exchange transfusion](#) (Ref. 1646)
- Waikato DHB NICU Nursing procedure: [Arterial lines – Nursing management and sampling and removal](#) (Ref. 1638)
- Waikato DHB NICU nursing procedure: [Central venous and umbilical venous line management: Part 1: Theory Part 2: Practical](#) (Ref. 4936)
- Waikato DHB NICU Nursing Procedure: [Exchange transfusion – nursing management](#) (Ref. 2616)

Doc ID:	4822	Version:	7.2	Issue Date:	13 JAN 2020	Review Date:	3 MAY 2022
Facilitator Title:	ACNM			Department:	NICU		
IF THIS DOCUMENT IS PRINTED, IT IS VALID ONLY FOR THE DAY OF PRINTING							Page 13 of 13