

Local Guideline



Health
Hunter New England
Local Health District

Extravasation in NICU

Sites where Local Guideline applies	Neonatal Intensive Care and Special Care Nursery JHCH
This Local Guideline applies to:	
1. Adults	No
2. Children up to 16 years	No
3. Neonates – less than 29 days	Yes
Target audience	All clinicians who care for infants with intravenous cannulas and those who treat extravasation
Description	Describes the treatment and management of extravasation in an infant
National Standard	Standard 8: Preventing & Managing Pressure Injury

[Go to Guideline](#)

Keywords	extravasation, hyaluronidase, infiltration, neonate, vesicant, wound
Document registration number	JHCH_NICU_10.02
Replaces existing document?	Yes
Registration number and dates of superseded documents	JHCH_NICU_10.02 May 2013
Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:	<ul style="list-style-type: none"> • Aseptic Technique for medium or Higher Risk Procedures Conducted in Clinical Settings • NSW Health Kids & Families GL2015_008 Standards of Paediatric Intravenous Fluids • NSW health Policy Directive PD 2017_013 Infection Control and prevention Policy • NSW Health Policy Directive PD2017_032 Clinical Procedure Safety • Medication Safety in HNE Health PD2013_043:PCP31
Prerequisites (if required)	Current prescription/medication order
Local Guideline note	This document reflects what is currently regarded as safe and appropriate practice. The guideline section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s require mandatory compliance . If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.
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Date authorised	30 th January 2018
This document contains advice on therapeutics	Yes Approval gained from Local Quality Use of Medicines Committee on 8 th January 2018
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Note: Over time, links in this document may cease working. Where this occurs, please source the document in the PPG Directory at: <http://ppg.hne.health.nsw.gov.au/>

Purpose and risks

This local clinical procedure has been developed to provide instruction to healthcare professionals and to ensure that the risks of harm to the child associated with extravasation are prevented, identified and managed.

The risks are:

- *Necrosis of tissue*
- *Infection*
- *Skin damage*

The risks are minimised by:

- *Clinicians having knowledge of prevention of extravasation*
- *Clinicians having knowledge of management of extravasation*
- *Clinicians seeking assistance if the therapy is outside their scope of practice*
- *Following the instructions set out in the clinical procedure*
- *Recognition of the common clinical signs of extravasation*
- *Recognition and management of patient factors that contribute to extravasation*

Risk Category: *Clinical Care & Patient Safety*

Staff Preparation

It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: **H**and hygiene **A**cknowledge, **I**ntroduce, **D**uration, **E**xplanation, **T**hank you or closing comment.

GLOSSARY

Acronym or Term	Definition
CVAD	Central Venous Access Device
IV/PIVC	Intravenous/Peripheral intravenous cannula
NICU	Neonatal Intensive Care Unit
NVIP	Neonatal Visual Infusion Phlebitis Score
Vesicant	A chemical agent that causes burns and destruction of tissue

Rationale

Extravasation injury is defined as the damage caused by the efflux of solutions from a vessel into surrounding tissue spaces during intravenous infusion. The damage can extend to involve nerves, tendons and joints and can continue for months after the initial insult. If treatment is delayed, surgical debridement, skin grafting and even amputation may be the unfortunate consequences of such an injury. This procedure is to assist staff in the neonatal intensive care unit (NICU) to manage the event of an extravasation of vesicant fluids or medication in the neonate.

Compliance with the procedure is essential to minimise the complications associated with extravasation injury.

Neonates born prematurely are particularly vulnerable to iatrogenic tissue damage due to the immature structure of the skin. These underdeveloped features increase the risk of skin damage (Fox 2011) and may render the infant vulnerable to systemic complications. In the event of extravasation, it is important for neonatal staff to understand:

- Why the injury occurred
- How to assess the wound
- What factors affect the healing process
- The correct management of the injury based on the best scientific evidence

The restoration of function and skin integrity, will minimise the complications (Fox 2011).

Outcomes

- The infusion site is monitored every 30–60 minutes when irritant solutions are being administered
- Infusion sites are never obscured by coverings (as this compromises effective observation)
- NICU staff recognise the early signs and symptoms of extravasation
- The method of treatment is initiated with medical urgency
- Adverse outcomes for the infant are negligible
- Appropriate management of extravasation of IV fluids or medications
- Appropriate wound care is initiated

Definitions

Infiltration is the inadvertent leakage of a non-vesicant solution from its intended vascular pathway (vein) into the surrounding tissue (Doellman et al 2009)

Extravasation is the inadvertent leakage of a vesicant solution from its intended vascular pathway into the surrounding tissue. Extravasation injury can extend through the dermis to the hypodermis, muscle or tendon tissues if not correctly managed.

Vesicant refers to any medication or fluid with the potential to cause blistering and severe tissue injury. Vesicant medications & solutions reported to cause extravasation injury include:

- Antimicrobials
- Vasoconstrictor agents
- Concentrated electrolyte solutions
- Cytotoxic agents
- Hyperosmolar agents
- Others—radiographic contrast media.



(Wilkins& Emmerson, 2004)



(Sui, S et al 2007)

Indications

Early identification and intervention at the first sign or symptom of extravasation is crucial, in order to circumvent any adverse outcomes.

The following signs can indicate whether an injury has occurred and can be classified into stages to guide the treatment (Fox 2011). (See- [Skin care guidelines for babies in NICU](#))

- Stage I: The intravenous device flushes with difficulty. Discomfort at site, but no indication of injury
- Stage II: Minimal inflammation with redness and discomfort at site. Pulse and perfusion normal distal to access site
- Stage III: Moderate inflammation on top of and underneath access site. Discomfort and blanching at site with cool skin. Pulse and perfusion normal distal to access site
- Stage IV: Severe inflammation on top of and underneath access site. Discomfort and blanching at site with cool skin. Evidence of skin breakdown and/or necrosis. Decreased or absent pulse and perfusion distal to access site

When looking after a neonate who has intravenous access, either peripheral or central, it is important for the allocated nurse to monitor and assess the site frequently (at least hourly) -follow the NVIP document in Skin CPG. Documentation of observations on the flow chart (PIVC score and [IV/CVAD care plan](#)) enable identification of trends and validate nurses' actions. This assists the nurse in reducing the incidence of injuries but does not completely prevent them from happening. Observing for signs as indicated previously can help the nurse classify the injury and determine the treatment that is required.

Procedure

It is recommended to control pain during this procedure, using effective pain relief such as: Sucrose (as per unit's drug protocol) or, in more severe injury, opioids. Behavioural techniques, e.g. soothing strategies, should be considered as an important component of pain relief in conjunction with pharmacological interventions.

If extravasation is suspected (Doherty, L. 2010):

- The infusion should be stopped and disconnected straight away, leaving the cannula *in situ*
- Inform medical officer urgently as treatment requires immediate attention
- Withdraw as much of the drug or fluid as possible via the cannula
- Remove cannula
- Follow instructions as per extravasation kit

**Extravasation kit located in the Box aisle in the Equipment Room
see Legend**

- Commence procedure
- Documentation of the process in the patient's case notes is essential

Equipment

- Extravasation kit:
 - Hyaluronidase 1500 IU powder x 2
 - 1 x 10 mL ampoule of water for injection
 - 2 x 50 mL mini-bags of sodium chloride 0.9%
 - 2 x 10 mL ampoules of sodium chloride 0.9%
 - Laminated copy of hyaluronidase and phentolamine drug protocols
 - 19 gauge needles x 2
 - 25 gauge needles x 5
 - Alcohol wipes x 5
 - Phentolamine 10 mg/mL ampoules x 2 (in level 3 NICU fridge)
 - 10 mL syringes x 5
 - 2 mL syringes x 2
 - 1 mL syringes x 2
 - NICU's Extravasation incident form
- Dressing pack
- Gloves

There are several treatments used to prevent scarring and injury from an extravasation; however, the common ones are hyaluronidase, sodium chloride 0.9% flushes and phentolamine. Overall, there is insufficient evidence to support the routine use of local anaesthetics after extravasation. Additionally, there may be some difficulty in administering local anaesthetics, particularly if there is local inflammation/swelling (Hunter Drug Information Service 2013).

Hyaluronidase is an enzyme that breaks down hyaluronic acid, which is a normal part of tissue structure, and assists to decrease or stop tissue damage by allowing quick dispersion of the extravasated fluid and re-establishing tissue permeability within one to two days (Doherty, L. 2010).

Phentolamine is an alpha-adrenoceptor blocker that creates peripheral vasodilation by directly relaxing vascular smooth muscle. This results in the reversal of local ischaemia caused by vasoconstrictor infiltration (Ramasetu, J. 2004).

Access the PPG to search for the appropriate guideline



Before and after photo showing the result of treatment for extravasation of Parenteral Nutrition in a preterm infant (Cho et al, 2007)

Treatment	Indication	Procedure
Hyaluronidase 1500 IU powder in Extravasation Kit	When intravenous solution leaks into the surrounding tissues such as ; <ul style="list-style-type: none"> • Parental nutrition (TPN) • Fat emulsion • Glucose solutions • Antibiotics • Medications (excluding vasoconstrictors) 	Dissolve hyaluronidase powder in 1.5 mL of water for injection (as per NICU drug protocol), to give a solution of 1000 IU per mL (NICU drug Protocol, 2010) in Extravasation Kit. Refer to the NICU CPG on the PPG Once dissolved; <ul style="list-style-type: none"> • Take 0.2 mL (200 units) and dilute with sodium chloride 0.9% to 1 mL (NICU drug Protocol, 2010) • Inject subcutaneously around and through area of injury site, making sure the needle is changed after each injection • Make four small incisions around injury site with large gauge needle • Flush small volumes of 20–50 mL of sodium chloride 0.9% through using blunt-ended needle –continue until visibly improves and runs clear • The saline should dilute the extravasate allowing it to freely flow out of exit stab incisions. Residual fluid can then be gently manipulated out of the exit holes • Apply dressing as per wound management

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<p>Phentolamine 10 mg/mL ampoule in Extravasation Box</p>	<p>When intravenous vasoconstrictor medications leak into surrounding tissues such as (Ramasethu, J. 2004).</p> <ul style="list-style-type: none"> • Dopamine • Dobutamine • Adrenaline (epinephrine) • Noradrenaline (norepinephrine) 	<p>Dilute 10 mg phentolamine in 9 mL of sodium chloride 0.9% (as per NICU drug protocol), to give a solution of 1 mg/mL (NICU drug protocol, 2010) in Extravasation Kit. Refer to the NICU CPG on the PPG</p> <ul style="list-style-type: none"> • Inject 1–5 mL, depending on the size of the baby and area of infiltration, in 4 or 5 places around the injury site. Repeat dose may be required
<p>Wound management (as per CNC Paediatric Surgery)</p>	<p>Once extravasation treatment is complete.</p>	<ul style="list-style-type: none"> • If a limb is affected -> elevate extremity • Initially; protect injury with a primary dressing ie thin silicone foam eg Mepilex Lite^R. Secure primary dressing with a secondary gauze swab/bandage. Fix with silicone tape ie Mepitac^R. <ul style="list-style-type: none"> ➤ Do NOT tape any limb circumferentially, it may constrict oedematous tissue. ➤ Contact the CNC Paediatric Surgery pg.5954 (business hours) or the Paediatric Surgical team for wound assessment. • Injury may be observed by removal, with subsequent replacement, of primary dressing. • Dressing products, initially selected, may alter as the wound healing advances.

Ongoing assessment & management of the extravasation injury must continue as often as required until the injury site regains intact skin integrity.

The incident must be documented in the patient's notes. If photographs are taken, inform parents of the incident and photographs as soon as practical after the incident (follow open disclosure guidelines). Consent for the photos is not required ([Photography & Recording of Patients/Clients. PCP 2012 HNELHD](#)) if taken for clinical care purposes, which includes managing a patient's condition and sharing information with other care providers to manage care. All images remain the property of HNELHD and are included in the patient's notes. The nurse caring for the infant is to complete an Incident Information Management System (IIMS) form on line.

The nurse caring for the infant should also notify the CNC for Paediatric Surgery during next business hours on page #5954 **through JHH switchboard**. In the absence of the Surgical CNC (e.g. over long holidays, etc.) request the the surgeons to review.

References

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Fox, MD. 2011 Wound care in the Neonatal Intensive Care Unit. *Neonatal network* 30, 5, 291-303.

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Legemaat, M; Carr, P; van Rens, R; van Dijk, M; Poslawsky, I and van den Hoogen, A. 2016 Peripheral intravenous cannulation : complication rates in the neonatal population : a multicentre observational study. *The Journal of Vascular Access* Vol 17 Issue 4

Miller, MB, Cotton, MC and Buschbach, D. 2011 Chapter 10: Pharmacology in neonatal care. In Gardner, SL, Carter, BS, Enzman-Hines, M and Hernandez, JA. (eds) *Neonatal Intensive Care*. Mosby Elsevier, St. Louis, Missouri.

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Reynolds, BC. 2007 Neonatal extravasation injury; case report. *Infant* 3, 6, 230-232.

Sui, S, Kwong, KL, Poon, SST and So, KT. 2007 The use of Hyaluronidase for treatment of extravasation in a premature infant. *HK J Paediatr* 12, 130-132.

RELATED LEGISLATION: PCP May 2012 Version 2 Hunter New England Health Local Health District: *Photography and Recording of Patients/Clients*-relates to NSW PD 2005_593

Department of health circulars: Safety notice: extravasation of IV fluids SN: 013/07

APPENDIX: Safety Notice: *Extravasation of IV Fluids* NSW Health Sept 07

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APPROVED BY NICU Operational, Planning & Management Committee 19/01/2018
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Implementation, monitoring compliance and audit

1. Approved clinical guideline will be uploaded to the PPG and communication of updated 'Extravasation in NICU' clinical guideline to NICU staff will be via email and message on the HUB
2. Incident investigations associated with this Guideline and Procedure will include a review of process
3. The Guideline and Procedure will be amended in line with the recommendations
4. The person or leadership team who has approved the Guideline and Procedure is responsible for ensuring timely and effective review of the Guideline and Procedure
5. Evaluation will include a review of the most current evidence as well as a consideration of the experience of Neonatal staff at JHCH in the implementation of the Guideline and Procedure

Feedback

Any feedback on this document should be sent to the Contact Officer listed on the front page.



Safety Notice

SN:013/07

21 September 2007

Distributed to:

- Chief Executives
- Directors of Clinical Governance
- Directors of Clinical Operations

Action required by:

- Directors of Clinical Governance

For response by:

- No response to the Quality and Safety Branch required

We recommend you also inform:

- Directors of Clinical Services
- Area Directors of Nursing
- Nurses
- Medical practitioners

Deadline for completion of action

Not applicable

Quality and Safety Branch

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www.health.nsw.gov.au/quality/sabs/register.html

Extravasation of IV fluids

Care of the cannula site in neonates and children

Background

Recent incidents have highlighted the need to ensure appropriate care of venous cannula sites, especially in neonatal and paediatric patients.

Two young children experienced extravasation—the infiltration of a substance that causes blistering of tissue from an intravenous line into the surrounding tissue—in association with a peripheral cannula. One child experienced swelling from the shoulder to the fingertips with cyanosis of the right thumb and subsequent development of blisters on the arm. The second child required surgery following the development of swelling and blistering of the arm.

Care of the peripheral venous cannula site

Simple steps to follow when caring for a peripheral venous cannula site of neonates and children include the following:

- Use limbs in preference to the scalp, with upper limbs in preference to lower limbs.
- Ensure a nurse is available to assist with cannulation and taping.
- Ensure the cannula is taped for security and allows maximum observation of the site.
- Use transparent IV dressings, steristrips, and non-stretchable tape (leukoplast).
- Regularly observe the IV cannula for secure placement, and for changes in the site around the cannula insertion and the fluid tracking direction. Direct observation is required.
- Check the IV cannula site hourly for redness, swelling, blanching and pain, and record a description of these observations.
- Ensure the cannula site is not covered with clothing or blankets to allow for observation of the site.
- Regularly check the infusion pump for the correct infusion rate and pumping action.
- Set appropriate pressure limits for pumps that have this functionality. The pressure should be checked regularly.
- Ensure the infusion pump is appropriate for neonates and children. Do **not** use an adult infusion pump.

Further reading

Hadaway LC. [Preventing and managing peripheral extravasation](#). *Nursing* 2004;34(5):66-67.

McCullen KL, Pieper B. [A Retrospective Chart Review of Risk Factors for Extravasation Among Neonates Receiving Peripheral Intravascular Fluids](#). *Journal of Wound, Ostomy and Continence Nursing* 2006;33:133-139.

Suggested Actions by Area Health Services:

1. Ensure that this Safety Notice is distributed to all relevant stakeholders.
2. Review peripheral cannula site practices.