Extravasation

Neonatal Policy & Procedures Manual

Policy Group: Integument

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Purpose
To provide Neonatal Nursery staff with guidelines for the assessment and treatment of intravenous infiltrations that exhibit signs of ischemia (stage 3 and 4 extravasation injuries).

Policy Statement
Patients in the NICU often require intravenous therapy as part of their treatment to deliver medications or parenteral nutrition. Neonates are at an increased risk of infiltration of intravenous solutions due to the small size of their vessels and their immature skin structure. Infiltration of vesicant intravenous fluid is referred to as extravasation. Vesicant fluid or medications are agents that will cause blistering of tissue. The severity of the injury depends on the type and pH of the fluid and volume of infiltration. Extravasation injuries are most often found on the dorsum of the hand or foot. These injuries may be severe enough to cause scarring, nerve and tendon damage, infection and potential loss of function of the limb.

The most important measure to minimize extravasation injury is the prevention of the development of those injuries. Potentially toxic intravenous fluids should be administered through a central line whenever possible. Intravenous access sites should also be monitored closely (every hour) for signs of inflammation or infiltration.

Once an extravasation injury is identified, the nurse will stop the infusion, remove the IV device, elevate the affected site, and notify the Neonatologist/Designate. Moist compresses should not be applied. The intravenous site will be assessed for the extent of the extravasation injury by staging the injury according to the criteria suggested by Montgomery et al. (1999) as noted below. Stage 3 and 4 injuries may be treated with phentolamine or hyaluronidase injection in an attempt to minimize tissue damage. Following injection treatment, Stage 3 and 4 injuries will have a dressing applied which consists of aqueous gel and an appropriate dressing.

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Absence of redness, warmth, pain, swelling, blanching, mottling, tenderness or drainage. Flushes with ease.</th>
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<tbody>
<tr>
<td>Stage 1</td>
<td>Absence of redness or swelling. Flushes with difficulty. Pain at site.</td>
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<tr>
<td>Stage 2</td>
<td>Slight swelling at site. Presence of redness and pain at the site. Good pulse below site with CFT 1-2 seconds.</td>
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<tr>
<td>Stage 3</td>
<td>Moderate swelling above or below the site. Blanching &amp; pain at the site. Good pulse below infiltration site with 1-2 CFT below infiltration site. Skin cool to touch.</td>
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<tr>
<td>Stage 4</td>
<td>Severe swelling above or below site. Blanching &amp; pain at the site. Decreased or absent pulse. CFT greater than 4 seconds. Skin cool to touch with breakdown or necrosis at infiltration site.</td>
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**Applicability**  
All Covenant Health Neonatal staff and physicians.

**Responsibility**  
This procedure is to be carried out by a Neonatologist/Designate. Treatment of the extravasation injury should be done as soon as possible. Use of hyaluronidase gives the best results if administered within one hour of injury. Phentolamine may be used up to 12 hours after extravasation.

**Assessment Algorithm**
Extravasation

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Equipment
5 – 1 mL syringe
7 – 26 guage needles
1 – 18 guage needle
1 – 10 mL syringe
Scalpel blade
Antiseptic solution
1% Lidocaine without Epinephrine
Sterile normal saline for injection
Hyaluronidase or Phentolamine as ordered by Neonatologist/Designate

Procedure

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RATIONALE</th>
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<tbody>
<tr>
<td>1. Notify the Neonatologist/Designate when an interstitial intravenous site exhibits signs of ischemia. They will assess the injury according to the staging criteria.</td>
<td>Extravasation can result in significant complications including tissue necrosis, pain and discomfort, cosmetic defects, loss of function of an extremity or amputation, nerve damage and contractures. Prompt assessment and treatment minimizes complications.</td>
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<tr>
<td>2. Do not apply a warm or moist compress.</td>
<td>Compresses lead to skin maceration and further necrosis.</td>
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<tr>
<td>3. Perform hand hygiene.</td>
<td>To maintain asepsis.</td>
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<tr>
<td>5. Select product to infiltrate tissue.</td>
<td>Hyaluronidase is indicated for extravasation of drugs that are irritating due to extreme pH or hyperosmolarity. It promotes rapid absorption of extravasated fluid by temporarily breaking down normal intra-cellular barriers.</td>
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**Extravasation treated with Hyaluronidase:** Aminophylline, Amphotericin B, Ampicillin, Calcium solutions, Dextrose 10% or greater, Diazepam, Erythromycin, Gentamicin, Lipid solutions, TPN, Phenytoin, Potassium, NaHCO₃, Radio contrast, Tromethamine, Vancomycin.

**Extravasation treated with Phentolamine:** Dobutamine, Dopamine, Epinephrine, Norepinephrine, and Phenylephrine.

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<tr>
<td>6. Perform skin antisepsis. Don technique gloves. Clean the affected area and surrounding tissue with antiseptic solution.</td>
<td>To prevent infection.</td>
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</table>
.7. Infiltrate the area with 1% Lidocaine. Used to anesthetize area, maximum dose is 4.5 mg/kg/dose for 2 hour period.

8. Please refer to current online resources (i.e. Parenteral Manual, Lexi-comp, Neofax, VAX) for reconstitution/mixing and dosages for Hyaluronidase and Phentolamine.

9. Using a 26 gauge needle, make five subcutaneous injections of 0.1ml - 0.2 mL around the periphery of the extravasation site. The needle is changed after each injection. When using phentolamine, reversal of ischemia should be seen within minutes.

10. **FOR HYALURONIDASE ONLY** - Fifteen minutes after hyaluronidase is infiltrated, make 4 small punctures in the tissue plane with an 18 gauge needle around the treatment area. Using a 20 gauge over-the-needle catheter with the stylet removed, flush each puncture with at least 2.5 mL saline. It is intended for the saline to flow from the other puncture sites. Excess fluid is milked gently toward the puncture sites. To remove harmful substances from the tissue.

11. Elevate the limb for several hours. Monitor heart rate and blood pressure if Phentolamine was used. To facilitate fluid absorption and promote venous drainage. Phentolamine may cause hypotension and tachycardia.

   - date and time of incident
   - site, appearance and size of injury
   - medications administered
   - following wound management
   - follow-up parent notification

13. Nitroglycerin ointment may be applied if swelling and poor perfusion persist (see following).
APPLICATION OF NITROGLYCERINE OINTMENT
Nitroglycerine ointment may be used to increase capillary blood flow to localized areas of ischemia remaining following extravasation injury treatment as described previously.

EQUIPMENT
Nitroglycerine ointment 2% (Nitrol ®)
Cotton tip applicator
Procedure gloves
Plastic wrap
Sterile saline
4 x 4 gauze

ACTION

1. Gather equipment as needed for treatment including Nitroglycerin ointment.


3. Glove before working with ointment. The caregiver’s skin should be protected from absorption of the nitroglycerin ointment.

4. Clean the area of the patient’s skin to be treated before each application of ointment. Skin cleansing will help to ensure proper absorption and to prevent increased dosing when multiple layers of ointment have been applied.

5. Squeeze a small dab of ointment onto a clean cotton-tipped applicator and apply a thin layer to the affected area. Do not apply to open skin. Do not rub or massage into skin. Open skin may result in rapid and increased absorption which could give undesired systemic effects.

6. Cover the ointment with plastic wrap. The heat produced by the plastic layer will enhance absorption.

7. Monitor site. Improved perfusion should be seen in 20 – 60 minutes and may last up to 8 hours.

8. Monitor blood pressure and heart rate every 30 minutes x 1 hour. Enhanced absorption may result in systemic effects.
Related Documents

Adapted with permission from Stollery Children’s Policy and Procedure Manual:
Extravasation, Procedure – June 2010

Adapted with permission from Stollery Children’s Practice Guidelines and Recommendations:
Extravasation Treatment, Clinical Guideline – November 2010

References


Revisions

November 2001
July 2016
Signing

Original signed

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