

Operational Standard

SUBJECT: Management of Medication Extravasation and Antidotes

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RESPONSIBLE DEPARTMENT: Pharmacy

OPERATIONAL STANDARD NUMBER: OHS.PHARM.OS.052

- I. **Purpose:** To outline the procedure for the management of an extravasation event due to a cytotoxic or non-cytotoxic agent and to provide guidance on access and administration of appropriate antidotes.
- II. **Scope:** This operational standard involves all outpatients and inpatients that are receiving cytotoxic or non-cytotoxic medications that are at risk for medication extravasation. This document will serve as a reference only for partner sites.
- III. **Roles and Responsibilities**
 1. Antidotes for non-cytotoxic medications can be stored at inpatient pharmacies or outpatient chemotherapy infusion centers. Antidotes for cytotoxic medication extravasations are stored at outpatient chemotherapy infusion centers within the Ochsner Health System. If an agent is unavailable at a site, the antidote may be procured from Ochsner Medical Center– Jefferson Highway pharmacy.
 2. Retrieval of the cytotoxic or non-cytotoxic medication extravasation antidote:
 - i. Medication orders for antidotes will comply with all applicable requirements of the appropriate medication orders policy OHS.PHARM.005.
 - ii. Antidote order sets are available in electronic medical record (EMR).
 - iii. All requests for non-stocked cytotoxic medication antidotes shall be coordinated through their respective pharmacies. The infusion center pharmacy may then contact Ochsner Medical Center – Jefferson Highway outpatient infusion pharmacy on behalf of the infusion suite to request the chemotherapy drug extravasation antidote.
 3. Transport of cytotoxic medication antidotes from Jefferson Highway pharmacy to requesting Ochsner pharmacy should be coordinated through appropriate courier services.
 4. Upon receipt of the cytotoxic medication antidote from Jefferson Highway pharmacy, the site pharmacy will verify and dispense the antidote in accordance with policy.

IV. Definitions

- *Extravasation*: the inadvertent extra-venous administration of a medication or solution that has the potential for severe tissue or cellular damage into the surrounding tissue - typically limited to materials that are known vesicants.
- *Infiltration*: an agent that causes aching, tightness, and phlebitis with or without inflammation, but does not typically cause tissue necrosis. Irritants can cause necrosis if the extravasation is severe or left untreated.
- *Vesicant*: any agent that has the potential to cause blistering, severe tissue injury, or tissue necrosis when extravasated or infiltrated.
- *Non-vesicants*: do not cause ulceration. If they are extravasated, they rarely produce an acute reaction or progress to necrosis.
- *Irritant*: any agent that causes aching, tightness, and phlebitis along the vein or at the injection site, with or without a local inflammatory reaction that does not cause tissue necrosis.

V. Standard: This operational standard provides an approach to the handling of extravasation events that occur due to cytotoxic or non-cytotoxic agents to ensure their appropriate management.

- Sites will provide access to appropriate antidotes for drug-specific extravasations that may occur.
- The appropriate non-pharmacological and pharmacological measures shall be taken if an extravasation occurs.
- A provider will be notified of an extravasation event and orders will be obtained for substance-specific measures.
- Antidotes, if indicated, will be provided in an as soon as possible manner to minimize the potential for tissue damage.
- There will be proper documentation of the extravasation event in the medical record.

VI. Procedure

General Treatment of Extravasations

The primary approach to an extravasation injury includes a combination of nonpharmacologic efforts to delay further tissue damage, a reversal agent specific to the type of extravasation, and surgical intervention, if necessary.¹⁻³

For most medications, the general treatment of extravasation is non-pharmacological:

- 1) Immediately stop the infusion or intravenous push of the medication.
- 2) Put on chemotherapy approved gloves and gown, if appropriate, per USP 800.
- 3) The area of extravasation should be marked to monitor for change in size of the affected area.
- 4) Catheter or needle should not be removed immediately. Instead leave them in place and aspirate as much residual drug from the extravasated area as possible through the needle or catheter using a syringe.
 - a. Avoid applying pressure to area.
 - b. Do not flush the line in attempt to dilute the drug concentration.

- 5) Notify physician and initiate pharmacologic interventions for specific drug extravasations if applicable.
- 6) Remove the catheter/needle if an applicable antidote is not meant to be given through the catheter/needle. Otherwise remove the catheter/needle after antidote administration.
 - a. Most medications do not have a specific antidote. Non-vesicants are treated in the same manner, except without use of an antidote.
 - b. Antidotes for specific extravasations are found in Table 1.
- 7) Elevate affected limb for 48 hours to minimize swelling. Consider analgesia if necessary.
- 8) Apply dry compresses for **20 minutes every 6 to 8 hours for 48-72 hours** as indicated after extravasation occurs – use of warm versus cold depends on offending agent. Refer to Table 1 for more details.
 - a. Cold Compresses: reduces swelling and localizes agent^{2,3,4}
 - i. Recommended for extravasation of most vesicant or irritant drugs except vinca alkaloids, etoposide, and vasopressors since cold worsens ulceration caused by these drugs
 - ii. A cold compress may be considered if local symptoms appear for non-vesicant or irritant drugs
 - b. Warm Compresses: promotes vasodilation and disperses agent^{2,3}
 - i. Recommended for vinca alkaloids and epipodophyllotoxins (etoposide)
- 9) Avoid using the affected extremity for venipunctures and blood pressure readings. If new peripheral access is needed use non-affected extremity, if possible.
- 10) Monitor site closely for 24 hours, at 1 and 2 weeks, and then as necessary for redness, swelling, pain, ulceration, or necrosis.
- 11) Unresolved tissue necrosis or pain lasting more than 10 days may require surgical debridement.⁴
- 12) Document the following in the medical record IV Extravasation Management flowsheet:
 - a. IV Device, Extravasation Site
 - b. Extravasation Type
 - c. Extravasation Appearance
 - d. IV Device, Extravasation Interventions

Table 1. Antidotes for Medication Extravasation

Offending Agent	Antidote ¹⁻¹²	Turnaround Time for Antidote Administration	Antidote Storage Location	Comments ^a
aminophylline	<p><u>Hyaluronidase^b</u> Intradermal or SubQ: Inject a total of 1 to 1.7 mL (15 units/mL) as five separate 0.2 -0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry cold compresses^{1,2}</p>
amiodarone	<p><u>Hyaluronidase^b</u> Intradermal: Inject as five separate 0.2 mL injections of 15 units/mL (using a 25-gauge needle) into area of extravasation; may consider for refractory cases.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses²</p>

<p>arginine</p>	<p><u>Hyaluronidase^b:</u> Intradermal: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections to the border of extravasation area.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry cold compresses^{1,2}</p>
<p>bendamustine (Treanda®, Bendeka®)</p>	<p><u>Sodium thiosulfate 1/6 M solution^c:</u> Inject subcutaneously into extravasation area using 2 mL for each mg of bendamustine suspected to have extravasated. Using ≤25-gauge needle; change needle with each injection.¹²</p>	<p>As soon as possible</p>	<p>Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry cold compresses for 20 minutes, 4 times/day for 1 to 2 days⁵</p>
<p>calcium salts</p>	<p>Early/Acute Calcium Extravasation: <u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p> <p>Delayed-Calcium Extravasation:</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p> <p>As soon as possible</p>	<p><u>Hyaluronidase:</u> Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge</p>	<p>Apply dry cold compresses^{1,2}</p>

	<p><i>Sodium Thiosulfate^c</i>: IV: 12.5 g over 30 minutes; may increase gradually to 25 g 3 times per week.^{1,2}</p>		<p>North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p> <p>Sodium Thiosulfate: Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	
<p>CISplatin (Platinol®) (only if > 20 mL of 0.5 mg/mL solution is extravasated)</p>	<p><i>Sodium thiosulfate 1/6 M solution^c</i>: Inject 2 mL into existing IV line for each 100 mg of cisplatin extravasated; then consider also injecting 1 mL as 0.1 mL subcutaneous injections (clockwise) around the periphery of the area of extravasation using a new 25- or 27-gauge needle for each injection; may repeat subcutaneous injections several times over the next 3 to 4 hours.⁹</p>	<p>As soon as possible</p>	<p>Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compress for 20 minutes 4 times/day for 1 to 2 days⁵</p>

<p>contrast media (high osmolarity and/or volumes > 50 mL)</p>	<p>Compression and elevation is the treatment of choice.¹³</p>	<p>As soon as possible and within 1 hour of extravasation¹³</p>		<p>Apply dry cold compresses¹³</p>
<p>DACTINomycin (actinomycin-D, Cosmegen)</p>	<p>No known antidote</p>			<p>Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days⁵</p>
<p>DAUNOrubicin (Conventional) (Cerubidine®)</p>	<p><u>Dexrazoxane:</u> <u>Days One & Two:</u> 1000 mg/m² (max 2000 mg) IV over 1-2 hours <u>Day Three:</u> 500 mg/m² (max 1000 mg) IV over 1-2 hours. Doses should be administered at approximately the same time (±3 hours) as the dose on day 1.</p> <p>Note: administer in a large vein far from site of extravasation. Infusion solution should be at room temperature prior to administration. Also reduce dexrazoxane dose by 50% in patients with CrCl <40 mL/min. Not for local infiltration into extravasation.⁵</p> <p>Alternatives: 50% Dimethyl Sulfoxide (DMSO) Apply topically to a region covering twice the affected area every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing.⁵</p>	<p>Administer as soon as possible, and within 6 hours after extravasation</p>	<p>Dexrazoxane: Jefferson Highway Covington Kenner Baptist Chabert Baton Rouge Shreveport St. Tammany Terrebonne West Bank</p> <p>DMSO: Jefferson Highway Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock</p>	<p>Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days⁵</p> <p>Withhold cooling for 15 minutes before and after dexrazoxane</p> <p>Do not give DMSO if using Dexrazoxane</p>
<p>dextrose (≥ 10% to < 50%)</p>	<p><u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne</p>	<p>Apply dry cold compresses^{1,2}</p>

			Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
dextrose (50%)	<u>Hyaluronidase^b</u>: Intradermal or SubQ: Inject a total of 1 mL (150 units/mL) as five separate 0.2 mL injections administered along the leading edge of erythema. ^{1,2}	As soon as possible and within 1 hour of extravasation ^{1,3,6}	Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry cold compresses ^{1,2}
diazePAM	<u>Hyaluronidase^b</u>: Inject 15 to 25 units, give as multiple 0.2 mL intradermal injections along extravasation site and edematous tissue OR through catheter that caused infiltration. ⁷	As soon as possible and within 1 hour of extravasation ^{1,3,6}	Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry cold compresses ^{1,2}

<p>DOBUTamine</p>	<p><u>Phentolamine:</u> Dilute 5 mg in 10 mL NS and administer into extravasation site as soon as possible after extravasation; may re-administer if patient remains symptomatic.¹</p> <p><u>Alternatives: Nitroglycerin topical 2% ointment</u> (limited data)¹</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>OR</p> <p><u>Terbutaline:</u> Infiltrate extravasation area using a solution of terbutaline 1 mg diluted in 10 mL in NS (large extravasation site; administration volume varied from 3 to 10 mL) or 1 mg diluted in 1 mL NS (small/distal extravasation site; administration volume varied from 0.5 to 1 mL).¹</p>	<p>As soon as possible and within 12 hours of extravasation^{2,3}</p>	<p><u>Phentolamine:</u> Jefferson Highway Covington Kenner Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank St. Charles Hancock</p> <p><u>Nitro/Terbutaline:</u> Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses^{1,2}</p>
<p>DOCEtaxel (Taxotere®)</p>	<p><u>Hyaluronidase^b (if needle/cannula still in place):</u> Administer 1 to 6 mL (150 units/mL) into existing IV line; usual dose is 1 mL for each 1 mL of extravasated drug.⁵</p> <p><u>Hyaluronidase^b (if needle/cannula was removed):</u></p>		<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge</p>	<p>Apply ice pack for 15–20 minutes at least 4 times per day for the first 24 hours¹¹</p>

	Administer 1 mL (150 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle and changing the needle each time) into area of extravasation at the leading edge in a clockwise manner. ^{1,2}		North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
DOPamine	<p><u>Phentolamine:</u> Dilute 5 mg in 10 mL NS and administer into extravasation site as soon as possible after extravasation; may re-administer if patient remains symptomatic.^{1,2}</p> <p><u>Alternatives: Nitroglycerin topical 2% ointment</u> (limited data)^{1,2}</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>OR</p> <p><u>Terbutaline:</u> Infiltrate extravasation area using a solution of terbutaline 1 mg diluted in 10 mL in NS (large extravasation site; administration volume varied from 3 to 10 mL) or 1 mg diluted in 1 mL NS (small/distal extravasation site; administration volume varied from 0.5 to 1 mL).^{1,2}</p>	As soon as possible but within 12 hours of extravasation ^{2,3}	<p>Phentolamine: Jefferson Highway Covington Kenner Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank St. Charles Hancock</p> <p>Nitro/Terbutaline: Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	Apply dry warm compresses ^{1,2}

<p>DOXOrubicin (Adriamycin®)</p>	<p><u>Dexrazoxane:</u> <u>Days One & Two:</u> 1000 mg/m² (max 2000 mg) IV over 1-2 hours <u>Day Three:</u> 500 mg/m² (max 1000 mg) IV over 1-2 hours. Doses should be administered at approximately the same time (±3 hours) as the dose on day 1.</p> <p>Note: administer in a large vein far from site of extravasation. Infusion solution should be at room temperature prior to administration. Also reduce dexrazoxane dose by 50% in patients with CrCl <40 mL/min. Not for local infiltration into extravasation.</p> <p><u>Alternatives:</u> 50% Dimethyl Sulfoxide (DMSO) Apply topically to a region covering twice the affected area every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing.⁵</p>	<p>Administer as soon as possible, and within 6 hours after extravasation</p>	<p>Dexrazoxane: Jefferson Highway Covington Kenner Baptist Chabert Baton Rouge Shreveport St. Tammany Terrebonne West Bank</p> <p>DMSO: Jefferson Highway Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock</p>	<p>Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days</p> <p>Withhold cooling for 15 minutes before and after dexrazoxane</p> <p>Do not give DMSO if using Dexrazoxane</p>
<p>doxycycline</p>	<p>Dry heat and elevation is the treatment of choice.⁷</p> <p>Refractory Cases <u>Hyaluronidase:</u> Inject 15 units, give as 5, 0.2 mL intradermal injections along extravasation site and edematous tissue.</p>	<p>Most effective if administered within 1 hour from extravasation if using hyaluronidase^{1,3,6}</p>	<p>Hyaluronidase: Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses⁷</p>

<p>EPINEPHrine</p>	<p><u>Phentolamine:</u> Dilute 5 mg in 10 mL NS and administer into extravasation site as soon as possible after extravasation; may re-administer if patient remains symptomatic.^{1,2}</p> <p><u>Alternatives: Nitroglycerin topical 2% ointment</u> (limited data)^{1,2}</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>OR</p> <p><u>Terbutaline:</u> Infiltrate extravasation area using a solution of terbutaline 1 mg diluted in 10 mL in NS (large extravasation site; administration volume varied from 3 to 10 mL) or 1 mg diluted in 1 mL NS (small/distal extravasation site; administration volume varied from 0.5 to 1 mL).^{1,2}</p>	<p>As soon as possible but within 12 hours of extravasation^{2,3}</p>	<p><u>Phentolamine:</u> Jefferson Highway Covington Kenner Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank St. Charles Hancock</p> <p><u>Nitro/Terbutaline:</u> Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses^{1,2}</p>
<p>epiRUBicin (Ellence®)</p>	<p><u>Dexrazoxane:</u> <u>Days One & Two:</u> 1000 mg/m² (max 2000 mg) IV over 1-2 hours <u>Day Three:</u> 500 mg/m² (max 1000 mg) IV over 1-2 hours. Doses should be administered at approximately the same time (±3 hours) as the dose on day 1.</p>	<p>Administer as soon as possible, and within 6 hours after extravasation</p>	<p><u>Dexrazoxane:</u> Jefferson Highway Covington Kenner Baptist Chabert Baton Rouge Shreveport</p>	<p>Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days⁵</p> <p>Withhold cooling for 15 minutes before</p>

	<p>Note: administer in a large vein far from site of extravasation. Infusion solution should be at room temperature prior to administration. Also reduce dexrazoxane dose by 50% in patients with CrCl <40 mL/min. Not for local infiltration into extravasation.⁵</p> <p><u>Alternatives: 50% Dimethyl Sulfoxide (DMSO)</u> Apply topically to a region covering twice the affected area every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing.⁵</p>		<p>St. Tammany Terrebonne West Bank</p> <p>DMSO: Jefferson Highway Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock</p>	<p>and after dexrazoxane</p> <p>Do not give DMSO if using Dexrazoxane</p>
erythromycin	No specific antidote			Apply dry cold compresses ⁵
etoposide (Toposar®) (only if > 20 mL of concentrated solution is extravasated)	<p><u>Hyaluronidase^b (if needle/cannula still in place):</u> Administer 1 to 6 mL (150 units/mL) into existing IV line; usual dose is 1 mL for each 1 mL of extravasated drug.⁵</p> <p><u>Hyaluronidase^b (if needle/cannula was removed):</u> Administer 1 mL (150 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle and changing the needle each time) into area of extravasation at the leading edge in a clockwise manner.¹²</p>	Administer as soon as possible, and within 1 hour of extravasation	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	Apply dry warm compress for 20 minutes 4 times/day for 1 to 2 days ⁵
IDArubicin (Idamycin®)	<p><u>Dexrazoxane:</u> <u>Days One & Two:</u> 1000 mg/m² (max 2000 mg) IV over 1-2 hours <u>Day Three:</u> 500 mg/m² (max 1000 mg) IV over 1-2 hours. Doses should be administered at</p>	Administer as soon as possible, and within 6 hours after extravasation	<p>Dexrazoxane: Jefferson Highway Covington Kenner Baptist</p>	Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days ⁵

	<p>approximately the same time (± 3 hours) as the dose on day 1.</p> <p>Note: administer in a large vein far from site of extravasation. Infusion solution should be at room temperature prior to administration. Also reduce dexrazoxane dose by 50% in patients with CrCl < 40 mL/min. Not for local infiltration into extravasation.⁵</p> <p><u>Alternatives: 50% Dimethyl Sulfoxide (DMSO)</u> Apply topically to a region covering twice the affected area every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing.⁵</p>		<p>Chabert Baton Rouge Shreveport St. Tammany Terrebonne West Bank</p> <p>DMSO: Jefferson Highway Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock</p>	<p>Withhold cooling for 15 minutes before and after dexrazoxane</p> <p>Do not give DMSO if using Dexrazoxane</p>
mannitol (> 5%)	<p><u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p> <p>OR</p> <p>SubQ: Administer multiple 0.5-1 mL injections of a 15 units/mL solution around the periphery of the extravasation.</p>	As soon as possible and within 1 hour of extravasation ^{1,3,6}	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	Consider dry cold compress ^{1,2}
mechlorethamine (nitrogen mustard, Mustargen®)	<p><u>Sodium thiosulfate 1/6 M solution^c:</u> Inject subcutaneously into extravasation area using 2 mL for each mg of mechlorethamine suspected to have extravasated. Inject drug into</p>	As soon as possible	<p>Jefferson Highway Covington Kenner St. Charles</p>	Apply dry cold compresses for 20 minutes 4 times/day for 1 to 2 days ⁵

	subcutaneous tissue in a circular pattern around the extravasated area following the marked pattern, using a new 25- or 27-gauge needle for each injection. ^{5,12}		Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
methylene blue	<u>Topical Nitroglycerin 2% Ointment:</u> Apply a 1-inch strip applied to the site of ischemia; may redose every 8 hours as necessary. ^{1,2}	As soon as possible	Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry, warm compresses proximal to the injection site ^{1,2}
mitoMYcin (Mutamycin®)	<u>50% Dimethyl Sulfoxide (DMSO):</u> Apply topically to a region covering twice the affected area with a saturated gauze pad or cotton swab every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing. ⁵	Goal of administration is within 10 minutes of extravasation	Jefferson Highway Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock	Apply dry cold compress for 20 minutes 4 times/day for 1 to 2 days ⁵
mitoXANTRONE (Novantrone®)	<u>50% Dimethyl Sulfoxide (DMSO):</u>	Administer as soon as possible, and	DMSO: Jefferson Highway	Apply dry cold compress for 20

	<p>Apply topically to a region covering twice the affected area every 8 hours for 7 days; begin within 10 minutes of extravasation; do not cover with a dressing.⁵</p> <p><u>Alternatives:</u> Dexrazoxane <u>Days One & Two:</u> 1000 mg/m² (max 2000 mg) IV over 1-2 hours <u>Day Three:</u> 500 mg/m² (max 1000 mg) IV over 1-2 hours. Doses should be administered at approximately the same time (±3 hours) as the dose on day 1.</p> <p>Note: administer in a large vein far from site of extravasation. Infusion solution should be at room temperature prior to administration Also reduce dexrazoxane dose by 50% in patients with CrCl <40 mL/min. Not for local infiltration into extravasation.⁵</p>	<p>within 6 hours after extravasation</p>	<p>Covington Kenner Baptist Chabert North Shore Shreveport Slidell Memorial Terrebonne West Bank Hancock</p> <p>Dexrazoxane: Jefferson Highway Covington Kenner Baptist Chabert Baton Rouge Shreveport St. Tammany Terrebonne West Bank</p>	<p>minutes 4 times/day for 1 to 2 days. Withhold cooling for 15 minutes before and after dexrazoxane.⁵</p> <p>Do not give DMSO if using Dexrazoxane</p>
<p>nafcillin</p>	<p><u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry cold compresses^{1,2}</p>

<p>NORepinephrine</p>	<p><u>Phentolamine:</u> Dilute 5 mg in 10 mL NS and administer into extravasation site as soon as possible after extravasation across symptomatic areas with hypodermic needle; may re-administer if patient remains symptomatic OR dilute 5 to 10 mg in 10 mL NS and administer into extravasation area.^{1,2}</p> <p><u>Alternatives: Nitroglycerin topical 2% ointment</u> (limited data)^{1,2}</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>OR</p> <p><u>Terbutaline:</u> Infiltrate extravasation area using a solution of terbutaline 1 mg diluted in 10 mL in NS (large extravasation site; administration volume varied from 3 to 10 mL) or 1 mg diluted in 1 mL NS (small/distal extravasation site; administration volume varied from 0.5 to 1 mL).^{1,2}</p>	<p>As soon as possible but within 12 hours of extravasation^{2,3}</p>	<p><u>Phentolamine:</u> Jefferson Highway Covington Kenner Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank St. Charles Hancock</p> <p><u>Nitro/Terbutaline:</u> Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses^{1,2}</p> <p>Longest reported time in literature with effective treatment is 13 hours⁴</p>
<p>oxaliplatin (Eloxatin ®)</p>	<p>No specific antidote</p>			<p>Apply dry warm compress for 20 minutes 4 times/day for 1 to 2 days.⁵ Avoid cold compresses as they may worsen peripheral neuropathy</p>

<p>PACLitaxel (Taxol®)</p>	<p><u>Hyaluronidase^b (if needle/cannula still in place):</u> If needle/cannula still in place: Administer 1 to 6 mL (150 units/mL) into existing IV line; usual dose is 1 mL for each 1 mL of extravasated drug.⁹</p> <p><u>Hyaluronidase^b (if needle/cannula was removed):</u> Administer 1 mL (150 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle and changing the needle each time) into area of extravasation at the leading edge in a clockwise manner.¹²</p>	<p>Administer as soon as possible, and within 1 hour of extravasation</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply ice pack for 15–20 minutes at least 4 times per day for the first 24 hours¹¹</p>
<p>parenteral nutrition</p>	<p><u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry cold compresses^{1,2}</p>
<p>pentamidine</p>	<p>Dry heat and elevation is the treatment of choice.⁷</p> <p>Refractory Cases <u>Hyaluronidase^b:</u> Inject 15 units, give as 5, 0.2 mL intradermal injections along extravasation site and edematous tissue.</p>	<p>Most effective if administered within 1 hour from extravasation if using hyaluronidase^{1,3,6}</p>	<p>Hyaluronidase: Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne</p>	<p>Apply dry warm compresses⁷</p>

			Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
phenylephrine	<p><u>Phentolamine:</u> Dilute 5 mg in 10 mL NS and administer into extravasation site as soon as possible after extravasation; may re-administer if patient remains symptomatic.^{1,2}</p> <p><u>Alternatives: Nitroglycerin topical 2% ointment</u> (limited data)^{1,2}</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p>	As soon as possible but within 12 hours of extravasation ^{2,3}	<p>Phentolamine: Jefferson Highway Covington Kenner Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank St. Charles Hancock</p> <p>Nitroglycerin oint: Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	Apply dry warm compresses ^{1,2}

<p>phenytoin</p>	<p>Dry heat and elevation is the treatment of choice.¹</p> <p><u>Alternatives:</u> Nitroglycerin topical 2% ointment</p> <p>Adults: Apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Refractory Cases <u>Hyaluronidase^b:</u> SubQ: Inject a total of 0.8 mL (15 units/mL) as four separate 0.2 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner.^{1,2}</p>	<p>Most effective if administered within 1 hour from extravasation if using hyaluronidase^{1,3,6}</p>	<p>Nitroglycerin oint: Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p> <p>Hyaluronidase: Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock</p>	<p>Apply dry warm compresses^{1,2}</p> <p>Extravasation may result in “purple glove syndrome”</p>
<p>piperacillin/tazobactam (Zosyn®)</p>	<p>No specific antidote</p>			<p>Apply dry cold compresses⁵</p>
<p>potassium salts</p>	<p><u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of</p>	<p>As soon as possible and within 1 hour of extravasation^{1,3,6}</p>	<p>Jefferson Highway Covington Kenner Baptist St. Charles</p>	<p>Apply dry cold compresses^{1,2}</p>

	extravasation at the leading edge in a clockwise manner. ^{1,2}		Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
promethazine	No known antidote ^{1,2}			Information Conflicts: Dry cold or dry warm compresses ^{1,2}
sodium chloride (> 1%)	<u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1 mL (15 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner. ^{1,2}	As soon as possible and within 1 hour of extravasation ^{1,3,6}	Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry cold compresses ^{1,2}
sodium bicarbonate (≥ 8.4%)	<u>Hyaluronidase^b:</u> Intradermal or SubQ: Inject a total of 1-1.7 mL (15 units/mL) as five separate 0.2-0.3 mL injections (using a 25-gauge needle) into area of extravasation at the leading edge in a clockwise manner. ^{1,2}	As soon as possible and within 1 hour of extravasation ^{1,3,6}	Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport	Apply dry cold compresses ^{1,2}

			Slidell Memorial St. Tammany Terrebonne West Bank Hancock	
vasopressin	<p><u>Nitroglycerin topical 2% ointment</u> Adults: apply 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.</p> <p>Pediatrics: Apply 4 mm/kg as a thin ribbon to the site of ischemia; may repeat after 8 hours if needed OR apply a 1-inch strip to the site of ischemia; may repeat every 8 hours as necessary.^{1,2}</p>	As soon as possible	Jefferson Highway Covington Kenner St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry warm compresses ^{1,2}
<p>vinBLAStine (Velban®)</p> <p>vinCRISStine (Oncovin®)</p> <p>vinorelbine (Navelbine®)</p>	<p><u>Hyaluronidase^b (if needle/cannula still in place):</u> Administer 1 to 6 mL (150 units/mL) into existing IV line; usual dose is 1 mL for each 1 mL of extravasated drug.⁵</p> <p><u>Hyaluronidase^b (if needle/cannula was removed):</u> Administer 1 mL (150 units/mL) as five separate 0.2 mL injections (using a 25-gauge needle and changing the needle each time) into area of extravasation at the leading edge in a clockwise manner.¹²</p>	Administer as soon as possible, and within 1 hour of extravasation	Jefferson Highway Covington Kenner Baptist St. Charles Chabert St. Anne Baton Rouge North Shore Shreveport Slidell Memorial St. Tammany Terrebonne West Bank Hancock	Apply dry warm compress for 20 minutes 4 times/day for 1 to 2 days. ⁵

50% DMSO = 50% Dimethyl Sulfoxide Solution

^aCompress Application: Apply dry compresses for 20 minutes every 6 to 8 hours for 48-72 hours after extravasation occurs.

^bHyaluronidase Preparation:

1. To obtain 1 mL of 15 units/mL concentration from a 150 units/mL vial: mix 0.1 mL (of 150 units/mL) with 0.9 mL normal saline in 1 mL syringe.¹
2. To obtain 6 mL of 150 units/mL concentration from a 200 units/mL vial: mix 4.5 mL of (200 unit/mL) with 1.5 mL of 0.9% sodium chloride in a 10 mL syringe.
3. To obtain 10 mL of 15 units/mL concentration from a 150 units/mL vial: mix 1 mL (of 150 units/mL) with 9 mL normal saline from a 10 mL normal saline vial.
4. To obtain 10 mL of 15 units/mL concentration from a 200 units/mL vial: mix 0.75 mL of (200 unit/mL) with 9.25 mL of 0.9% sodium chloride from a 10 mL 0.9% sodium chloride vial.

^cSodium thiosulfate Preparation:

1. To prepare 1/6 M solution from 25% solution: Mix 1.6 mL of 25% sodium thiosulfate solution with 8.4 mL of sterile water for injection or 0.9% sodium chloride.
2. To prepare 1/6 M solution from 10% solution: Mix 4 mL of 10% sodium thiosulfate solution with 6 mL of sterile water for injection or 0.9% sodium chloride.

VII. Enforcement

Failure to comply with this operational standard may result in progressive discipline for employees or termination of contract or service for third-party personnel, students, or volunteers.

VIII. Internal References:

1. OHS.RAD.OS.004 Contrast Extravasations

IX. External References:

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9. Ener RA, Meglathery SB, Styler M. Extravasation of systemic hemato-oncological therapies. *Ann Oncol*. 2004;15(6):858-862.
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13. American College of Radiology (ACR) Committee on Drugs and Contrast Media. *ACR manual on contrast media*. Version 10.3. 2018.
14. *Elsevier Skills: Extravasation - Chemotherapy Medications*. (2018). Retrieved July 22, 2020, from https://point-of-care.elsevierperformancemanager.com/skills/9013/extended-text?skillId=ZZ_034#scrollToTop.

X. History

XI. Approval

Deborah Simonson, VP Pharmacy

Date

Reviewers

Operational Standards are required to be reviewed, at a minimum, by:

- *A direct report of any Responsible Department/Division Leader approver; and*
- *Any subject matter experts*

Reviewer	Date of Review	Notes
<i>System Clinical Coordinators Meeting</i>	<i>5-14-2020</i>	<i>Approved</i>
<i>System Operations</i>	<i>5-15-2020</i>	<i>Approved</i>
<i>System Oncology-Chemotherapy Subcommittee</i>	<i>5-26-2020</i>	<i>Approved</i>
<i>System Infusion Council</i>	<i>5-28-2020</i>	<i>Approved</i>
<i>Pediatric Integration Council</i>	<i>7-28-2020</i>	<i>Approved</i>
<i>DOP System Policy Committee</i>	<i>8-6-2020</i>	<i>Approved</i>
<i>DOP</i>	<i>8-7-2020</i>	<i>Approved</i>
<i>Critical Care Integration Council</i>	<i>8-14-2020</i>	<i>Approved</i>
<i>System P&T Committee</i>	<i>8-19-2020</i>	<i>Approved</i>
<i>Nursing Informatics</i>	<i>10-6-2020</i>	<i>Approved</i>