**Alert**

Don appropriate personal protective equipment (PPE) based on the patient’s signs and symptoms and indications for isolation precautions.

Refer to Oncology Nursing Society (ONS) interim guidelines for PPE recommendations during an emergent shortage of PPE (e.g., pandemic).16

Vesicant agents may cause severe tissue damage, including necrosis, if they extravasate into tissue.

Only qualified physicians, physician assistants, advanced practice registered nurses (APRNs), or registered nurses with demonstrated competency administer antineoplastic therapies. Refer to the professional’s regulatory scope of practice and the organization’s practice.

Remember to route tubes and catheters having different purposes in different, standardized directions (e.g., IV lines routed toward the head; enteric lines toward the feet). This is especially important in the care of neonates.8

Take steps to eliminate interruptions and distractions during medication preparation.

**Overview**

Some antineoplastic agents may be classified as a vesicant, others as an irritant, and some as an irritant with vesicant properties, depending on the effect on surrounding tissue when the agent leaks outside the vein.15,17 A vesicant (Box 1) is any drug that has the potential to cause tissue damage when leakage occurs outside the vein.12

<table>
<thead>
<tr>
<th>Box 1 Examples of Vesicant Chemotherapy Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alkylating agents: DNA binding</strong></td>
</tr>
<tr>
<td>• Nitrogen mustard</td>
</tr>
<tr>
<td><strong>Anthracyclines: DNA binding</strong></td>
</tr>
<tr>
<td>• Daunorubicin</td>
</tr>
<tr>
<td>• Doxorubicin</td>
</tr>
<tr>
<td>• Epirubicin</td>
</tr>
<tr>
<td>• Idarubicin</td>
</tr>
<tr>
<td><strong>Taxanes: Non-DNA binding</strong></td>
</tr>
<tr>
<td>• Docetaxel</td>
</tr>
<tr>
<td>• Paclitaxel</td>
</tr>
<tr>
<td><strong>Antitumor antibiotics: DNA binding</strong></td>
</tr>
<tr>
<td>• Dactinomycin</td>
</tr>
<tr>
<td>• Mitomycin-C</td>
</tr>
<tr>
<td><strong>Vinca alkaloids: DNA binding</strong></td>
</tr>
<tr>
<td>• Vinblastine</td>
</tr>
<tr>
<td>• Vincristine</td>
</tr>
<tr>
<td>• Vinorelbine</td>
</tr>
<tr>
<td>• Vindesine</td>
</tr>
</tbody>
</table>


Vesicants cause blistering, pain, skin sloughing, and tissue damage that progresses to necrosis. Damage can occur to underlying tendons and nerves, causing permanent damage.
Antineoplastic Drug Administration: Vesicant and Irritant Agents (Oncology) - CE

that results in severe disability and discomfort. In some instances, permanent nerve damage, loss of a limb, or death can occur.\(^{10,12}\) The exact incidence of chemotherapy extravasation varies greatly because of the lack of reporting of events and the lack of a centralized registry. Overall incidence is estimated to range from 0.1% to 6.5% and from 0.3% to 4.7% with central venous access.\(^6\)

An irritant is a drug that causes inflammation in the vein wall; however, it does not cause tissue damage (Box 2).\(^{17}\)

<table>
<thead>
<tr>
<th>Box 2 Examples of Irritant Antineoplastic Agents*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alkylating agents</strong></td>
</tr>
<tr>
<td>• Bendamustine</td>
</tr>
<tr>
<td>• Carboplatin</td>
</tr>
<tr>
<td>• Carmustine</td>
</tr>
<tr>
<td>• Cisplatin</td>
</tr>
<tr>
<td>• Cyclophosphamide</td>
</tr>
<tr>
<td>• Dacarbazine</td>
</tr>
<tr>
<td>• Ifosfamide</td>
</tr>
<tr>
<td>• Melphalan</td>
</tr>
<tr>
<td>• Oxaliplatin</td>
</tr>
<tr>
<td><strong>Antimetabolites</strong></td>
</tr>
<tr>
<td>• Cytarabine</td>
</tr>
<tr>
<td>• Fludarabine</td>
</tr>
<tr>
<td>• 5-fluorouracil</td>
</tr>
<tr>
<td>• Gemcitabine</td>
</tr>
<tr>
<td>• Methotrexate</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>• Bleomycin</td>
</tr>
<tr>
<td>• Bortezomib</td>
</tr>
<tr>
<td>• Carfilzomib</td>
</tr>
<tr>
<td>• Dexrazoxane</td>
</tr>
<tr>
<td>• Etoposide</td>
</tr>
<tr>
<td>• Ipilimumab</td>
</tr>
<tr>
<td>• Irinotecan</td>
</tr>
<tr>
<td>• Liposomal doxorubicin</td>
</tr>
<tr>
<td>• Mitoxantrone</td>
</tr>
<tr>
<td>• Nivolumab</td>
</tr>
<tr>
<td>• Topotecan</td>
</tr>
</tbody>
</table>


Irritants may cause a burning sensation. A flare reaction causes transient erythema along the vein proximal to the IV site that is thought to be from a local release of histamine. This reaction may cause local pruritus, urticaria, or a red streak.\(^7,15\) Irritants that have vesicant properties can cause tissue damage.

With vesicants, tissue damage occurs based on the mechanism of action.\(^{11,17}\) Deoxyribonucleic acid (DNA)–binding drugs, such as anthracycline, attach to the nucleic acids in the DNA tissue surrounding the vein. Progressive cell death and tissue injury occur over time as local cells die and the drug complexes are released and taken up by healthy cells. Non-DNA binding drugs, such as vinca alkaloids, do not attach to DNA within the surrounding tissue.\(^1\) Subsequently, indirect damage occurs immediately in the tissue outside the vein. Because these drugs do not bind to the DNA, these agents are metabolized in the tissue and are easily neutralized as compared with DNA-binding agents.\(^{17}\)
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Preventing an extravasation requires recognition of risk, preparation, planning, and insight. Extravasation management procedures must be within current guidelines, with antidote order sets developed and the known antidote readily available if needed in the event of an extravasation. Only nurses who have received specialized training should give vesicant agents. Nurses must be able to identify factors that increase the patient’s risk for an extravasation (Box 3).

### Box 3 Risk Factors for Extravasation

**Patient-related**
- Altered sensory perception
- Compromised circulation
- Deeply implanted port
- Exposure to non–chemotherapy agent irritant (i.e., potassium chloride, calcium chloride)
- Highly mobile and active
- History of repeated peripheral chemotherapy administration or multiple venipunctures
- Impaired communication skills or cognition
- Inadequate education or poor understanding of information
- Lymphedema
- Pediatric or geriatric patient
- Poor or no blood return from IV site or VAD
- Poor venous access
- Obese patient with deep veins
- Small or fragile veins
- Treatment duration

**Nurse-related**
- Extensive experience giving vesicants during which no extravasations have occurred (therefore, improper assumption that skill level will prevent any future extravasations)
- Failure to identify patients at risk for extravasation
- Improper venipuncture technique
- Improper vesicant administration
- Inexperience with giving vesicants
- Interruptions during vesicant administration
- IV site selection (dorsum of hand, wrist, antecubital area)
- Lack of time
- Lack of training

**Device-related**
- Fibrin sheath at VAD catheter tip
- Improper port needle placement
- Migration of VAD catheter tip
- Pinch-off syndrome of VAD catheter
- Use of a device without adequate blood return

**Drug-related**
- Concentration
- Duration of infusion
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<table>
<thead>
<tr>
<th>Route (infusion versus push)</th>
<th>Vesicant properties</th>
<th>Volume of dilution</th>
</tr>
</thead>
</table>

VAD, venous access device

Once these factors are identified, the nurse can begin to implement preventive strategies to reduce extravasation risks (Box 4).12,13

**Box 4 Prevention of Extravasation**

- Provide adequate patient education about extravasation.
- Maintain annual competencies to validate nursing practice.
- Avoid extremities with impaired circulation, such as that caused by lymphedema.
- Avoid sites such as the hand, wrist, or antecubital fossae.
- Use VADs for vesicant administration, continuous infusions of vesicants, anticipated long-term administration of chemotherapy, poor venous access, and for children or older adult patients.a,b
- Ensure clear visualization of the site throughout the infusion.
- Closely inspect the venipuncture or VAD site for erythema and swelling and note the patient’s complaints of pain or burning.a,b
- Maintain free-flowing IV fluid in which to dilute the injected or piggybacked chemotherapy agent.
- Ensure good blood return from the peripheral or VAD line.
- Avoid using a VAD without a blood return until patency has been verified (as with a dye study).
- Use a large vein for peripheral administration, and ensure patent access.
- Select an appropriate cannula type and size.
- Insert a new IV line (if more than 24 hours old).a,b
- Secure the IV site or needle within an implanted port.

VAD, venous access device

Nurses administering IV antineoplastic therapy must be alert to patients at risk for extravasation, as well as the signs and symptoms of an extravasation (Box 5). Patients should be taught to report any symptom that occurs during antineoplastic administration. The nurse should investigate each concern verbalized by the patient.3,11
### Box 5 Signs and Symptoms of Extravasation

**Acute**
- Erythema
- Feelings of coolness around site
- Infusion slows or stops
- Loss of blood return from IV line or VAD
- Pain, burning, stinging
- Swelling at site

**Delayed**
- Blistering, ulceration
- Discoloration, induration
- Dry desquamation, peeling and sloughing of skin
- Functional impairment
- Increased erythema
- Increased pain
- Necrosis, eschar formation
- Sensory impairment at site of extravasation

Although extravasation can be prevented in most cases, leakage can occur despite all measures instituted to reduce the risks. Typically, venous access devices (VADs), such as implantable ports, peripherally inserted central catheters (PICCs), nontunneled catheters, and tunneled catheters reduce the risk for extravasation.

Nevertheless, extravasation from these devices can occur, causing severe tissue damage to the antecubital area of the arm from PICCs or peripheral ports or to the chest wall, mediastinum, or pleural space from other VADs.

An extravasation kit can be useful to provide care in a timely manner in the event of an extravasation. A kit should at least include disposable syringes, cold packs, hot packs, gauze pads, gloves, antidotes, and a disposable camera. If extravasation is suspected, measures must be implemented immediately. If an extravasation is identified early, smaller drug volumes may potentially minimize extensive tissue injury.

Tubing or catheter should be traced from the patient to the point of origin before connecting or reconnecting any device or infusion. Tubing should be labeled at the connection site closest to the patient and at the connection site closest to the source when there are different access sites or several bags. Labeling reduces the chance of misconnection, especially in circumstances where multiple IV lines or devices are in use. Connections should not be forced, and equipment should only be used for its intended purpose. Forced connections or workarounds could indicate that the connection should not be made.

If the patient expresses concern regarding the accuracy of a medication, the medication should not be given. The concern should be explored, the practitioner notified, and the order verified.
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EDUCATION

- Provide developmentally and culturally appropriate education based on the desire for knowledge, readiness to learn, and overall neurologic and psychosocial state.
- Encourage the patient to bring the caregiver or other support people to the educational session.
- Instruct the patient and caregiver regarding the potential side effects and adverse reactions to vesicant and irritant agents.
- Inform the patient that all vesicant and irritant agents have the potential for extravasation every time they are administered.
- Inform the patient that extravasation can occur even with close monitoring and expert administration.
- Instruct the patient to report signs and symptoms of extravasation, such as swelling, redness, or pain, immediately to the nurse (Box 5).
- Explain to the patient that movement or manipulation of the IV tubing or device must be limited during infusion to reduce the risk of extravasation.
- Educate the patient on self-care measures at home after extravasation.
  - Extremity elevation
  - Adequate pain management
  - Hot or cold compress application
  - Signs and symptoms to report from home
  - The need to return to the clinic for follow-up appointments
- Explain to the patient and caregiver that despite close monitoring and expert administration hazardous medication spills can still occur.
- Explain why safe handling precautions must be observed for at least 48 hours after the administration of vesicant and irritant antineoplastic therapy.
- Encourage questions and answer them as they arise.

ASSESSMENT AND PREPARATION

Assessment
1. Perform hand hygiene and don PPE as indicated for needed isolation precautions.
2. Introduce yourself to the patient.
3. Verify the correct patient using two identifiers.
4. Review the antineoplastic agent(s) to be administered and note each one’s vesicant or irritant properties.
5. Review drug information about the antineoplastic agent as well as the antidote, if any, and treatment of extravasation before administration.
6. Assess the central VAD or peripheral site before IV administration.
7. Assess the patient for specific contraindications to receiving the antineoplastic drug and advise the practitioner accordingly.
8. Assess the patient for risk factors for extravasation and document the findings.
9. Review with the patient what to report to the nurse during infusion. Ensure that the call device, if available, is within reach.

Preparation
1. Gather the needed supplies (e.g., patient record, treatment plan or orders, educational handouts, consent forms, IV or port access supplies).
2. Ensure that the extravasation kit, antidote, and spill kit are accessible.
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a. Use a standardized list to verify that all required items, including informed consent, are available.
b. Mark the procedure site when required.

4. Verify the patient’s actual admission weight in kilograms. Reweigh the patient if appropriate. Stated, estimated, or historical weight should not be used. Obtain the patient’s height.
5. Recalculate drug doses based on weight before each new cycle of antineoplastic therapy.

   Rationale:
   Doses of some antineoplastic agents are based on body surface area (BSA). Accurate measurement of the patient’s height and weight is needed to perform this calculation. Patients may understate or overstate their height and weight, so measurements must be performed.

6. Obtain the medication, check the practitioner’s order, verify the expiration date, and inspect the medication for particulates, discoloration, or other loss of integrity.

   Do not use any medication that is cloudy or precipitated unless such is indicated by its manufacturer as being safe.

7. Review medication reference information pertinent to the medication’s action, purpose, onset of action and peak action, normal dose, and common side effects and implications.

PROCEDURE
1. Perform hand hygiene and don gloves and appropriate PPE based on the patient’s signs and symptoms and indications for isolation precautions. Use the ONS interim guidelines for PPE recommendations during an emergent shortage of PPE (e.g., pandemic) (Table 1).

<table>
<thead>
<tr>
<th>PPE</th>
<th>ONS recommendations*</th>
<th>Pandemic interim guidelines (in descending order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gown</td>
<td>Disposable poly-coated gown</td>
<td>• Regular disposable gown (water resistant)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cloth gown (facility laundered) for infection control and nonhazardous drugs</td>
</tr>
<tr>
<td>Mask</td>
<td>Mask with face and eye protection required only if splashing likely and for spill cleanup</td>
<td>• N95 mask for symptomatic or patients with COVID-19 and hazardous drug spills and cleanup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PAPR</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Mask with eye protection or goggles if splashing likely or spill cleanup</td>
<td>• Full facepiece air-purifying respirator or PAPR</td>
</tr>
<tr>
<td>Gloves</td>
<td>Double chemotherapy-tested gloves</td>
<td>• Single chemotherapy-tested gloves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Double standard examination gloves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Single standard examination gloves</td>
</tr>
<tr>
<td>Shoe covers</td>
<td>Only in area for compounding hazardous drugs</td>
<td>• Work-only, washable shoes</td>
</tr>
</tbody>
</table>

COVID, coronavirus, PAPR, powered air purifying respirator; PPE, personal protective equipment

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*Highest-level recommended practice based on supplies of available PPE

2. Two practitioners or personnel approved to prepare or administer antineoplastic therapies verify the patient using two identifiers, confirm with the patient the planned treatment, and verify the drug name, dose, volume, rate and route of administration, expiration dates and times, and appearance and integrity of the drugs.
3. Explain the procedure to the patient and ensure that he or she agrees to treatment.

Administration of Vesicant or Irritant Chemotherapy
1. Ensure the six rights of medication safety: right medication, right dose, right time, right route, right patient, and right documentation. Use a bar code system or compare the medication administration record to the patient's identification band.
2. Label all medications, medication containers, and other solutions. The only exceptions are medications that are still in their original container or medications that are administered immediately by the person who prepared them.
3. Label the tubing at the connection site closest to the patient and the source.
4. Comply with Universal Protocol: Perform a time-out to verify the correct patient, correct site, and correct procedure.
5. Choose a large peripheral vein if a central VAD is not available. Avoid hands, wrists, and points of flexion.

Rationale: Points of flexion are at greater risk for extravasation and are more likely to develop vascular irritation and inflammation with the potential for function deficits.

6. Choose a small-gauge, plastic cannula instead of a metal needle, such as a butterfly set, if clinically feasible.

Rationale: Metal needles and large-gauge cannulas cause more trauma to the vein than plastic cannulas; they do not flex in the vessel and they have a higher potential for extravasation.

7. Assess the access site, including skin and vein integrity; the length and type of prescribed therapy; and the venue of care.
8. Assess the integrity and patency of the peripheral catheter if an IV line is already in place.

a. Start a new IV line if the present one is more than 24 hours old.

If starting a new peripheral IV line, avoid probing that damages vein integrity. Venipuncture into the vein should be a clean stick.

b. Ensure that the new IV site is proximal to the first site if starting in the same extremity.
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Rationale: Choosing an IV site that is proximal to the first site prevents inadvertent leakage from holes in the vein caused by a venipuncture proximal to the final IV site.²

Avoid sites distal to preexisting conditions, such as edema or lymphedema.

9. Trace tubing or catheter from the patient to the point of origin.⁸
10. Ensure that needle placement is correct and secure if using an implanted port.
11. Determine that a blood return can be obtained from the IV site or VAD before administering any chemotherapeutic or biologic agent.

Rationale: Although VADs reduce the risk, extravasation may still occur.¹⁰

12. Verify patency before administering antineoplastic agents if a VAD does not have a blood return. Notify the practitioner of lack of blood return; he or she may prescribe fibrinolytic therapy or imaging studies.

Do not use a VAD without blood return until placement verification is confirmed, and after receipt of an order to administer an antineoplastic drug, and only if no other venous access options are possible.

13. When no PPE shortage exists, don double chemotherapy-tested gloves, a chemotherapy-resistant gown, and eye protection if splashing is possible, according to the organization’s practice for administering hazardous drugs.

Rationale: Double chemotherapy-tested gloves, a protective chemotherapy-resistant gown, and protective eyewear (if splashing is possible) should be worn when administering hazardous drugs or when handling blood or bodily fluids from patients who have received hazardous drugs within at least the last 48 hours.¹⁴

14. Determine patency by assessing blood return and infusing a free-flowing nondrug IV fluid.¹³
15. Observe the venipuncture site and surrounding area throughout the entire vesicant infusion or IV push to ensure that no swelling, erythema, or local pain is present.²

Rationale: Swelling, erythema, or local pain may indicate an extravasation.

Never infuse vesicant agents through a peripheral vein for longer than 1 hour.²

16. Confirm line patency by checking for a blood return every 5 to 10 minutes during a short IV infusion.⁷,¹³
17. Check the patency of an IV push every 2 to 5 ml.⁷,¹³
18. Question the patient repeatedly during the infusion about pain, stinging, or changes in sensation at the IV site.
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Stop the infusion or push immediately and evaluate for extravasation if there is no blood return, if swelling develops around the site, or if the patient reports pain, burning, or a change in sensation.

Extravasation or Suspected Extravasation
1. Stop the infusion immediately.
2. Do not flush the line.
3. Follow the organization’s practice for extravasation of a vesicant agent.
4. Disconnect IV tubing and dispose of it in an appropriate hazardous waste container. 
   - Attach a syringe to the IV cannula and attempt to aspirate residual vesicant. Remove the cannula or port needle.
5. Notify the practitioner of possible extravasation.
6. Determine if an antidote can be administered (Table 2).

<table>
<thead>
<tr>
<th>Vesicant agent</th>
<th>Antidote</th>
<th>Local treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkylating agent (nitrogen mustard)</td>
<td>Sodium thiosulfate</td>
<td>Cooling pack Extremity elevation</td>
</tr>
<tr>
<td>Anthracyclines (daunorubicin, doxorubicin, epirubicin, idarubicin)</td>
<td>Dexrazoxane</td>
<td>Cooling pack Extremity elevation</td>
</tr>
<tr>
<td>Antitumor antibiotics (dactinomycin, mitomycin C)</td>
<td>None known</td>
<td>Cooling pack</td>
</tr>
<tr>
<td>Plant alkaloids (vinblastine, vincristine, vindesine, vinorelbine)</td>
<td>Hyaluronidase</td>
<td>Heating pack Extremity elevation</td>
</tr>
</tbody>
</table>


7. Administer the antidote through subcutaneous injections in a clockwise manner around the extravasation site or as an IV infusion, depending on which vesicant extravasated and which antidote is required. 


i. Administer sodium thiosulfate immediately after extravasation.
ii. Inject 2 ml of the antidotal solution (with a 25-G or smaller needle) for each milligram of mechlorethamine extravasated.

   Rationale: Sodium thiosulfate neutralizes nitrogen mustard extravasation to form nontoxic thioesters that are excreted in urine.

b. Anthracyclines: Administer dexrazoxane intravenously as prescribed within 6 hours of extravasation or as soon as possible.

   Rationale: Systemic dexrazoxane treatment prevents anthracycline-induced wound formation by binding to iron and preventing the formation of free radicals. It also binds to DNA topoisomerase II.
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i. Apply ice over tissue that is extravasated with an anthracycline.
ii. Remove ice 15 minutes before initiating the dexrazoxane treatment to allow blood flow to the area of extravasation.²
iii. Administer a daily dexrazoxane dose of 1000 mg/m² intravenously over 1 to 2 hours; then on the third day, administer one dose of 500 mg/m² within 24 hours for a total of 3 days.¹⁰
iv. Administer dexrazoxane intravenously away from the extravasation site (e.g., on the opposite arm).
v. Monitor the complete blood count, including granulocyte and platelet counts, and liver enzyme levels.

Rationale: Bone marrow suppression and elevated liver enzyme levels are potential side effects of dexrazoxane. Chemotherapy may exacerbate these effects.

c. Vinca alkaloids and microtubule inhibitors: Administer hyaluronidase as prescribed.¹⁰

Rationale: Hyaluronidase degrades hyaluronic acid, promotes drug diffusion, and enhances drug absorption.²

i. Inject about 0.2 ml (1 to 6 ml of a 150 unit/ml solution) subcutaneously (25-G needle) in a clockwise manner around the extravasation site in five injections.¹⁰
ii. The usual dose is 1 ml of hyaluronidase solution for every 1 ml of extravasated agent.¹⁰

d. Antitumor antibiotics (e.g., mitoxantrone, an irritant with vesicant properties): No known antidote is available. Care includes ice pack application for 15 to 20 minutes at least four times a day for the first 24 hours.²

8. Measure and document the area of edema or erythema. If possible, photograph the area and document with the date and time stamp within the picture.

Rationale: A photograph allows for continuity of care between practitioners, as well as thorough documentation.

9. Apply warm or cold compresses (as appropriate) for 15 minutes every 4 hours for 24 to 48 hours.¹⁷

a. Apply warm compresses for vinca alkaloids.

Rationale: Warm compresses increase blood flow to the area, distributing extravasated vesicant and promoting absorption.¹⁷

b. Apply cold compresses for alkylating agents and anthracyclines.

Rationale: Cold compresses reduce local inflammation and pain.¹⁷
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Do not use cold compresses for an extravasation of vinca alkaloids or epipodophyllotoxins because they increase the ulceration caused by these agents.7

10. Elevate the patient’s extremity.

Completing the Procedure
1. If extravasation has not occurred, taking care not to exert excessive force on the catheter, flush the IV line using 10 to 20 ml of compatible fluid2 after the vesicant infusion and according to the organization’s practice.

   Do not flush if extravasation has occurred.

2. Assess, treat, and reassess pain.
3. Discard supplies, remove PPE, and perform hand hygiene.

MONITORING AND CARE

Vesicant or Irritant Administration without Suspicion of Extravasation
1. Instruct the patient to call the nurse immediately if any signs of extravasation occur, such as blistering, erythema, and pain at or above the venipuncture or VAD site.
2. Monitor the patient for adverse and allergic reactions to the antineoplastic drug. Recognize and immediately treat respiratory distress and circulatory collapse, which are signs of a severe anaphylactic reaction. Follow the organization’s practice for emergency response.
3. Assess, treat, and reassess pain.

Vesicant or Irritant Administration with Suspicion of Extravasation
1. Schedule the patient for follow-up assessments of the site at, minimally, 24 hours, 48 hours, and 1 week after the extravasation, preferably by the same practitioner or nurse.2 Follow-up should continue for at least 3 weeks or until complete resolution of the extravasated site.6
2. Photograph the site at each assessment.
3. Document the site’s appearance, the patient’s reports, and functional changes at each assessment.
4. Instruct the patient to keep the affected extremity elevated.
5. Refer the patient to physical therapy, pain management, rehabilitation services, a surgeon, or a plastic surgeon for early evaluation, as needed.4

   Rationale: Some surgeons choose to remove the affected tissue before necrosis occurs; however, opinions differ about the timing of a surgical procedure if it is deemed necessary.12

6. Assess, treat, and reassess pain.

EXPECTED OUTCOMES
• Vesicant or irritant chemotherapy is administered without extravasation.
• Medication is administered per the six rights of medication safety.
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UNEXPECTED OUTCOMES
- Extravasation of a vesicant or irritant agent
- Damage to underlying tissue, tendons, or muscle
- Medication not administered per the six rights of medication safety

DOCUMENTATION
- Time-out procedure, including verification of the correct patient, correct procedure, and correct site
- Location and type of venous access
- Method and schedule of assessing patency
- Patency of IV line
- Risks for extravasation
- Education and response to education
- Patient’s weight in kilograms per the organization’s practice
- Patient’s understanding that any intravenous antineoplastic agent has the potential for infiltration or extravasation
- Patient consent for treatment
- Date and time that extravasation occurred or was suspected
- Description and quality of blood return before and during vesicant administration
- Reports of symptoms in patient’s own words
- Interventions for extravasation
- Measurements of erythema or swelling with description
- Name and approximate amount of chemotherapy agent that extravasated and amount remaining in syringe or IV bag
- Nurse’s observations
- Timing of infusion and complaints and observations
- Patient’s response to medication, including any adverse reactions
- Photographs of site at the time of extravasation and at times of follow-up (at least 24 hours, then 48 hours, and 1 week after extravasation)
- Follow-up instructions given to patient for self-care and appointment
- Unexpected outcomes and related interventions

SPECIAL CONSIDERATIONS
- Patients who are very mobile, such as pediatric patients, and patients who are nonadherent may need limb immobilization for vesicant or irritant administration to avoid accidental extravasation.
- Patients with impaired communication abilities may require assistance with alerting the nurse to symptoms of extravasation. The nurse should stay with the patient during short infusions. A caregiver should be present for long infusions.
- Older adults are at higher risk for extravasation because of sensory deficits, sensitivity to medication, fragile skin and veins, and poor circulation.
- Pediatric patients are at higher risk for extravasation because of difficulties with communicating, uncooperative behavior, and increased mobility.

REFERENCES
Antineoplastic Drug Administration: Vesicant and Irritant Agents (Oncology) - CE


**ADDITIONAL READINGS**


*In these skills, a “classic” reference is a widely cited, standard work of established excellence that significantly affects current practice and may also represent the foundational research for practice

**Elsevier Skills Levels of Evidence**

- Level I - Systematic review of all relevant randomized controlled trials
- Level II - At least one well-designed randomized controlled trial
- Level III - Well-designed controlled trials without randomization
- Level IV - Well-designed case-controlled or cohort studies
- Level V - Descriptive or qualitative studies
- Level VI - Single descriptive or qualitative study
- Level VII - Authority opinion or expert committee reports

**Supplies**

**Vesicant or Irritant Administration**

- Alcohol swabs
- Supplies for peripheral IV line or VAD
- Orders
- Patient record
- Educational handouts
- Consent forms
- Extravasation kit and antidote
- Standardized checklist
- Skin-marking pen
- Scale
- Drug per practitioner’s order
- Drug reference
- Medication administration record
- Bar code reader

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- Medication and tubing labels
- Thermometer, stethoscope, and blood pressure cuff
- PPE
  - For isolation precautions: gloves and PPE, as indicated
  - For antineoplastic administration: double chemotherapy-tested gloves, eye protection, face shield, impervious chemotherapy-resistant gown with long sleeves that closes in the back, and respirator
- Spill kit, including elastomeric half-mask with multi-gas cartridge and P100 filter in the event of larger spills that exceed the spill kit capacity

**Extravasation**
- 25-G needles
- Syringe
- Antidote as prescribed and diluent if required
- Extravasation documentation form
- Camera
- Warm and cold compress

Clinical Review: Heather T. Mackey, MSN, RN, ANP-BC, AOCN®

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