Guidelines for the Management of Extravasation (Version 5 May 2012)

“Quality and safety for every patient every time”

Document Control

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<tr>
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What is extravasation?

Extravasation refers to the process by which one substance (e.g., fluid, drug) leaks into the surrounding tissue. In terms of cancer therapy, extravasation is defined as the accidental leakage of chemotherapy from its intended compartment (the vein) into the surrounding tissue. A broader definition of extravasation includes the injury which occurs following extravasation. The degree of injury can range from a very mild skin reaction to severe necrosis depending on the type of substance which has extravasated.

When does extravasation occur?

Extravasation is not as rare as some people may think. In cancer therapy experts estimate that it accounts for 0.5% to 6.0% of all adverse events associated with treatment. But, when you consider that adverse events with cancer therapy are quite common, the absolute number of extravasations which take place is significant.

Some extravasations are caused by an error in the intravenous (IV) procedure. Cancer patients receiving chemotherapy may have multiple risk factors that make IV infusion difficult. For example, patients with a tendency for thin, fragile and mobile veins are at risk of extravasation. In addition to factors relating to the procedure and to the patient, factors associated with the equipment and material used, concomitant medications and the treatments themselves can also increase the likelihood of extravasation. The most common factors known to increase the risk of extravasation are listed in the guidelines.

What are the implications of extravasation?

Extravasation is to be avoided. Although not all extravasation incidences result in ulcerative and necrotic tissue damage, patients may still experience pain and discomfort as well as indirect consequences such as disruption of treatment and prolonged hospitalisation for the management of extravasation. The specific symptoms of extravasation, as well as their wider consequences, are discussed in this section of the guidelines and these include the initial symptoms, tissue damage, surgery, impact on cancer therapy, and other consequences.

How is extravasation recognised?

It is critical that an extravasation is recognised and diagnosed early. The most effective way to assess extravasation in its early stages is to be aware of and act on all relevant signs and symptoms. Signs and symptoms can be gathered from simple visual assessment of the injection site and careful observation of the IV device.

Once an extravasation is suspected to have occurred, it is important to rule out other possible conditions, such as flare reaction or phlebitis. The quality of the nursing assessment during administration of cytotoxic drugs plays a key role in minimising frequency and severity of extravasations, since delays in the recognition and treatment of vesicant extravasation increase the likelihood of developing tissue damage and necrosis. If there is any doubt as to whether or not an extravasation has occurred, stop the infusion and ask for advice.
Early detection of an extravasation is often based on the following factors: patient reporting, visual assessment, checking the infusion line, and distinguishing extravasation vs. other conditions.

**How is extravasation prevented?**

The most important approach to minimising the consequences of extravasation is prevention. Healthcare professionals involved in the handling and administration of IV cancer therapies should become familiar with the extravasation potential of the agents being administered (See Appendix 2), their local procedures and protocols. Healthcare professionals should develop an understanding of the important precautionary steps that should be taken to avoid extravasations and their resulting injuries.

**How is extravasation managed?**

A pathway for the management of extravasation includes detection, analysis and action is described below and shown as a flow chart in appendix one.

A. The first course of action is to stop and disconnect the infusion, aspirate as much of the infusate as possible, mark the affected area and then remove the cannula (while continuing to aspirate from the extravasation site).

B. Elevate the affected limb if required. If possible take a photo of the extravasated area.

C. Check which category drug belongs to (see appendix Two). Depending on the type of drug, vesicant or non vesicant being infused, the correct protocol should be followed to determine the next steps.

D. If the drug is a non-vesicant (see appendix 2), application of a cold compress and elevation of the limb may be sufficient to limit the adverse effects.

E. In contrast, the extravasation of a vesicant requires several steps and differs for the various classes of drug. (see appendix 2 for list)

F. Anthracyline extravasation needs immediate referral to oncology/haematology (see appendix three) for potential treatment with dexrazoxane (Savene) antidote

G. Vesicant (non anthracycline) extravasation needs immediate referral to plastic surgeons for potential formal subcutaneous washout of tissues.

H. Proceed with damage limitation management as below whilst awaiting review

I. There are two main approaches to limiting the damage caused by extravasation: localisation and neutralisation or dispersion and dilution.

J. The localise and neutralise strategy involves the use of cold compresses to limit the spread of the extravasation with the potential formal subcutaneous washout of tissues by plastic surgeons to neutralise or use of a specific antidote to neutralise.

K. Antidotes are agents applied or injected to the extravasated area to counteract the effects of the infiltrated agent. They form an important part of the “localise and neutralise” and the “disperse and dilute” strategies. Antidotes such as Dexrazoxane (Savene TM) for anthracycline extravasations are an option for use to counteract vesicant actions.
L. The disperse and dilute strategy involves the initiation of appropriate measures for the extravasation of *vinca alkaloids* and non DNA binding agents, *e.g.* taxanes the use of warm compresses to prompt vasodilatation and encourage blood flow in the tissues which helps to spread the extravasation and the immediate referral to the plastic surgeons for potential formal subcutaneous washout of tissues to dilute it.

M. Even if extravasation is identified early, progressive extravasation can give rise to ulcerated and necrotic tissue over time.

N. Early steps to prevent and manage extravasation such as referral to the plastic surgeons for potential subcutaneous washout of tissues may help to limit the need for surgery.

O. About one-third of extravasations due to anthracyclines result in ulcerations. In these cases, surgery should not be considered as the initial primary treatment of choice. Surgery to excise damaged tissue is indicated when there is ulceration or continued pain.

P. Complete the Green National Extravasation Reporting Card and submit to Birmingham. [http://www.extravasation.org.uk/greencard](http://www.extravasation.org.uk/greencard)

**Use of Antidotes**

Early steps to prevent and manage extravasation such as using antidotes may help to limit the need for surgery. About one-third of extravasations due to anthracyclines result in ulcerations. The only antidote that can be recommended on basis of clinical evidence is dexrazoxane (Savene). NECDAG has recommended dexrazoxane is available as an option for confirmed anthracycline extravasations following assessment and decision to treat by a consultant oncology specialist. The decision to use dexrazoxane must take into account the potential for referral to plastic surgeons.

Dexrazoxane is given as a three day course of treatment: 1000mg/m² IV as soon as possible (no later than 6 hours) after extravasation on day 1; 1000mg/m² IV on day 2 and 500mg/m² IV on day 3. Due to the potential need to administer over a weekend and the cytotoxic nature of the drug it is recommended that the treatment be given in cancer centres or units that are able to administer chemotherapy at weekend.

Other products such as topical DMSO (99%), sodium thiosulfate and hyaluronidase have been suggested as possible antidotes in many literature sources. Hyaluronidase while having limited evidence, is licensed and may be considered an option to assist dispersal where dispersal is indicated (*e.g.* vinca-alkaloids). When hyaluronidase is used 1500iu of hyaluronidase should be dissolved in 1ml of water for injection or sodium chloride 0.9% and infiltrated into the affected area using multiple subcutaneous injections as soon as possible after extravasation is detected. The use of DMSO and sodium thiosulfate is not recommended as they are not licenced.
Local Trust Responsibilities

Local Trusts are responsible to ensure they have established a referral pathway to the cancer centre for administration of dexrazoxane (Savene) antidote (see appendix three) and that they have established a pathway for referral to plastic surgery. Cancer Centres administering dexrazoxane (Savene) can recharge the cost of the drug to the referring patients PCT/CCG.

Local Trusts are responsible for the adoption of these guidelines via their own Trust Chemotherapy Multi Disciplinary Meetings and for ensuring the most up to date version is in use.

Conclusion

Managing extravasation in accordance with the latest scientific understanding and medical consensus allows for optimal treatment of the patient. By following current protocols and policies nurses can contribute to improving the standard of care in cancer therapy. By learning how to effectively recognise extravasation and by becoming familiar with local protocols for dealing with it, nurses can help to minimise the incidence of this complication of cancer treatment and, subsequently, play a crucial role in expanding the use of best practice. By implementing guidelines in their practice setting, nurses can provide best practice based on clinical evidence.
Step 1: STOP the infusion immediately. DO NOT remove the cannula

Step 2: Disconnect the infusion (not the cannula/needle)

Step 3: Leave the cannula/needle in place and try to aspirate as much of the drug as possible from the cannula with a 10ml syringe. Avoid applying direct manual pressure to suspected extravasation area

Step 4: Collect the extravasation kit, (cold/ warm compresses)

Step 5: Mark the affected areas and take digital images of the site (if possible)

Step 6: Remove cannula

Step 7: Check which category drug belongs to (see appendix Two)

Anthracyline extravasation needs immediate referral to oncology/haematology (see appendix three) for potential treatment with dexrazoxane (Savene) antidote (see step 11 below)

Vesicant (non anthracyline) extravasation needs immediate referral to plastic surgeons for potential formal subcutaneous washout of tissues.

Proceed with damage limitation management as below whilst awaiting review

Step 8: Administer pain relief as required

Step 9: Decide on Appropriate Damage Limitation Management (Cold compress to localise or Hot compress to disperse)

COLD COMPRESS
Actinomycin D Amsacrine
Bendamustine Carmustine
Carboplatin Dacarbazine
Dactinomycin Daunorubicin
Docorubicin Epirubicin
Idarubicin Mitomycin C
Mitoxanthrone Mustine
Streptozotocin Treosulphan

HOT COMPRESS
Docetaxel
Oxaliplatin
Paclitaxel
Vinblastine
Vincristine
Vindesine
Vinflunine
Vinorelbine

Only use heat those listed above

Step 10: LOCALISE
Apply cold pack to the affect area for 20 minutes 4 times daily for 1-2 days

Step 11: NEUTRALISE
(Anthracyclines only) Assess for potential administration dexrazoxane (Savene)

Step 10: DISPERSE
Apply a warm compression to the affect area for 20 minutes, 4 times daily for 1-2 days

Step 10: Elevate the limb. Consider applying cold compression if local symptoms occur. Arrange necessary follow up for patient.

Step 12: Notify doctor in charge of patient’s care. Complete documentation

If presents after 24 hours with vesicant extravasation, needs referral to plastic surgeons for management of potential blistering or soft tissue necrosis

Document incident including completion of a green card [http://www.extravasation.org.uk/greencard]
## Appendix 2: Classification of drugs

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<th>Vesicant</th>
<th>Irritant</th>
<th>Non Irritant</th>
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<tr>
<td>Aclarubicin</td>
<td>Cisplatin</td>
<td>Asparaginase</td>
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<tr>
<td>Actinomycin D</td>
<td>Cladribine</td>
<td>Bleomycin</td>
</tr>
<tr>
<td>Amsacrine</td>
<td>Cyclophosphamide</td>
<td>(if painful treat as irritant)</td>
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<tr>
<td>Bendamustine</td>
<td>Cytarabine</td>
<td>Bortezomib</td>
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<tr>
<td>Carmustine</td>
<td>Docetaxel</td>
<td>Carbplatin</td>
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<tr>
<td>Cabazitaxel</td>
<td>Fludarabine</td>
<td>Eribulin</td>
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<tr>
<td>Dacarbazine</td>
<td>Gemcitabine</td>
<td>Etoposide</td>
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<td>Dactinomycin</td>
<td>Ifosfamide</td>
<td>Fluorouracil</td>
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<td>Daunorubicin</td>
<td>Melphalan</td>
<td>Irinotecan</td>
</tr>
<tr>
<td>Liposomal-Daunorubicin</td>
<td>Oxaliplatin*</td>
<td>Methotrexate</td>
</tr>
<tr>
<td>Doxorubicin</td>
<td>Paclitaxel</td>
<td>Pemetrexed</td>
</tr>
<tr>
<td>Liposomal-Doxorubicin</td>
<td>Pentostatin</td>
<td>Ralitrexed</td>
</tr>
<tr>
<td>Epirubicin</td>
<td>Thiotepa</td>
<td>Tenopiside</td>
</tr>
<tr>
<td>Idarubicin</td>
<td></td>
<td>Topotecan</td>
</tr>
<tr>
<td>Mitomycin</td>
<td></td>
<td>Monoclonal antibodies (MAB’s)**</td>
</tr>
<tr>
<td>Mitoxantrone</td>
<td></td>
<td>- Alemtuzumab</td>
</tr>
<tr>
<td>Mustine</td>
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<td>- Bevacizumab</td>
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<tr>
<td>Treosulphan</td>
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<td>- Bortezomib</td>
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<tr>
<td>Vinblastine</td>
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<td>- Cetuximab</td>
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<td>Vincristine</td>
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<td>- Rituximab</td>
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<td>- Trastuzumab</td>
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<tr>
<td>Vinorelbine</td>
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### Notes

**a.** Oxaliplatin extravasation has been associated with increased risk of pain, oedema and neurological symptoms. These symptoms can develop more slowly that with other agents, so careful monitoring is required. It is classified as an irritant but as a non-DNA binding drug can be safely treated with a warm compress to avoid the risk of parasthesia which can be precipitated by cold.

**b.** Monoclonal antibodies (MAB’s) and other biologically active non-cytotoxic agents are generally classified as non-irritants, though experience is limited with their extravasation.

**c.** The above list does not claim to be a comprehensive list of all chemotherapy products, new treatments are approved on a frequent basis therefore it is the responsibility of users of this document to ensure they are aware which category new drugs fall into.
Appendix Three: Referral Pathway for Dexrazoxane

**Referral Pathway for Savene (Dexrazoxane)**

Cancer Unit Trust patient has an extravasation with anthracycline chemotherapy.

Nursing staff assess extravasation following NECN guidelines and decide if patient is potential for Savene treatment. **Note:** if an oncologist / haematologist available on ward at time then Dr. asked to review patient.

Nursing staff contact Cancer Centre and inform that patient is being referred. **Contact haematologist or oncologist on call depending on whether the patient is haem-onc or solid tumour.**

Patient transferred within 3 hours (Trust transferring patient arranges transport).

Patient assessed by on call oncologist / haematologist on ward.

Savene prescribed as 3-day treatment as appropriate. Administered and patient arranged to come in next 2 days for treatment.

Patient referred to plastics by centre team for further management if appropriate.

Patient’s PCT/ Commissioners (for referring Trust) billed from Centre for cost of Savene (agreed by NECDAG commissioners July 2010).

NUTH/JCUH receive patient episode attendance fees as per standard arrangement

Patient’s Oncologist / Haematologist informed of outcome of savene treatment and patient discharged back to cancer unit.

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**Cancer Units referring to Newcastle (NCCC)**
- Northumbria - Hexham, North Tyneside, Wansbeck
- Gateshead
- Sunderland
- South Tyneside
- Durham Hospital

**Cancer Units referring to South Tees (JCUH)**
- Darlington
- North Tees - Stockton and Hartlepool
- Friarage

**Note:** Cumbria have own Savene kit

**Note:** A different locally agreed referral pathway will be needed in each trust for referral to plastic surgery
References


10. These guidelines have been adopted from the European Oncology Nursing Society (EONS) extravasation guidelines (2007) which can be found at: http://www.cancerworld.org/CancerWorld/getStaticModFile.aspx?id=2340
