Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication

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Specialty

Oncology and Haematology- Adults

This document should be read alongside the Administration of Systemic Anti-Cancer Therapy (SACT) Policy as there are other considerations about administration of intravenous drugs pertinent to extravasation.

Paediatric Oncology

Follow the Paediatric Oncology Guidelines from Piam Brown, Southampton.

The original version of these guidelines was developed with reference to contents agreed by the then network- Central South Coast Cancer Network (CSCCN) although this network no longer exists elements of the guidance structure have been retained.

1. Indications

1.1.1-Definition

Extravasation refers to the escape of a drug into the extra vascular space [1]. It is a well-recognised complication of intravenous (IV) administration but in general it is often under diagnosed, under treated and under-reported[2].

Drugs or fluids administered parenterally can be divided into two main classes:-

- ***Non-vesicant*** cytotoxic drug may cause local irritation if extravasation occurs.
- ***Vesicants*** *are* agents that can produce blistering and/ or tissue destruction following extravasation.

In addition some non-vesicants and vesicants can cause a ***Flare*** reaction, which is a local allergic reaction without pain that is usually accompanied by red blotches along the vein. Symptoms of flare should subside within 30 minutes with or without treatment[3]. Therefore the practitioner must consider the presentation to exclude extravasation if a flare reaction is suspected.

Injuries that may occur as a result of extravasation include sloughing of tissue, infection, pain, necrosis and loss of mobility of that extremity. The degree of tissue damage will be related to several factors such as drug vesicant potential, drug concentration, the quantity of drug extravasated, duration of tissue exposure, vein puncture, site device, needle insertion technique, and individual tissue responses. Chemotherapy administered peripherally should only be given via cannulas and no other venous access devices e.g. butterfly needles.

1.1.2-Definitions of Groups [4]

Neutrals

Ostensibly inert or neutral compounds that do not cause inflammation or damage

Inflammitants

Capable of causing mild to moderate inflammation and flare in local tissues.

Irritants

Capable of causing inflammation and irritation, rarely proceeding to breakdown of the tissue.

Exfoliants

Capable of causing inflammation and shedding of skin, but less likely to cause tissue death.

Vesicants

Capable of causing pain, inflammation, blistering of the local skin, underlying flesh and structures, leading to tissue death and necrosis. The vesicants have been divided into 2 groups according to their specific management.

The potential severity of the extravasation is influenced by the type of vesicant that has been extravasated (DNA-binding or not DNA binding), the concentration and the amount of vesicant that has entered the tissue and the location of the IV device. Non vesicant drugs still have the potential to cause reactions although these tend to be milder and cause fewer complications for the patient.

Extravasations are a known and dreaded complication of intravenous chemotherapy[1]

1.1.3-Incidence

There is uncertainty about the exact incidence of extravasation due to under-reporting of events and concerns about the quality of these reports. Many authors estimate the incidence between 0.1% and 7% [1] but anecdotal reports suggests that the incidence may be decreasing due to improvements in infusion procedures, early recognition of drug leakage coupled with training and management techniques. Local data reporting reflects a rise in the number of extravasations, however this is felt to be because of the increased promotion of a culture of reporting. Clinical staff feel more secure to report and manage the extravasations. This has been achieved through annual competency assessment and extravasation education on the clinical governance sessions as indicated.

Additional emphasis is placed on patient awareness. This topic is now included in the SACT (systemic anti-cancer medication) pre-assessment presentation as incidences were shown to increase in the unit when patients went to the toilet and dislodged their cannulas. Warning patients of the risk of extravasation and

encouraging patients to report any changes in sensation including pain, swelling or discomfort during infusions.[5] The risk of extravasation is included in the consent process.

1.1.4-Background

All Patients who attend pre-assessment prior to the start of their chemotherapy will have their venous access assessed by a senior member of the chemotherapy nursing team. Insertion of a PICC (peripherally inserted central catheter) or STCVC (skin tunneled central venous catheter) is recommended if patient is assessed as having poor venous access. Another consideration for PICC or STCVC is the nature of the drug to be given intravenously. There is a lack of published evidence available concerning the effects of extravasated oxaliplatin but local consensus suggests that this drug should be treated as a vesicant with a low threshold for considering administration via a PICC in this Trust. Careful assessment of peripheral access should be made when patients are administered oxaliplatin. Patients commonly experience venous pain when oxaliplatin is infused peripherally suggesting some damage to the tunica intima (internal lining of the vein). This damage can then result in increased risk of extravasation. The same is also true of dacarbazine and therefore central venous access would be encouraged here too. If nothing else this practice is kinder to the patient by avoiding the associated discomfort and will reduce the length of stay of the patient in the unit, which can occur when the infusion is either slowed down or temporarily stopped. There is a lower threshold than in the past for using central venous access for other regimens, such as FEC and FECT, where venous access is restricted and there is a higher incidence of extravasation and thrombophlebitis. Non pre-assessed patients should have their venous access assessed by either their clinician or a nurse proficient in SACT.

1.1.5 Patient Risk Factors of Extravasation [6,7]

There are some other factors, which increase the risk of extravasation:

- Poor venous return (e.g. Superior Vena Cava Obstruction SVCO)
- Poor nutritional state
- Those with fragile veins or who are thrombocytopenic
- Patient non-compliance
- Infants and young children
- Patient with communication issues e.g. English as a second language, sedated, unconscious or confused.
- Poor choice of vein e.g. over a joint or dorsal veins
- Those on medications such as anticoagulants or corticosteroids
- Those who have undergone repeated IV cannulation or venepuncture The position, size and age of the venipuncture site are factors which have the greatest bearing on the likelihood of problems occurring
- Poor cannulation technique
- Drug to be administered

These factors must be considered by the individual administering the cytotoxic drug.

Venous access devices such as STCVC, PICC, and implantable ports (Portacaths) also carry a risk of extravasation. They may leak as a result of catheter separation from the port body, a nick in the outflow catheter, a rupture or tear in the port septum, excessive back-pressure around the needle through the port septum. This is rare so signs are not well documented, but will be similar to those for peripheral lines. Advice should be sought immediately from a Chemotherapy Nurse Practitioner/Senior nurse on duty and/or the patient's consultant if extravasation is suspected.

Choice of cannula:

Use of a small cannula (25g) is generally favoured for the administration of chemotherapy as this allows for good venous flow around the cannula. However, other factors for example, the depth of the vein need to be taken into account when selecting a cannula. The cannula must sit sufficiently into a vein once it has gone through the skin and underlying tissue in order to avoid chemotherapy leaking into the tissue increasing the risk of extravasation. For an overweight patient the vessel maybe deep down in the tissue and in that case then a larger 23g should be the cannula of choice.

1.1.6 Detection of Extravasation

Extravasation should be suspected if any of the following indicators are present during or after administration of cytotoxics;

1. **Pain** – patient complains of sharp stinging or burning sensation around the cannula/port/catheter site. N.B. Pain may occur elsewhere if leakage occurs at a previous puncture site. Sometimes there maybe an absence of pain but an extravasation has still occurred.
2. **Swelling or leakage** at the entry site of the line or cannula.

N.B. Swelling may occur elsewhere if extravasation occurs at a previous puncture site.

3. **No flash back of blood** is obtained with *pull back* on the syringe or stopping and restarting the infusion, the latter being the preferred method to test the integrity of venous access. This is not a defining factor. Flash back may not occur due to other factors such as collapse of a small cannula or if the cannula tip is against the vein wall of the vessel. If this is the case then repeated *pull back* of the syringe is not advised as this may cause damage to the vessel wall. In some circumstances flash back may occur with extravasation e.g. if the cannula is leaking or extravasation has occurred further up the vein.
4 **Resistance** is felt on the syringe during bolus administration when administered manually and an alarm will indicate a change in pressure when administered using a pump.
5 **Free flow** of an infusion is absent or reduced

If any of the signs or symptoms are present it is advisable for the nurse in charge of the patient's care to consult a colleague to either rule out extravasation or confirm it has occurred. The presenting signs and symptoms informing the clinical decision must be documented in the health care record regardless of the diagnosis made so there is a clear record of the clinical care.

! IF IN DOUBT STOP AND FOLLOW THE EXTRAVASATION GUIDELINES

1.1.7 Documentation

It is normal practice to document where the patient has been cannulated (left/right arm and what vein e.g. cephalic) and to report if the treatment was infused as prescribed or otherwise. Cannulation is either recorded on Aria, the chemotherapy electronic prescribing system, in the journal or, for inpatients, documented on the intravenous cannulation pathway.

1.2 Aim/purpose

This policy aims to provide clear guidelines for the prompt first aid treatment of extravasation of cytotoxic drugs. This immediate treatment should aim to quickly remove as much as possible the offending drug, and therefore to limit the damage any remaining drug may cause.
More detailed guidelines for the management of specific drugs will follow. The treatment and general management of extravasation can be quite complex, these guidelines aim to offer a manageable treatment regimen taking into consideration the previous guidance from St. Chad's Unit in Birmingham and practice across the south region. St Chad's, the former national reporting centre for extravasation, had the most experience of dealing with this complication, however the limited evidence base for their recommendations was taken into consideration when previously developing these guidelines.

1.3 Patient/client group

Patients who are receiving intravenous SACT.

1.4 Exceptions/ contraindications

These guidelines concentrate on extravasation via the peripheral route. There is little evidence concerning the management of cytotoxics drugs centrally, therefore these guidelines should be considered when dealing with an extravasation centrally. Given the nature of the potential damage and the anatomical area involved it is vital that the consultant in charge of the patient's care is consulted along with referral to a plastic surgeon if the drug extravasated is either a vesicant or the amount of drug extravasated is greater than 5ml.

Numerous non-anti-cancer medications have the potential to cause tissue damage. These guidelines have been developed to describe the management of extravasation of those drugs used in the cancer or malignant haematological setting and do not specifically include non-SACT medications. In general, the nature of the extravasated drug, its concentration, volume extravasated and the siting of the administration device need to be taken into account. In extravasations from other medication information may be available in the Summary of Product Characteristics.

1.5 Options

None

2. Clinical Management

2.1 Staff & equipment

2.1.1 Personnel Allowed to Undertake Procedure

IV administration of prepared cytotoxic infusions and of bolus cytotoxic drugs is considered to be a specialist practice within this Trust. An advanced practice may be defined as an aspect of care which may be undertaken by Registered Nurses and Midwives who have *undergone the specified training and assessment*,

accept *accountability* for their actions, and feel *competent* to undertake the aspect of care. Therefore, practitioners who administer SACT will be aware of the signs of extravasation and the immediate treatment required.

Stopping an infusion if extravasation is suspected is essential and any member of nursing staff can perform this, then immediately contact a chemotherapy trained nurse/doctor to carry out other specific care.

The actions outlined in the "Immediate Action Plan" should be carried out immediately by nursing and/or medical staff at the scene.
Expert advice should then be sought urgently from the patient's consultant or a senior member of staff for example the Trust Lead Chemotherapy Nurse or Sister in charge of the Pembroke Suite. The consultant will then need to make a decision about referral to plastics, however all extravasations involving vesicants where dexrazoxane is not used must be referred to a plastic surgeon.
There must be a current and appropriate plan of care for patients receiving cytotoxic drugs [8]. The plan must incorporate ongoing evaluation and reassessment of care and evidence that the relevant interventions and observations have been communicated to appropriate members of the multidisciplinary team.

2.1.2 Extravasation Kit

An extravasation kit can be found in Pembroke Ward & Suite, Paediatric Day Unit, Sarum Ward and the emergency drug cupboard. After the kit has been used, it should be returned to pharmacy for restocking.

Contents:

Hot pack
Syringe cap
1500 units injection Hyaluronidase
Hydrocortisone 1% cream
Sterile pen
Guidelines for the management of extravasation
Water for injection 10ml ampoule.
Cold pack available on unit in fridge
Selection of needles, syringes, Clinell wipes 2%, non-woven swabs
Lidocaine 1% 5ml
Follow up chart
Patient information sheet(s)

2.1.3 Specific Interventions

Hyaluronidase

Is used to dilute and disperse extravasated solutions, this helps to minimise or prevent tissue injury by increasing rate of absorption of the toxic agent and dilute the local concentration.

Dexrazoxane (Savene ^{TM}) Adults only

This is the only licensed antidote for anthracycline extravasations. It blocks the enzyme DNA topoisomerase II thus preventing anthracycline induced cell damage. This antidote is only effective if used within 6 hours of the extravasation occurring and should then be administered daily for three days. This antidote has to be prescribed by a consultant chemotherapy prescriber. As the dexrazoxane is a cytotoxic, it requires reconstitution in pharmacy aseptics during normal working hours. For doses needed out of hours and at weekends reconstitution should be carried out at ward level using a closed reconstitution device as described in **appendix 1**. *See section 'Vesicant Cytotoxic Drugs Group-Anthracycline' for prescribing and administration details*

Flush-out Technique

The Flushout technique is now established practice in the management of extravasation and should be used for all vesicants (unless dexrazoxane has been administered) and larger volumes of non-vesicant cytotoxics administered peripherally. This technique is used in preference to chemical antidotes in order to preserve tissue integrity and potential function. Rapid removal of the extravasated drug can prevent tissue damage from occurring and avoids future potentially invasive management being required[7].
If chemotherapy extravasated centrally then the plastics team should always be notified immediately for advice and management. To contact the Plastics ask switchboard for Plastics on call.

Contact for Plastics Team Plastics Outpatients, Level 3 for Follow up

08.30 – 17.00 Phone ex. 3254 Plastics OP or out of hours ex 3507 Odstock ward to make appointment. Out of Hours bleep 1460 until 20:00 then H@NT bleep 1309.

Hot Pack
This involves applying firmly but without undue pressure a heat source (hot pack or for patients at home-hot water bottle or small electrically heated blanket) to the area for 20 minutes four to five times a day for 24 hours. The heat source should not be in direct contact with the skin, instead a piece of gauze should be laid in direct contact.

Cold Pack
This involves applying firmly but without undue pressure a cold source (cold pack for patients at home-crushed ice) to the area for 20 minutes four to five times a day for 24 hours. The cold source should not be in direct contact with the skin, instead a piece of gauze should be laid in direct contact.

2.2 Method/procedure

Extravasation Immediate Action Plan

If extravasation is suspected

⇓

Stop the drug infusion

⇓

Do not remove the cannula

⇓

Put on gloves, apron and eye protection

⇓

Carefully disconnect the chemotherapy, clamp line or use bung as appropriate

⇓

Aspirate drug & blood from the cannula, (3-5ml) if possible

⇓

Obtain Extravasation Kit

⇓

Mark area of extravasation with the soft tipped pen

⇓

Take a picture (file in healthcare record)

⇓

Remove Cannula
Contact Patient Senior Doctor and CNP/Senior Nurse
Consider referral to Plastics Team
Document all actions include date and time

Are any of the following involved? Daunorubicin, Doxorubicin, Epirubicin or Idarubicin

⇓ ⇓

YES

Discuss use of Dexrazoxane
See Vesicant Group -Anthracycline
Go to Appendix 2

NO

Are any of the following involved?
Vinblastine, Vindesine, Vinorelbine, Vincristine, Cisplatin, Etoposide, Paclitaxel, Paclitaxel albumin, Docetaxel, Cabazitaxel, Oxaliplatin & Carboplatin

NO

Apply Cold Pack (from freezer)
To affected site

YES

Apply hot pack
Elevate limb and encourage movement

⇓

THEN

Follow "Action for all Patients" on page 17

Index of Drugs

Drug Name	Trade Name	Vesicant Potential	Page
Aclarubicin	Aclacin	Exfoliant	15
Aldesleukin IL2	Proleukin	Neutral	15
Alemtuzumab	Mabcampath	Neutral	15
Amsacrine	Amsidine	Vesicant	10
Arsenic trioxide	Trisenox	Irritant	15
Asparaginase	Erwinase	Neutral	15
Atezolizumab	Tecentriq	Neutral	15
Bendamustine	Levact	Irritant	15
Bevacizumab	Avastin	Neutral	15
Bleomycin	Bleomycin –Lundbeck	Neutral	15
Bortezomib	Velcade	Neutral	15
Brentuximab	Adcetris	Neutral	15
Cabazitaxel *	Jevtana	Not established*	10
Carboplatin	Paraplatin	Irritant	15
Carfilzomib		Irritant	15
Carmustine	BiCNU	Vesicant	10
Cetuximab	Erbitux	Neutral	15
Cisplatin	Cisplatin	Exfoliant	15
Cladribine	Leustat	Neutral	15
Clofarabine	Evoltra	Neutral	15
Cyclophosphamide	Endoxana, Cytoxan	Neutral	15
Cytarabine	Cytosar. Alexan	Neutral	15
Dacarbazine	DTIC	Vesicant	10
Dactinomycin [Actinomycin D]	Lyovac – Cosmegen	Vesicant	10
Daratumumab	Darzalex	Neutral	15
Daunorubicin	Cerubidin	Vesicant	12
Daunorubicin Liposomal	Daunoxome	Exfoliant	15
Decitabine	Dacogen	Neutral	15
Docetaxel	Taxotere	Exfoliant treat as vesicant	10
Doxorubicin	Adriamycin	Vesicant	12
Doxorubicin Liposomal	Caelyx	Exfoliant	15
Edrecolomab	Panorex	Neutral	15
Epirubicin	Pharmorubicin	Vesicant	12
Eribulin	Halaven	Neutral	15
Etoposide	Vepesid	Irritant	15
Floxuridine		Exfoliant	15
Fludarabine	Fludara	Neutral	15
5 Fluorouracil	5 fluorouracil	Inflammitant	15
Folinic acid		Neutral	15
Gemcitabine	Gemzar	Neutral	15
Gemtuzumab	Mylotarg	Neutral	15
Idarubicin	Zavedos	Vesicant	12
Ifosfamide	Mitoxana. Holoxan	Neutral	15
Interferons (beta)		Neutral	15
Irinotecan	Campto	Irritant	15
Isatuximab	Sarclisa	Neutral	15
Melphalan	Alkeran	Neutral	15
Methotrexate	Emtexate	Inflammitant	15
Mitozantrone	Novantrone	Exfoliant	15
Mitomycin C		Vesicant	10
Mustine (Chlormethine)		Vesicant	10
Nivolumab		Neutral	15
Obinutuzumab	Gazyvaro	Neutral	15
Ofatumumab	Arzerra	Neutral	15
Oxaliplatin	Eloxatin	Exfoliant treat as vesicant	10
Paclitaxel	Taxol	Irritant treat as vesicant	10

Paclitaxel albumin	Abraxane	Irritant treat as vesicant	10
Panitumumab	Vecibix	Neutral	15
Pembrolizumab	Keytruda	Neutral	15
Pemetrexed	Alimta	Inflammitant	15
Pentostatin	Nipent	Neutral	15
Pertuzumab	Perjeta	Neutral	15
Polatuzumab	Polivy	Neutral	15
Raltitrexed	Tomudex	Inflammitant	15
Rituximab	MabThera	Neutral	15
Streptozotocin	Zanosar	Vesicant	10
Thiotepa	Thiotepa	Neutral	15
Topetecan	Hylamtin	Exfoliant	15
Trastuzumab	Herceptin	Neutral	15
Trastuzumab derutxtecan	Enhertu	Irritant [$]	15
Trastuzumab emtansine	Kadcyla	Irritant	15
Treosulphan		Vesicant	10
Vinblastine	Velbe	Vesicant	10
Vincristine	Oncovin	Vesicant	10
Vindesine	Eldesine	Vesicant	10
Vinorelbine	Navelbine	Vesicant	10

*** Data relating to the extravasation of this drug is very limited; cases should be discussed with the relevant consultant on an individual patient basis.**

[$] There has been a published case study report of tissue necrosis following extravasation (J OncPract vol 13 Issue 8 August 2017 pp555-557) but extravasation guidelines in the UK either classify this agent as neutral or irritant.

Vesicant Cytotoxic/SACT Group- Non Anthracycline

These are the guidelines for the management of extravasation of the following drugs:

Vesicant Drug	HOT/COLD PACK	Drug Action
Amsacrine	COLD	DNA intercalation
Carmustine	COLD	Alkylating agent
Cabazitaxel *	HOT	microtubule inhibitor
Dacarbazine	COLD	Alkylating agent
Dactinomycin – [Actinomycin D]	COLD	Cytotoxic antibiotic
Docetaxel (This drug is an exfoliant but guidelines suggest it is treated in the same way as a vesicant)	HOT	Inhibitor of mitosis
Mitomycin C	COLD	Cytotoxic Antibiotic
Mustine (Chlormethine)	COLD	Alkylating agent
Oxaliplatin (This drug is an exfoliant but guidelines suggest that it be treated in the same way as a vesicant)	HOT	Heavy metal compound
Paclitaxel (This drug is an irritant but guidelines suggest it is treated in the same way as a vesicant)	HOT	Inhibitor of mitosis
Paclitaxel albumin(This drug is an irritant but guidelines suggest it is treated in the same way as a vesicant)	HOT	Inhibitor of mitosis
Streptozotocin	COLD	Alkylating agent
Treosulphan	COLD	Alkylating agent
Vincristine	HOT	Inhibitor of mitosis
Vinblastine	HOT	Inhibitor of mitosis
Vindesine	HOT	Inhibitor of mitosis
Vinorelbine	HOT	Inhibitor of mitosis

Intervention	Rationale
1. Follow **"Immediate Action Plan"**	Quickly remove as much as possible of the offending drug to limit the damage any remaining drug may cause
2. Remove the cannula	Prevents it being used again
3. Apply HOT or COLD pack as table above Apply for 20 minutes 4-5 times a day for 24 hours	Restrict spread of cytotoxic agent where cold pack used or to encourage dilution where hot pack applied
The following actions should only be carried out by the plastic surgery team after discussion with the patient's consultant	
4. Use flush-out technique (see section on flush-out technique, page 11)	Aims to remove extravasated drug thus limiting damage to tissue
5. Complete the follow-up documentation	Maintaining a record of intervention, a clear pathway of care
6.Follow section – "action for all patients" page 17	

Dacarbazine- Avoid intense sunlight to effected area after extravasation.

*** The true vesicant potential is not established with this drug, however evidence is emerging to suggest it should be treated as a vesicant**

Flush-out Technique

The flush-out technique will be used for the management of larger volumes of non-vesicant drugs and all non-anthracycline vesicants. Speed is of the essence and early use of this technique is recommended to reduce damage

This technique should be carried out by staff deemed competent in this practice. The flush out kit is made up and kept on Pembroke Unit for their use.

Flush-out equipment

Hyaluronidase 1,500 unit (from extravasation kit)
250ml 0.9% Sodium Chloride infusion (from clinical area)
Lidocaine 1% 5ml x 2 amps (from clinical area)
2 x 50ml syringes
1 x 5ml syringes
3 packs of sterile gauze
Scalpel Size15
Cannula 18g
2 x 25g needles (in extravasation kit)
Wound care pack
Clinell 2% wipes (in extravasation kit)
Sterile Gloves small, medium, large
Jelonet dressings various sizes available dependent on area needs covering

Intervention	Rationale
1. Reconstitute 1,500 units hyaluronidase with 5ml 1% lidocaine*.	Lidocaine acts as an anesthetic to minimize discomfort. Also consider oral systemic analgesia for patient.
2.Inject hyaluronidase/ lidocaine into the extravasated area as soon as possible after the event (approximately 4-5 incisions around extravasated area) using a 25g needle and make approximately 4-5 excisions with a scalpel around extravasated area	Allows diffusion of extravasated drug into bloodstream, and out of concentrated area.
3. Puncture the area of extravasation with cannula and flush with as much as 200ml 0.9% sodium chloride. This depends on amount and agent extravasated	Flush-out as much of the cytotoxic agent as possible to minimize tissue damage
4. Whenever possible, elevate the area to minimize swelling and encourage movement	
5. Reapply ice/hot pack (as applicable) 20minutes, 4-5 times a day for 24hours.	
7. Observe the region for pain, induration, or necrosis	
8.Document the procedure in healthcare records	
9. Arrange Follow-up for patient with plastics Team and Oncology / Haematology Team Contact details on page 5.	
10.Follow section – “action for all patients” page 17	
11. Complete follow-up sheet	

* NB
Hyaluronidase increases absorption of local anaesthetic, therefore the patient should be monitored for signs of systemic anaesthesia such as increased pulse rate and decreased respirations.

Vesicant Cytotoxic/SACT Drugs Group - Anthracycline

These are the guidelines for the management of extravasation of the following drugs:

Vesicant Drug	Drug Action
Daunorubicin	Anthracycline
Doxorubicin	Anthracycline
Epirubicin	Anthracycline
Idarubicin	Anthracycline

Intervention	Rationale
1. Follow **"Immediate Action Plan"**	Quickly remove as much as possible of the offending drug to limit the damage any remaining drug may cause
2. Remove the cannula	Prevents it being used again
The following actions should only be carried out by a senior member of nursing staff (chemotherapy trained) after discussion with the patient's consultant	
3. Consider use of Dexrazoxane for anthracyclines listed above	This antidote is only applicable to certain drug (see list above) and patient criteria
4. Follow section – "action for all patients" page 17	

Dexrazoxane (Savene^{TM}) and Extravasation

Introduction

Dexrazoxane (Savene^{TM}) is the only licensed antidote for anthracycline extravasation. It prevents or reduces tissue destruction by two mechanisms: it is hydrolysed intracellularly to form a chelating agent and it is an inhibitor of topoisomerase II, a target enzyme for anthracyclines. This antidote has been shown to be clinically effective and has reduced the need for surgery but has not been directly compared with patients treated with a Flush-out procedure. Use of dexrazoxane has been adopted by this Trust in accordance with the European Oncology Nurses Society guidelines[8].

When to use dexrazoxane – for Epirubicin, Idarubicin, Doxorubicin & Daunorubicin (Centrally or Peripherally)

If an extravasation involving an anthracycline occurs then use of dexrazoxane should be considered rather than flush out and surgical interventions. The decision to treat a patient with dexrazoxane should be made by the consultant in charge of the patient or in their absence another haematology/oncology consultant. Prescriptions for dexrazoxane must be written by the oncology/haematology consultant, or under their instruction, by a specialist registrar/non-medical prescriber.

Note :

•Dexrazoxane must be administered as soon as possible, preferably within 3 hours but, at the latest, within 6 hours of the extravasation.
•Do not use DMSO on the skin before administering dexrazoxane.
•Stop cooling the skin at least 15 minutes before giving dexrazoxane.
Discontinue any scalp cooling at least 1 hour before administration of Dexrazoxane.

Special precautions

• The current cycle of chemotherapy must be discontinued and not restarted until at least 48 hours following the 3 day treatment with dexrazoxane. This must be discussed with the patient's consultant[8].
•Haematological monitoring should be performed daily during treatment with dexrazoxane and then as clinically indicated. Monitor both serum potassium and sodium levels.
•Patients taking warfarin should have a daily INR whilst receiving dexrazoxane and then regularly as clinically indicated.
•Infusion site should be examined on a daily basis during treatment with dexrazoxane and then as appropriate. Consider taking a photograph to record progress.

•Use with caution in patients taking ciclosporin or tacrolimus.
•Dexrazoxane is NOT routinely recommended in the following patient groups, as it is not licensed:

1. Children
2. Renal impairment –there is some limited data to suggest that patients with a creatinine clearance of 40 ml/min or less should have dexrazoxane with a 50% dose reduction. If the eGFR is less than 60 ml/min then a calculated creatinine clearance should be used. The most recent blood results should be used but at the latest this should have been within the last 2 weeks. Creatinine clearance calculator: Calculators (microguide.global)

If dexrazoxane is used in a patient with renal impairment monitor for signs of haematological toxicity.

3. Hepatic impairment- there is limited data supporting use of dexrazoxane in patients with hepatic impairment. There is no evidence to support use in patients with LFTs> 3 xULN. If dexrazoxane is used in a patient with hepatic impairment then monitor LFT's prior to each dose.
4. Patients taking phenytoin.

Use of Dexrazoxane for these patient groups may be considered based on clinical judgment of the authorising consultant.

Requesting doses- see **appendix 2**

Dexrazoxane (Savene™) is stocked at this Trust. When the decision has been made to treat a patient with dexrazoxane, pharmacy must be contacted to arrange a supply. Within normal working hours either telephone Pharmacy aseptics or bleep the oncology pharmacist. It must be stressed that this is an emergency situation in order to highlight the timeframe. Out of hours the on-call pharmacist must be contacted via the Site team. Suitability of the role of dexrazoxane in the treatment of this extravasation must be confirmed using the form provided in **appendix 3**. The dexrazoxane (Savene) kit must be replaced as soon as possible.

In the unlikely event that there is no dexrazoxane (Savene) on site as it has just been used to treat another patient then a supply must be obtained from another Trust in our region. The hospitals where dexrazoxane (Savene) is stocked are listed in the table below. Closed reconstitution devices must be requested with the pack of dexrazoxane. Delivery direct to the clinical area must be arranged so that any time delays are minimised.

Hospital	Normal Working Hours	Out-of-Hours
University Hospital Southampton	Oncology Pharmacy 02381203125	On-call Pharmacist 02380777222
QA Hospital Oncology Pharmacy	Lead Pharmacist - Catrin Watkinson – 02392 286000 Ext 6550	On-call pharmacist 02392 286000
Hampshire Hospitals	01256 313439 for Wessex ward where the kit is held	01256 313439 for Wessex ward where the kit is held
The Spire Portsmouth	Lead Pharmacist Rosemary Hull – 02392 456090/91	On-call Pharmacist 02392 456000

Dosing and administration

Day 1: 1000 mg/m^2 (must be given within 6 hours of extravasation)
Day 2: 1000 mg/m^2 (given 24 +/- 3 hours of previous dose)
Day 3: 500 mg/m^2 (given 48 hours +/- 3 hours of original dose)
Each dose is administered as an intravenous infusion into a large vein over 1 to 2 hours. For patients with a BSA of more than 2m^2, a single dose must not exceed 2000mg (2g or 4 vials). As each treatment pack contains a total of 10 vials the dose on day 3 must also not exceed 1000 mg (1g or 2 vials) as an additional treatment pack would otherwise be required.

Side effects

The main side effects include nausea, vomiting, diarrhoea, stomatitis, bone marrow suppression, abnormal LFT's and pain at the injection site. For a full list of side effects please refer to the SmPC.

How is dexrazoxane prepared

Dexrazoxane is a cytotoxic drug and must usually be prepared in Pharmacy during normal working hours. Out of hours dexrazoxane must be prepared at ward level using a closed reconstitution device. The medication is available as a treatment pack containing sufficient vials of dexrazoxane and infusion bottles to complete the recommended 3 day treatment.

Each vial of dexrazoxane is reconstituted with 25 ml of diluent from the infusion bottle to provide a concentrate of 20 mg/ml. The required volume of reconstituted drug must be drawn up and added to the 500 ml bottle of diluent provided in the treatment pack. When prepared each bottle of dexrazoxane has an expiry

of 4 hours when stored in the fridge. As each infusion is administered over 1-2 hours in practice bottles are used immediately.

Preparation on clinical area if out of hours

Dexrazoxane (Savene™) is a cytotoxic drug that is normally prepared as an infusion in Pharmacy aseptics. The aseptic suite is open 8.30-17.00 Monday to Friday only. Out of these normal working hours dexrazoxane infusion must be reconstituted and prepared as an infusion at ward level using a closed reconstitution, device as described in **appendix 3**.

Preparation of dexrazoxane using the closed reconstitution device must only be carried out by staff who have received appropriate training (chemotherapy nurse) and who have been assessed as competent in this practice. Staff involved with the preparation of dexrazoxane using a closed reconstitution device must wear two pairs of gloves, a chemotherapy apron and a mask. Any issues with the device must be reported using Datix, ensuring that both the Principal Oncology Pharmacist and Lead Chemotherapy Nurse are notified.

Only Luer lock syringes must be used for any drug manipulation. Once the drug has been added to the diluent bottle, the bottle must be checked for any leaks before carefully inverting the diluent bottle several times to mix the contents. As with any other parenteral medication prepared at ward level, the bottle must be labeled prior to administration. Used vials of dexrazoxane and the empty infusion bottle must be discarded as cytotoxic waste in accordance with the Trust waste management guidelines.

If subsequent doses are planned to be prepared in pharmacy then the remainder of the kit should be sent to pharmacy aseptics.

Non Vesicant Cytotoxic/SACT Drugs

These drugs are capable of causing inflammation and shedding of the skin, but less likely to cause tissue death. For large volume / central extravasation consider use of the flushout procedure, this decision rests with the consultant

Exfoliant Drug	Hot or Cold Pack	Drug Action
Aclarubicin	COLD	Anthracycline
Aldesleukin IL2	COLD	Immunostimulant
Alemtuzumab	COLD	Immunostimulant
Arsenic trioxide	COLD	Changes to DNA
Asparaginase	COLD	Antimetabolite enzyme
Atezolizumab	COLD	Immunostimulant
Bendamustine	COLD	Alkylating agent
Bevacizumab	COLD	Growth Factor Inhibitor
Bleomycin	COLD	Cytotoxic antibiotic
Bortezomib	COLD	Proteosome inhibitor
Brentuximab	COLD	Antibody linked to inhibitor of mitosis
Carboplatin *	HOT	Heavy metal compound
Carfilzomib	COLD	Proteasome inhibitor
Cetuximab	COLD	Growth Factor Inhibitor
Cisplatin	HOT	Heavy metal compound
Cladribine	COLD	Antimetabolite
Clofarabine	COLD	Antimetabolite
Cyclophosphamide	COLD	Alkylating agent
Cytarabine	COLD	Antimetabolite
Daratumumab	COLD	Monoclonal antibody
Daunorubicin Liposomal	COLD	Anthracycline
Decitabine	COLD	Hypomethylating agent
Doxorubicin Liposomal	COLD	Anthracycline
Edrecolomab	COLD	Monoclonal Antibody
Eribulin	COLD	Inhibitor of mitosis
Etoposide	HOT	Inhibitor of mitosis
Floxuridine	COLD	Antimetabolites
Fludarabine	COLD	Antimetabolite
5 Fluorouracil	COLD	Antimetabolite
Folinic Acid	COLD	Folate
Gemcitabine	COLD	Antimetabolite
Gemtuzumab	COLD	Antibody linked to cytotoxic antibiotic
Ifosfamide	COLD	Alkylating agent
Irinotecan	COLD	Topoisomerase1 inhibitor
Interferons	COLD	Immunostimulant
Isatuximab	COLD	Monoclonal antibody
Mitozantrone	COLD	Anthraquinone
Melphalan	COLD	Alkylating agent
Methotrexate	COLD	Antimetabolite
Nivolumab	COLD	Monoclonal antibody
Obinutuzumab	COLD	Monoclonal antibody
Ofatumumab	COLD	Monoclonal antibody
Panitumumab	COLD	Growth Factor Inhibitor
Pembrolizumab	COLD	Monoclonal antibody
Pemetrexed	COLD	Antimetabolite
Pentostatin	COLD	Antimetabolite
Pertuzumab	COLD	Monoclonal antibody
Polatuzumab	COLD	Monoclonal antibody
Raltitrexed	COLD	Antimetabolite
Rituximab	COLD	Immunostimulant
Thiotepa	COLD	Alkylating agent
Topotecan	COLD	Topoisomerase I inhibitor
Trastuzumab	COLD	Monoclonal antibody

Tractuzumab deruxtecan	COLD	Antibody linked to a topoisomerase inhibitor
Trastuzumab emtansine	COLD	Antibody linked to inhibitor of mitosis

Intervention	Rationale
1. Follow **"Immediate Action Plan"**	Quickly remove as much as possible of the offending drug to limit the damage any remaining drug may cause
2. Remove cannula	Prevent it from being used again
3. Apply HOT or COLD pack as table above Apply for 20 minutes 4-5 times a day for 24 hours	Restrict spread of cytotoxic agent where cold pack used or to encourage dilution where hot pack applied
4. Apply 1% hydrocortisone cream twice daily as long as the erythema persists	Helps to reduce local trauma and irritation
5. Follow section – "action for all patients" page 17	

Action for all patients

Intervention	Rationale
Encourage patient to verbalize pain, discomfort or numbness	This could be an indicator to the extent of the damage
Ensure the patient's pain relief needs are met	Promote patient comfort
If any visible reaction occurs a photograph of the affected area should be arranged with Medical photography. Outside hours a digital photo can be taken and printed on the unit with the patient's permission. This should be then kept for comparison in the patient's healthcare record	Provide a baseline visual record of the effects of extravasation. Ensure consent is obtained for this.
Estimate and record the amount of drug infused. Discuss further treatment with medical staff	Ensure the patent receives appropriate therapy
Discard unused drug – As per SFT Waste Management Policy	Facilitate safe disposal
If any drug is spilled during the procedure follow the chemotherapy spillage protocol	Facilitate safety for all
Return opened extravasation kit to pharmacy and obtain replacement	Ensure a kit is always available
Commence *Follow up chart and arrange follow up with patient as indicated by injury(in kit, kept on Suite, Ward and on Microguide)*	Provide a guideline for follow-up and to facilitate audit and care
Enter incident on Datix,	Ensure the incident is audited and support can be given as required
Ensure incident is documented in the patient's healthcare record	Ensure the incident is recorded for legal reasons and for nursing and medical reference
Ensure patient's Keyworker is notified	Maintaining appropriate follow up and support for the patient
Ensure the patient receives the appropriate P*atient Information Sheet* on extravasation and support.	Ensure the patient is fully informed about what has happened and what follow up involves

2.3 Potential complications

Extravasation is a complication of the administration of cytotoxics/SACT, however from this adverse event other complications can arise for example the handler may be at risk of a greater uncontrolled exposure of cytotoxics. Therefore it is essential that any personnel have undergone the specified Trust training including yearly assessment of competencies. This training and assessment includes the management of complications including extravasation.

Refer to:
Administration of Systemic Anti-Cancer Therapy (SACT) Policy
Chemotherapy Education Programme, Wessex Network - Open Learning Package for Registered Nurses

2.4 After care

After care for extravasation can vary according to the amount and nature of the drug extravasated. There is specific documentation (*Follow up Chart see appendix 4)* for recording the extravasation and for the follow up. Copies of the documentation are kept in each clinical area. Once follow up is complete then the completed form should be filed in patient health care record or added to Lorenzo.

3. Patient Information

All patients will receive a chemotherapy diary in which there is basic information about the risk of extravasation. Any patients who attend a pre-assessment presentation will receive additional information regarding extravasation. There are specific Patient Information Sheets for each group of drugs and as well as general information including contact information. These are available in the extravasation kit and on Microguide. These should be given to the patient to take home following explanation by the nurse or doctor.

4. Audit

4.1 Standards

Standard Statement: **All patients who have experienced extravasation of their chemotherapy/SACT will receive care according to the Trust Guidelines.**

Structure

1. All the personnel involved in this practice will be advised to note this standard, the Trust Administration of Systemic Anti-Cancer Therapy (SACT) Policy and the Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication.
2. Nursing staff who administer cytotoxic drugs will have undergone the specified Trust training which includes the management of extravasation and following assessment have a certificate of competence.
3. Each clinical area where the administration of cytotoxics/SACT takes place will have access to the Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication.
4. Each clinical area where the administration of intravenous cytotoxics/SACT takes place will have access to an extravasation kit.
5. Each clinical area where the administration of intravenous cytotoxics/SACT takes place will have access to patient information on extravasation.

Process

1. All patients receiving intravenous cytotoxics/SACT drugs should be aware of the risk of extravasation.
2. Written information should be given to the patient about their chemotherapy and extravasation.
3. All nursing staff who administer chemotherapy should have a certificate of competence.
4. All staff who are involved with the administration of intravenous cytotoxics/SACT should be familiar with and have access to the Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication and the contents and whereabouts of the extravasation pack within their clinical area.
5. The Trust Lead Chemotherapy Nurse and departmental leads will monitor their team to ensure staff working in the area are complying with the standard.

6. Extravasations that occur should be recorded in the patient's healthcare records and a Datix entry completed
7. Those leading in the management of the extravasation and in conjunction with the patient's keyworker should ensure that the patient is informed on the care and follow-up required.

Outcome

1. Patients understand the risk of extravasation associated with intravenous chemotherapy and to report any signs of extravasation.
2. Patients have written information on their chemotherapy and extravasation.
3. Extravasation is managed by competent staff who have been appropriately trained.
4. The extravasation has been managed according to the guidelines.
5. The patient is satisfied with the information and care they have received with regard to the extravasation.

4.2 Audit tool

Topic:	***Extravasation of Cytotoxic/SACT Drugs***
Sub-topic:	***Management of Extravasation***
Care Group:	*All Patients receiving Intravenous Cytotoxic/SACT Drugs*
Standard Statement:	All patients who have experienced extravasation of their chemotherapy will receive care according to the Trust Guidelines.

1. Each member of staff will have received a copy of this standard, Administration of Systemic Anti-Cancer Therapy (SACT) Policy and the Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication.
2. Each Nurse that has undergone Trust Cytotoxic/SACT Drug Administration Training has received specific training for the management of extravasation and has a certificate of competence.
3. Each clinical area has access to a copy of Guidelines for the Management of Suspected Extravasation of Intravenous Anti-cancer medication .
4. Each clinical area where the administration of intravenous chemotherapy/SACT takes place has access to an extravasation pack.
5. Each clinical area has access to a copies of patient information sheets for extravasation
6. The Departmental/Ward leaders monitors their staff to ensure compliance with the standard

4.3 Patient survey

As the occurrence of extravasation is a rare complication of chemotherapy a patient survey is difficult to carry out. If extravasation does occur it is recommended that the patient be asked to give feedback on the following:
Understanding of the risk of extravasation
Explanation of the immediate plan of care
Management of pain
Information received
Follow-up

4.4 Risk management

Extravasation is an associated risk of the administration of intravenous chemotherapy.
There are associated risks known to the handler of chemotherapy and these are dealt within the Administration of Systemic Anti-Cancer Therapy (SACT) Policy.

When extravasation takes place it is upsetting for the nurse as well as the patient, however the nurse must ensure that she/he follows the *"Extravasation Immediate Action Plan"* and continues to handle the cytotoxics/SACT with extreme care according to the Guidelines.
If either the patient or a member of staff has a cytotoxic drug spilled onto the skin then this should be dealt with first according to the *Protocol for the Management of Cytotoxic Chemotherapy Spillage.*

Factors Associated with an increased risk of Extravasation Injury Based on Mullin et al [8]	
Factors	***Risk Management***
Administration Factors	
Nursing staff inexperienced in the administration and monitoring of chemotherapy infusions	Nursing staff to have appropriate orientation to service & Trust training in the Administration of Cytotoxic/SACT Chemotherapy and undergo annual assessment of their competence. Nurses who were trained in previous employment should produce documentation to the nature of this training and signed competency. Before nurses are deemed competent to practice in this Trust then they will undergo a competency assessment carried out by the Trust Lead Chemotherapy Nurse
Staff inexperienced in cannulation in patients who require chemotherapy/SACT Not observing the criteria of cannulation for patients receiving chemotherapy	As part of nurses chemotherapy training they will receive sufficient training for cannulation in patients who are to have chemotherapy
Inappropriate choice of cannula	Address at training (type-not metal tipped, size)
Environment conducive with the administration of chemotherapy/SACT	Appropriate work space available for the preparation and administration of chemotherapy
Inappropriate preparation of drugs	Drugs to be prepared in aseptic unit of pharmacy with the correct dilution/concentration and media
Obscuring the cannulation site with tape/dressing	Cannula to be taped/secured so that cannulation site can be observed continuously during administration but ensuring that it is secure
Infusion characteristics (e.g. rapid rate, long duration of infusion or large infusion volume)	Infusion rate according to drug data and protocol.
Inappropriate choice of venous access device, according to regimen, specific drugs and patient factors	Choice of administration method according to protocol, drug and patient status.
Delay in implementing extravasation management	Training to be given as part of chemotherapy training and the introduction of guidelines
Anatomic Factors	
Small venous diameter	Cannulation policy to recommend using forearm and avoiding dorsal veins & antecubital fossa. Consideration given to central line placement if patients venous access is poor.
Sclerosed veins	These veins should not be used for the administration of chemotherapy or other intravenous drugs
Reduced number of sites due to surgery	Consider central line placement.
Fragile veins	Consider central line placement.
Physiologic Factors	
Lymphoedema (e.g. mastectomy, radiation, amputation)	Use other limb if possible or consider central line placement.
Poor venous return (e.g. Superior Vena Cava Obstruction -SVCO Raynaud's Disease)	Consideration given to central line placement if patient’s venous access is poor.
Peripheral neuropathy (e.g. Diabetes or patient's with previous vinca therapy)	Consider central line placement
Patient Characteristics	
Inability to communicate with the administrator of the chemotherapy	Consider delay or placement of a central line
Use of CNS depressants (e.g. opioids, antiemetics)	If this is an issue consider delay or placement of a central line

5. Evidence Base

5.1 Sources of information

1. Pérez Fidalgo, J.A , Garcia Fabregat, L. et al (2012) Management of Chemotherapy Extravasation: ESMO- EONS clinical Practice Guidelines. European Journal of Oncology Nursing. 16 p528-534.

2. Allwood, M. Stanley, A. Wright, P. (2002) *The Cytotoxic Handbook*, 4th ed. Radcliffe Medical Press.

3. Schulmeister, L. (2011) Vesicant Chemotherapy Extravasation management. British Journal of Nursing – intravenous supplement, 20, 19. P 6-12.

4. Dougherty, L. Oakley, C. (2011) Advanced Practice in the management of Extravasation. Cancer Nursing Practice. Vol 10 number 5. P 16-22.Record keeping for nurses and midwives (2009) NMC. London. Now ref 9

5. Personal Communication with SpePharm with Authors (2012)

6. Mullin, S. Beckworth, M.C. Tyler, L.S. (2000) *Prevention and Management of Antineoplastic Extravasation Injury.* Hospital Pharmacy. Vol35 No 1 p57-76.

7. Bertelli, G. (1995) *Prevention and Management of Extravasation of Cytotoxic Drugs*. Drug Safety 12/14 p.244-255.

8. European Oncology Nursing Society, (2008) Extravasation Guidelines. European Journal of Oncology Nursing vol 12 p357-361.

9. Gonzalez. T, (2013) Chemotherapy Extravasation: Prevention, Identification, Management and Documentation Vol 17, number 1.

5.2 Evidence review

The information contained within this policy has been collated from the best evidence available to date. There is a lack of good quality data about the treatment of extravasation. This is due to many factors including the fortunate low number of incidences, the lack of research in this subject and the variances of treatment and the lack of reporting. The majority of the information within these guidelines have been drawn information from St. Chad's Unit and guidelines from other hospitals. The 2022 review has aimed to update the policy to reflect changes in practice and incorporate use of new agents introduced into practice since the previous review.

5.3 Summary of Literature Review and Recommendations

The majority of extravasations can be avoided with the safe administration of intravenous cytotoxics/SACT. This can be achieved by careful cannulation if peripheral, order of drugs (vesicants first), correct route being used according to drug, patient's venous access and correct dilution of the drugs

The choice of cannula is an important one. The science and technology of cannula have developed rapidly and there are now a number of high-technology developments, e.g. the Silicone/ Teflon IV cannula, and the cannula materials that soften once exposed to the warmer internal body temperature of 37ºC. [5]

The size of cannula is another factor that should be considered. Using the smallest cannula necessary for the delivery of the chemotherapy reduces the risk of venous damage and increases the dilution of the chemotherapy as it enters the blood stream. **[9]**

The site of cannulation is an important one. With the administration of vesicants it is recommended that the forearm is used opposed to the dorsal veins & the antecubital fossa. **[9]**

Training is vital to ensure that the incidence of extravasation remains low **[6]**. It is important that like all competencies they are re-assessed to ensure staff knowledge and skills are maintained.

Antidotes have been evaluated experimentally and a few may be able to reduce the local toxicity of the more common vesicant cytotoxic drugs. **[7]** Recommendations of this policy have been based on more consistent experimental evidence and on cumulative clinical experience available in the literature.

Appendix 1

Preparing Dexrazoxane (Savene™) using a closed reconstitution device

Staff must wear two pairs of gloves, a chemotherapy apron and a mask during the preparation of dexrazoxane using the closed reconstitution device. Only Luer lock syringes must be used for any drug manipulation. Any device failure/issues must be reported using Datix and the Principal Oncology Pharmacist notified. The dexrazoxane kit, kept in pharmacy, contains more of the closed devices than will be needed to prepare three doses of dexrazoxane.

Equipment Required:

Vented bag spike (CH-14) (one per diluent bottle and per flush bag)
Bag spike adapter (CH 30-34) (one per administration)
Genie vial adapter (CH-77) (one per vial)
Spiros Valve (CH-2000-S) (one per syringe)

Other:
Luer lock syringe (1 per vial)
Sodium Chloride 0.9% infusion bag
Alcohol wipes (Clinell)

Procedure Guidelines:

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1) Select the dexrazoxane (Savene) vials needed to prepare the dose. Flip off the vial dust cover and clean the top of the vials with an alcohol wipe then allow to dry .

2) Pierce each vial with a Genie Vial Adapter spike using a straight downward movement until a click is heard indicating that the adapter is attached to the top of the dexrazoxane vial.

3) Remove the metal tab from the top of the diluent infusion bottle then swab the bung with an alcohol wipe and allow to dry. Insert the Vented Bag Spike in the bung.

4) Attach one Spiros Valve to each 30 ml leur lock syringe.

5) Draw up 25ml of diluent from the infusion bottle using the leur lock syringe with the Spiros valve attached. Repeat this until the total amount of diluent required for each vial to be reconstituted has been drawn up.

6) Attach the syringe to the dexrazoxane vial using a twisting action to ensure that the Spiros Valve and Genie Vial Adapter are connected. Push the 25 ml of diluent into the dexrazoxane vial. **Note** that the clear spike on the bottom of the Genie Vial Adapter will detach from the bottom of the device and the balloon within the device will inflate if required to equalise the pressure. If the balloon does not inflate it does NOT affect the closed system safety.

7) Gently agitate the dexrazoxane vial until the powder has dissolved.

8) Invert the vial and draw back the required amount from the vial.

9) Disconnect the Spiros Valve/syringe from the Genie vial adapter/vial and attach to the Vented Bag Spike Adapter on the diluent bottle.

10) Add the required amount of dexrazoxane solution to the diluent bottle.

11) Repeat points 6 to 10 until the total required dose has been added to the diluent bottle.

12) Wipe the top of the diluent bottle with an alcohol wipe and allow to dry.

13) Gently invert the diluent bottle to mix the contents, checking for any signs of leakage.

14) Label the contents of the infusion bottle using an IV additive label.

15) Dispose of the used dexrazoxane vials as cytotoxic waste.

16) Attach a new Vented Bag Spike to a bag of sodium chloride 0.9% via the giving set port.

17) Remove the end cap at the open end of the Bag Spike Adapter and insert IV giving set spike into the open end.

18) Using an alcohol wipe, clean the blue clave end of the bag spike and the Spiros end on the spike adapter, then allow to dry before connecting these together.

19) Prime the giving set.

20) Using an alcohol wipe, clean the end of the vented bag spike attached to the prepared dexrazoxane infusion bottle and allow to dry.

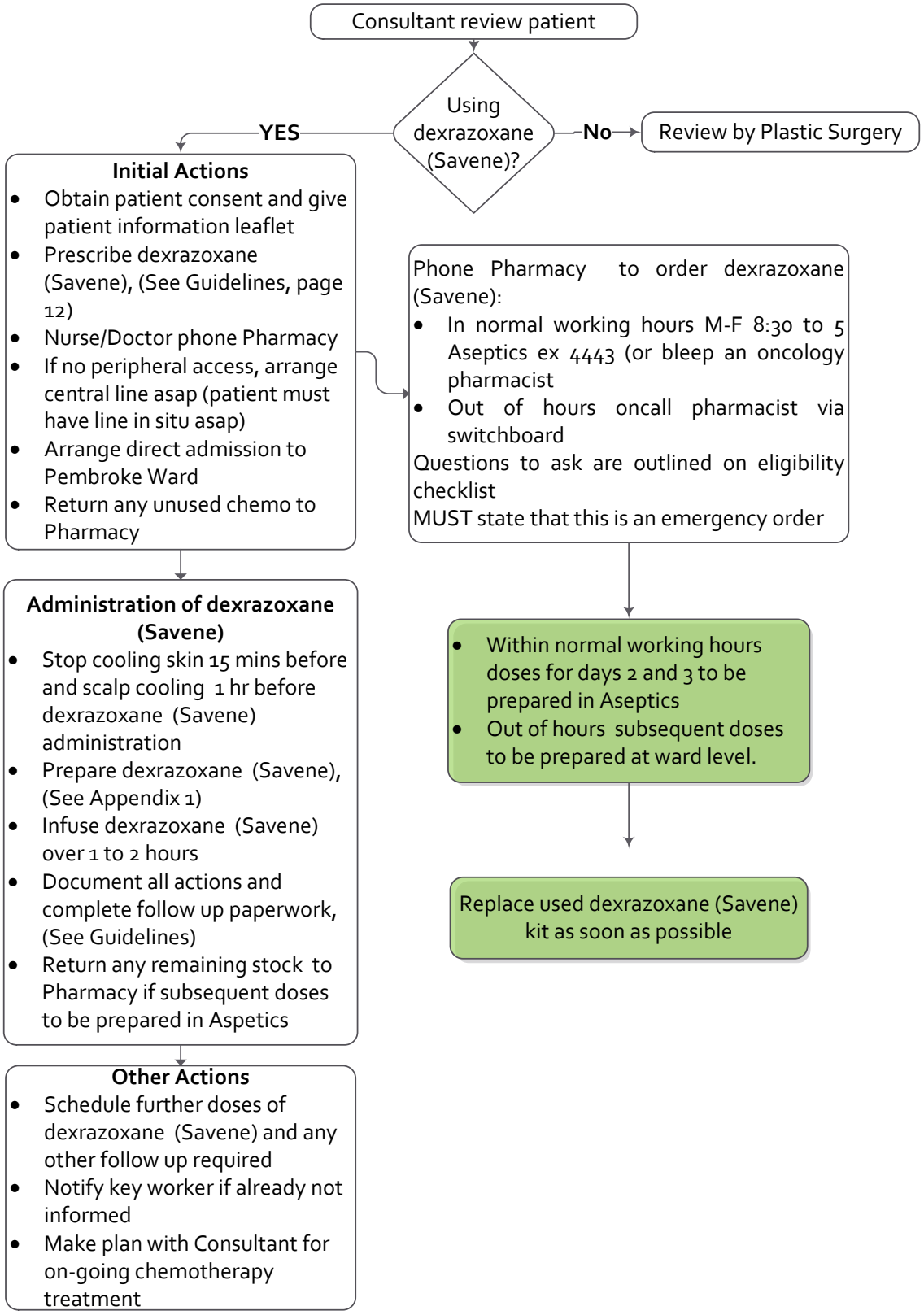
21) Dettach the giving set assembly from the sodium chloride 0.9% bag, at the Vented Bag Spike, and attach the prepared bottle of dexrazoxane infusion.

22) Infuse the dexrazoxane dose as described in the guidelines.

23) Discard the used infusion bottle and giving set as cytotoxic waste.

Appendix 2 Flow chart: Anthracycline extravasation

(Following Immediate Actions)



Appendix 3: Dexrazoxane (Savene) eligibility checklist

Did the extravasation involve an anthracycline? Must involve one of the following anthracyclines to use dexrazoxane (Savene): ☐ Daunorubicin, ☐ Doxorubicin, ☐ Epirubicin, ☐ Idarubicin.	**Yes** ☐	No ☐
Which consultant has approved use of dexrazoxane (Savene)? (must be consultant haematologist or oncologist)	Name:…….	
How long ago did the extravasation occur? Savene must be used within 6 hours of the extravasation. Take this into account when ordering.	Time:……	
Is the patient an adult? In this context an adult patient is defined as a patient treated by the adult service and over the age of 18. Savene must NOT be administered to children.	**Yes** ☐	No ☐
Do any of the below apply to this patient: a) Renal impairment ☐ b) Hepatic impairment ☐ c) Taking phenytoin ☐ d) Taking ciclosporin or tacrolimus ☐ If any of the above apply seek advice from the prescriber before ordering and record name of prescriber authorising prescription:…… (Oncology pharmacist can be called for assistance if required or if any boxes ticked yes in this section)	Yes ☐	**No** ☐

Phone call from Pembroke unit to Pharmacy /On call pharmacist
Date:…….. Time:……
Call made by (Pembroke Unit):……
Call received by (Pharmacy):……

Ordering replacement kit:
A replacement kit must be ordered as soon as possible.
Replacement ordered by:…… Date:……..

Phone call to other hospitals (if no kit available at SFT, normally located in aseptics with other kit for on call use):

Hospital	Normal working hours	Out of hours	Time called and by whom	Availability
University Hospital Southampton	Oncology Pharmacy 02381203125	On-call Pharmacist 02380777222		
QA Hospital Oncology Pharmacy	Lead Pharmacist = Catrin Watkinson 02392 286000 ext 6550	On call Pharmacist 02392 286000		
Hampshire Hospitals	01256 313343	On-call pharmacist 01256 473202 Kit on Wessex ward		
The Spire Portsmouth	Lead Pharmacist – Rosemary Hull – 02392 456090/91	On-call Pharmacist – 02392 456000		

Phone 01722 777777 to arrange transport.

Transport arranged at time…… and date…… by ……..
Planned time for transport to arrive at other Trust:…….
Planned arrival time at SFT:……
Name of staff member on Pembroke Unit informed of anticipated arrival time:……

Comments about process:

When completed forward to: Trust Lead Chemotherapy Nurse or Principal Oncology Pharmacist for Pharmacy copy.

Appendix 4: Follow up sheet

SALISBURY NHS FOUNDATION TRUST
FOLLOW UP CHART FOR SUSPECTED / ACTUAL
CYTOTOXIC/SACT DRUG EXTRAVASATION

PATIENT NAME	
HOSPITAL #	
CONSULTANT	
TELEPHONE #	

EXTRAVASATION OCCURRED :				
	DATE:		TIME:	

DRUG(S) GIVEN:			
	NAME:	DOSE:	TOTAL VOLUME:
1			
2			
3			
4			

TREATMENT FOR EXTRAVASATION		
	NAME OF DRUG	TIME
1		
2		
3		
4		

INITIAL INTERVENTIONS

DESCRIBE INITIAL FIRST AID TREATMENT:		
STATE ANTIDOTE GIVEN:		
	TIME:	
COLD / WARM COMPRESS:		
	DURATION:	
OTHER (E.G. PAIN RELIEF):		
WAS EXTRAVASATION IMMEDIATE ACTION PLAN AVAILABLE TO YOU? IF NO STATE WHY:		

WOUND CARE – DESCRIBE:

ADDITIONAL INTERVENTIONS

REFERRALS MADE:		
TEAM	DATE	ACTION
PLASTIC SURGERY		
KEY WORKER		

FOLLOW UP PHOTO:			
DATE		FILED IN:	

PATIENT TEACHING				
PATIENT INFORMATION SHEET GIVEN & EXPLAINED:				
	DATE:		NURSE:	
FOLLOW UP SCHEDULE EXPLAINED:				
	DATE:		NURSE	

DESCRIPTION OF EXTRAVASATION AT INITIAL EVALUATION (DAY 0)

IV SITE APPEARANCE:	
DIAMETER OF EXTRAVASATION:	
VENOUS ACCESS DEVICE USED:	
DEVICE TYPE & GUAGE:	
WAS A PUMP USED?	YES / NO *(DELETE AS APPROPRIATE)*
PATIENT COMPLANED OF:	

LOCATION OF IV ACCESS: DRAW ARM TO DEMONSTRATE SITE

SIGNS NOTED	DESCRIBE:
INFLAMMATION:	
LACK OF BLOOD BACK FLOW:	
FLOW RATE SLOWING:	
SWELLING:	
OTHER:	

DATE TRUST ADVERSE EVENT FORM SENT:	DATE:

FOLLOW UP CHART FOR SUSPECTED EXTRAVASATION

DAY	1	3	5	7	14	21*	28*	35*	42*
DATE									
CALL/VISIT									
SKIN COLOUR									
SKIN INTEGRITY									
SKIN TEMP.									
OEDEMA									
MOBILITY									
PAIN									
FEVER									
RGN INITIAL									

GRADING SCALE FOR FOLLOW UP CHART

GRADE	**0**	**1**	**2**	**3**	**4**
SKIN COLOUR	NORMAL	PINK	RED	BLANCHED ENTRY SURROUNDED BY RED	BLACKENED
SKIN INTEGRITY	UNBROKEN	BLISTERED	SUPERFICIAL SKIN LOSS	TISSUE LOSS EXPOSING SUBCUTANEOUS TISSUES	TISSUE LOSS EXPOSING MUSCLE/BONE WITH A DEEP CRATER OR NECROSIS
SKIN TEMP.	NORMAL	WARM	HOT		
OEDEMA	ABSENT	NON-PITTING	PITTING		
MOBILITY	FULL	SLIGHTLY LIMITED	VERY LIMITED	IMMOBILE	
PAIN	RATE USING A **0-10 SCALE** WHERE 0 IS NO PAIN & 10 IS WORST				
FEVER	NORMAL	ELEVATED			

*MAY OMIT IF NO SIGNS OF EXTRAVASATION

DOCTOR INFORMED:			
NAME:			
DATE:		TIME:	