Reference Number: UHB 194 **Version Number:** 6	**Date of Next Review: 04/06/2023** **Previous Trust/LHB Reference Number: 277**

Extravasation Procedure

Introduction and Aim

The aim of this Procedure is to provide guidance on the prevention, detection and management of an infiltration or extravasation. It supports the Management of Parenteral Cytotoxic Chemotherapy Procedure and the Cytotoxic Administration Guidelines; but it is not exclusive to cytotoxic administration.

Objectives

- To enable a consistent approach to the prevention, detection and management of an infiltration or extravasation
- To ensure patient safety whilst administering intravenous medication

Scope

This procedure applies to all of our staff in all locations including those with honorary contracts.

Equality and Health Impact Assessment	An Equality and Health Impact Assessment (EHIA) has been completed and this found there to be no negative impact. Key actions have been identified and these can be found incorporated within this procedure.
Documents to read alongside this Procedure	• Management of Parenteral Cytotoxic Chemotherapy Procedure • The Medicines Code • Safe and Secure Handling of Medicines Policy • Health and Safety Policy • Handling Cytotoxics During Pregnancy Procedure • Guidelines for the Safe Handling, Checking and Administration of Cytotoxics
Approved by	• Cytotoxic Chemotherapy Group • Medicines Management Group

Accountable Executive or Clinical Board Director	Medical Director
Author(s)	Chemotherapy and IV Access CNS (Adults)

Disclaimer

If the review date of this document has passed please ensure that the version you are using is the most up to date either by contacting the document author or the Governance Directorate.

Summary of reviews/amendments			
Version Number	**Date of Review Approved**	**Date Published**	**Summary of Amendments**
2	March 2006	*TBA*	Revised document. Extravastion Poster amended.
3	October 2008		Poster amended. Contents of Extravasation kit changed. Extra references added. Patient education amended. Documentation and follow up amended.
4	June 2013		Up-dated evidence in line with local and national guidance. Amendments in line with UHB guidance on written control documents.
5	July 2016		Up-dated evidence added in line with local and national guidance. Information added on prevention, causes and how to assess and document after an incident. Patient information leaflet added as an appendix. References added. EHIA up-dated. Front sheets up-dated in line with UHB guidance on written control documents.
6	October 2019	17 June 2020	Documents to read alongside this Procedure amended. Minor amendments to Causes and Prevention of Extravasation: Risk Factors. Amendments to Documentation and Follow Up: Grading tool added. Cytotoxic Chemotherapy Group names up-dated. Contact List up-dated. Minor changes to references.

CONTENTS

APPENDICES

(PLEASE NOTE: FOR IMMEDIATE MANAGEMENT OF A SUSPECTED EXTRAVASATION PLEASE READ THE ALGORITHM ON PAGE 13 AND THE MANAGEMENT OF EXTRAVASATION: TREATMENT SUMMARY POSTER ON PAGE 18).

INTRODUCTION

Over 100,000 doses of chemotherapy and 1,000,000 intravenous (IV) infusions are administered on a daily basis world-wide. It is vital therefore, both for the patients and the healthcare staff who administer them that any possible complications associated with these procedures are kept to a minimum (European Oncology Nursing Society (EONS) 2007).

Although extravasation has become a well-recognised complication of IV administration, it still remains sadly under-diagnosed and poorly managed (Stanley 2002, Dougherty and Lister 2015). Indeed, although there is generally consensus on how to recognise and prevent an extravasation there is less agreement on its management. There is little data from controlled studies and, because of the ethical and legal implications, no randomised control trials have been conducted on extravasation management on humans. Therefore the evidence base remains limited to animal studies, uncontrolled clinical trials and case studies.

If not correctly treated the consequences of an extravasation for the patient may include blistering, necrosis, damage to tendons, nerves and joints, surgical debridement and even amputation (Dougherty and Oakley 2011). For the healthcare provider the risk of litigation is not insubstantial.

Prompt detection and treatment are therefore clearly essential and as healthcare professionals, (and patient advocates), we are instrumental in preventing, detecting, treating and reporting such events (Schulmeister 2011).

This document will therefore provide information, guidance and support to facilitate this and enable staff to help maintain the highest standard of care when administering IV medication.

POLICY STATEMENT

Cardiff and Vale University Health Board, subsequently referred to as the UHB, is committed to ensuring that all medication is administered safely and that the organisation is compliant with national guidance. This Procedure will provide clear recommendations for the prevention, early detection, and treatment of extravasations, or infiltrations, of any IV medication.

AIM

The aim of this Procedure is to provide guidance on the prevention, detection and management of infiltrations/extravasations.

SCOPE

This Procedure applies to the IV administration of both cytotoxic and non-cytotoxic medication. For advice on specific agents please refer to the Management of Extravasation: Treatment Summary (Appendix 1).

The Procedure may be used by all appropriately trained and/or registered UHB staff, regardless of location, and sets out the recommendations to be followed to prevent, detect and manage an infiltration or extravasation.

OBJECTIVES

To enable a consistent approach to the prevention or management of an extravasation; in line with current evidence-based practice, national guidance and protocols in use in other Health Boards.

ROLES AND RESPONSIBILITIES

The administration of IV medication must only be undertaken by staff who have been trained and assessed as competent to do so by the UHB. In addition, those staff who administer cytotoxic chemotherapy must have attended the Administration of Chemotherapy Workshop, been entered on the cytotoxic database and undergo annual assessment.

The following identifies who will be accountable for ensuring implementation of this procedure:

Chief Executive

The Chief Executive has overall responsibility for ensuring the organisation works to best practice, complies with current legislation and has appropriate written control documents in place for the management of adverse incidents.

Executive Lead

The Executive Lead is responsible for liaising with the Authors to ensure that this Procedure is maintained and up-dated.

Authors

The authors are responsible for:

- ensuring that the Procedure is implemented appropriately and compliance with its recommendations is audited
- up-dating the Procedure in line with the review timescale
- identifying relevant training needs and resources

Senior Nurse

The Senior Nurse is responsible for:

- ensuring that local arrangements exist to enable the review and audit of this Procedure

Line Manager

It is the responsibility of the line manager to:

- ensure that the staff training needs identified within this document are met
- make sure that staff without access to the intranet are aware of, and able to access a copy of, this written control document

Consultant / Medical Staff

- All medical staff need to be aware of the risks of IV administration and comply with the guidance offered in this Procedure

- In addition, Consultants who use cytotoxic chemotherapy are responsible for the training and assessment of all medical staff involved in the administration of these agents. Medical staff would need appropriate UHB training before administering intravenous medication and training on the management of an extravasation should be incorporated in to their training

The UHB Cytotoxic Chemotherapy Group

The Cytotoxic Chemotherapy Group (Appendix 2) is responsible for reviewing the Procedure in conjunction with the authors and ensuring it reflects both best practice and national guidance.

Chemotherapy / Chemotherapy and IV Access Clinical Nurse Specialists (CNSs)

The Chemotherapy / Chemotherapy and IV Access CNSs are responsible for:

- teaching and assessing all nurses in the UHB who administer IV chemotherapy. (Training on prevention and management of an extravasation is incorporated into the Chemotherapy Administration Workshop)
- acting as a resource for the management of non-cytotoxic extravasations
- promoting the use of the most appropriate Vascular Access Device
- assessing and reviewing the patient after a possible chemotherapy extravasation has occurred

- supporting staff and medics in their management of the incident
- ensuring appropriate follow up and reporting of the incident
- monitoring compliance and effectiveness of treatment
- reporting any incidents to the cytotoxic board every quarter and auditing
- ensuring all changes to practice are appropriately disseminated
- Up-dating the relevant risk assessment

Employee

It is the responsibility of the employee to:

- undertake specific training, and training up-dates, as required
- ensure understanding of, and compliance with, this Procedure

DEFINITION OF TERMS

In its broadest sense the term extravasation is commonly used to describe the inadvertent leakage of a medication or fluid from its intended vessel into the surrounding tissue (EONS 2007).

However, a clearer definition of an extravasation would be the inadvertent administration of a 'vesicant' medication or fluid from its intended vascular pathway into the surrounding area (Dougherty 2008, Royal College of Nursing (RCN) 2019). Whereby a vesicant is an agent that has the potential to cause blistering, sloughing of the skin, ulceration, tissue damage and necrosis (Schulmeister 2011, EONS 2007). Damage to tendons, nerves and joints may also occur resulting in loss of function, loss of sensation, or even loss of limb (Dougherty and Lister 2015).

Infiltration, however, is the term which applies to the non-intentional leakage of a 'non-vesicant' medication or fluid from the vein into the surrounding tissue (RCN 2019). Non-vesicants do not destroy the surrounding tissue when they infiltrate; nor do they cause ulceration. Signs of an acute response or necrosis with a non-vesicant infiltration would be rare (EONS 2007, Schulmeister 2011). However infiltration may on occasion also result in long term injury due to localised inflammatory reactions or by the surrounding tissues being compressed; known as compartment syndrome (Dougherty and Lister 2015).
Drugs may be further classified as follows:

Vesicants:

- Vesicant chemotherapy drugs can be further divided into two categories; those that bind to DNA and those that do not. Vesicants that do not bind to DNA are eventually metabolised in the tissue and their potential for harm more easily neutralised. Whereas those that do bind to DNA bind to the DNA in healthy tissue and promptly cause the cell to die (Dougherty and Lister 2015, Schulmeister 2011)

Exfoliants:

- Capable of causing inflammation and shedding of skin, but less likely to cause tissue death and full thickness necrosis

Irritants:

- In oncology practice a third category of drugs exists called irritants. These tend to cause pain at the site of the injection and along the vein and may also cause inflammation. There is also potential for ulceration with some of these agents; but this is usually volume related (EONS 2007)

Inflammatory agents:

- Capable of causing mild to moderate inflammation and flare in local tissue

Neutral agents:

- Ostensibly inert or neutral compounds that cause minimal inflammation or damage

CAUSES OF AN EXTRAVASATION

Peripheral:

- Trauma or puncturing the vein wall
- The cannula becoming dislodged
- Administration of a vesicant into a vein below a recent cannulation or venepuncture site (<24 hours). (Dougherty and Lister 2015)
- Administration of a vesicant to an oedematous patient

Central:

Although the incidence may be lower with a central vascular access device the severity may sometimes be worse because they are harder to detect. The following are potential contributory factors:

- The vein being perforated
- A catheter that is leaking or fractured
- The development of a fibrin sheath leading to backflow of the drug along the catheter from the insertion site. (Dougherty and Lister 2015)
- Needle dislodgement from an implanted port

PREVENTION OF EXTRAVASATION: RISK FACTORS

Drug or Infusion related

Soft tissue damage following an extravasation may be due to a number of factors related to the physico-chemical properties of the drug or infusate. It will also depend on the concentration and volume of the drug that has extravasated. Appendix 1 shows the different classifications of extravasation risk and gives examples of agents which fall into each category. However, these are by no means definitive, as many agents will have properties which would place them into more than one category. The physico-chemical factors which are known to influence, and usually increase, the extravasation risk of individual drugs are as follows:

- the ability to bind directly to DNA (most cytotoxic drugs do this)
- an ability to kill replicating cells; which would also include cytotoxic and anti-viral agents
- an ability to cause tissue or vascular dilatation
- the pH, osmolarity and excipient used in the formulation of the drug. These parameters are more specifically defined as pH outside the range 5.5 - 8.5 and osmolarity greater than that of plasma, 290 mOsmol/ L (Allwood et al 2002)

Staff related:

Cannulas may only be inserted by trained and competent staff or staff who have been trained and are undergoing supervised practice.

In addition all staff must have been trained and assessed in the use of Aseptic Non Touch Technique (ANTT).

Patient related: Cannulation site

Although all patients are at risk of an extravasation the risks may be increased for older adults who may have more fragile veins, children who may be unable to express pain, individuals who are unable to communicate effectively (EONS 2012, Dougherty 2010) and patients with comorbidities (Dougherty and Lister 2015). Diseases such as Raynauds, advanced diabetes and peripheral vascular disease for example may cause sensory deficits which increase the potential risk (Fidalgo J.A.P. et al 2012). The following guidance may help reduce those risks:

- The ideal location for cannulation is a long, straight vein on the forearm. Avoid veins which are small and fragile; or those next to joints, tendons or arteries (EONS 2007)

- Veins in the antecubital fossa and palmer surface of the wrist should not be used for administering vesicant agents (Dougherty and Lister 2015, Fidalgo J.A.P. et al 2012, Dougherty 2010)
- Avoid probing when inserting a cannula because of the increased risk of piercing the vein wall (Sauerland 2006)
- Secure using a dressing which allows the exit site to be easily monitored. **Never** cover the exit site with a bandage
- Always confirm patency of the cannula by checking for blood return a**nd flushing** with 0.9% sodium chloride. It is also good practice to use a new cannula for the administration of vesicants wherever possible
- A steel cannula or butterfly needle must never be used for administe**ring** c**hemot**herapy (EONS 2007)
- It is sometimes necessary to insert pedal venflons for IV access. Best practice dictates that stat IV drugs, vesicant drugs or drugs with extreme pH, osmolarity or toxic excipients must not be administered in the foot. However, in extreme circumstances it may be deemed necessary to do so; for example in paediatrics. Where administration in the foot appears necessary the decision to do so must be fully risk assessed by the MDT, and documented, before administration takes place. For advice on which drugs to avoid please contact your pharmacist
- Patients with poor venous access should be considered for a central line early in the course of their treatment

Administration techniques

IV medication may only be administered by practitioners who attend the UHB Medicines Management IV Administration Study Days. Training on the prevention, recognition and management of a potential extravasation forms part of both the study days and the competency documentation.

Chemotherapy may only be administered by staff who have received training and been assessed as competent to do so. Likewise demonstrating an ability to prevent, recognise and manage an extravasation is an integral part of both final, and annual, assessments.

Please consider the following to help reduce the risks:

- Blood return from the vascular access device (VAD) should always be obtained before drugs are administered and checked regularly throughout a bolus infusion (Fidalgo J.A.P. et al 2012)

- The VAD site should be assessed throughout the IV administration for any signs of redness, swelling or discomfort. **If there is any doubt about the patency of the vascular access device please investigate or, in the case of a cannula, re-site**

- Infusions of vesicant drugs should ideally be administered through a central VAD (CVAD). This is to reduce the risk of severe tissue damage occurring following an unobserved extravasation via a peripheral cannula. (For advice on the properties of a drug where no Treatment Summary is available please contact the appropriate pharmacist). On occasions where this is not feasible the nurse is to remain with the patient and monitor the cannulation site closely throughout the infusion

- If administering a bolus injection of a vesicant drug through a cannula please administer via the side port of a free flowing gravity infusion (Fidalgo J.A.P et al 2012) and do not regulate by an infusion pump

- Consider the order of administration and, when administering more than one drug, please give the most vesicant agent first and flush between each one with sufficient fluid to clear the line. (In trial patients however please follow the order of protocol)

- Infusion pumps can-not be relied upon to detect extravasation, therefore when administering IVs using an infusion pump please check the vascular access device site regularly

Patient education

- Patients must be informed of the importance of reporting any discomfort or changes in sensation around the infusion site (Fidalgo J.A.P. et al 2012). It is important to explain this in a way which is not frightening but which clearly conveys the need for the patient's input and participation in preventing a rare but serious complication

- If receiving an anthracycline agent patients should be advised to monitor for signs of extravasation damage up to 48 hours afterwards; as signs and symptoms may not be immediate

RECOGNISING AN EXTRAVASATION

There are a number of signs and symptoms that indicate that a drug may be leaking out of the vein into the surrounding tissue. Some of these may be immediate, whilst others (particularly with vesicant extravasations) may be delayed (Dougherty 2010).

As part of their training practitioners should be taught that an extravastion must be suspected if any of the following occurs:

- the patient complains of pain, burning, stinging, tenderness or discomfort at the intravenous site. Pain is not always present immediately but may start within 48 hours (Dougherty 2010)

- erythema, (also not always present immediately), or blanching. Blanching may occur if the full thickness of the skin is damaged with a vesicant extravasation

- swelling or hardening

- lack of blood return. (However, successful blood return does not mean that an extravasation will not occur as the wall of the vein may already have been punctured)

- increased resistance when administering a bolus

- a reduction in the infusion rate

- leaking around the cannula/exit site

Delayed manifestations of extravasation include:

- intensification of pain over time (Dougherty 2010)

- Blistering, necrosis and ulceration. (Fidalgo J.A.P. et al 2012). This can occur within 48-96 hours but may take weeks to develop. Early firm induration, with or without tenderness, has been shown to be a reliable sign of eventual ulceration. Ulcers are typically necrotic in appearance with a yellowish base and a rim of persistent erythema

DISTINGUISHING EXTRAVASATION FROM OTHER CONDITIONS

Some drugs may, by their very nature, cause irritation and aching and tightness along the vein. This may be known as chemical phlebitis and is frequently followed by a thrombosis. It is important to differentiate this from an actual extravasation however. Usually discomfort from venous irritation is not localised to the cannula site but will run along the vein and stop as soon as the infusion is stopped. Some relief may be obtained by using a hot pack. However a central line is often the best way to prevent it.

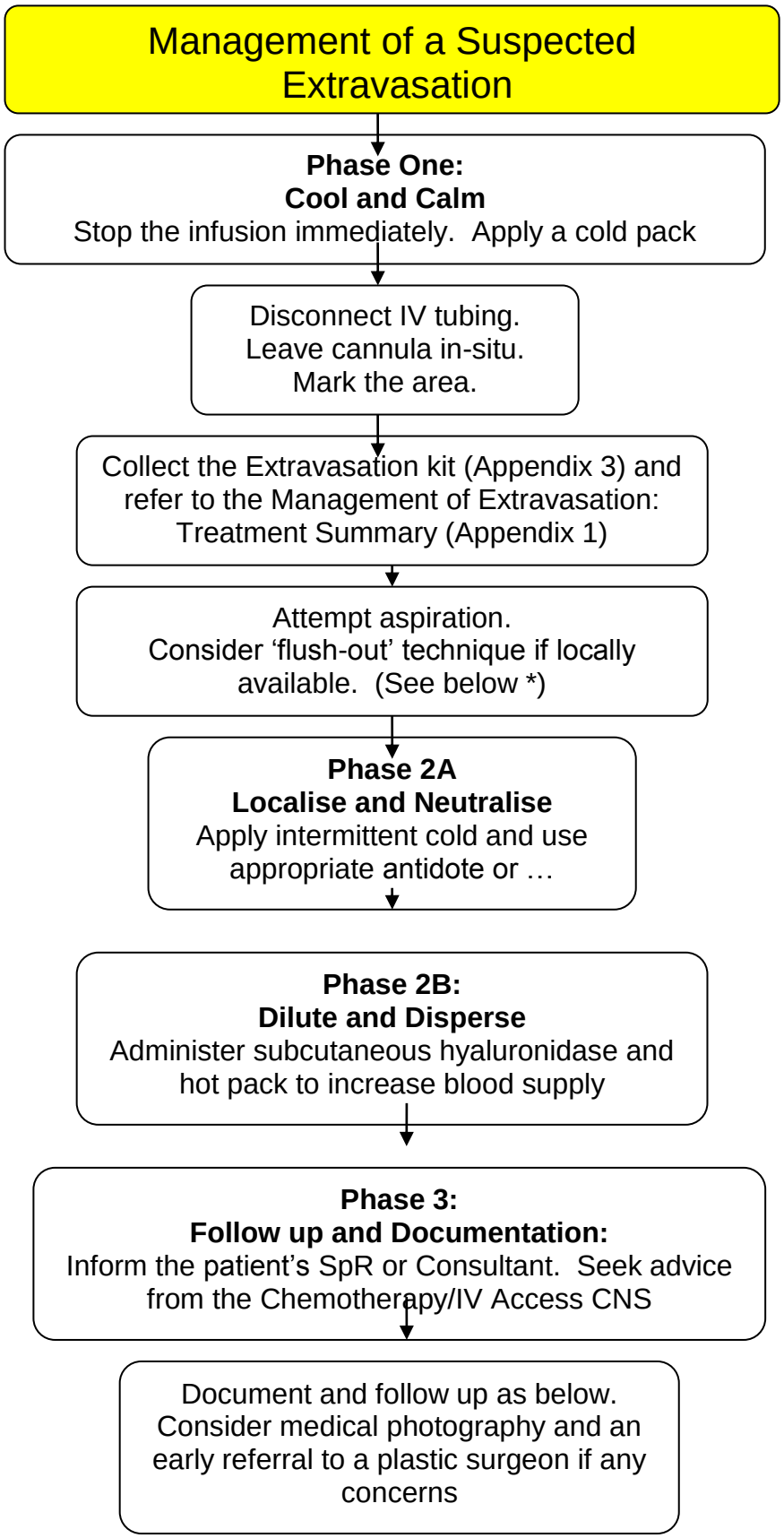
A flare reaction is more unusual and manifests as a redness along the vein during actual administration. It is caused by an inflammatory response along the vein to the release of histamine. It is usually painless, although may be itchy, and tends to subside within 30-60 minutes. If it is painful please treat as an extravasation.

Venous shock causes the wall of the vein to go into spasm and may also be mistaken for an extravasation because blood return is often absent (EONS 2007).

TREATMENT OF EXTRAVASATION

Specific courses of action depend on the nature of the drug you suspect has extravasated, how much you believe has extravasated and where. Immediate treatment is paramount and the algorithm below gives an outline of the initial procedure to follow; both for an extravasation from a cannula and from a central line.

In some cases of extravasation Consultants, or the Chemotherapy/IV Access team if trained, may decide to use a flush-out technique. However, this may only be carried out by someone who is trained and competent to do so.


Management of a Suspected Extravasation
Phase One:
Cool and Calm
Stop the infusion immediately. Apply a cold pack
Disconnect IV tubing.
Leave cannula in-situ.
Mark the area.
Collect the Extravasation kit (Appendix 3) and refer to the Management of Extravasation: Treatment Summary (Appendix 1)
Attempt aspiration.
Consider 'flush-out' technique if locally available. (See below *)
Phase 2A
Localise and Neutralise
Apply intermittent cold and use appropriate antidote or …
Phase 2B:
Dilute and Disperse
Administer subcutaneous hyaluronidase and hot pack to increase blood supply
Phase 3:
Follow up and Documentation:
Inform the patient's SpR or Consultant. Seek advice from the Chemotherapy/IV Access CNS
Document and follow up as below.
Consider medical photography and an early referral to a plastic surgeon if any concerns

Management of an extravasation is often about settling the local cytokine cascade that has been triggered by the injury. Precise symptom management will depend on the extent and location of the suspected extravasation. However it is recommended that practitioners should consider topical and local treatments first, followed by central and oral interventions second and IV interventions third; but only if required (Appendix 4). The National Extravasation Protocol for Cancer Chemotherapy: A 10 step plan (Appendix 4) shows a useful table for such possible topical, oral and IV interventions that may be used in conjunction with the Management of Extravasation: Treatment Summary. However care must be taken to consider the overall needs of the individual patient and guidance sought from the patient's Consultant/Registrar.

One such possible IV intervention that has been licensed for use with larger (> 3-5 mls) anthracycline extravasations is IV Dexrazoxane. However it has not been approved by the All Wales Medicines Strategy Group, therefore it currently remains outside the remit of this Procedure. (www.wales.nhs.uk/awmsg). If further evidence becomes available recommending a change in practice this Procedure will be up-dated accordingly.

- Some areas, including Paediatrics, may contain medics/specialist nurses who have been trained and assessed as competent in the 'flush-out' technique. For those areas a hard copy of the 'flush-out' procedure will be available on file. It will be the responsibility of the Paediatric Chemotherapy Nurse Trainer to ensure this is current and accessible when required or, if the service becomes available in adults, the Adult Chemotherapy Nurse Trainer
- For telephone advice please see contacts list (Appendix 5)

DOCUMENTATION AND FOLLOW UP

When a suspected extravasation occurs it is vital that the patient is followed up accordingly and the incident documented appropriately. The following recommendations may be helpful:

- inform the patient, the patient's Consultant/Registrar and the Chemotherapy and IV Access CNS

- document the following in the patients' notes:

-patient details
-date and time of the incident
-the name of the drug that has extravasated
-the order of administration
-approximate volume of drug that has extravasated and extent of the injury. (Consider including a photographic record but as a minimum measure the diameter if any visual damage)

-signs and symptoms
-appearance
-management
-patient information sheet given (Appendix 5)
-confirm if a medical photography and plastic surgeon referral has been made (Dougherty and Lister 2015)
-nurse signature

- complete an extravasation documentation slip (supplied in the extravasation kit) and a DATIX incident form on-line

- return the opened extravasation kit to pharmacy for replacement

- ensure patient follow up according to the extent of the injury, the infiltrate and the volume

- A grading tool may be useful in terms of initial and on-going monitoring; allowing for a more standardised assessment. An example of such a tool may be found below:

  https://www.academia.edu/23731914/Procedures_The_Royal_Marsden_Manual_of_Ninth_Edition_Clinical_Nursing_Professional_Edition

  Accessed 22.10.19

- CNS to report incident to Cytotoxic Board for audit purposes

The treatment proposed above is "first aid" only. Seek further advice – early review by a plastic surgeon may be necessary.

More detailed information may be obtained from the National Extravasation Information Service:
http://www.extravasation.org.uk/home.htm

In the event of an extravasation when the patient is brought in for follow up please assess the following:

-skin integrity
-pain (a scale of 1-10 may be used with 10 being the most severe)
-blistering
-ulceration
-sensation (loss of / numbness or any changes)
-changes to mobility in the affected limb
-psychological impact

Please ensure the patient's medical team are involved on every visit, that medical photographs are taken regularly to document any changes and that

the patient is reviewed by the wound team and a plastic surgeon as appropriate.

RESOURCES

No additional resources were identified as a result of approval of this policy.

EQUALITY AND HEALTH IMPACT ASSESSMENT

Cardiff and Vale UHB is committed to ensuring that, as far as is reasonably practicable, the way we provide services to the public and the way we treat our staff, patients and others reflects their individual needs and that we will not discriminate, harass or victimise individuals or groups unfairly on the basis of sex, pregnancy and maternity, gender reassignment, disability, race, age, sexual orientation, disfigurement, religion and belief, family circumstances including marriage and civil partnership. These principles run throughout our work and are reflected in our core values, our staff employment policies, our service delivery standards and our Strategic Equality Plan and Equality Objectives. We believe that all staff should have fair and equal access to training as highlighted in both the Equality Act 2010 and the1999 Human Rights Act. The responsibility for implementing the Plan falls to all employees and UHB Board members, volunteers, agents or contractors delivering services or undertaking work on behalf of the UHB.

We have undertaken an Equality and Health Impact Assessment (Appendix 7) and received feedback on this procedure and the way it operates. We wanted to know of any possible or actual impact that this procedure may have on any groups in respect of their sex, maternity and pregnancy, marriage or civil partnership issues, race, disability, sexual orientation, Welsh language, religion or belief, transgender, age or other protected characteristics. The assessment found that there was no impact/minimal impact to the equality groups mentioned. Where appropriate we have taken the necessary actions required to minimise any stated impact to ensure that we meet our responsibilities under the equalities and human rights legislation; including ensuring a Welsh language version of the Patient Information Sheet is available on request.

AUDIT

This Procedure will be continually monitored and audited to ensure compliance and that it is it is fit for purpose.

REVIEW

This Procedure will be reviewed every three years or sooner if evidence dictates a change in practice.

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APPENDIX 1

MANAGEMENT OF EXTRAVASATION: TREATMENT SUMMARY (VERSION 4)

Extravasation suspected – resistance or absence of free flow, swelling, discomfort, burning, pain:

- Stop the infusion immediately
- Apply a cold pack whilst you carry out an initial assessment
- Disconnect IV tubing but if the incident has occurred with a cannula then leave the cannula in-situ
- Mark the area
- Collect the Extravasation Kit
- Attempt aspiration. Try to draw back 3-5mls of blood if possible. (Consider flush-out technique if locally available)
- Remove the cannula if applicable
- Classify the agent using the tables below and treat as directed

Vinca alkaloids

Vinblastine
Vincristine
Vindesine
Vinorelbine

Vesicant drugs

Amsacrine
Bendamustine Hydrochloride
Carmustine
Dacarbazine
Dactinomycin
Daunorubicin
Doxorubicin
Epirubicin
Idarubicin
Mitomycin
Mustine
Paclitaxel
Plicamycin
Streptozcin
Treosulphan

Extreme pH, osmolarity, or toxic excipients

Aciclovir
Allopurinol
Aminophylline
Amiodarone
Amphotericin
Calcium chloride
Calcium gluconate
Ciprofloxacin
Clarithromycin
Co-trimoxazole
Diazepam
Erythromycin
Etomidate
Foscarnet
Ganciclovir
Hypertonic glucose (10% or greater)
Hypertonic saline (1.8% or greater)
Magnesium sulphate
Mannitol
Methohexitone
Methylene blue
Parenteral nutrition
Phenytoin
Potassium chloride (>40mmol per litre)
Sodium bicarbonate
Thiopentone
Vancomycin
X-ray contrast media

Exfoliant or irritant drugs

Aclarubicin
Arsenic Trioxide
Busulphan
Carboplatin
Cisplatin
Cloretazine
Daunorubicin (liposomal)
Docetaxel
Doxorubicin (liposomal)
Etoposide
Etoposide phosphate
Floxuridine
Fluorouracil
Irinotecan
Methotrexate
Mitoxantrone
Oxaliplatin
Raltitrexed
Teniposide
Topotecan
Trastuzumab

Vascular regulators

Adrenaline
Alprostadil
Dobutamine
Dopamine
Epoprostenol
Noradrenaline

Neutral drugs

Aldesleukin
Asparaginase
Bleomycin
Bortezomib
Cladribine
Clofarabine
Cyclophosphamide
Cytarabine
Fludarabine
Gemcitabine
Ifosfamide
Interferons
Melphalan
Monoclonal antibodies
Nelarabine
Pemetrexed
Pentostatin
Thiotepa

Aim: spread and dilute

- Reconstitute 1500iu of Hyaluronidase with 1ml Water for Injection.
- **Give this Hyaluronidase solution in 0.1- 0.2ml subcutaneous injections at 6 to 8 sites around the circumference of the extravasation area.**
- Apply a HOT pack for 24 hours. Remove the pack every 3 hours for 20 to 30 minutes replace with a fresh pack.
- Apply Hydrocortisone Cream 1% four times a daily for as long as erythema persists.

Aim: localisation 1.

- For bendamustine hydrochloride, carmustine, mustine, paclitaxel and treosulphan treat as in 'Aim: localisation 2'. For all other vesicant drugs treat as detailed below.
- Apply a thin layer of DMSO 50% cream to the marked area immediately using a cotton bud and allow to dry. Avoid contact with unaffected skin.
- Repeat DMSO application every 2 hours for 24 hours then every 6 hours for 7 days. Patient to apply a non occlusive dressing to cover further DMSO applications.
- Immediately after first DMSO application apply COLD pack for 30 minutes. Repeat every 4 hours for 24 hours.
- 3 hours after first DMSO application apply hydrocortisone 1% cream. Repeat every 6 hours for 7 days.

Aim: localisation 2.

- Apply cold pack for 30 minutes every 4 hours for 24 hours.
- Apply hydrocortisone cream 1% every 6 hours for 7 days or as long as erythema persists'

NB for liposomal daunorubicin / liposomal doxorubicin treat as in 'Aim: localisation 1' but delay DMSO application until 8 - 12 hours post incident and continue for 10 - 14 days. Commence treatment with hydrocortisone 1% cream and COLD pack immediately.

Aim: symptomatic treatment

- Apply hydrocortisone cream 1% four times each day if erythema is present

DOCUMENTATION

- Inform the patient's consultant
- Complete a Cardiff and Vale UHB Form (HS/IDO/07).
- Document the extent of extravasation in the patient's medical notes. Consider including a photographic record of the injury and treatment progress.
- Complete an extravasation report (Green Card) and post or complete on-line at http://www.extravasation.org.uk/Documentation.htm
- Return opened extravasation kit to pharmacy for replacement.
- Check the site regularly and review at least twice daily, initially. Then according to the severity of the injury and progress.
- **The treatment proposed above is "first aid" only. Seek further advice – early review by plastic surgeon is advisable.**

Further Information

More detailed information may be obtained from the National Extravasation Information Service: http://www.extravasation.org.uk/home.html

EXTRAVASATION KITS ARE AVAILABLE

UHW - Ambulatory Care : Sky Ward : Heulwen : Paediatric South Ward PICU : TCT : HDC : A7 : B4 Haem : GITU : A&E : ICU : Dermatology : C2 : CRF : B6 : Nephrology OP Clinic : C4 Neurosciences : Upper Ground Gynaecology : A1 Ophthalmology : Rheumatology OP Clinic : CRF : Main Theatres : A6 OP Clinic : Pharmacy Emergency Cupboard.

LLAN - Chemotherapy Day Unit : ICU : MAU : Pharmacy Emergency Cupboard : Theatres Ground Floor

NHS WALES GIG CYMRU

APPENDIX 2: CYTOTOXIC CHEMOTHERAPY GROUP: NAMES

This policy was updated by the Cardiff and Vale University Health Board Cytotoxic Chemotherapy Group:

Dr Jonathan Kell, Consultant Haematologist
Jordan Morris, Haematology Pharmacist LLandough
Sarah Irwin, Lead Haematology Pharmacist
Sarah Rowland, Chemotherapy and I.V. Access CNS
Claire Lawson, Chemotherapy CNS
Kay Rowe/Gemma Behenna Lung Cancer CNSs
Faye Blackborow, Trainee Advanced Nurse Practitioner
Mary Harness, Senior Nurse, Haematology, Immunology, TCT and Medical Genetics Directorate.

APPENDIX 3: CONTENTS OF THE EXTRAVASATION KIT

- Hyaluronidase Injection, 1500iu
- Hydrocortisone Cream 1%, 15g
- Water for Injection, 10ml
- Sodium Chloride 0.9% Sachets, 25ml
- Luer Lock Syringe, 30ml
- Luer Lock Syringe, 1ml x 2
- Syringe Transfer Hub (fluid dispensing connector)
- 19g Needles
- 25g Needles
- Mediswabs (Sterets)
- Sterile Gauze
- Hot and Cold Gel Pack and Cover
- Documentation Slip
- Procedure for Managing an Extravasation
- Dimethyl sulfoxide 50% cream, 90g
- Cotton buds x 10
- Tegaderm Dressing
- Indelible Pen
- Patient information leaflet

Extravasation kits are available from pharmacy and may also be found in the following areas:

- Haematology – B4 Haematology, Haematology Day Unit UHW, Chemotherapy Day Unit Llandough
- Paediatric oncology – Sky ward
- Teenage Cancer Trust Unit
- Respiratory medicine – Chemotherapy Day Unit Llandough
- Neurosciences – C4 Day Unit
- Intensive care
- Rheumatology outpatients
- Renal - B5 Renal and Renal Outpatients
- Clinical Research Facility
- Dermatology - Day Unit
- Hafan Y Coed
- Velindre (Nurse led chemotherapy beds)

APPENDIX 4: Topical Oral and Intravenous Interventions to Consider in the Symptomatic Management of an Extravasation Injury (National Extravasation Protocol for Cancer Chemotherapy: A 10 step plan)

Agent	Mode of Action	Dose & Schedule Please see BNF for dosages
Topical		
Hydrocortisone cream 1%	Anti-inflammatory	
Crotamiton 10% cream(Eurax)	Anti-pruritic	
Eurax-Hydrocortisone cream	Combination of above	
Heparinoid 0.3% cream (Hirudoid)	Improve local circulation; used in the dispersal phase of an extravasation injury.	
Topical NSAID's (e.g. Ibuprofen or Diclofenac)	Local pain relief	
Oral and central		
Sodium Cromoglicate	Prevent de-granulation of mast cell and limit histamine release	
Ibuprofen (or alternative NSAID)	Systemic pain relief	
Chlorpheniramine	Anti-histamine to 'Mop up' / 'Dampen down' released histamine.	
Paracetamol: can be escalated to Co-codamol 8/500's and then to 30/500's	Adjuvant to the ibuprofen or for level 2 pain relief	
Morphine immediate release	Level 3 pain relief	
Systemic – Intravenous or subcutaneously		
Diamorphine	Sever, acute pain	
Hydrocortisone	Anti-inflammatory	
Chlorpheniramine	Alternative fast acting anti-histamine. Alternative to 8mg p.o. loading dose	

APPENDIX 5: PATIENT INFORMATION

PATIENT INFORMATION: EXTRAVASATION

Introduction

This leaflet has been written to provide you with information on extravasation because you have been receiving intravenous medication, or medication given into a vein, and your medical team suspects you may have had an extravasation. It is not intended to replace the discussion between you and your nursing team but to help you understand more about what has been discussed.

What is an extravasation?

Extravasation is the accidental leakage of a drug from the vein into the surrounding tissue. With some drugs this may lead to an immediate painful reaction and result in local tissue damage. For others symptoms such as discomfort or skin changes may not appear until several days after the drug was administered.

You may have noticed discomfort or pain, stinging, swelling or other changes at the site where the drug was being infused; or the nurse may have noticed that the drug was not going in as well as it should. This may occur whether you are having your treatment through a peripheral cannula in your arm or a central line.

Why did this happen?

Extravasation is an un-common but known complication of intravenous medication administration. Unfortunately, even though every precaution is taken, it can be very difficult to prevent. The most important thing is that it has been detected and that we are able to start the appropriate treatment.

Why is extravasation a problem?

Extravasation may lead to pain, stiffness and tissue damage in the area where the drug has leaked. In very rare cases patients have had to be referred to a plastic surgeon for additional care.

What treatment have I received to prevent tissue damage?

The nurse has given you the initial recommended treatment for the type of drug that has extravasated, or leaked out of the vein. Although this will help to minimise the likelihood of developing further problems, it is very important for you to keep checking the area every day and to continue any recommended treatment for as long as advised.

Checking the area

Once a day please check the affected area for the following:

- Changes in colour or increasing redness

- Blistering, peeling or flaking
- Changes in sensation
- Pain/discomfort
- Any loss of movement

If you notice any of the above, or you have any concerns, then please contact your nursing team on the number(s) below:

Ward:

Day Unit:

Treatment

As treatments may vary depending on the individual drug that has extravasated, please follow the specific treatment requirements recommended below:

Additional advice

- Mild painkillers may be taken if required. (Your nurse will guide you on what is suitable to take)
- Do not apply any other lotions, creams or ointments to the affected area unless asked to do so by your doctor or nurse
- Avoid wearing tight clothing, or putting anything restrictive, around the affected arm
- Do not allow the affected area to get wet
- Do not expose the affected area to strong sunlight
- Please do gently move the affected arm

Follow up

Follow up will depend on the nature of the drug that has extravasated, Your nursing team will give you an appointment to review the affected area if necessary.

In some cases medical photography may also be used to monitor any changes. However if you have any concerns please do contact us on the numbers above.

Bibliography

Grateful thanks to Pan-Birmingham Cancer Network 2010

European Oncology Nursing Society. 2007. Extravasation Guidelines

APPENDIX 6: CONTACTS LIST

For advice on the management of an extravasation please contact:

Chemotherapy and IV Access CNS,
-TEL: 029 2074 2363
Chemotherapy CNS (paediatrics),
TEL: 029 2074 5569
Principal Pharmacist,
Welsh Medicines Information Centre, UHW.

For advice on the properties of individual agents please contact:
Lead Haematology Pharmacist, TEL: 029 2074 8639 or 029 2074 3710
Lead Paediatric Pharmacist TEL: 029 2072 6364

For referral to a plastic surgeon please contact the on-call doctor at Morriston.

APPENDIX 7

Equality & Health Impact Assessment: Extravasation Procedure

1.	For service change, provide the title of the Project Outline Document or Business Case and Reference Number	Extravasation Procedure. Reference number: TBA Version No: 5
2.	Name of Clinical Board / Corporate Directorate and title of lead member of staff, including contact details	Sarah Rowland, Chemotherapy and IV Access CNS, C/o B4 Haematology, Specialist Services.
3.	Objectives of strategy/ policy/ plan/ procedure/ service	To enable a consistent approach to the prevention, detection and management of an infiltration or extravasation and to ensure patient safety whilst administering intravenous medication.
4.	Evidence and background information considered. For example • population data • staff and service users data, as applicable • needs assessment • engagement and involvement findings • research • good practice guidelines • participant knowledge • list of stakeholders and how stakeholders have engaged in the development stages • comments from those involved in the designing and development stages	The following background information was considered: • research • good practice guidelines • feedback from patients Implementation of this Procedure will involve the following stakeholders: • Pharmacy/ Sterile Production Services • Chemotherapy Nurse Specialists • Senior Nurses/ Clinical Managers • Health & Safety Department • All staff who administer IV medication • Patients receiving intravenous medication • Parents of children receiving intravenous medication • Carers of patients receiving IV medication
5.	Who will be affected by the strategy/ policy/ plan/ procedure/ service	All patients receiving intravenous medication throughout Cardiff and Vale UHB may be affected by this Procedure.

6. EQIA / How will the strategy, policy, plan, procedure and/or service impact on people?

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
6.1 Age For most purposes, the main categories are: • under 18; • between 18 and 65; and • over 65	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same conclusion: -Royal Cornwall Hospitals NHS Trust (www.rcht.nhs.uk/.../Clinical/CancerServices/**Extravasation**Guideline.pdf) -Northampton General Hospital NHS Trust (www.**northamptongeneral.nhs**.uk/.../EQIA Guidelinefor**Extravasation**.pdf) However, NHS TaySide identified a positive impact for patients because of improved staff training and understanding of when to escalate should a serious extravasation occur. (www.nhstaysideadtc.scot.nhs.uk/approved/policy/EXTRAV.PDF)		
6.2 Persons with a disability as defined in the Equality Act 2010 Those with physical impairments, learning disability, sensory loss or	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same conclusion: -Royal Cornwall Hospitals NHS Trust (as above …) -Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
impairment, mental health conditions, long-term medical conditions such as diabetes	training and understanding of when to escalate should a serious extravasation occur.		
6.3 People of different genders: Consider men, women, people undergoing gender reassignment **NB** Gender-reassignment is anyone who proposes to, starts, is going through or who has completed a process to change his or her gender with or without going through any medical procedures. Sometimes referred to as Trans or Transgender	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same conclusion: -Royal Cornwall Hospitals NHS Trust (as above) -Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff training and understanding of when to escalate should a serious extravasation occur.		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
6.4 People who are married or who have a civil partner.	A search undertaken on the 6th October 2016 found no evidence of negative impact. No other EHIAs were found to have considered this issue.		
6.5 Women who are expecting a baby, who are on a break from work after having a baby, or who are breastfeeding. They are protected for 26 weeks after having a baby whether or not they are on maternity leave.	A search undertaken on the 6th October 2016 found no evidence of negative impact. No other EHIAs were found to have considered this issue.		
6.6 People of a different race, nationality, colour, culture or ethnic origin including non-English	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same outcome -Royal Cornwall Hospitals NHS Trust (as above)		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
speakers, gypsies/travellers, migrant workers	-Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff training and understanding of when to escalate should a serious extravasation occur.		
6.7 People with a religion or belief or with no religion or belief. The term 'religion' includes a religious or philosophical belief	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same outcome: -Royal Cornwall Hospitals NHS Trust (as above) -Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff training and understanding of when to escalate should a serious extravasation occur.		
6.8 People who are attracted to other people of: • the opposite sex (heterosexual); • the same sex (lesbian or gay); • both sexes (bisexual)	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same outcome: -Royal Cornwall Hospitals NHS Trust (as above) -Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff training and understanding of when to escalate should a serious extravasation occur.		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
6.9 People who communicate using the Welsh language in terms of correspondence, information leaflets, or service plans and design Well-being Goal – A Wales of vibrant culture and thriving Welsh language	A potential negative impact was identified for people who communicate using the Welsh language.	A Welsh Version of the Patient Information Leaflet to be made available on request.	The Patient Information Leaflet on Extravasation has been translated into the medium of Welsh and is available on request.
6.10 People according to their income related group: Consider people on low income, economically inactive, unemployed/work less, people who are unable to work due to ill-	A search undertaken on the 6th October 2016 found no evidence of negative impact. The following organisations came to the same outcome: -Royal Cornwall Hospitals NHS Trust (as above) -Northampton General Hospital NHS Trust. However, NHS TaySide identified a positive impact for patients because of improved staff		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate.** Make reference to where the mitigation is included in the document, as appropriate
health	training and understanding of when to escalate should a serious extravasation occur.		
6.11 People according to where they live: Consider people living in areas known to exhibit poor economic and/or health indicators, people unable to access services and facilities	Minimal impact.	Hospital transport may be required for follow up if the patient has been discharged and needs to have the extravasation reviewed.	
6.12 Consider any other groups and risk factors relevant to this strategy, policy, plan, procedure and/or service			

7. HIA / How will the strategy, policy, plan, procedure and/or service impact on the health and well-being of our population and help address inequalities in health?

Questions in this section relate to the impact on the overall health of individual people and on the impact on our population. Specific alignment with the 7 goals of the Well-being of Future Generations (Wales) Act 2015 is included against the relevant sections.

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts and any particular groups affected**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate** Make reference to where the mitigation is included in the document, as appropriate
7.1 People being able to access the service offered: Consider access for those living in areas of deprivation and/or those experiencing health inequalities Well-being Goal - A more equal Wales	A search undertaken on the 6th October 2016 found no evidence of negative impact.		
7.2 People being able to improve /maintain healthy lifestyles: Consider the impact on healthy lifestyles, including healthy eating, being active, no smoking /smoking cessation, reducing the harm caused by alcohol and /or non-prescribed drugs plus access to services that support disease prevention (eg immunisation and vaccination, falls prevention). Also consider impact on access to supportive	A search undertaken on the 6th October 2016 found no evidence of negative impact. Correct management of an extravasation will enable patients to maintain a healthy and active lifestyle; therefore should have a positive impact. However, no other EHIAs were found to address this issue.		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts and any particular groups affected**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate** Make reference to where the mitigation is included in the document, as appropriate
services including smoking cessation services, weight management services etc Well-being Goal – A healthier Wales			
7.3 People in terms of their income and employment status: Consider the impact on the availability and accessibility of work, paid/ unpaid employment, wage levels, job security, working conditions Well-being Goal – A prosperous Wales	A search undertaken on the 6th October 2016 found no evidence of impact. Only NHS Tayside consider it as an issue however. But correct management of an extravasation will enable patients to continue to work if other health conditions permit; therefore should have a positive impact.		
7.4 People in terms of their use of the physical environment: Consider the impact on the availability and accessibility of transport, healthy food, leisure activities, green spaces; of the design of the built	A search undertaken on the 6th October 2016 found no evidence of impact. No other EHIAs were found to consider it as an issue.		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts and any particular groups affected**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate** Make reference to where the mitigation is included in the document, as appropriate
environment on the physical and mental health of patients, staff and visitors; on air quality, exposure to pollutants; safety of neighbourhoods, exposure to crime; road safety and preventing injuries/accidents; quality and safety of play areas and open spaces Well-being Goal – A resilient Wales			
7.5 People in terms of social and community influences on their health: Consider the impact on family organisation and roles; social support and social networks; neighbourliness and sense of belonging; social isolation; peer pressure; community identity; cultural and spiritual ethos Well-being Goal – A Wales of cohesive	A search undertaken on the 6th October 2016 found no evidence of impact. No other EHIAs were found to consider it as an issue. However, there can only be a positive impact if health & well-being are maintained and serious incidents prevented or appropriately managed.		

How will the strategy, policy, plan, procedure and/or service impact on:-	**Potential positive and/or negative impacts and any particular groups affected**	**Recommendations for improvement/ mitigation**	**Action taken by Clinical Board / Corporate Directorate** Make reference to where the mitigation is included in the document, as appropriate
communities			
7.6 People in terms of macro-economic, environmental and sustainability factors: Consider the impact of government policies; gross domestic product; economic development; biological diversity; climate Well-being Goal – A globally responsible Wales	This Procedure has been written in line with the latest National Guidelines on Extravasation Management and current best practice.		

Please answer question 8.1 following the completion of the EHIA and complete the action plan

8.1 Please summarise the potential positive and/or negative impacts of the strategy, policy, plan or service	Implementation of this Procedure will have a beneficial impact in terms of supporting staff to prevent, recognise or manage any signs of an Extravasation. Recognition by staff of potential issues will enable patients to receive the most appropriate treatment in a prompt manner; ensuring all IVadministrations are administered safely. All patients whose first language is Welsh now have access to an information leaflet in their preferred tongue. Where there are language barriers with different nationalities then every effort will be made to find an interpreter.

Action Plan for Mitigation / Improvement and Implementation

	Action	**Lead**	**Timescale**	**Action taken by Clinical Board / Corporate Directorate**
8.2 What are the key actions identified as a result of completing the EHIA?	None required.			
8.3 Is a more comprehensive Equalities Impact Assessment or Health Impact Assessment required? This means thinking about relevance and proportionality to the Equality Act and asking: is the impact significant enough that a more formal and full consultation is required?	A more comprehensive Equalities or Health Impact Assessment is not required.			

	Action	Lead	Timescale	Action taken by Clinical Board / Corporate Directorate
8.4 What are the next steps? Some suggestions:- • Decide whether the strate policy, plan, procedure and/or service proposal: ○ continues unchanged as there are no significant negative impacts ○ adjusts to account for the negative impacts ○ continues despite potential for adverse impact or missed opportunities to advance equality (set out the justifications for doing so) ○ stops. • Have your strategy, policy, plan, procedure and/or service proposal approved • Publish your report of this impact assessment • Monitor and review	Procedure to continue un-changed as there are no significant negative impacts.			