Birmingham Women's and Children's NHS Foundation Trust

Policy for Minimising the Risk and Management of Extravasation and Phlebitis
Applies to BCH and NICU Site only

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Name of responsible committee/individual:	Plastics Nurse Specialist
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Target audience:	All Clinical BCH Staff

Contents

Summary of important points

Extravasation can cause serious, life changing injuries to neonates, children, and young people. By following this policy, you will reduce the risk of this happening to a patient in your care.

Learning from serious incidents at BWC shows that following are important:

Drug risk levels

Serious incidents have shown that some drugs we administer carry a high risk of causing serious injury if an extravasation occurs during administration and go undetected.

For this reason, we have given drugs a rating of either “Critical Red Risk”, “Red Risk”, “Amber Risk” or “Green Risk”. Critical Red drugs have the highest risk of causing serious injuries if being infused when an IV extravasates.

Green risk drugs have the lowest chance of causing serious injury (NB: lower risk does not mean there is no risk). This rating system is called RAG (Red-Amber-Green) rating.

The Red Amber and Green (RAG) classification offers guidance on the prescribing of drugs, the: -

- Specialist nature of the drug
- The complexity of the assessment and monitoring arrangements required for the patient
- Clinical responsibility and competency associated with the drug/fluid.

When preparing IV drugs for administration check the risk level of that drug on your departments RAG rating list in the drug preparation area. If it is not listed search the intranet using the term “extravasation” to find the full list of IV drugs and their risk levels.

Using this risk level, you should:

Use the most appropriate access for the drugs you need to give. If available use central lines for the higher risk drugs

Perform an additional 30-minute check if administering a red risk drug into a peripheral cannula, (see frequency section). This identifies extravasations earlier and reduces the risk to patients.

Ask medical teams to assess if it is safe for the patient to have a different IV device if you think it will reduce the risk of serious extravasation injuries.

NB Peripheral cannulas are short-term IV devices that sit in small blood vessels.
They are therefore less suited for the administration of higher risk drugs, especially if prescribed for long periods of treatment).

DO NOT delay administration of time critical drugs (e.g. Antibiotic’s for treating sepsis).

Label infusions using a drug label that matches the infusions risk level (i.e., a red drug label for a red risk drug).

Site Checking

Serious incidents have shown that even highly experienced and skilled staff can miss the early signs of extravasation
To help you identify extravasations early we now use

Touch, Look and Compare.

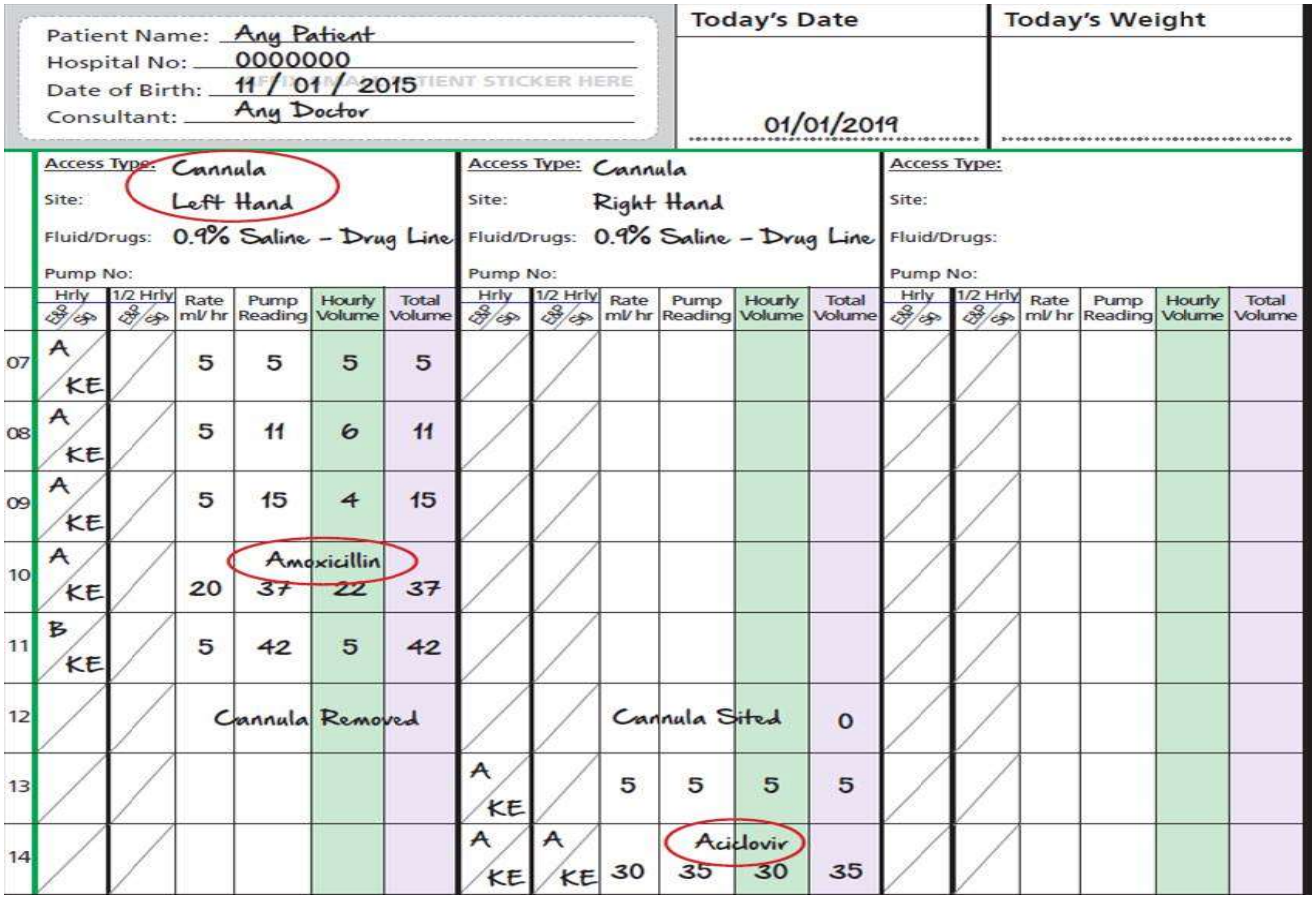
Bandages should be removed and area well lit to complete TLC assessment

Touch	Look	Compare
		
Is the site: • Soft? • Oedematous? • Dry? • The same temperature as surrounding skin? • Pain free?	**Is the wider area:** • Well perfused? • Without redness / discolouration? • Oedematous? • Blanching?	**Are the limbs:** • The same size? • The same colour? • The same temperature?

Tracking IV fluids and drugs

Serious incidents have shown that tracking what IV drug is administered into which device is essential. When an extravasation occurs, if referral to the Plastic Surgery Team is necessary, they need to know what drugs have been administered to decide what, if any, treatment is required to reduce further tissue damage (see example below).

Picture of fluid chart



Patient Name: Any Patient
Hospital No: 0000000
Date of Birth: 11 / 01 / 2015
Consultant: Any Doctor

Today's Date: 01/01/2019
Today's Weight:

	Access Type: Cannula Site: Left Hand Fluid/Drugs: 0.9% Saline – Drug Line Pump No:						Access Type: Cannula Site: Right Hand Fluid/Drugs: 0.9% Saline – Drug Line Pump No:						Access Type: Site: Fluid/Drugs: Pump No:					
	Hrly	1/2 Hrly	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume	Hrly	1/2 Hrly	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume	Hrly	1/2 Hrly	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume
07	A KE		5	5	5	5												
08	A KE		5	11	6	11												
09	A KE		5	15	4	15												
10	A KE		20	Amoxicillin 37	22	37												
11	B KE		5	42	5	42												
12			Cannula Removed						Cannula Sited			0						
13							A KE		5	5	5	5						
14							A KE	A KE	30	Aciclovir 35	30	35						

Introduction

This policy is to be used in conjunction with the Intravenous (IV) Therapy Policy and the Management of Arterial Lines Policy and is mandatory for all staff caring for patients with intravenous access devices.

N.B If the line is arterial and causes an Ischaemic limb there is a different policy for these types of injuries and this must be followed.

Scope

This policy applies to BCH site and NICU at the Women's hospital.

Purpose

The purpose of the document is to guide staff in the prevention, early detection and management of extravasation and phlebitis injuries for Children and Young People at Birmingham Children's Hospital.

Duties within the organisation

Clinical nurse managers of all clinical staff who care for patients with IV access devices are responsible for ensuring that their staffs are aware of, and adhere to, this policy.

All clinical staff are responsible for ensuring their clinical practice complies with this policy.

Identification of stakeholders

Plastic Surgeons, Intensivists, Plastic Surgery Nurse Specialists, Pharmacists, Senior Nurses, Ward Managers, Ward & Theatre Nurses, Anaesthetists, ODP's and Radiology.

Method for development

The original policy was implemented in February 2004. This review is in response to learning from serious incidents. This policy is written by the Clinical Nurse Specialist for Plastic Surgery, in consultation with the Extravasation Working Group.

The Extravasation Working Group included the Lead Nurse for Patient Safety, Intensivists, Pharmacist, Plastic Surgeon, Plastic surgery nurse specialist Team, Education & Learning Team, Clinical Photography and Design Team, Advanced Nurse Practitioner-Oncology, Education Sister-Oncology, Assistant Chief Medical Officer for Quality Safety / Paediatric Intensivist, Lecturer from the University of Birmingham, Ward manager for Medical Day Care and the NICU ward sister at the women's hospital.

Consultation and communication with stakeholders

Extensive consultation included Consultant Anaesthetists, Intensivists, Pharmacists, Plastic Surgeons, Plastic Surgery Nurse Specialist's, the Senior Operational Nursing Group, Ward Managers, Safety Link Workers, a pilot in 4 ward areas with subsequent feedback from 61 registered nurses / clinical support workers, rollout across the BCH site was followed by obtaining feedback from 305 registered nurses / clinical support workers.

Communication with stakeholders

This policy will be uploaded to the clinical policy page of the intranet. A link to this page will be disseminated as follows:

- Using established mailing lists for the Senior Operational Nursing Group, Ward Sisters and Safety Link Workers
- Via the hospitals communication update email.

Definitions

- **Extravasation** – The inadvertent administration of a fluid into the surrounding subcutaneous or sub dermal tissue instead of the bloodstream. Extravasation can result from the use of any IV device including central venous access lines, mid-lines, peripheral lines, and intra-osseous lines.

The **RAG rating** of drugs has been developed by reviewing the following risk factors for each drug:

- **Vesicant-** if the drug can cause pain, inflammation and blistering of the local skin and underlying structures. If left untreated may lead to tissue necrosis. (Dougherty 2011)

- **Irritant-** if the drug can cause inflammation, irritation, or pain at the site of extravasation but rarely cause tissue breakdown. Some irritants have the potential to cause ulceration.

- **Non-Vesicant**– if the drug is neutral and does not cause inflammation or damage. They do not cause ulceration; however, they do tend to cause pain at, and around the injection site and along the vein.

- **Extreme of pH**- in particular, if the drug is an alkaline drug (pH> 10) as these cause tissue damage.

- **Vasoactive properties -** this group of drugs includes those with vasopressor actions. They are used to increase systemic vascular resistance and hypotension by causing constriction of the blood vessels**.**

Phlebitis–. It is the inflammation of the vein due to injury, intravenous insertion, impaired venous flow, or coagulation disorder. It causes pain, swelling, tenderness and redness around the vein. It can be treated using anti-inflammatory medication.

<u>There are different types of phlebitis: -</u>

- **Mechanical** movement of the cannula within the vein.

- **Bacterial**–bacterial infection during insertion or accessing the cannula.

- **Chemical**–associated with the solution or medication itself. Factors such as pH and osmolality of the medication/fluid can have a significant effect on the vein.

The vein becomes inflamed frequently followed by a thrombosis or sclerosis of the vein which may cause a burning sensation at the cannula site and cramping along the vein proximal to the cannula site.

- As the dilution and diluent of the drug can affect osmolality and to a lesser extent pH of an intravenous drug to be given, many IV monographs found on the intranet will direct user to risk minimisations strategies if central access is unavailable.

Risk levels of IV drugs and fluids

Some IV drugs carry a high risk of causing serious injury if an extravasation occurs during administration. For this reason, we have given drugs a rating of either “Critical Red Risk”, “Red Risk”, “Amber Risk” or “Green Risk”.

Critical Red drugs have the highest risk of causing serious injuries if being infused when an IV extravasates. Green risk drugs have the lowest chance of causing serious injury (NB: lower risk does not mean no risk). This rating system is called RAG (Red, Amber, Green) rating.

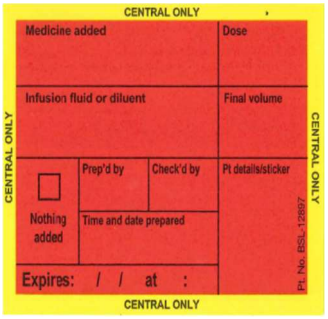
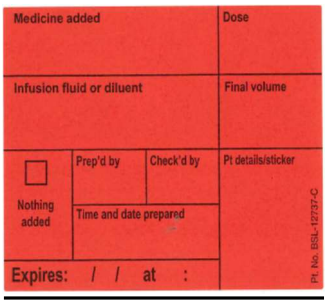
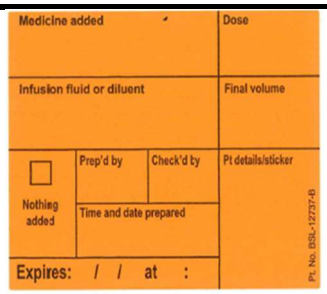
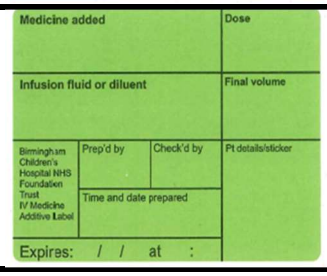
When preparing IV drugs for administration, check the risk level of that drug on your departments RAG rating list in the drug preparation area. If it is not listed, search the intranet using the term “extravasation” to find the full list of IV drugs and their risk levels.

The RAG rating of drugs / fluids for a neonate, child or young person receives affects the following:
The IV access device to be sited

- If a Child or young Person has multiple IV access devices, which one is used for administration e.g., a child with a central line and a peripheral cannula you would administer higher risk drugs using the central line and lower risk drugs through the peripheral cannula.

- How often IV site observations are done?

- The colour of the drug label you attach to the drug or bag of fluid (see below)

RAG Rating	Risk of injury if extravasation occurs during infusion	IV access device to be used	Drug label to be attached
Critical Red Risk	Very high	Central line only	
Red Risk	High	Central line preferred but do not delay administration if the drug is time critical (e.g. antibiotics to treat sepsis). If only peripheral access is available, discuss with medical team the pros and cons of citing either a mid / central line.	
Amber Risk	Moderate	Non central IV device is acceptable if central IV device is not available.	
Green Risk	Lower risk (NB this does not mean "no risk")	Central and non-central IV devices can be used for administration.	

NB Infusions administered in Theatres should comply with the above labelling for infusions that remain on the patient when transferred out of the Theatre department, unless doing so contravenes or affects the safety of national, anaesthetic labelling guidelines.

Drug and fluid administration

When administering a bolus or setting up an infusion, you must flush the device in accordance with the Birmingham Women's and children IV policy.

During flushing you must have full sight of both the entry site and, for non-central lines, the line tip site, to observe for any swelling, blanching or redness during flushing. Also look for signs of pain and feel for any resistance during flushing. Any of these signs can indicate an extravasation.

Leaking of fluid at the entry site may also indicate reduced flow that could be due to an extravasation.

If extravasation occurs with a central line, this may be difficult to detect as the fluid may initially be hidden, collecting in a body cavity such as the abdomen or chest.
Additionally, leaking of fluid around the entry site of a central line may indicate a vessel thrombosis causing obstruction to flow, rather than an extravasation although leaking of the fluid or drug at the entry site may still cause some surface tissue injury. It may also be leaking anywhere along the length of the line.

Look for the following concerning signs on administration through a central line in the child or young person

- general signs of extravasation
  - swelling, colour changes to skin (e.g., blanching or redness) at the line insertion site, or along the length of the line
  - pain or resistance to flow when the line is flushed
- signs of extravasation with CVC in upper central venous system
  - respiratory deterioration due to pleural effusion
  - cardiovascular deterioration due to pericardial effusion
- signs of extravasation with CVC in lower central venous system
  - this is very hard to detect but there may be abdominal distension, pain or signs of general systemic inflammation or sepsis
- signs of vessel thrombosis
  - leaking around the insertion site
  - pump occlusion alarm
  - reverse flow up another lumen (a venous thrombosis causing obstruction may cause fluid to flow backwards up one of the other lumens of the line)

If you have any doubt about the position of the IV device, do not infuse any drug or fluid.
If you are concerned about the position of a femoral central line, please seek the advice of an intensivist

All central lines (excluding femoral lines) must be x-rayed to check the line position. All must be documented in the notes as being central before they are used.

In neonates -Umbilical Venous catheters are usually inserted with the first hour of birth. To determine the correct position an x-ray confirms line placement. This line when in place can be used for all infusions, TPN, colloids and crystalloid infusions. This will be removed when a Central venous line has been inserted.

Umbilical Arterial catheter usually inserted within one hour of birth. This will need to have continuous Heparinised saline infusion and will be removed at 5 days.

Signs and symptoms to look for in a neonate with an umbilical venous catheter and umbilical arterial catheter for extravasation occurring is undue swelling in the abdomen, legs,

feet, back, groin and buttocks. Extravasation can occur around the site and surrounding tissues and area of line placement.

Femoral Intra osseous needle in a neonate – look for any swelling in the groin and check for leg perfusion in the neonate.

Intra Arterial line in a neonate check the fingertips, hand, foot perfusion and blanching when taking sampling, noting areas of mottling and the warmth and colour of the arm or leg. Especially fingers and toes.

Siting the right IV device reduces the risk of extravasation

Before siting a cannula, consider if it is the correct IV device. Your assessment should consider:

- What is the risk level of the drug (drug risk levels are explained later in this summary)?
- What is the length of treatment? If the course of treatment is longer than you expect a cannula to last, consider the possibility of a midline or other IV access device.
- Assessment of the child or young person's veins.
- Factors such as urgency of starting treatment and susceptibility to infection.

- **Patient risk factors including**:

  - Neonates have higher risk of serious injury from extravasation due to fragile veins, immaturity of peripheral circulation, blood vessels and skin.
  - Neonates may need an Umbilical venous catheter or umbilical arterial catheter.
  - Neonates will have a central venous line for any infusions that have glucose greater than 10% in the NICU.
  - Patients unable to communicate they are in pain.
  - Patients with reduced sensation as they may not feel pain from an extravasation.
  - Patients with reduced peripheral perfusion/low cardiac output state
  - Patients with poor skin integrity (e.g., burns, prematurity, severe oedema)
  - Patients with a history of multiple attempts at cannulation are at increased risk of extravasation.
  - Patients with a history of extravasations.
  - Patients requiring multiple different drug infusions.
  - Cannulas should not be re-sited into an area / limb that has any remaining injury, pain or swelling from a previous extravasation or at worse may cause an Ischaemic event
  -

DO NOT use veins in limbs or extremities that are compromised for any other reason

Never insert a cannula or long line under an anti-embolism stocking as this will cause too much pressure on the vein when drugs or fluid inserted.

Never cut an anti-embolism stocking to access a vein

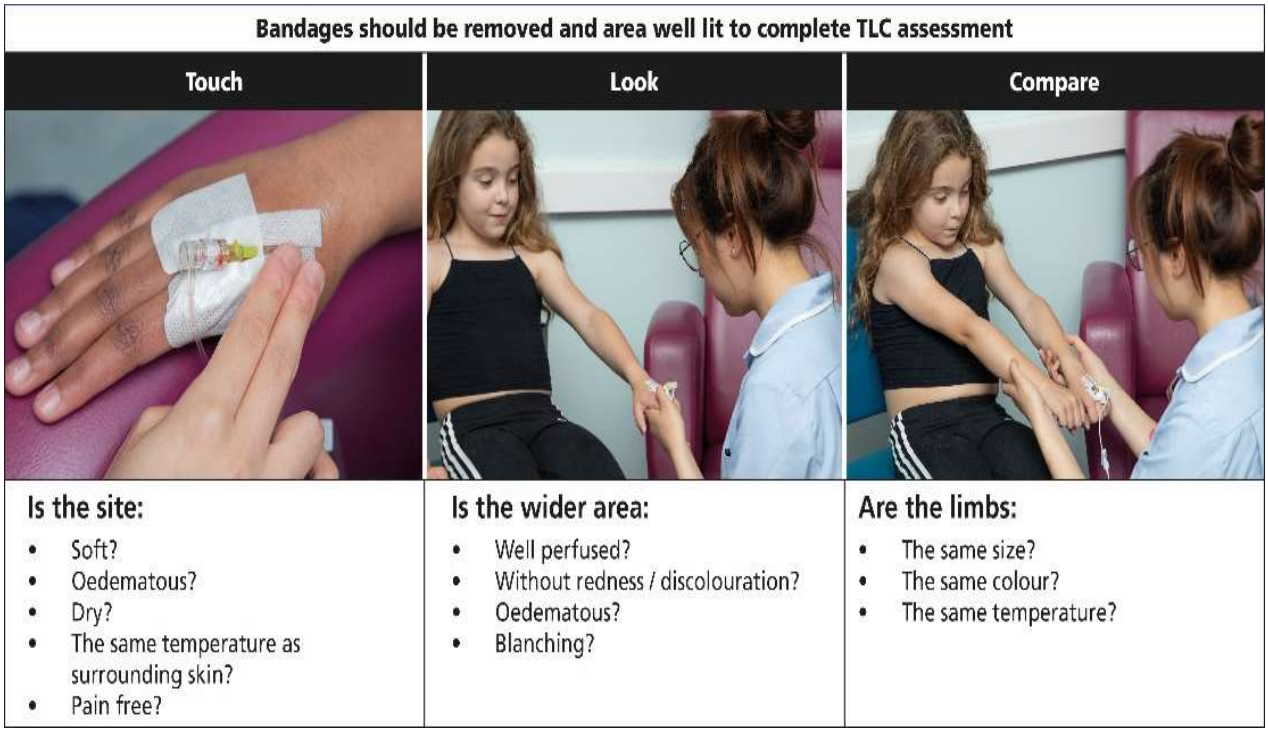
It is suggested that the practitioner attempt to cannulate a patient **TWICE** before handing over to another practitioner. However, there may certain clinical situations where this may have to be done more often.

It is important to document both successful and unsuccessful cannulation attempts in the clinical notes.

IV site assessment

BWC incidents show that even experienced, skilled clinical staff can miss early signs of extravasation. Learn from this by following the steps below to maximise your chance of capturing extravasations early and be confident in acting on your findings:

Touch Look, and Compare is used to assess IV sites for extravasation.



- **Touch.**
- Gently palpate where the tip of the device sits, NB this is NOT the same as the entry site. The tip of an IV device may sit many centimetres away from the entry site e.g. in the upper arm, groin, abdomen, or chest. Look for pain as this is often an early sign of extravasation. Feel for swelling, this may feel soft or taut / hard on palpation. Feel for temperature difference (warmer or cooler) than surrounding skin. Assess for numbness.

- **Look.**
  The area must be well-lit to see the subtle colour changes / swelling you are looking for. Don't look only at the entry site; look at a wide area around the device.

  Look for swelling of the whole area / limb. Look at fingers, toes, nearby joints like wrists, elbows, ankles, and knees. Skin colours are different so looking for colour

changes compared to surrounding skin colour or on opposite limbs is important e.g., darker, or paler in colour.

If the child's skin tone allows, look for redness and blanching. NB: It can be difficult to see blanching on very light-coloured skin and it can be difficult to see redness on dark coloured skin. Also look for leakage of fluid from around the entry site.

Is the hand arm or foot swollen?

- **Compare; This step is crucial!**
  Compare the IV site area to the equivalent area on the other side of the body e.g. left and right hand, left and right side of neck, left and right side of chest. Look for change in size of the area and skin colour.

How often should IV site checks be done during continuous infusions?

	PICU		All other clinical areas	
	Central line	Non-central line	Central line	Non-central line
Critical Red Risk	Hourly	• Half-hourly	• At the start of the infusion • Then Hourly thereafter	Not applicable / central only administration
Red Risk	Hourly	Half-hourly	• At the start of the infusion then • Hourly	• At the start of the infusion • 30 minutes into the infusion • 60 minutes into the infusion • hourly thereafter
Amber Risk	Hourly	Half Hourly	• At the start of the infusion • Then Hourly	• At the start of the infusion • 60 minutes into the infusion • Hourly thereafter
Green Risk	Hourly	Half Hourly	• At the start of the infusion • Hourly thereafter	• At the start of the infusion • 60 minutes into the infusion • Hourly thereafter

All IV lines must be checked as detailed on the back of the fluid balance chart ward areas or the PICU observation chart (PICU)

This can either be at the same time as administering intermittent IV drugs / fluids or as separate checks if the line is not being used. Hourly or 30 min checks! The risk of extravasate increasing to length of line staying in.

In neonates if the line is not being used then this should be removed.

If the line site is inaccessible (e.g., during surgery or an emergency), check the site as soon as you are safely able to document your findings including why you were unable to assess the site earlier.

If it is clinical safe to do so, removing unused IV devices reduces the risk of both infection and extravasation.

When in use, IV-line sites must be checked using TLC, as detailed above and the results recorded on the patient's fluid balance chart. When not in use, IV lines must be checked using TLC twice a day and the results documented on the back of the fluid balance chart for ward areas and PICU.

In addition to TLC assessments, IV lines must have additional checks (e.g., ensuring dressing is intact) completed. These additional checks are detailed on the back of the fluid balance charts for ward areas and for PICU.

Parent education

Parents know their child better than we do. They can often see changes in IV site appearance / skin colour and behaviour before we do.
For this reason, explain to parents:

- The signs of extravasation and why it is important to find them early.
- Explain how they can raise concerns if they think there are signs of extravasation.
- Why it is important that IV sites are checked especially during the night.

Securing and reducing movement of IV lines

The dressing that secures the IV device must be transparent to allow for IV site inspection. Ensuring it is securely stuck down reduces the risk of an IV line becoming dislodged.

Bandages can be used in ward area to reduce the chance of accidentally dislodging cannulas. BWC serious incidents have demonstrated that a clear view of the area surrounding an IV device is needed to look for extravasation. You must therefore completely remove the bandage to do this.

However, if intensive care patients are sedated and/or muscle relaxed, the risk of extravasation outweighs the risk of accidental line dislodgment.

In this case bandages should **not** be used for intensive care patients who are more awake, an assessment of the risk of extravasation and therefore the need to be able to frequently observe the line site versus the risk of line dislodgment without the use of a bandage, will need to be made. This is a clinical judgement and should be made by the nursing team in discussion with the medical team.

If intensive care patients are sedated and/or muscle relaxed, the risk of extravasation is greater than the risk of accidental line dislodgment. In this case bandages should not be used to allow easier visual assessment.

For intensive care patients who are more awake, the bed side nurse will need to make an assessment of the risk of extravasation and therefore the need to be able to frequently observe the line site versus the risk of line dislodgment and how secure the line is without the use of a bandage

Where possible, infusion lines attached to peripheral cannulas and midlines should be looped back and secured under the bandage to reduce mechanical movement.

Splints can be used to reduce movement when an IV line is sited near a joint. Splints must be observed for signs of pressure injury / impairment of circulation every with each IV site check. Splints must also be completely removed twice a day to check for pressure injury and cleanliness.

In using splints on the neonates, it is important that the correct size and shape have been chosen and it is secured with Velcro straps securely but not tightly

T-pieces should be attached to the cannula. Holding the t-piece, rather than the cannula itself, when using the cannula reduces movement of the cannula and therefore reduces the risk of mechanical phlebitis. The exception is when the use of the T piece can cause greater clinical risk e.g., administration of anaesthetic agents.

In neonates a post-natal filter extension set is used in NICU. This should also include the date of the line and documentation on the neonatal body map.

Woollen mittens must not be worn by babies, at any time as tiny strands of fibres can wrap around a small digit and act as a tourniquet and compromise a finger causing circulatory problems for the baby to the hand.

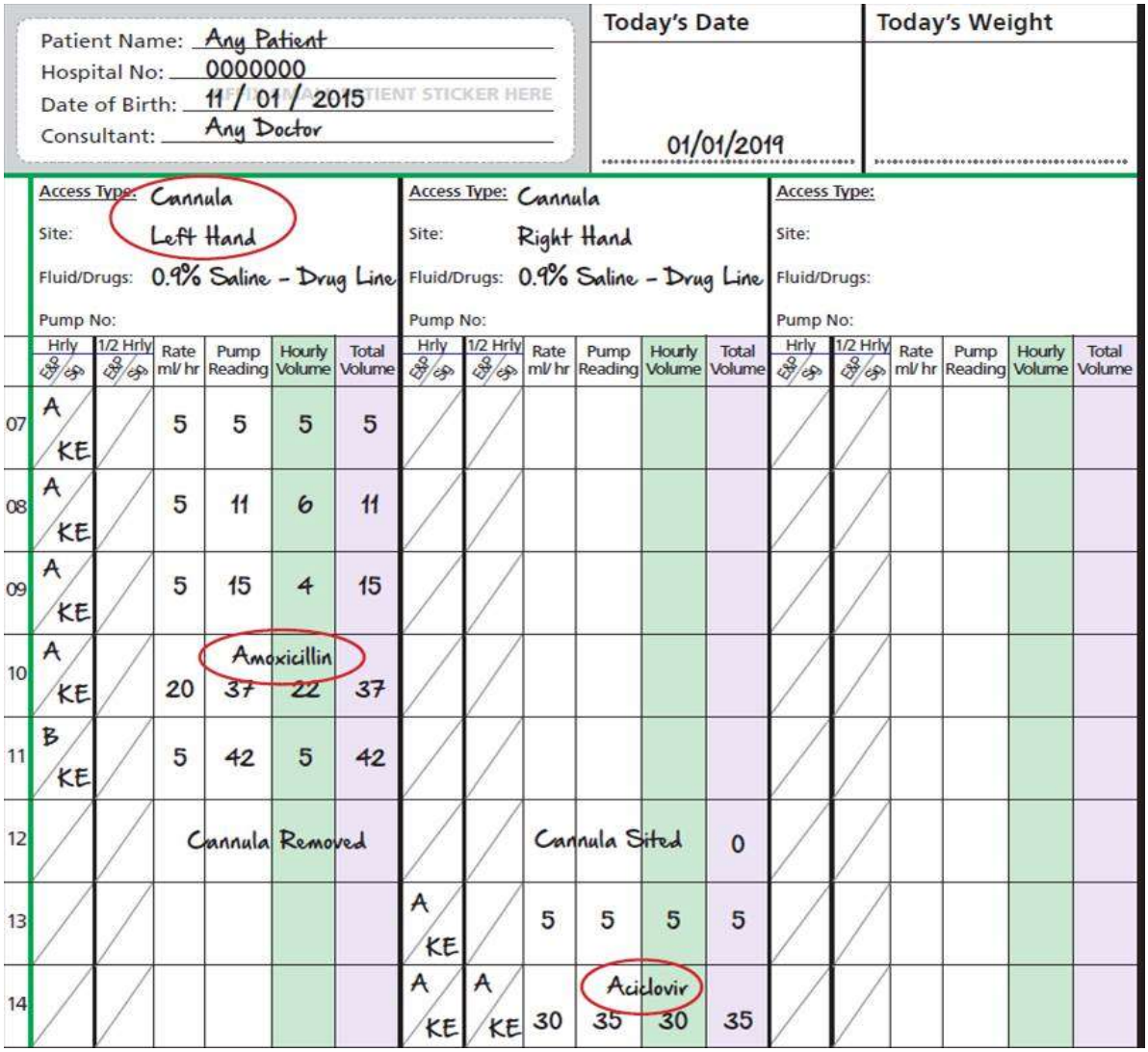
Tracking drugs and fluid delivery through IV devices

BWC incidents show that knowing what drugs and IV fluid have been administered into an IV device that extravasation enables:

- Rapid assessment of whether escalation to the Plastic Surgery Team is required based on the risk level of the drug (red and critical red risk drugs must be escalated regardless of the grading of the extravasation injury).

- If assessment by the Plastic Surgery Team is required, they will be able to decide what intervention is required to reduce further injury.

In ward areas drugs are to be documented on the fluid balance chart as shown below to enable effective tracking of drugs into each IV device.



Patient Name: Any Patient
Hospital No: 0000000
Date of Birth: 11 / 01 / 2015
Consultant: Any Doctor
PATIENT STICKER HERE

Today's Date: 01/01/2019
Today's Weight:

	Access Type: Cannula Site: Left Hand Fluid/Drugs: 0.9% Saline – Drug Line Pump No:						Access Type: Cannula Site: Right Hand Fluid/Drugs: 0.9% Saline – Drug Line Pump No:						Access Type: Site: Fluid/Drugs: Pump No:					
	Hrly Exp / Sp	1/2 Hrly Exp / Sp	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume	Hrly Exp / Sp	1/2 Hrly Exp / Sp	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume	Hrly Exp / Sp	1/2 Hrly Exp / Sp	Rate ml/ hr	Pump Reading	Hourly Volume	Total Volume
07	A KE		5	5	5	5												
08	A KE		5	11	6	11												
09	A KE		5	15	4	15												
10	A KE		20	Amoxicillin 37	22	37												
11	B KE		5	42	5	42												
12			Cannula Removed						Cannula Sited			0						
13							A KE		5	5	5	5						
14							A KE	A KE	30	Aciclovir 35	30	35						

Grading and Management of extravasation injuries

Extravasation	Grade & Immediate actions		Phlebitis
No symptoms	**A** Continue to observe as per policy		No symptoms
Any one of the following: - Blanching - Oedema of < 2.5cm - Cool to touch - With or without pain	**B**		One is evident near IV site: - Slight redness - Slight pain
	- STOP infusion! - Red risk drug, follow grade C - Aspirate as much drug /	- STOP infusion! - Red risk drug, follow grade C - Remove IV device	

	fluid as possible. - Remove IV device - Elevate if oedematous - Mark wound with pen **- 1-hrly wound assessment (4-hrly if healing).** - Complete incident form	- Elevate if oedematous **- 1-hrly wound assessment (4-hrly if healing).** - Complete incident form	
Any one of the following: - Blanching or redness - Oedema of 2.5–15cm - Cool to touch - With or without pain	**C**		Two are evident near IV site: - Redness - Oedema, feels soft - Moderate pain
	- STOP infusion! - Do NOT remove IV device - Aspirate as much drug / fluid as possible. - Mark wound with pen - Elevate if oedematous **- 1-hrly wound assessment (4-hrly if healing).** - Call Plastic Surgery Team - Photograph injury * - Complete incident form	- STOP infusion! - Do NOT remove IV device - Elevate if oedematous **- 1-hrly wound assessment (4-hrly if healing).** - Call own medical team - Photograph injury * - Complete incident form	
Any one of the following: - Blanching or redness - Oedema of > 15cm - Cool to touch - Mild to moderate pain - Numbness	**D**		All are evident and extensive: - Redness - Oedema, feels hard - Severe pain
	- STOP infusion! - Do NOT remove IV device - Aspirate as much drug / fluid as possible. - Mark wound with pen	- STOP infusion! - Do NOT remove IV device - Elevate if oedematous **- 1-hrly wound assessment (4-hrly if healing).**	

	- Elevate if oedematous **- 1-hrly wound assessment (4-hrly if healing).** - Call Plastic Surgery Team - Photograph injury * - Complete incident form	- Call own medical team - Photograph injury * - Complete incident form	
Any one of the following: - Blanching / redness - Discoloured / bruised - Broken skin - Pitting oedema - CRT > 2-seconds - Moderate - severe pain	**E**		All are evident and extensive, with or without pyrexia: - Redness - Oedema, feels hard - Severe pain - Palpable venous cord
	- STOP infusion! - Do NOT remove IV device - Aspirate as much drug / fluid as possible. - Mark wound with pen - Elevate if oedematous - Call Plastic Surgery Team **- 1-hrly wound assessment (4-hrly if healing).** - Photograph injury * - Complete incident form	- STOP infusion! - Do NOT remove IV device - Elevate if oedematous - Call own medical team **- 1-hrly wound assessment (4-hrly if healing).** - Photograph injury * - Complete incident form	
* Photographing an injury must be done with consent by either Clinical Photography or on a Trust registered, departmental camera.			

Extravasation injury prior to escalation to the Plastic Surgery Team

Grade B extravasations do not need escalating unless they involve a **red risk drug,** or you have an additional concern that is not covered by the grading guidelines.

Grade C, D and E extravasations, and any extravasation involving a Red / Critical Red Risk drug are to be escalated to the nurse in charge first. If they agree with the grading of the extravasation, you can refer to the Plastic Surgery Team

(NB if the nurse in charge is unavailable, do not delay escalation). Nurses and medical staff can make referrals to the Plastic Surgery Team.

In neonates grade c and above will be referred to plastic surgery.

When escalating to the Plastic Surgery Team; have the following information ready:

- Patient's name and age?
- What makes this a Grade C, D or E extravasation?
- Name and RAG rating of each drug / fluid that were infusing?
- Type of IV device and where it is cited?
- Is the device still in situ / what initial treatment has been done?

Treatment

Early Assessment of neurovascular status is essential for the early recognition of neurovascular deterioration or compromise. Delays in recognizing neurovascular compromise can lead to permanent deficits, loss of a limb and even death. Neurovascular deterioration can occur late after trauma, surgery or cast application

Compromise to the neurovascular status of the limb or suspected compartment syndrome is a surgical emergency and should be immediately referred to Plastic Surgery

Vigilance is required in children who are anaesthetized, sedated, are unable to communicate due to age or disability, and in if the IV cannula is sited in an area with a peripheral neuropathy

Symptom onset may occur many hours after extravasation occurs, so it is important to report and escalate any of the following signs immediately

- Pain
- Sensation
- Motor function
- Perfusion (colour, temperature, capillary refill, swelling, pulses)

Initial Management –

Do not remove the IV device at this stage

- Immediately stop the infusion/injection.
- Assess the grade of injury
- Aspirate as much of the residual drug as possible
- Do not flush the device
- Disconnect administration set or syringe containing drug but retain it to determine amount of drug extravasated/infiltrated
- Escalate to nurse in charge and agree if further escalation to the Plastic Surgery Team is needed in accordance with the guidance in this policy
- Mark and photograph the whole area of extravasation injury on the limb
- An Incident form to be completed by bedside nurse.

Clinical Photography

All extravasations grade C and above must have a clinical photography done either by the Clinical photography team or with a trust registered camera to provide a base line for future observations and treatment.

A consent form for Clinical photography must be completed for each instance of photography.

Clinical images **MUST be transferred** from the digital camera/memory care to the trust Clinical Image database as soon as possible after clinical photograph has been take at Birmingham Children's Hospital so that images and consent can be uploaded.

At the Birmingham women's site any clinical images must be photographed either by the Clinical photographer or if taken on a digital camera they must be sent to Birmingham Children's clinical photography department for uploading for secure keeping.

Once clinical images have been done all images will be erased from the camera or memory stick.

It is important. Unless clinical photography is out of hours, or they are unavailable, clinical photography should be done by a member of the Clinical photography team and design service.

Birmingham Women' hospital clinical photography process now has their own email for clinical photography to be sent across using requests online and can upload the photographs electronically.

The role of the plastic surgery team is to: -

- Assess the extent of an extravasation injury considering the risk level of the drug / fluid infused, the volume infused and time since the extravasation occurred.
- If required, dilute the drug concentration of the drug / fluid in the patient's tissues and facilitate dispersion using multiple incisions and saline irrigation with the drug's own specific antidote or Hyaluronidase (if not contraindicated).
- Decide if surgical intervention is necessary.
- Give advice on the management of the wound and any follow up advice on how to care for the extravasation injury.
- Document a plan in the patient's notes to reduce the risk of further injury / promote healing.
- Decide if surgical intervention is necessary.
- Decide on the most appropriate follow up until the wound is healed.

Extravasation washout procedure

Many drugs have their own antidotes that promote dispersion of the drug and aim to reduce damage caused by the extravasation.

A washout of the drug is with saline
Antidote can be hyaluronidase of other as per protocol/BNF or manufacturers drug information
In the absence of a specific antidote, Hyalourindase may be suitable for infiltration of the wound (check its contraindications first to ensure it can be safely used for the drug involved). Wound infiltration with hyalourindase is time critical and should be carried out within 30 minutes (but can be within 1-hour) of the injury.

Extravasation washout procedure

If plastic surgery team decide to conduct a washout procedure, then the following is a guide to how it will be done **rated** but never if there is a compromise in vascularity or the limb is showing pending compartment syndrome

The volume of the washout should never cause a compartment syndrome and must be adapted to the age and weight of the patient

By Whom

Doctor from the Plastic Surgery Team

Equipment:

Sterile Saline, needle, 5 mL syringe, and local anaesethic may be needed, dressing pack

Procedure:

- Ensure adequate analgesia if needed is given to the baby, child or young person prior to the procedure might need a general anesthetic
- IV/oral plus 1% lignocaine (max 4mg/kg) subcutaneously around zone of extravasation **or** local nerve block
- Use an aseptic technique and clean with antiseptic
- Using needle make multiple vertical punctures 1cm apart around and over the affected area
- Using needle horizontal to skin, infuse sodium chloride 0.9% into the subcutaneous tissue from different angles around the site (360˚).
- Infused saline should appear out of the vertical punctures made prior (Fig. 1). Flushing can be aided by gentle milking of the saline out of exit points
- Infuse additional antidote after normal saline if indicated by class of vesicant
- Cover the wound with a sterile non-stick dressing such as a silicon dressing, review at least six-hourly in the first 24 hours
- Keep limb warm and elevated for 24 hours.
- **the danger of compartment syndrome, must be checked after 1 hour**

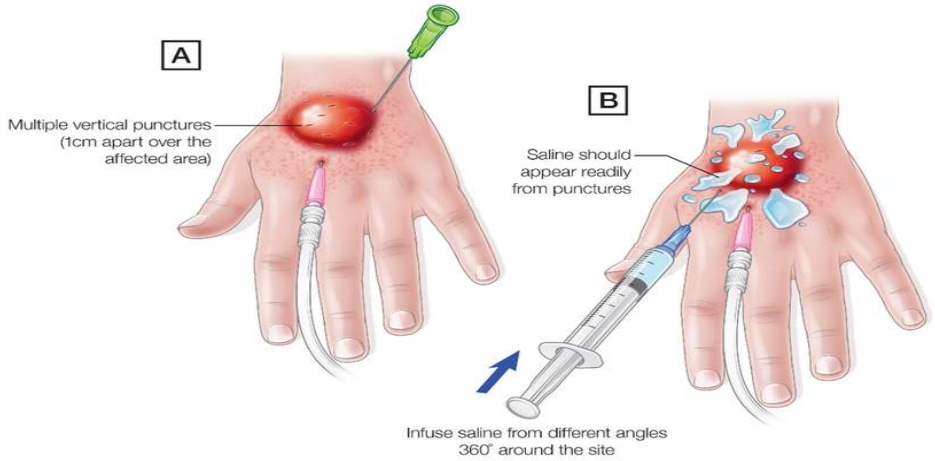
Post Washout Monitoring:

- Record limb observations including colour, capillary refill, pulse, and limb warmth

- Photograph to be taken and stored in patient's notes if out of hours, then clinical photography to upload the picture.

Non-physiological pH agents - No specific antidote, attempts to neutralize pH may worsen the injury

Illustration of saline washout procedure



Post-procedure care and discharge instructions

- Agree a plan with bedside nurse about informing parents
- Consider ongoing analgesia requirements to keep patient comfortable.
- Plastic surgery team to review Grades **C and D or if drug/fluid red rated** injuries within 24 hours to assess the degree of tissue damage and outcome of the irrigation procedure if performed
- Grade A and B injuries should be reviewed daily by medical staff
- Document details in medical record and lodge an incident report via the appropriate system for all extravasation injuries
- If the line was placed by another clinical team inform them of the event.

If the neonate, child, or young person suffers a serious injury from Extravasation or phlebitis, then a **Duty of Candour letter** must be given to the neonate child or young person's family by their medical team.

Hyaluronidase is now stored in the following departments:

BCH Site

R block, F Block theatres, water fall house modular, PICU, Burns and Theatre 8, MHDU, PAU, wards 18 and ward 19, ward 1, ward 10 and the pharmacy out of hour's cupboard.

Documentation

In some cases, signs of extravasation injury may be delayed and will only appear after discharge home. Parents may need to contact the ward for advice or further management.

BWH Site: NNU and the pharmacy out of hour's cupboard.

Education & training

All staff that are responsible for the care of IV devices must complete the extravasation Moodle. This will be repeated 3-yearly.

Process for monitoring compliance with and the effectiveness of the procedural document

Compliance with care standards is monitored through monthly Nursing Care Quality Indicator Audit. Results of which are reviewed via each clinical groups governance meetings. All extravasations reported via the Trust's incident reporting system will be investigated to assess if there were gaps in care and establish lessons learnt. If required these findings will be used to further develop this area of clinical practice.

Standards / key performance indicators

The KPI for all NCQI audits is ≥95% compliance.

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