

Complications of Peripheral Intravenous Therapy

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Purpose

To ensure:

- Timely identification of complications.
- Actions are implemented to avoid complications.
- Best practice interventions to manage complications of IV therapy are upheld.

Scope

All staff and approved persons involved in Intravenous therapy management.

Associated documents

- IV Cannulation Resource Book
- [Roles and Responsibilities: Fluid and Medication](#)
- Medication and Fluid Foundation Programme
- Incident Management Form (Safety 1st)

Responsibilities

The RN/Midwife/EN/MRI/MRT/Anaesthetic Technician responsible for managing or monitoring the patient and/or administering the IV therapy must be aware of the signs and symptoms of:

- Phlebitis / thrombo phlebitis
- Hypervolemia
- Extravasation
- Flare Reactions
- Air Embolism
- Allergic reaction / Anaphylaxis
- Cellulitis
- Infection / Sepsis
- Pressure Injury

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Documentation

Any of the above must be documented in the clinical notes.

This documentation must include:

- Date and time of problem
- What the problem is
- Action taken
- What medical staff have been notified and when.
- If appropriate/indicated, an Incident form must be completed

Common Complications

Phlebitis

Phlebitis is inflammation of one or more layers of the vein. Causative factors are classified as mechanical, chemical, bacterial and post infusion phlebitis and occur when:

- Cannula is too large for vein
- Cannula inserted near a point of flexion initiating movement against vein wall
- Inadequate dressing and securement
- Cannula movement
- Extension set not used
- Properties of drugs and fluids
- Speed and method of infusion delivery
- Length of therapy
- Break in aseptic technique during insertion or routine care.
- Inadequate skin preparation and/or hand hygiene
- Use of contaminated/expired IV solution or medication.
- Post infusion phlebitis can occur up to 24 hours after an infusion has been stopped and the cannula removed

Clinical Signs and Symptoms

- Refer to the VIP score card page 4.
- Note: Thrombophlebitis is associated with VIP stage 4 and 5

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Clinical Signs:

V. I. P. Score (Visual Infusion Phlebitis Score)		VIP score should be evaluated during each shift and documented on the observation chart
I.V. site appears healthy	0	No signs of phlebitis <input type="checkbox"/> OBSERVE CANNULA
One of the following is evident: ● Slight pain near I.V. site or slight redness near I.V. site	1	Possible first signs of phlebitis <input type="checkbox"/> OBSERVE CANNULA
Two of the following are evident: ● Pain near I.V. site ● Erythema ● Swelling	2	Early stage of phlebitis <input type="checkbox"/> RESITE CANNULA
ALL of the following are evident: ● Pain along path of cannula ● Erythema ● Induration	3	Medium stage of phlebitis <input type="checkbox"/> RESITE CANNULA <input type="checkbox"/> CONSIDER TREATMENT
All of the following are evident & extensive: ● Pain along path of cannula ● Erythema ● Induration ● Palpable venous cord	4	Advanced stage of phlebitis or start of thrombophlebitis <input type="checkbox"/> RESITE CANNULA <input type="checkbox"/> CONSIDER TREATMENT
All of the following are evident & extensive: ● Pain along path of cannula ● Erythema ● Induration ● Palpable venous cord ● Pyrexia	5	Advanced stage of thrombophlebitis <input type="checkbox"/> INITIATE TREATMENT <input type="checkbox"/> RESITE CANNULA

Management

- Remove cannula if VIP score 2 or greater
- Apply warm moist compress (i.e. body temperature) to site for 20 mins, 6 hourly for 24 hours as required (non-cytotoxic drugs only)
- Dilute irritating solutions to acceptable dilutions in consultation with pharmacy
- Decrease speed of infusion
- Reinsert new cannula if clinically indicated. Use smallest gauge cannula in largest vein possible (refer to IV cannulation Resource Book)
- Place away from points of flexion
- If VIP score 5, take swab for culture if there is ooze from the site and send along with IV cannula to Canterbury Health Laboratory for culture –Infection section in this document
- Thrombophlebitis may develop at VIP 4 and 5
- Assess insertion site and arm 8 hourly. Elevate if required
- Enter assessment /actions in Patienttrack or clinical notes if Patienttrack not used
- Complete Safety 1st – VIP 5

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Hypervolaemia

Those particularly at risk are:

- The elderly
- Children and infants
- Patients with cardiac or pulmonary disease
- Patients with significant cerebral or renal disease/injury
- Pregnant women

Clinical Signs and Symptoms

- Deteriorating respiratory status – tachypnoea, dyspnoea, decreased oxygen saturations
- Tachycardia.
- Hypertension.
- Raised CVP measurement and distended neck veins.
- Pulmonary oedema may also occur, leading to dyspnoea and cyanosis
- Weight increase >2kg over 24 to 48hrs

Management

- Stop the infusion.
- Notify Medical staff
- Administer treatment as ordered
- Document the above actions and assessments

Extravasation

Extravasation of vesicant drugs / fluids into the tissues is a serious complication and occurs due to:

- Inappropriate site selection at points of flexion – antecubital and wrist
- Vein injury during cannula insertion
- Cannula size too large for the selected vein
- Use of deep veins with insufficient cannula length
- Inadequate securement of the cannula
- Constriction of the vein above infusion site. e.g. clothing, bandages, patient ID bracelet

Note: For Cytotoxic extravasation refer to the Cytotoxic Therapy Section

[Cytotoxic and Biotherapies Resources website](#)

Clinical Signs and Symptoms

- Pain, burning or stinging – may be sudden and severe.
- Pain may be severe if the IV solution is hypertonic (e.g. solutions greater than 5% Dextrose), acid or alkaline

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- Oedema appears as a raised area under the skin near cannula site
- Changes in skin colour- blanching or redness
- Fluid leakage from insertion site
- Blister formation appearing within hours(e.g. contrast media)
- Progression to ulceration

Management

(refer IV cannulation package and link-scroll to extravasation) [Cytotoxic and Biotherapies Resources website](#)

- Immediately stop infusion
- Do not flush the cannula
- Attempt to aspirate drug from the cannula
- Remove the cannula once aspiration is complete
- Do not apply pressure to the area
- Use a skin marker, outline the area with visible signs to allow for assessing changes
- Elevate arm
- Contact pharmacy for advice on appropriate treatment ongoing management of the site in relation to the particular drug extravasation
- Notify medical staff
- Re cannulate the opposite arm
- Site assessment hourly and report changes
- Document actions and assessments
- Ensure there is adequate follow up assessment of the site
- Complete a safety 1st report

Prevention

- Know the property of the drugs/ IV fluids that are being infused
- Avoid cannulating vein at points of flexion
- Ensure the cannula is the appropriate size for the vein
- Ensure the cannula is stabilised to prevent movement and has an extension set attached
- Observe for blood return on aspiration before using cannula
- The insertion site must be visible at all times during administration
- Check cannula site at least hourly or more often if there is any concern during an infusion

Note: the insertion site should never be over an area of flexion. Splints are never to be used

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Flare reactions (transient chemical reaction)

Flare reactions can occur during administration of an irritant drug.

Clinical Signs and Symptoms

Transient venous irritation is marked by:

- Local urticaria
- Stinging
- Oedema
- Inflammation along the track of the vein
- Blood return remains present
- No slowing of the infusion rate

Management

- Discontinue administration of fluids
- Flush the line with 0.9% Sodium Chloride
- Place warm pack over the cannulated vein
- Rest the vein for at least 30 mins
- Use the phlebitis score to assess the site
- When appropriate use a 0.9% Sodium Chloride infusion to check patency of the line and check blood return
- Recommence the medication administration if patent
- Document the above actions and assessments

Air Embolism

Clinical signs and symptoms

- Characterised by abrupt onset of signs and symptoms.
- Sudden dyspnea, cough, wheezing
- Gasp reflex
- Chest and/or shoulder pain
- Agitation, sense of impending doom, tachypnea,
- Tachycardia, hypotension
- Neurological findings consistent with cerebrovascular accident
- Harsh systolic murmur may be present
- Death

Management

If there is evidence that air has entered the vascular compartment:

- Stop the infusion by clamping the line
- Place patient in left trendelenburg position (head down on left side by tipping the bed)

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- Theoretically this action keeps the air in the pulmonary out flow tract to a minimum. Traps air in the right chamber of heart and great veins proximal to the pulmonic valve and may be withdrawn via a central catheter inserted into the ventricle.
- Notify medical staff immediately.
- Administer oxygen
- Hyperbaric treatment may be considered
- Document the above actions and assessments
- Complete safety 1st report

Prevention

- Ensure air is removed from administration set/syringes and the set /syringe has all air purged from the system before attaching to the IV device and commencing infusion/ delivery
- Never leave the rate control fully open unless the fluids are continuously visually monitored, e.g. Resus situation
- Observe the fluid level in the bag frequently and prepare the next prescribed bag when the level is low
- Ensure all connections are tight (Should they be loose, fluid usually leaks out rather than air entering the system)
- Remove air from the side arm reservoir before injection of intravenous drugs.
- Use buretrol/pump, if appropriate.
- Ensure lines are clamped during access device changes

Allergic Reaction / Anaphylaxis

Clinical Signs and Symptoms

Systems that may be involved include:

- Skin producing urticaria
- Respiratory producing bronchospasm
- Oedema
- Cardiovascular producing signs of shock. i.e. Low BP, tachycardia.
- Gastrointestinal producing cramps and diarrhoea

Management

- Cease treatment.
- Implement resuscitation procedures depending on severity
- Notify doctor immediately

Refer to the [Adverse Reactions Identification and Documentation](#) Policy regarding alerts and documentation

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Prevention

It is the responsibility of all staff, (i.e. both the person prescribing and the person administering) to be aware of previous reactions and possible medication interactions.

Cellulitis

Cellulitis is an inflammation of the tissue and occurs when bacteria enter through the insertion site and passes along the extra luminal pathway of the cannula.

Clinical Signs and Symptoms

- Erythema
- Pain
- Tenderness
- Swelling

Management

- Remove cannula
- Re-site cannula in opposite arm. In sever cases a PICC will be necessary to administer prescribed antibiotics
- Antibiotic treatment as ordered by medical team
- Mark site and monitor any deterioration/improvement of site 8 hrly
- Document the above actions and assessments
- Complete Safety 1st report

Infection

Infection can result from cannula insertion or during management and care of a cannula when aseptic non touch technique is not adhered to. It is usually a local infection at the catheter-skin entry point, but may progress on to a HABS!

Clinical Signs and Symptoms

- Redness
- Swelling, localised induration
- Skin discolouration
- Purulent discharge
- Pain
- Sever systemic infection (eg, fever)

Management

- Take swab from insertion site for culture
- Remove cannula and culture
- Clean insertion site with antimicrobial wipe

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- Place sterile dressing over site
- Notify medical staff
- Systemic antibiotics may be necessary
- Monitor site 8 hourly
- Document the above actions and assessments
- Complete Safety 1st report

Pressure Injury: Child Health

Pressure injury is most common in child health.

This generally occurs where the cannula hub and extension connect.

Prevention /Management

- Use padding such as a Hub Guard under the area where the cannula hub and extension set connect to protect the skin.
- Avoid tight taping over the area of the cannula hub. 'Tent' the tape across this area to avoid pressure.
- Monitor site 8 hourly
- Report and document any changes to the area where pressure has occurred
- Complete Safety 1st report

ENSURE THESE ESSENTIAL ELEMENTS ARE COMPLETED DURING CANNULA CARE		
HAND HYGIENE	ANTT	DRESSING INTACT
<ul style="list-style-type: none"> • Do not touch cannula or equipment unless you are compliant with hand hygiene 	<ul style="list-style-type: none"> • During any subsequent interaction with cannula • Protect key parts 	<ul style="list-style-type: none"> • Ensure the dressing is intact at all times. • Replace at 5-7 days if VIP score 0. • Clean site, apply new dressing, and consider use of Cavilon skin protectant to assist with dressing adhesion.
VIP SCORE	CANNULA REQUIRED	ACCESSING CANNULA
<ul style="list-style-type: none"> • Visually check the condition of the cannula site using the VIP score as a measure and document results every shift 	<ul style="list-style-type: none"> • Remove cannula when no longer required or when clinically indicated (following assessment using VIP score) • Replace cannula if VIP score indicates and only if ongoing therapy is require 	<ul style="list-style-type: none"> • Use gloves • Clean access device vigorously chlorhexidine 2% & Alcohol 70% wipe, allow to dry before attaching syringes or IV tubing.
CHECKLIST SUMMARY		
IN USE	DRESSING	VIP Score
<ul style="list-style-type: none"> • Check if in use each shift • Remove when no longer required 	<ul style="list-style-type: none"> • Check intact • Change every 5-7 days 	<ul style="list-style-type: none"> • Check every shift • Replace at VIP score 2 • If VIP score 5- complete safety 1st

Measurement

Clinical Practice Observation Audits
Incident Management System

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Procedure Owner	Nurse Consultant Vascular Access
Procedure Authoriser	Chief Medical Officer & Executive Director of Nursing
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