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 package via Clinical Skills Unit website
- IV Certification package
- Incident Report Form (ref. 1077)

Responsibilities

The RN/Midwife/EN responsible for managing or monitoring the patient and/or administering the IV therapy must be aware of the signs and symptoms of:
- Allergic reaction / Anaphylaxis
- Phlebitis (Place in link from IV section here)
- Hypervolemia
- Extravasation
- Flare Reactions
- Air Embolism
- Infection / Sepsis
- Cellulitis
**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**

An inflammation of one or more layers of the vein.

<table>
<thead>
<tr>
<th>Mechanical Phlebitis (irritation by catheter)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Possible Causes</strong></td>
</tr>
<tr>
<td>Cannula too large for vein</td>
</tr>
<tr>
<td>Cannula inserted near a joint, creating piston motion against vein wall when patient moves</td>
</tr>
<tr>
<td>Inadequate dressing and securement</td>
</tr>
<tr>
<td>Discuss with doctor or IV Certificated nurse /midwife, IV Link Staff nurse cannulator or senior nursing staff member</td>
</tr>
<tr>
<td>Document the above actions and assessments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Phlebitis (irritation by IV medications or fluids)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Possible Causes</strong></td>
</tr>
<tr>
<td>Infusion Alkaline solutions: - e.g. acyclovir, azathioprine, ganciclovir, phenytoin or Acid solutions - vancomycin, thiamine, glucagon, cyclizine, haloperidol</td>
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<tr>
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<td></td>
</tr>
</tbody>
</table>
- Infusion of hyper/hypotonic solutions (link to IV certification package)
- Speed and method of infusion delivery

- Dilute irritating solutions to acceptable dilutions in consultation with pharmacy
- Decrease infusion rate
- Discuss with doctor or IV Certificated nurse/midwife, IV Link Staff nurse cannulator or senior nursing staff member
- Document the above actions and assessments

### Bacterial Phlebitis (irritation by bacteria or bacterial toxins)

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break in aseptic technique during insertion or routine care.</td>
<td>Remove IV cannula and reinsert appropriate vascular access device in new location.</td>
</tr>
<tr>
<td>Inadequate skin preparation and/or hand hygiene</td>
<td>Send IV cannula to Canterbury Health Laboratory for culture, if inflammation or sepsis is suspected. (refer to IV cannulation package for identification of bacterial infection)</td>
</tr>
<tr>
<td>Use of contaminated/expired IV solution or medication.</td>
<td>Obtain swab for culture if there is ooze from the site.</td>
</tr>
<tr>
<td>Cannula remaining in situ past date of expiry (refer to IV cannulation package)</td>
<td>Apply warm moist compress (ie. body temperature) to site for 20 mins, 6 hourly for 24 hours (non cytotoxic drugs only)</td>
</tr>
<tr>
<td></td>
<td>Discuss with doctor for ongoing management</td>
</tr>
<tr>
<td></td>
<td>Document the above actions and assessments</td>
</tr>
</tbody>
</table>

### 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 complication that can occur due to:
- Vein injury during cannula insertion
- Too large a cannula for the vein
- Cannula dislodgement during infusion
- Inadequate securement of the cannula
- Constriction of the vein above infusion site, e.g. clothing, patient ID bracelet

**Note:** For Cytotoxic extravasation refer to the Cytotoxic Therapy Section *(place link here)*

**Signs and symptoms**
- Swelling
- Burning and or pain at the insertion site. Pain may be severe if the IV solution is hypertonic (e.g. solutions greater than 5% Dextrose), acid or alkaline
- Slowing of the infusion rate
- Lack of blood return from cannula

**Management** *(refer IV cannulation package/Cytotoxic Website for the Extravasation Management Flowchart)*
- Do not flush the line
- Attempt to aspirate drug from the cannula
- Remove the cannula once aspiration is complete
- Notify medical staff
• Contact pharmacy regarding the ongoing management of the site in relation to the particular drug extravasation
• Re cannulate away from the affected area
• Document the above actions and assessments
• Ensure there is adequate follow up assessment of the site

Prevention
• Ensure the cannula is the appropriate size and well secured
• Blood return on aspiration is observed before flushing 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

Flare reactions (transient chemical phlebitis)
Flare reactions can occur during administration of a drug.

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
• 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
• Recomence 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.
- Loss of consciousness
- Focal seizures
- Complete collapse
- Loud murmur over heart on auscultation
- Death

Management

If there is evidence that considerable 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)
- 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

Prevention

- Ensure air is removed from administration set and the set is primed with the infusion fluid before commencing infusion
- Never leave the rate control fully open unless the fluids are continuously visually monitored, eg. 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 of a buretrol/pump, if appropriate.
- Ensure lines are clamped during luer plug 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 Policy Vol 12 regarding alerts and documentation

Prevention
- It is the responsibility of all staff, ie. 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 whereas phlebitis is an inflammation of the vein

Clinical signs and symptoms
- Erythema
- Pain
- Tenderness
- Swelling

Management
- The cannula does not necessary require removal
• Antibiotic treatment as ordered by medical team
• Mark the site and monitor any deterioration/improvement of site 8 hrly
• Document the above actions and assessments

Infection

Infection can be the result of cannula insertion or during management and care of a cannula when aspetic non touch technique is not adhered to. It is usually a local infection at the catheter-skin entry point. Infection can also be the result of unresolver phlebitis.

Clinical signs and symptoms

• Redness
• Swelling
• Skin discolouration
• Purulent discharge
• Pain

Management

• Take swab from insertion site for culture
• Clean insertion site with antimicrobial wipe before removing cannula
• Remove cannula and culture
• Place sterile dressing over site
• Notify medical staff
• Systemic antibiotics may be necessary
• Monitor site 8 hourly
• Document the above actions and assessments

Measurement/Evaluation

Canterbury and West Coast IV Clinical Practice Observation Audits – Peripheral IV audit
Incident Management System

References

• INS Standards of Infusion Practice 2011
- CDC Guidelines for the Prevention of Intravascular catheter-related infections 2011

<table>
<thead>
<tr>
<th>Procedure Owner</th>
<th>Professional Developmental IV Nurse Educator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure Authoriser</td>
<td>Chief Medical Officer &amp; Executive Director of Nursing</td>
</tr>
<tr>
<td>Date of Authorisation</td>
<td>15 December 2015</td>
</tr>
</tbody>
</table>