Purpose
To identify standards of practice related to care and maintenance of Implanted Vascular Access Devices (IVAD).

Policy Statement
At Covenant Health facilities, IVADs are inserted by an interventional radiologist / surgeon under local or general anaesthetic. Full barrier precautions must be observed during the insertion. An x-ray is done post insertion to confirm proper placement of IVAD, and to rule out pneumothorax.

Patient consent is required for IVAD insertion.

Qualified staff who access/de-access IVAD catheters must demonstrate competence prior to independently performing this skill. Only non-coring needles will be used to access IVADs.

Blood return must be observed prior to the infusion of solution/medication via an IVAD.

Applicability
This policy and procedure is applicable to Covenant Health physicians/clinicians who insert IVADs and patient care provider staff.

Responsibility
Patient care provider staff shall demonstrate compliance with this policy/procedure by ensuring that they have demonstrated competency when accessing/de-accessing

Physicians/clinicians shall demonstrate compliance with full barrier precautions when inserting IVADs

Principles
An Implantable Venous Access Device (IVAD) is inserted for the following reasons:

- exhausted or poor peripheral venous access
- patients who require long term IV therapy (chemotherapy agents, blood products, IV fluids, or antibiotics).
- frequent blood sampling
- infusion of hyperosmolar solutions
- infusion of vesicant / irritant drugs

Advantages of an IVAD:

- It is aesthetically more appealing to the patient since there is no catheter exiting the skin to act as a constant reminder of its presence.
- There is less chance of infection as the device does not exit the body onto the skin of the chest.
There are no exposed parts outside the body (when it is not in use) which can be subjected to damage or dislodgement, as with other venous access catheters. When in use the needle could be considered outside of the body and can become dislodged.

With this device, the patient is able to shower normally and maintain his routine lifestyle when the IVAD is not in use (swimming / non-contact sports).

It decreases patient discomfort and anxiety by avoiding repetitive and often difficult peripheral venipuncture.

Ideal for patients requiring long term intermittent (several weeks between IV treatments) therapy

Disadvantages of IVADs:

- Non-coring needle access required. Damage to device if coring needle is used
- Less suitable for frequent repeated access.
- Displacement of needle possible.
- Minor surgical procedure to place and remove.

Procedure

see attached

Definitions

For the purpose of this policy and procedure:

*Scrub the hub means:* Each time the injection cap is entered it must be cleaned with an alcohol or chlorhexidine/alcohol wipe. Scrub the injection cap with the wipe for 15 seconds using friction and allow the solution to dry.
Related Documents / Resources

See “Resources” listed with this policy at http://www.compassionnet.ca/Policies.asp
Hold down the Ctrl F keys and search for ‘IVAD’

References

Healthmark Ltd. Personal correspondence from Bill Kroesen regarding citrate 4% flush.
January 11, 2013.

January 25, 2013 – personal correspondence from Dr. Artur Szkotak, MD, PhD, FRCPC, Assistant Professor, Division of Hematopathology, Dept of Laboratory Medicine and Pathology, University of Alberta Laboratory Services, Alberta Health Services. 4B2.19 Walter C. Mackenzie Health Sciences Centre, 8440-112 Street NW, Edmonton, AB T6G 2B7


Revisions N/A
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1.0 GENERAL INFORMATION

1.1 An IVAD is a small infusion port with an attached catheter which is surgically implanted under the skin for the purpose of providing access into a blood vessel. IVADs are commonly referred to as ports. To use the device, the port body is palpated and accessed with a non-coring needle.

1.2 IVADs are made of titanium or plastics, and can remain in situ for many years. The port septum accommodates a non-coring needle. The use of non-coring needles is critical to the success of the device as a coring needle would damage the port septum. The IVAD septum can tolerate from 750 to up to 2000 punctures with a non-coring needle.

1.3 The IVAD port body is placed infraclavicular in subcutaneous tissue. The IVAD catheter is then tunnelled and placed in the jugular or subclavian vein, with the tip located at the junction of the superior vena cava and right atrium. Blood specimens can also be drawn from the device.

1.4 IVADs may be single or dual lumen, and non-power injectable or power injectable. Power injectable ports allow for the infusion of contrast at high pressure directly through the port septum. This negates the need for a peripheral IV during a contrast enhanced CT scan. Power injectable IVADs may be identified by chest radiograph, as manufactures will insert radio-opaque identification marks on the device. They also can be identified by palpation depending of the product manufacturer, and by the product identification tools that are given to the patient after insertion.

1.5 **Scrub the hub**: Each time the injection cap is entered it must be cleaned with an alcohol or chlorhexidine/alcohol wipe. Scrub the injection cap with the wipe for 15 seconds using friction and allow the solution to dry.
2.0 INSERTION

2.1 Pre-insertion Instructions provided by both nursing and person inserting IVAD prior to insertion

2.1.1 Provide patient teaching about the IVAD as required. Teaching should include the insertion procedure; care and maintenance of the IVAD; and potential complications and what action to take if they occur.

2.1.2 Advise patients not to play or fidget with the port (Twiddler’s syndrome) to prevent the port from being damaged by manipulation.

2.1.3 Informed consent is obtained by the most responsible health care practitioner, who is usually the person inserting the IVAD.

2.1.4 The patient will have two incisions on the upper chest on the side the IVAD is inserted. The one incision will be over where the catheter enters the vein, called the ‘insertion site’ and one above or near where the port has been situated. The steristrips or sutures at these sites will be removed as ordered by the physician (usually within one to two weeks).

2.2 Post-insertion Instructions

2.2.1 Monitor incision sites for bleeding and replace with dry sterile gauze if bleeding is observed. Once bleeding stops, the gauze may be replaced and the site should be checked regularly.

2.2.2 Monitor vital signs as per post-op routine/patient care order.

2.2.3 Do NOT access the IVAD unless clearly ordered by the physician who inserted the device. Slight edema and tenderness are usually present around the port implantation site, and the physician may wait a few days for accessing the port for this reason.

3.0 PROCEDURE: ACCESSING THE IVAD

Demonstrated competency is required prior to independently accessing the IVAD – contact your educator.

3.1 A special non-coring needle must be used for accessing the IVAD. This type of needle has a bevel which prevents coring of the septum.

3.2 The port is accessed by inserting a special non-coring needle through the skin and port septum into the port reservoir. Insertion of the needle is usually not painful, but if the area is tender topical anaesthetic cream can be applied to the skins’ surface and
covered with a transparent dressing at least one hour prior to insertion for increased comfort. See PPCO at http://www.compassionnet.ca/Policies.asp (hold down the Ctrl F keys and search for ‘IVAD’ – see Resources).

3.3 The needles are designed in straight and right angle versions, or as a needle set with an attached extension tubing and clamp. All non-coring needles in use must be safety engineered devices.

3.4 Every time an injection cap/tubing set is accessed, perform hand hygiene, wear protective gloves and scrub the hub (injection caps or secondary ports on IV tubing)

3.5 Insertion of Non-coring needle into IVAD

3.5.1 Clean the surfaces that you will be using to place your equipment on with a hospital approved disinfectant and allow solution to dry.

Equipment for initiation:

- dressing tray
- 1-2% chlorhexidine - 70% alcohol swabsticks
- Noncoring needle - appropriate length as per depth of IVAD (most common is ¾ inch 20 gauge adults)
- transparent dressing (10 cm x 12 cm)
- tape
- injection cap and 2 blunt cannula if required
- 10mL prefilled normal saline (more if desired)
- Empty 10 mL syringe
- sterile gloves
- mask
- 10 mL syringe filled with 5 mL heparin lock solution (10 u/mL) if planning to heparin lock the line instead of maintaining a continuous infusion **OR USE**
- 5 mL of sodium citrate 4% in a 10 mL syringe (available summer 2013)

3.5.2 Perform hand hygiene and put on mask.

3.5.3 Explain procedure, locate IVAD septum by palpation.

3.5.4 Cleanse skin over IVAD with chlorhexidine-alcohol swabsticks by moving in a back and forth motion using friction, for at least 30 seconds. Cleanse from the anticipated puncture site outward and use the other side of the swab stick to cleanse again to cover a 10 cm diameter. Time and friction are required for effective skin antisepsis. Allow solution to dry. Video shows back and forth movement, and anticipated insertion site outward. See videos at [http://www.compassionnet.ca/Policies.asp](http://www.compassionnet.ca/Policies.asp) (hold down the Ctrl F keys and search for ‘IVAD’ – see Resources).

3.5.5 Using aseptic technique, place/drop equipment onto sterile dressing tray/field while chlorhexidine alcohol solution on skin is drying.

3.5.6 Perform hand hygiene and put on sterile gloves. Attach an injection cap to the non-coring needle extension tubing. If using interlink injection cap, attach the blunt cannula to prefilled saline syringe. Use saline to pre-fill the extension tubing.

3.5.7 Close clamp on extension tubing and leave syringe attached to the extension.

3.5.8 Locate port body by palpating it under the skin using fingers and thumb of the non-dominant hand. Holding port securely between the fingers, gently push the non-coring needle in at a 90° angle into the port septum until you feel it hit the ‘needle stop’ at the back of the port body.

Do not tilt or rock the non-coring needle as this may burr the needle tip and cause damage to the IVAD septum upon removal and may lead to leaking of the infusate.

3.5.9 Undo the clamp and flush the port with 1–2 mL using the attached 10 mL NS syringe. Then aspirate to check for blood return - when blood return is observed, continue to flush the NS using positive pulsating pressure. **If you meet resistance, notice swelling at the site, or patient experiences pain with flushing Stop! Do not flush against resistance.**
### Unable to flush

<table>
<thead>
<tr>
<th>Unable to flush</th>
<th>Unable to aspirate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove non-coring needle and replace with new non-coring needle. Sterile field and technique must be maintained. Attempt to flush with new needle.</td>
<td>Ensure clamp is open. Patient changes position, performs Valsalva or coughs and aspiration attempted again. Ensure needle tip has stopped at back of port.</td>
</tr>
<tr>
<td>Notify physician that IVAD occluded. 1. Consider attempts to restore patency to IVAD as outlined in the procedure for restoring patency to Central venous access devices</td>
<td>Remove non-coring needle and replace with new non-coring needle. Sterile field and technique must be maintained. Aspiration attempted.</td>
</tr>
</tbody>
</table>

3.5.10 After flushing with NS, clamp the extension tubing and remove the syringe. If continuous infusion ordered scrub the hub and attach primed IV line using a luer needleless connector. Open clamps and begin infusion. Video shows correct technique and time for cleansing injection port. See video at [http://www.compassionnet.ca/Policies.asp](http://www.compassionnet.ca/Policies.asp) (hold down the Ctrl F keys and search for ‘IVAD’ – see Resources).

3.5.11 If heparin/sodium citrate locking IVAD, scrub the hub of the injection cap, open clamp and inject 5 mL lock solution using a 10 mL syringe, using positive pulse pressure. Clamp the extension when the last 0.5 mL is being injected to maintain positive pressure within the IVAD.

3.5.12 Ensure the foam cushioning of the non-coring needle base is flush with the skin over the IVAD. If not, place sterile gauze in a way to support the wings (if applicable) of the non-coring needle. Do not obscure or cover the needle-skin insertion site.
3.5.13 Cover the non-coring needle with transparent dressing (approximate size 10 cm x 12 cm) and anchor the catheter tubing to the patient’s skin with tape to avoid tension on the needle and extension set.

3.5.14 Change dressing prn and with needle changes.

4.0 Intermittent Medication Administration

4.1 Each time the injection cap is entered scrub the hub of the injection cap. Aspirate for blood return, then to maintain the patency of IVADs with indwelling needles that locked between medications follow the SASH method:

- **S**aline to assess catheter resistance to flushing - see 3.5.9
- **A**dministration of solution/medication
- **S**aline to flush medication out of catheter – see 3.5.9
- **H**eparin Lock to maintain patency between medication - see 3.5.11

4.2 Note: Patients who have double lumen IVADs may have both lumens accessed. The procedure is repeated for each lumen.

5.0 PATIENT TEACHING

Instruct patient to notify nurse if:

5.1 Port looks to be in different place and does not feel secure (moves easily). The port body can flip if patient manipulates or plays with the port or if the port is not sutured in place.

5.2 There is swelling, stinging or burning around portal when flushing or when medication is infusing. (Non-coring needle may be in or out of port or catheter may be disconnected from port body or port body is fractured.)

5.3 Erythema (redness), edema (swelling), or pain around the port or with infusion.
6.0 PROCEDURE: Locking IVAD and Discontinuing Non-coring Needle

Demonstrated competency is required prior to independently discontinuing non-coring needle – contact your educator.

6.1 Perform hand hygiene and apply protective gloves. Scrub the hub each time the injection cap is entered.

6.2 Once the infusion is complete, scrub the hub of the injection cap and flush the line with at least 10 mL of NS. Close clamp on extension tubing as you inject the last 0.5 mL of NS.

6.3 Scrub the hub of the injection cap and attach the 10 mL syringe (filled with 5 mL of lock solution- heparin 100 units/mL OR sodium citrate 4% 5 mL) to the extension tubing.

6.4 Open the clamp on the extension tubing and inject lock solution using positive pulsating pressure.

6.5 As the last 0.5 mL is injected, close the clamp on the extension tubing.

6.6 Remove the transparent dressing noting any drainage, redness or swelling.

6.7 While stabilizing the port with your thumb and finger of your non-dominant hand, remove the non-coring needle while activating the safety mechanism if appropriate. Refer to the “Resources” section in the policy for link to poster for needle instruction for activating safety mechanism.

6.8 Apply pressure to insertion site with a sterile 5 cm x 5 cm gauze for 1-2 minutes.

6.9 Apply dry gauze dressing, or bandage if desired.

7.0 PROCEDURE: MAINTAINING PATENCY OF IVAD THAT HAS BEEN DORMANT FOR FOUR WEEKS

7.1 Refer to section 3.5 to 3.5.9 procedure to insert non-coring needle. Insert needle, flush with NS and lock with 5 mL heparin lock solution 100 units/mL or sodium citrate 4% 5mL. Remove needle as outlined in section 6.3 to 6.9.
8.0 DOCUMENTATION

8.1 Patient Care Record
* insertion - time, site, by whom, any complications
* integrity of site
* complications of IVAD
* status of infusion (continuous or intermittent)
* dressing changes, observation of insertion site
* non-coring needle change (q week)

8.2 Infusion Therapy Record
* nature of infusion - volume and type of solution
* initiation and discontinuation of therapy

8.3 Medication Administration Record
* locking solution
* medications/solutions

8.4 Kardex
* dates of planned equipment changes;

Blood specimen collection from IVAD
Only qualified staff who have obtained a Specialized Clinical Competency in Central Line Blood collection may obtain specimens from IVAD

Refer to Covenant Health Policy #VII-B-300, Central Venous Catheter - Blood Collection for instructions
<table>
<thead>
<tr>
<th>COMPLICATIONS</th>
<th>SIGNS / SYMPTOMS</th>
<th>ACTION</th>
<th>PREVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR EMBOLI</td>
<td>coughing, chest pain, respiratory distress, shortness of breath</td>
<td>clamp or pinch off extension tubing between damaged area and needle insertion point</td>
<td>Always keep extension tubing clamped when not in use.</td>
</tr>
<tr>
<td></td>
<td>cyanosis</td>
<td>patient to lie on left side in Trendelenberg position</td>
<td>Always clamp extension tubing before disconnecting from a continuous infusion, or removing the injection cap. Have patient perform Valsalva manoeuvre.</td>
</tr>
<tr>
<td></td>
<td>unconsciousness</td>
<td>begin resuscitation procedure if required. Notify physician. Administer O₂, monitor vital signs.</td>
<td>Remove all air from tubing and syringes.</td>
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<td></td>
<td></td>
<td></td>
<td>Use luer lock connections - ensure they are tight.</td>
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<td></td>
<td></td>
<td></td>
<td>Have non-toothed clamp available.</td>
</tr>
<tr>
<td>THROMBOSIS</td>
<td>upper chest pain, jaw pain, ear ache</td>
<td>do not use catheter</td>
<td>Monitor for signs and symptoms and report.</td>
</tr>
<tr>
<td></td>
<td>swelling of arm, neck, and shoulder on same side as catheter</td>
<td>notify physician immediately</td>
<td>Insert smallest catheter possible to deliver the therapy, minimize endothelial trauma</td>
</tr>
<tr>
<td></td>
<td>sluggish flow of IV solution</td>
<td></td>
<td>Ensure optimal tip position</td>
</tr>
<tr>
<td>CATHETER OCCLUSION OR PARTIAL OCCLUSION</td>
<td>unable to inject or infuse solution</td>
<td>do NOT apply force when flushing</td>
<td>Use positive pulsing pressure when flushing and locking IVAD.</td>
</tr>
<tr>
<td></td>
<td>leaking of fluid or blood from insertion site</td>
<td>remove non-coring needle if unable to flush and insert a new non-coring needle - attempt to flush line</td>
<td>Clamp catheter when not in use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>if unable to do so, contact the physician immediately</td>
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<tr>
<td></td>
<td></td>
<td>Get order to restore patency using Alteplase as per procedure</td>
<td></td>
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<tr>
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<td>SIGNS / SYMPTOMS</td>
<td>ACTION</td>
<td>PREVENTION</td>
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<tr>
<td>DAMAGED CATHETER (port may separate from catheter)</td>
<td>swelling or discomfort of chest area</td>
<td>clamp extension tubing immediately</td>
<td>Use 10 mL syringes or large barrel syringes when flushing with NS.</td>
</tr>
<tr>
<td></td>
<td>a complete separation or breakage can result in an emboli - causing the sudden onset of chest pain or shortness of breath</td>
<td>notify the physician</td>
<td>Use 10 mL syringes when locking with 5 mL locking solution. (By following the above techniques, the pressure is minimized on the catheter.)</td>
</tr>
<tr>
<td></td>
<td>if experiencing chest pain, monitor closely V/S, need for O₂, begin resuscitation if required</td>
<td></td>
<td>Never use force when flushing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclamp extension tubing before flushing.</td>
</tr>
<tr>
<td>HEMOTHORAX PNEUMOTHORAX</td>
<td>mild to severe dyspnea and/or chest pain</td>
<td>notify physician immediately</td>
<td>Occurs inadvertently during insertion.</td>
</tr>
<tr>
<td></td>
<td>delayed symptoms include tachycardia, hypotension, cyanosis, diaphoresis, and hemoptysis</td>
<td></td>
<td>X-ray will determine if pneumothorax occurred at time of insertion.</td>
</tr>
<tr>
<td>PERICARDIAL TAMponade</td>
<td>hypotension</td>
<td>notify physician immediately</td>
<td>Occurs inadvertently during insertion.</td>
</tr>
<tr>
<td></td>
<td>neck vein distension</td>
<td>begin resuscitation if required</td>
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</tr>
<tr>
<td>SUPERIOR VENA CAVA SYNDROME</td>
<td>progressive shortness of breath, dyspnea, cough, chest skin tightness; unilateral edema, cyanosis of face, neck, shoulders and arms; jugular, temporal and arm vein distension</td>
<td>notify physician immediately at first signs and symptoms</td>
<td>Monitor for signs and symptoms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>place in semi-Fowlers position and start oxygen at 2 L/min.</td>
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<td>provide emotional support</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>monitor cardiovascular and neurologic status</td>
<td></td>
</tr>
<tr>
<td>CATHETER PINCH-OFF SYNDROME (when catheter is inserted via the subclavian site and is compressed by the clavicle and first rib) with patient movement</td>
<td>intermittent catheter occlusion that is relieved by postural change</td>
<td>notify physician</td>
<td>Can be prevented by inserting catheter into the subclavian vein more laterally or using jugular insertion site</td>
</tr>
<tr>
<td></td>
<td>weak point on the catheter “balloon out” on X-ray</td>
<td>do not use catheter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>difficult to aspirate blood or aspiration may be dependent upon patient position</td>
<td>x-ray confirmation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>resistance to flushing or infusion or infusion may be positional</td>
<td>contrast dye study via catheter to rule out partial transection of catheter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- intraclavicular pain</td>
<td>can result in complete or partial catheter transection and catheter embolization</td>
<td></td>
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<tr>
<td></td>
<td>- palpitation, chest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPLICATIONS</td>
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</tr>
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<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>INFECTION</td>
<td>• erythema, pain, warmth, edema around IVAD insertion site&lt;br&gt;• dressing wet with pus, blood or fluid&lt;br&gt;• fever and chills&lt;br&gt;• generalized malaise</td>
<td>• do not use catheter&lt;br&gt;• notify physician immediately</td>
<td>• perform hand hygiene before handling catheter or equipment.&lt;br&gt;• Strict aseptic technique.&lt;br&gt;• Change dressings and equipment according to procedure and when necessary; i.e. soiled, loose, contaminated.</td>
</tr>
<tr>
<td>MALPOSITION</td>
<td>• difficulty with aspiration or infusion&lt;br&gt;• discomfort in neck or arm&lt;br&gt;• edema of neck or shoulder&lt;br&gt;• ear “gurgling” sound described during infusion&lt;br&gt;• arrhythmias (if in right atrium)</td>
<td>• do not use catheter&lt;br&gt;• inform physician so that chest X-ray can be done</td>
<td>• Monitor IVAD placement and ensure the IVAD is secure under the skin (and not easily displaced)</td>
</tr>
<tr>
<td>EXTRAVASATION (port may disconnect from catheter or the non-coring needle is not securely within the IVAD)</td>
<td>➢ difficulty flushing port&lt;br&gt;➢ swelling and tenderness with IVAD site&lt;br&gt;➢ discomfort with flushing</td>
<td>➢ do not use catheter&lt;br&gt;➢ inform physician</td>
<td>➢ Monitor for S&amp;S and report.&lt;br&gt;➢ Follow procedure properly for inserting the non-coring needle - ensuring you have aspirated for blood so you know you are within the port.&lt;br&gt;➢ Use appropriate non-coring needle length for the patient.</td>
</tr>
<tr>
<td>DISLODGE OF PORT WITHIN THE SUBCUTANEOUS POCKET</td>
<td>➢ port moves easily under the skin&lt;br&gt;➢ resistance when attempting to infuse into the port&lt;br&gt;➢ swelling may occur at the site</td>
<td>➢ notify physician immediately</td>
<td>➢ Avoid trauma to IVAD site.&lt;br&gt;➢ Patient should be reminded not to manipulate the port. <strong>This is called Twiddler’s Syndrome</strong> - in which the patient tends to play/fidget with the port because it protrudes from under the skin.</td>
</tr>
</tbody>
</table>