Totally Implantable Vascular Access Device (TIVAD)/ Implantable port Management

Self-Directed Learning Package
February 2015

NSW GOVERNMENT Health
Hunter New England Local Health District

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SDLP Overview

Author/s:
Prepared by
Peter Cocking - CNC Wound Management, Intravenous and Enteral/Parenteral Therapy
Pauline Dobson CNC HIV/AIDS, Immunology & Infectious Diseases Unit

Peer reviewed by: Area intravenous vascular access group, HNELHD vascular clinicians

Date of Peer review:

Purpose: *This Totally implantable vascular device (TIVAD)/ Port-a-Cath® - insertion and removal of a non-coring needle insertion package aims to provide instruction to Medical Officers (MO), Registered Nurses (RN) and Registered Midwives (RM) who are seeking competence in the skill of insertion of non-coring needle. This is a pre-requisite to being taught to insert a non-coring needle tube.*

Date for Learning Package Review: November 2017
The learning package is to be reviewed every 3 years or earlier if changes in NSW Health or HNELHD policy or clinical practice change.

Acknowledgements:
Hayley Ford

Contact details:
CNC wound management, IV and enteral/parenteral
peter.cocking@hnehealth.nsw.gov.au

Introduction

Introduction

The information covered in this package is specific to the insertion, removal of a non-coring needle and management of a totally implantable vascular access device in adult patients (>16yrs). The successful completion of this package will require you to undertake the prescribed reading and complete the associated learning activities. The reading activities within this Self Directed Learning Package (SDLP) are identified at the end of the package. Readings, activities and guidelines are hyperlinked throughout this package and require you to click on the link to access them. Upon completion of the package there is a post-test to measure comprehension of the principles and procedures that have been addressed. If you are unable to answer a question reread that section again.

Disclaimer

This learning package has been prepared by health professionals employed in Hunter New England Local Health District at John Hunter Hospital. While all care has been taken to ensure that the information is accurate at the time of development, the authors recommend that all information is thoroughly checked before use if utilised by another unit, context or organisation.

Aim

The totally implantable vascular access device (TIVAD)/ implantable port - management package aims to provide instruction to MO, RN and RM who are seeking competence in the skill of insertion and removal of a non-coring needle.

Learning Outcomes

Completion of this learning package will enable the clinician to fulfil the related TIVAD insertion competencies, and therefore demonstrate an understanding of the following:

1. Related anatomy/physiology
2. TIVAD's / implantable ports
3. Accessing the port
4. De-accessing the port
5. Maintenance of a port
6. Post-operative management
7. Potential complications
8. Patient/carer education
9. Related issues
10. Problem based questions

Pre-requisites

In order to complete this package the clinician must have met the following requirement:

- Be fully aware of the relevant policies and guidelines relating to central venous catheters and TIVAD / implantable ports
    - *Hunter New England Health* Guidelines - Central Venous Catheter (CVC) – Adult. Document Registration Number: HNELHN GandP 11_02 http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0009/79344/HNELHN_GandP_11_02_Central_Venous_Catheter.pdf
    - HNELHD GandP 13_11 Totally Implantable Vascular Access Device (TIVAD)/ Port-a-Cath® - insertion and removal of a non coring needle and management, (hyperlink) guideline and procedure.

Learning Package Outline

The package is designed to be a self-directed learning experience that will guide you through the literature and clinical issues related to insertion and removal of a non-coring needle.

This package is developed within an adult learning framework so not all activities need to be documented but it is expected that you will complete them in order to facilitate your learning.

On completion and submission of this learning package a record of your completion will be added to your professional development record in MYLINK and you will be credited with continuing professional development (CPD) 2 of hours.

Problem based learning

This program is based on a problem-based approach to learning. This approach has been chosen to enhance critical thinking, and to create a body of knowledge that the clinician can apply to practice. Problem based learning (PBL) is characterised by the use of patient specific problems or situations as a context for developing problem-solving skills and for acquiring clinical knowledge.

How to use this resource or Instructions for participants

- It is anticipated that you will be able to complete the theoretical component of this package in 2 hours.
- Completion of this package is equivalent to Continuing Professional Development (CPD) 2 hours which is a requirement for National Registration. A certificate identifying 2 CPD hours will be given on the successful completion of the package.
- At the completion of this learning package you are asked to complete questions or a problem based scenario related to the topic.
- There is a suggested reference list and it is by no means complete. Please read widely to facilitate your learning.
- This resource has been written from a Hunter New England Local Health District perspective so it is not specific to any one health facility.
- Throughout this self-directed learning package there are readings and activities that you will need to complete. You can access the readings online (journal articles) through CIAP. The online readings are not provided within this document due to copyright law restrictions. You will be provided with information on how to access the online readings. If you have any difficulty locating the readings please seek assistance from your hospital / health facility library.

Assessment process

The clinician needs to:

- Complete and submit the SDLP for Totally implantable vascular device (TIVAD)/ implantable port management package
- Observe at least one non-coring needle insertion and removal
- Be supervised by a person skilled in inserting non-coring needle until they are

deemed competent and they feel confident in the procedure. Competency tool appendix 1

- Once the requirements are completed, notify your working supervisor to update your scope of practice.

Students undertaking insertion of a non-coring needle are to be supervised at all times by a clinician with expertise in the procedure.

Recognition of prior learning (RPL)

Where a clinician can demonstrate prior experience and skills in accessing and de-accessing of a TIVAD, modification of the credentialing process can include the following:

1. Be fully aware of the relevant policies and guidelines relating to central venous catheters and TIVAD / implantable ports

Hunter New England Health Guidelines - Central Venous Catheter (CVC) – Adult. Document Registration Number: HNELHN GandP 11_02
http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0009/79344/HNELHN_GandP_11_02_Central_Venous_Catheter.pdf
HNELHD GandP 13_11 Totally Implantable Vascular Access Device (TIVAD)/ Port-a-Cath® - insertion and removal of a non coring needle and management, (hyperlink) guideline and procedure.

And

2. Completion of online knowledge assessment and one observed accessing and de-accessing of a TIVAD in adult.

Maintenance of skills/proficiency

Clinicians who have completed all phases of the TIVAD maintenance program or have had RPL have a professional responsibility to maintain skills and seek learning opportunities when they no longer feel confident or have identified learning needs.

To enable this, the online knowledge assessment can be repeated as often as required. In addition use of the simulation labs and /or dummy chest can be accessed.

Principles of accessing and de-accessing of a TIVAD or port

Verify correct patient, procedure and site
You must verify the correct patient by confirming full name, date of birth and a 3rd identifier such as MRN with the patient and against the health care record. Then verify the correct procedure is being performed on the correct site. A NSW Health Procedural Safety Checklist must be completed.

Obtain patients consent
You must obtain consent before accessing and de-accessing of a TIVAD. Verbal consent is sufficient, but it must be voluntary and informed. This must be documented in the progress notes.

The only circumstances where consent is not required is in an emergency, or if the person is unconscious.

Guard against infection
Any organism which is present on the skin during accessing and de-accessing a TIVAD may be introduced into the bloodstream and cause infection.

The most effective method of protecting against infection during accessing and de-accessing a TIVAD is by ensuring disinfection for both the TIVAD site and the clinician using hand hygiene and a sterile aseptic technique.

Never make more than 2 attempts in accessing a TIVAD
If you cannot access a TIVAD on the 1st or 2nd attempt, seek help from a clinician who is experienced in accessing a TIVAD.

If it is difficult to palpate the TIVAD and you don't feel confident it is preferable to seek help earlier rather than later and learn from a more experienced clinician.

Check TIVAD and monitor the patient with an implantable port regularly
As a minimum a TIVAD accessed site should be checked at least once per shift by nursing/midwifery staff and more frequently if the patient is receiving vesicant medications. Observe for signs of infection or extravasation and document findings.

The TIVAD accessed site must also be checked and documented when the patient is reviewed by a medical officer.

The patient's temperature must be taken and documented at least three times a day for inpatients.

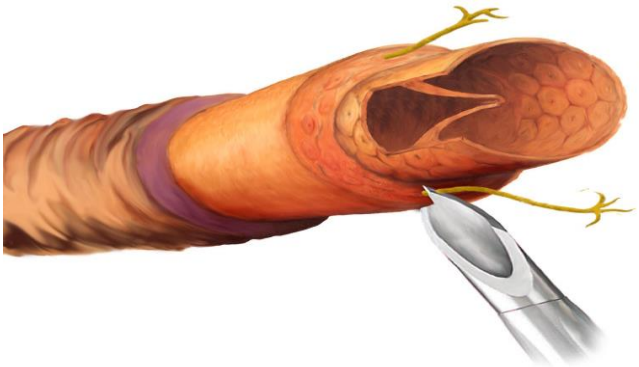
Any non-coring needles should be re-sited or removed at least every 7 days.

Patients transferred from another facility with a non-coring needle insitu and no documentation of when the needle was inserted, should have the non-coring needle removed or replaced when the patient is stable and/or within 24 hours. An IIMS should be filled out.

Anatomy & Physiology

Anatomy/physiology

Vein structure



The wall of the vein is composed of three layers:
Tunica intima (inner layer)
Tunica media (middle layer)
Tunica externa (outer layer)

Veins contain valves, crescent shaped folds of endothelium, which assists blood flow back to the heart.

Tunica intima
The inner layer of the vein is made up of the endothelium and connective and elastic tissue. The endothelium prevents blood cells from sticking to the wall of the vein. Trauma to the endothelium, such as that caused by the long-term presence of a TIVAD, may lead to platelet adherence and thrombus formation.

Tunica media
The middle layer of the vein contains muscular, elastic and nerve fibres. This layer dilates and constricts response to vasomotor stimulation from the sympathetic nervous system. Anxiety, low temperature, blood loss and dehydration can all cause the tunica media to constrict.

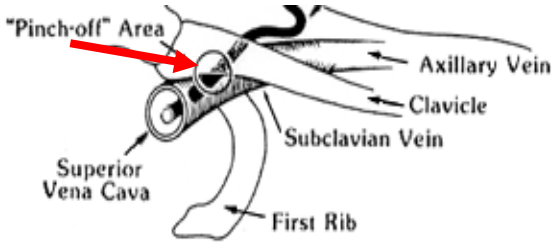
Tunica externa
The outer layer of the vein is a thick, elastic layer made up of connective tissue, nerves and lymphatic vessels.

Valve
Valves are located at intervals along the vein, and are frequently found at junctions. They prevent back-flow and assist with blood return.

Catheter insertion and venous anatomy/physiology

TIVAD ‘s are usually placed in the upper chest wall with the catheter tunnelled over the clavicle and inserted into the internal jugular vein or tunnelled up the infra-clavicular area and inserted into the axillary/subclavian vein outside the boarder of the lung fields. The healed pocket then provides a barrier to migrating bacteria along the catheter into the bloodstream.

Catheters should not be inserted in the narrow juncture near the sternal border between the first rib and clavicle as this may cause then catheter to become compressed (pinched-off syndrome). With arm movement infusion and withdrawal blockage occurs due to the impingement of the catheter. This wear and tear on the catheter over time can lead to catheter fracture and embolus.



The catheter tip should be located in the lower third of the superior vena cava, parallel to the vessel wall. The inferior vena cava is sometimes used if unable to access upper veins. The high rate of blood return to the right atrium provides adequate haemodilution to safely administer irritating infusate and has a relative lower risk for the formation of deep vein thrombosis.

Once the TIVAD is inserted the body initiates the coagulation cascade forming a fibrin sheath that covers the surface of the catheter. As the fibrin grows it can eventually block the end of the catheter. The catheter should infuse easily and have brisk blood return. (Nakazawa, 2010)

Venous thrombosis - physiology

Virchow's triad elucidates three factors that intertwine to form venous thrombosis to which TIVAD's have at least two

1) Stasis or turbulent blood flow
    a. Blood flowing around the catheter
2) Endothelial vascular injury due to
    a. Catheter insertion
    b. Catheter rubs or injures the vein wall repeatedly
    c. Catheter tip impinges on the vessel wall
3) Hypercoagubility of the blood due to
    a. Dehydration
    b. Inflammation
    c. Diabetes
    d. Smoking
    e. Obesity
    f. Solid tumors
4) Metastatic disease (Nakazawa, 2010)

Skin and microflora

When the non-coring needle is inserted the body's defence system, the epidermis, is breached thus allowing microbial invasion. The skin of both the patient and the healthcare worker needs to be disinfected to avoid healthcare acquired infections.

Biofilms seem to be one of the major causes of catheter related blood stream infections. Bacteria adhere to the fibrin surface by producing slime and are contained in a polysaccharide extracellular matrix. They are thought to form on the external surface of the catheter between 24-72 hours after insertion and possibly after 10 days on the intraluminal surface (Schiavone, et al., 2010).

TIVAD Basics

TIVAD – The Basics

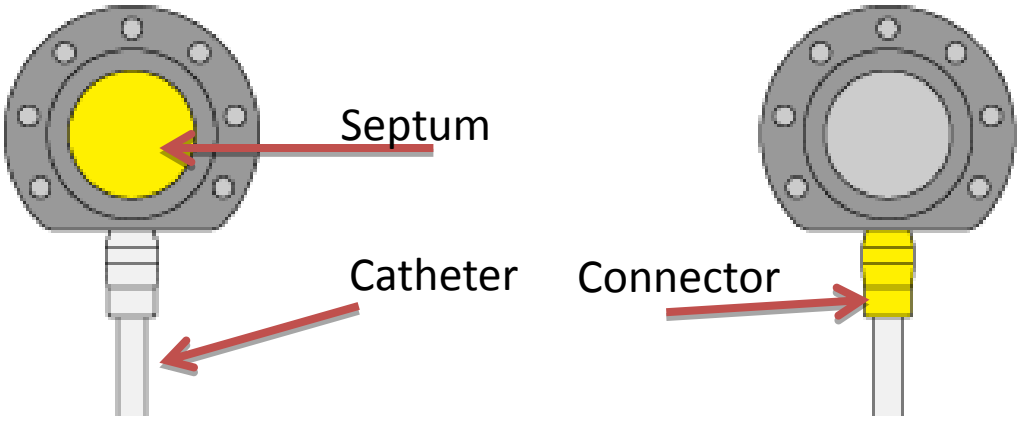
A TIVAD is a central venous catheter where the distal end (tip) lies in a major/central vein. TIVAD have become popular as an option for long term vascular access for chronic health conditions. They are designed to provide repeated vascular access for the delivery multiple intravenous therapies including:

- Intravenous fluids
- Blood products
- Antibiotics
- Total parenteral nutrition
- Chemotherapy
- Intravenous analgesia

TIVADs are tunnelled catheters that have a subcutaneous portal with a self-sealing septum that is accessed through the skin by a non-coring needle. Some advantages of TIVAD are that they require little manipulation, have few complications, promote a positive body image, and maintenance of routine daily activities.

A TIVAD consists of three components

- Self-sealing septum encased in a port made of titanium or plastic attached to
- A silicone or polyurethane catheter with a
- Catheter connecter securing the port and the catheter



Choosing a TIVAD

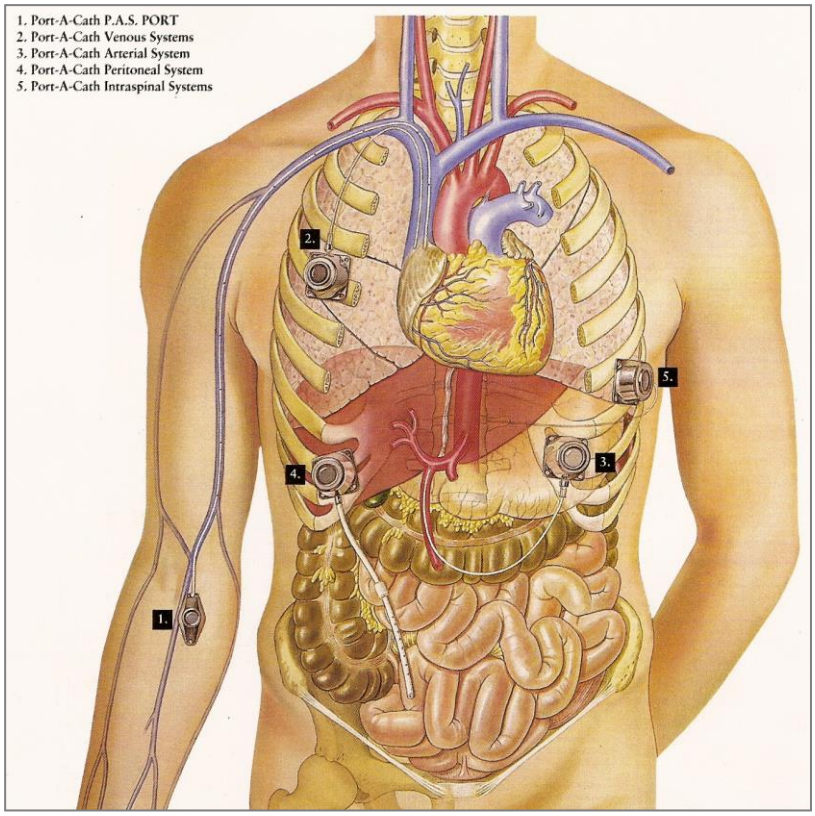
- Advantages
  - No external parts when not accessed decreasing risk of infection
  - Cosmetically acceptable
  - Require less maintenance
  - Allows more activities e.g. swimming

- Disadvantages
  - Difficult to insert, must be inserted in theatre or radiology
  - May be difficult to access or find in larger patients or breast tissue
  - Problems with needle phobia, option use local anaesthetic cream
  - Require special non-coring needle for access
  - Initial costs expensive ~ $600 for port alone, plus theatre costs, surgeon etc.
  - Higher risk of extravasation
  - Inflamed exit site prevents use
  - Difficult to remove as requires surgical removal

The implantable port is chosen dependent on:

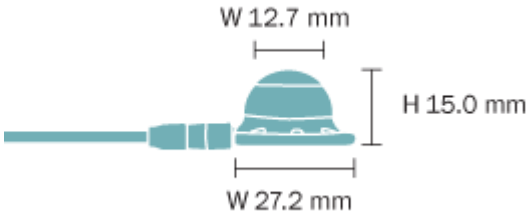
- Anatomical location
  - Venous, arterial, spinal etc. (see site diagram opposite)
  - Chest insertion vs. peripheral arm insertion
- Size (smaller paediatric, low profile)
- Material e.g. polymer, titanium
- Number of lumens (single or dual)
- Valved or non-valved
- Priming volume (~ 1 – 2mL catheter & chamber)

Note: - this SDLP does not cover Ventricular Peritoneal (VP), intrathecal or hepatic shunts or ports.

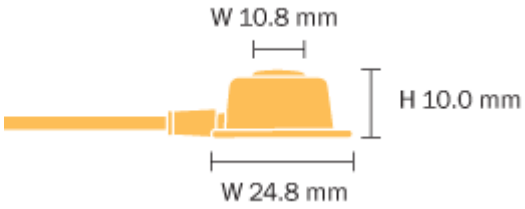


Common Implantable port types

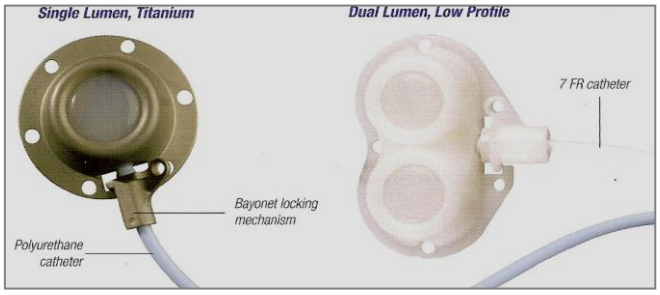
Domed type
More prominent visually & by feel



Low profile ports
Less prominent



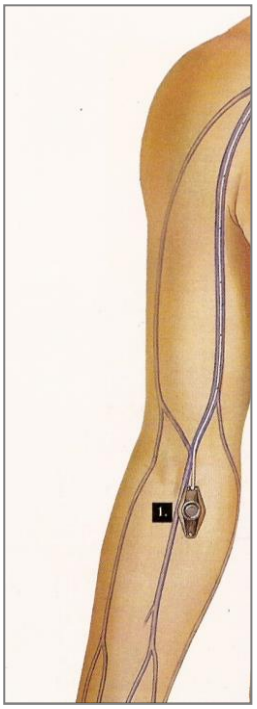
Single or dual lumen



Less common Implantable Ports

Power injectable or contrast ports

Power ports are special TIVADs that allow power injection of contrast associated with CT and MRI scanning. Although all power injectable CVCs are coloured purple, it is not possible to see this with an existing port because it is implanted under the skin. The only way to be sure is to check the medical records to identify if a port is able to be used for power injections and check accessing non-coring needle is power injectable compatible. Some studies have suggested that contrast is not easily removed from the TIVAD and could lead to future complications (Guiffant, et al, 2013)

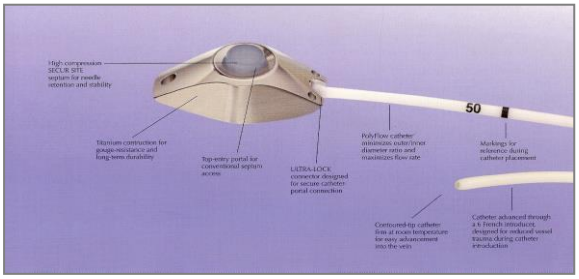


Peripheral ports

- May be chosen when chest area contraindicated
- Smaller port, less obtrusive
- Self-care more difficult as only one hand free
- Smaller access needle required
- Determine type
  - Some accessed at 45 degree angle vs. commonly 90 degree

Avoid on the arm with a peripheral port

- taking blood pressure or taking blood samples



TIVAD Insertion

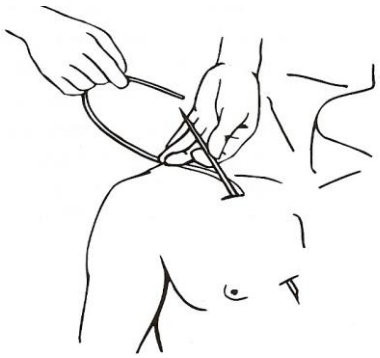
TIVAD Insertion

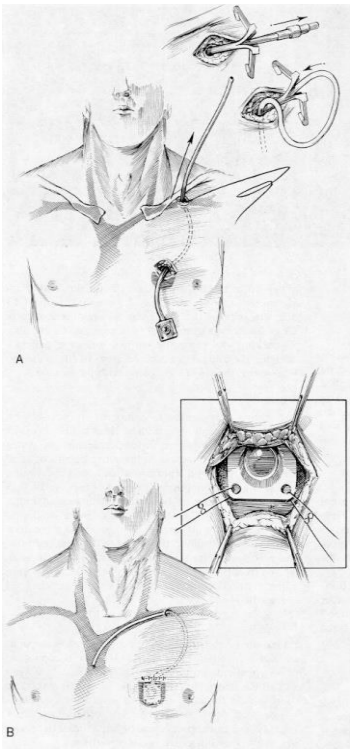
Choosing a site

- Provides good port stability
- Does not interfere with patient movement
- Does not interfere with clothing
- Does not create pressure points
  - Excess subcutaneous tissue over port will make access difficult
  - Too thin a layer may lead to port erosion

The Insertion Procedure

A TIVAD is inserted by a surgeon or an interventional radiologist generally under local anaesthetic and sedation. A subcutaneous pocket is created for the TIVAD to reside. The catheter tip is inserted usually into the cephalic, external jugular or subclavian vein and advanced to lower 3rd of the superior vena cava. The catheter is tunneled from the insertion site to the subcutaneous pocket where it is attached to the TIVAD. The TIVAD is stabilised to the fascia of the underlying muscle with sutures and the pocket is sutured closed.





Anatomical tip location of the TIVAD and the absence of a pneumothorax must be confirmed and documented in the patient's health care record following insertion. Observe the patient for signs of dyspnoea, chest wall discomfort or pain post procedure as there is a risk that a patient may develop a pneumothorax which may not be evident on the first chest X-ray (reference CVAD Implanted Venous Port (IVP) Clinical Procedures EVI Q cancer treatments online)

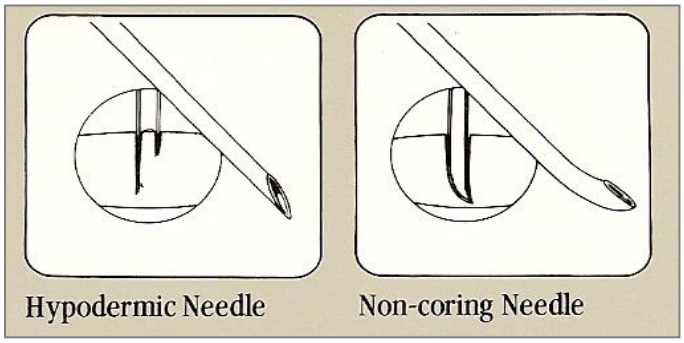
Non-coring needles

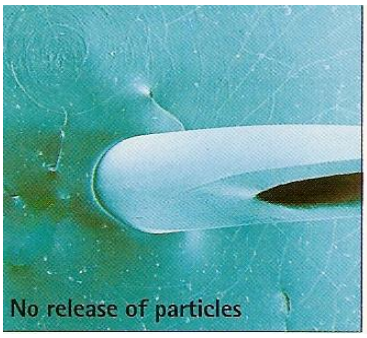
Non-Coring Needles

Choosing a needle

The non-coring needle has a slightly curved tip, and was designed by Huber so that it will

- Prevent holes forming in silicone septum on removal of needle. Ordinary needles will core a piece of the septum when the needle is removed (see diagram showing re-closure of septum following Huber needle removal.





- The port septum has limited life e.g. number of times it can be accessed by a non-coring or Huber needle
  - 1000 times for 19 g needle
  - 2000 times for 22g needle (equates to once daily for 5 ½ years)
  - also dependent upon the septum size and manufactured type

The non-coring needle MUST have a safety device to reduce the risk of needle-stick injuries when de-accessing ports.

Examples of safety non-coring needles

Needle length

The length of needle is dependent on size of TIVAD and amount of subcutaneous tissue between the skin and the top of the septum

- Size of needle usually 22g, larger gauges can be used for more viscous fluids
- Clinician & patient may have a preference for needle size

Needles & Computer Tomography (CT) / Magnetic Resonance Imaging (MRI)

CT uses computer processed x-rays to produce slices and 3D images of specific areas of the body. MRI scanning reconstructs computer images using strong magnetic fields and radio waves for diagnostic purposes.
TIVAD's made from metal for example titanium and stainless steel produce high levels of artifacts thus producing distorted images for both MRI and CT's. It is important to identify what the TIVAD is constructed from.

Regular maintenance

- Line Changes (giving sets)
  - Standard fluids: every 72 hours
  - Blood products – after 2 units or transfusion completion
  - TPN – daily

  Or if
  - they become disconnected
  - there is damage to the line
  - line contamination occurs

- Needleless connectors – weekly

  Or if
  - blood or debris is visible within the needleless connector
  - the needleless connector is contaminated

- Dressings: weekly, or change dressing sooner if
  - the dressing is no longer intact i.e. there is no longer a seal
  - there is evidence of inflammation
  - there is excessive accumulation of blood and or moisture under the dressing
- Add on devices, 3 way taps: weekly when dressings performed
- Non coring needle removed replaced weekly

Pre-procedure Preparation

Pre Procedure Preparation

Patient preparation

Check documentation

- Verify medical order if available
- If the order is unclear or ambiguous take appropriate action
- Undertake required documentation and checking procedure
- **Check allergies to all materials used including dressings, solutions and non-coring needle.**
- It is mandatory to ensure that the patient has received appropriate information to provide informed consent and, that patient identification, correct procedure and correct site process is completed prior to any procedure.
- The patient is given a clear explanation of the procedure including turning of the head away from the TIVAD insertion site.
- Patient's must be able to understand and cooperate with instructions

Assess TIVAD site for signs of infection and that skin integrity intact. If able ask patient about their TIVAD i.e. what was the previous needle length, if blood was able to be withdrawn previously when accessed.
As a rough guide to assess the approximate length of the non-coring needle required is, if the TIVAD is visible above the skin level use a 16-19mm, or if not visible use a 25mm.

Patient, carer and or family education should cover:-
TIVAD insertion and de-accessing complications;

- How to care for a TIVAD and the importance of hand hygiene;
- To report symptoms such as pain, redness, discharge, swelling, burning, stinging, pruritus, presence of a rash or leaking around the TIVAD site; and details of appropriate and readily accessible 24 hour medical and nursing contact to which patients can direct queries.
- That the TIVAD requires monthly flushes when not accessed
- Reason we do not routinely disconnect IV lines
- To cover the needle and dressing with plastic and avoid directly spraying the dressing area in shower
- Patients should be supplied with any printed information currently available and must be given the opportunity to ask questions. Prior to insertion of a TIVAD a valid consent must be obtained as per NSW Health policy

Greet the patient

There are steps you should take to help the patient relax and ensure they are completely informed about the procedure.
When you initially approach the patient you should ensure privacy and greet the patient in a pleasant cordial manner. Introduce yourself including your role, your intention to access their TIVAD and the reasons this is necessary.
You must verify the correct patient by confirming full name, date of birth and a 3rd identifier such as MRN or address with the patient and against the health care record as well as any allergies.

Explain the procedure

- Ask the patient if they have any allergies (including skin prep, tapes or dressings)
- Explain the procedure to the patient – what you will be doing and why.
- Explain any risks.

- Explain any discomfort or adverse outcome which may arise from the procedure – explain some discomfort is to be expected.
- Reassure the patient and respond to their questions

Prepare the patient and environment

Environment & Patient positioning

- Ensure that curtains have been drawn to provide a barrier to prevent access to the area whilst a sterile procedure is taking place
- Provide privacy for female patients when accessing a chest port
- Position the patient to reduce the risk of manual handling injuries. Follow manual handling/WH&S guidelines.
- Where possible the patient should be in a recumbent position in the case of vasovagal attack
- Ensure patient is comfortable

Hand hygiene

- Effective hand hygiene of the clinician
- Effective hand hygiene must be practiced according to 5 moments for Hand Hygiene
- The use of alcohol base hand rubs for hand hygiene is preferred and allows the clinician to assess their own skin integrity
- Any cuts, abrasions or broken areas on the skin of the health care workers' hand should be covered with a sterile occlusion dressing
- Any organism on the skin has potential to cause infection

Collect and check equipment

Take a few moments to gather all equipment you might need. The trolley must be cleaned with a large alcohol wipes immediately prior to use.

Arrange equipment on the cleaned work area, including dressing and caps, checking the expiry dates as you proceed. Set up properly using the provided trolleys. Sharps disposal container should be attached to the trolley wherever practical. This allows for safer disposal of sharps at point of use if unsuccessful.

Obtain consent

- Obtain verbal consent
- Consent should be informed – adequate explanation should be given and consent must be voluntary. The patient makes an informed choice to accept or reject proposed treatment
- In an emergency situation or where a person is unconscious, consent is not required. Where patients are not able to communicate consent due to illness, it can be implied
- People from Culturally and Linguistically Diverse (CALD) backgrounds should be provided with an opportunity to consent if the procedure is not an emergency. This can occur using an over the phone interpreter service
- Sensory impairments should also be considered when obtaining consent, and all attempts should be made to ensure the patient is aware of the rationale for the procedure and they understand the side effects and complications which can develop

- You may not be able to obtain verbal consent although the intervention may be medically indicated. It is important at these times that the persons concerns and queries are listened to and these are addressed in a respectful and ethical manner. This may require seeking the advice of the clinician with more experience in accessing a TIVAD.

Staff Preparation

- It is mandatory for staff to follow relevant: “Five moments of hand hygiene”, infection control, moving safely/safe manual handling, and documentation practices.
- Appropriate training and experience
- **Use aseptic non-touch technique**

Read clinical guideline
HNELHD GandP 13_11
Totally Implantable Vascular Access Device (TIVAD)/ Port-a-Cath® - insertion and removal of a non coring needle and management, (hyperlink) guideline and procedure.

Accessing a TIVAD

Accessing TIVAD

Topical local anaesthesia

Reason you may want to administer a topical local anaesthetic:

- Recently inserted TIVAD and surrounding area still oedematous and painful
- Patient has requested that a topical local anaesthetic
- The patient often jerks on insertion of the needle, potentially placing clinicians at risk of a needlestick injury

Local topical anaesthetic agents may be applied to the insertion site prior to the procedure if required and must be removed prior to skin disinfection. Assess the patient for potential allergic reactions.

- Check drug name, dose and expiry date during the 5 rights of medication administration
- Apply at least 30 – 60 minutes before accessing the TIVAD to allow topical local anaesthesia to take effect - check with manufacturer recommendations
- Topical local anaesthesia must be cleaned from the skin surface prior to disinfection
- Administration of topical local anaesthesia must be charted and signed for on the patient's medication chart.

Trolley checklist – TIVAD Accessing

- Alcohol based hand rub
- Personal Protective Equipment: sterile gloves, protective eye wear
- Dressing trolley
- Surgical clipper and clipper blade (if required)
- Chlorhexidine **1%** or **2%** in 70% alcohol swab sticks x 1 or skin prep solution
- A **safety** non-coring needle of appropriate length/gauge with extension tubing all in one (should be the smallest gauge non-coring needle for the prescribed therapy to sit flush with the skin or slightly above)
- Topical local anaesthetic (if required, check with patient)
- Dressing pack
- Large sterile transparent occlusive dressing
- Syringe 10mL
- Drawing up needle
- 10mL ampoule sodium chloride 0.9% for priming and flush
- Needleless connector (bung)
- Heparinised saline 50units/5mL (if port is being locked)
- Administration set/add on devices, fluid and parenteral labels as required
- Tape to secure the IV tubing to minimise needle dislodgement
- Large alcohol wipes to clean trolley

Perform procedure
Pre-procedure preparation
Prepare for de-accessing procedure as per Pre-procedure preparation (page 21-23)

Remove hair if problematic at the insertion site using surgical clippers. This is done to improve adherence of the occlusive dressing and reduce pain upon removal. Shaving is contraindicated.

Don personal protective equipment

Skin disinfection

- Skin disinfection occurs after removing any surface topical local anaesthesia
- Chlorhexidine 1% or 2% in alcohol 70% should be used as the antiseptic agent for skin cleansing. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives.
- Use swab stick 1% or 2% chlorhexidine 70% alcohol and scrub area starting at the insertion site moving back and forth in a circular motion as you move from the centre out to beyond where the dressing edge will reside. If necessary use another 1-2% chlorhexidine 70% alcohol swab stick until area clean (you can disinfect the skin wearing non-sterile gloves prior to sterile gloves being applied or double sterile glove and remove and discard outer pair after disinfecting if a sterile field has been established)
- Apply firm friction to disinfect the skin pores and penetrate the deeper layers
- Allow to dry naturally (minimal 60 seconds) to ensure effective disinfection
- Avoid re-palpating the centre of the TIVAD once disinfection has taken place

Insertion Procedure Step by Step

- The standard aseptic technique must be followed
- Prepare sterile set-up immediately prior to the procedure and maintain asepsis throughout the procedure.
- Wash/alcohol gel hands and open equipment
- Check expiry date on the non-coring needle
- Wash/gel hands, don sterile gloves
- Apply needleless connector/bung to non-coring needle pigtail hub
- Check sodium chloride 0.9% 10mL ampoule for solution name, dose and expiry date
- Draw up sodium chloride 0.9% 10mL aseptically and prime the non-coring needle set leaving the 10mL syringe connected.

NB: Huber non-coring needles should be changed weekly or earlier if erythema present or removed before the patient is discharged home unless IV access is required in the community.

- Avoid accessing port via previous insertion hole. Do not access the port if the skin surrounding the port is inflamed

- Palpate TIVAD sides and secure firmly with your non-dominant hand if the port is difficult to palpate, lie the patient supine with a rolled towel under the shoulder blades which should make the port more prominent to palpation

Note: - do not touch where the non-coring needle will be inserted. If area touched it must be disinfected and allowed to dry again.

- Advise the patient of impending insertion and a sharp scratch maybe felt if no local anaesthetic used. Insert the non-coring safety needle perpendicular into the TIVAD until the base of the port is reached. If after a maximum of two attempts the non-coring needle does not enter the port correctly, contact a senior nurse/MO with skills in TIVAD access.

- Once inserted attempt to aspirate a small amount of blood into the tubing to confirm placement.

- If non-coring safety needle to be left in, apply clamp on, remove any add on devices that aided insertion and apply the film dressing as per manufactures instructions covering the insertion site first and pinching off the dressing around the pigtail.

- Connect IV line if applicable. Apply central venous catheter line label to giving set, with date line change due documented on label.

- Ensure the dressing is sealed on all sides.

- Date the dressing.

- Loop and counter-tape the catheter or administration set avoiding the shoulder, to prevent traction and movement at the insertion site

- Documentation in the patient's health record should include the antimicrobial used for skin disinfection, sterile aseptic technique, length/gauge of non-coring needle, if blood was withdrawn, any extravasation or discomfort or difficulty upon flushing, time and date.

- Ensure that the patient is comfortable before leaving the area

Waste disposal

- Segregate, contain, store and transport waste according to infection control policy and organisational procedures.
- Dispose of equipment and clean trolley with alcohol surface wipe, cleanse hands with alcohol hand gel and document the procedure
- Discard covered non-coring needle if unsuccessful into appropriate sharps container immediately after use
- Should an occupation exposure occur during or following accessing a TIVAD, follow staff health/infection control guidelines for first aid, reporting and management of the injury
- It is the responsibility of staff to be aware of their vaccination status with regard to blood-borne viruses in accordance with NSW Health

De-accessing a TIVAD

De-accessing - removal of a non-coring needle from a TIVAD

Pre-procedure preparation
Prepare for de-accessing procedure as per Pre-procedure preparation (page 21-23)

TIVAD trolley checklist

- Alcohol based hand rub
- Personal Protective Equipment: non-sterile gloves, protective eye wear
- Dressing trolley
- 70% alcohol swabs x 3
- Occlusive dressing small
- Syringe 10mL x 2
- 10mL ampoule sodium chloride 0.9% for flush
- Heparinised saline ampoule 50units/5mL if not reinserting non coring needle
- Sharps disposal container at point of use
- Large alcohol wipes to clean trolley

De-accessing Procedure Step by Step

- Don protective eyewear.
- Wash/gel hands, don non-sterile gloves.
- Turn off and disconnect infusion lines from pump if applicable
- Draw up 10mL sodium chloride 0.9% and (Heparinised saline 50units/5mL if not reinserting non coring needle) into separate syringes aseptically.
- Using two 70% alcohol wipes scrub the needleless connector using friction. Wait for the alcohol to dry
- Attach syringe with 10mL sodium chloride 0.9% and flush the port using a pulsating, stop start, positive pressure flush technique. Clamp extension set or 3-way tap whilst injecting the last mL of sodium chloride 0.9%.
- Attach syringe with heparinised saline 50units/5mL and flush the port using a pulsating, stop start, positive pressure flush technique (see page 33). Clamp extension set or 3-way tap whilst injecting the last mL of heparinised saline 50units/5mL.
- Remove the film dressing so non-coring needle can be removed when ready.
- Remove the **safety** non-coring needle with a smooth action, applying the safety mechanism

- *If the non-coring needle has **no safety mechanism**:*
  - If patient is able, have them put 2 fingers either side of the TIVAD to stabilise their own port as the non- coring needle is removed – this will reduce the risk of rebound needlestick injury to the clinician

OR

  - If patient is unable to anchor the TIVAD, use forceps to keep your hand well away as the non-coring needle is removed

- Immediately discard the non-coring needle into a sharps disposal container.
- Apply a 70% alcohol swab over the needle access site with firm pressure until haemostasis is achieved.
- Allow the area to dry and assess the appearance of the insertion site and the skin integrity.
- Apply a small occlusive dressing. If not re accessing TIVAD, the dressing can be removed after 24-48hrs.
- If re-accessing device, refer to Insertion of a non-coring needle into a TIVAD (page 25).
- Dispose of equipment and clean trolley with alcohol surface wipe, cleanse hands with alcohol hand gel and document the procedure in the patients' health record.
- Ensure patient is comfortable, educate patient on need for monthly flushes, on signs and symptoms of infection and to notify health professional if these are present.

TIVAD Maintenance

Maintenance of a TIVAD

Initial Post-insertion post-operative management

Keep the TIVAD site clean. The initial post-operative dressing can be left in place 48-72 hours

Initially the incision site will be painful but this will resolve over the next few days. If the area becomes increasingly painful and shows signs of infection a MO should be notified.

For 7 to 10 days avoid strenuous activities involving the shoulder and arm on the side of the TIVAD.

- An unused TIVAD should be flushed monthly with at least 10 mL of sodium chloride 0.9% then with Heparinised saline (50units/5mL).

- Prior to discharge contact details to be given to the patient regarding who will access and flush TIVAD monthly and where.

Monitoring the TIVAD site

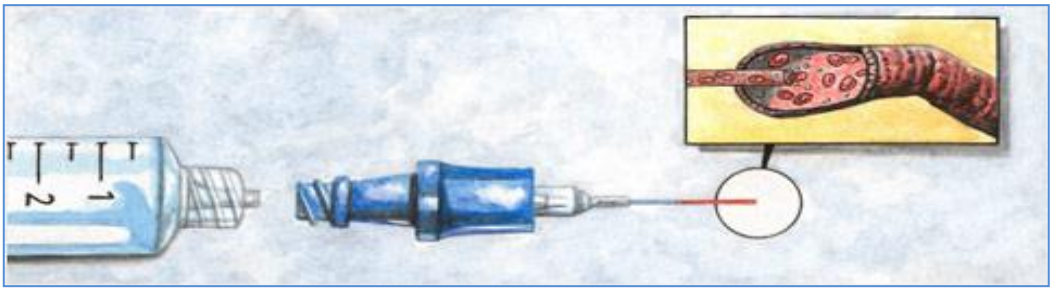
The point of checking a TIVAD site is to monitor there are no ill effects from having a non-coring needle insitu.

There are five ways to monitor TIVAD care.

- ☐ Speak to patient
  - Ask about the TIVAD, the site of the non-coring needle and the surrounding skin. Ask about discomfort, heat, tenderness, swelling and movement.
- ☐ Observation
  - Observe the TIVAD site and surrounding area for any changes including venous tracking and/or inflammation.
- ☐ Temperature
  - The patients' temperature should be taken at least 8th hourly and recorded on the standard adult observation chart.
  - If the patient becomes febrile, the Medical Officer is to be advised and the presence of TIVAD should be considered as a source of infection if no other source identified and increase frequency of observations
- ☐ Ensure patency
  - Check infusion working if no intravenous access required the non-coring needle should be removed
- ☐ Documentation
  - Document the condition of the non-coring needle, dressing changes and any interventions taken to minimise the risk of infection or other complications. Also document, the condition of the non-coring needle site, on the CVC / PICC / Permacath Implantable Port Care Plan every shift for Nurses and Midwifes and when the patient is reviewed by their Medical Officer.

Positive Pressure Flushing technique

The diagram below illustrates what happens to the end of any catheter when a syringe or IV line is disconnected and positive flushing technique is not used. The action of disconnection 'sucks' a little blood from the vein into the catheter tip. This small amount of blood can lead to the formation of a clot that blocks the catheter.



The image below illustrates what happens with Positive Pressure Flushing. When the syringe is disconnected a small amount of fluid (usually saline) is flushed out of the end of the catheter, preventing blood backflow into the catheter tip.

There are two ways this be achieved

- Passively through use of a positive pressure bung
- Actively by clamping the catheter whilst injecting the last millilitre of the flush solution. This is positive pressure flushing techniques and it should be used on all central venous catheters in HNELHD

Handy hints

Prior to accessing the TIVAD, take your time to know the exact position of the port to make insertion of a non-coring needle successful.

Discuss with the patient the history of their TIVAD i.e. date inserted, length of usual non-coring needle, if blood return is normal, if they prefer anaesthetic cream applied to the skin prior to insertion, how well it flushes, preference where the infusion line is secured

When a non-coring needle is inserted into the TIVAD don't rock or tilt the needle as this can lead to fluid leakage by damaging the septum.

Refer to CVC, PICC and Tunnelled Central Catheter Hickman, Port-A-Cath, Vascath and Permcath Dressing HNELHN GandP 11_03

Troubleshooting & Complications

Trouble shooting

Introduction
During accessing a TIVAD process you may encounter difficulties. Some of the common difficulties and solutions are introduced in this lesson.
Complications can occur with accessing TIVAD and must be understood and managed.

Objectives
During this lesson you see examples of problems you may encounter while undertaking accessing a TIVAD.

Non coring needle won't flush

Some reasons why this may occur:

- Check for any mechanical obstruction such as kinks or clamps still on
  Ensure clamps are off
- The needle is not in the TIVAD septum and is in the tissue surrounding the port
  Re-palpate area if not in TIVAD and firmly secured remove non-coring needle, discard and use a new non-coring needle and repeat accessing procedure. Ensure perpendicular to the TIVAD.
- Non-coring needle not at the base of the septum
  Ensure non-coring needle at the base of the septum push firmly until base felt. Avoid excessive pressure when non-coring needle contacts the base
- Catheter tip may be up against blood vessel wall
  Ask patient to look in opposite direction to catheter take a deep breath and cough
- The non-coring needle may be up against inner septum wall
  Turn non-coring needle carefully with no downward pressure in the opposite direction
- The TIVAD may be blocked from thrombus or medication precipitation
  Ascertain if thrombus or medication precipitation possible cause for blockage. If medication precipitation consult your pharmacist if blood clotting refer to http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0008/79343/HNELHN_GandP_11_01_Blocked_CVC_Using_Alteplase.pdf

Non coring needle will flush with no blood return

Blood aspiration is not always possible via a TIVAD. Where there is no extravasation, resistance or pain, and TIVAD that is easily flushed with 0.9% sodium chloride 10mL may be used for infusions except in the case of cytotoxic infusions where a referral should be made to personnel with appropriate expertise. If blocked refer to http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0008/79343/HNELHN_GandP_11_01_Blocked_CVC_Using_Alteplase.pdf

Some reasons why this may occur:

- The catheter tip may be up against blood vessel wall
  Ask patient to look in opposite direction to catheter take a deep breath and cough
- Patient is dehydrated
  Change patients position i.e. lie flat if able or tilt head down slightly.
  Attempt to flush with a small amount of 0.9% sodium chloride. Reattempt withdrawing blood
- Clot on the distal end of the TIVAD acting as a trapdoor
- Maybe the non-coring needle is against inner septum
  Turn non-coring needle carefully with no downward pressure in the opposite

direction

Leaking around TIVAD non-coring needle

Some reasons why this may occur:

- Excessive moisture from shower
  Ensure plastic bag or equivalent covering dressing, avoid direct water on area and reduce the amount of steam
- The non-coring needle has not been inserted into the TIVAD septum or has completely come out into the surrounding tissue causing extravasation
  If completely out remove non-coring needle
- TIVAD integrity may have been compromised and a contrast study maybe required

Leaking around non-coring needle is never normal and must be investigated immediately

Potential complications

1. Infection
2. Blockage
3. Air embolism
4. Bleeding
5. Infiltration/extravasation
6. Pinched-off syndrome

Infection

Introduction
A TIVAD and non-coring needle are invasive devices as they reside inside the patient's body. All patients who have a TIVAD and non-coring needle are at risk.

It is the responsibility of the clinicians who are looking after the patient to monitor the site and the patient for early detection of any complication. This includes checking the site regularly, changing dressings, taking the patients temperature at least 8/24, and ensuring documentation is maintained.

A high percentage of hospital acquired infection are related to infusion therapy.

Infection entry routes
All patients are at risk developing infection. Patients who have a TIVAD insitu accessed with a non-coring needle are at higher risk.

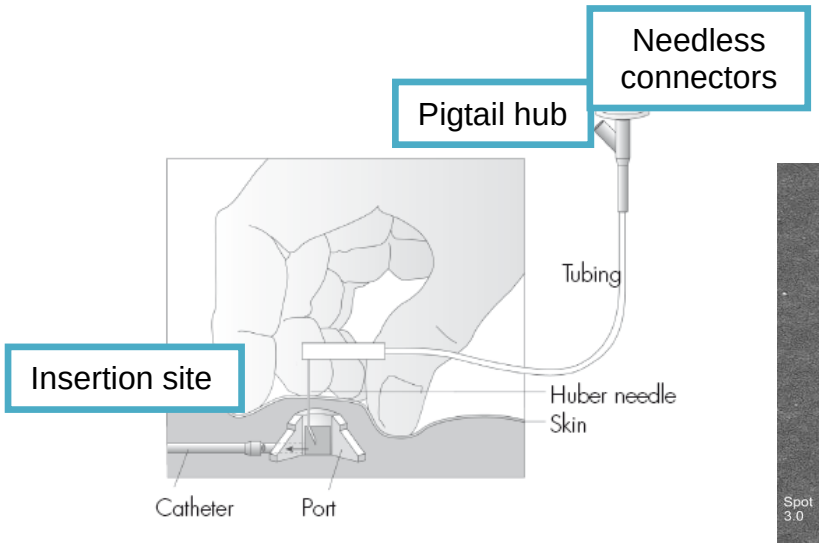
There are many points along the intravenous line where a microorganism may enter. Some of these are:

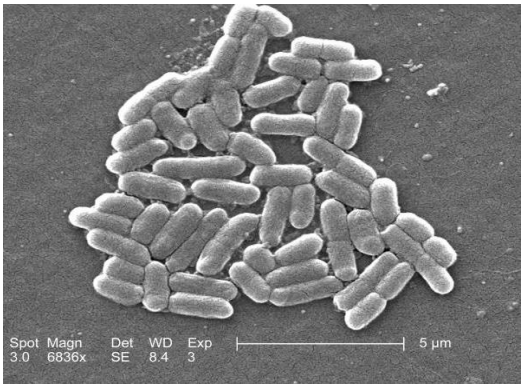
- Non-coring needle tip
- Migration down the non-coring needle surface
- Non-coring needle hub
- Contaminated infusate
- Haematogenous spread
- Manipulation of the intravenous line

Prevention of infection

- Perform effective hand hygiene
- Don PPE where there is a risk of exposure to blood and/or bodily fluids
- Maintaining aseptic technique
- Use 70% alcohol swabs x 2 to clean needleless connector or hub immediately prior to administering medication by using friction/scrubbing
- Avoid disconnection and re-connection of an intravenous line
- Minimal manipulation
- Change non-coring needle weekly

Entry sites for microorganisms





Common organisms

- *Staph aureus; Staph epidermis*
- *Candida* species
- *Pseudomonas*
- Anything on skin of the patient or operator

Prevention

- Hygienic hand washing prior to patient care
- Ensure dressing is clean and dry and replace when any fluid is identified under the dressing

Management

- Undertake effective five moments of hand hygiene
- Cease any infusion which may be in progress
- Notify Medical Officer
- Take timed paired cultures from TIVAD and peripherally
- MO to consider the following Management of Suspected or Proven Infection of Tunnelled Central Venous Catheters and Portacaths, HNELHN GandP 11_04 http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0011/79346/HNELHN_GandP_11_04_Infection_of_Tunnelled_CVC_and_Portacaths.pdf
- Collect a sample of any exudate and send for culture and sensitivity if indicated

- Increase frequency vital sign observations
- Complete IIMs notification
- Monitor the patient

Blockage

Reasons why this may occur

- Drug precipitation
- Thrombosis
- Mechanical obstruction
- Non coring needle is not hard up against the base of the TIVAD

Prevention

Ensuring TIVAD flushed using push & pause pulsatile technique with 10mL sodium chloride 0.9% in between intravenous medications, and locking the port with heparinised saline 50 units/5mL every 4 weeks

Management

Ascertain reason for blockage checking for any mechanical obstruction such as kinks, three way taps or clamps still on.
Contact pharmacy regarding a precipitate and if the pH can be altered

Air embolism

Reasons why this may occur

TIVAD non-coring needle extension set unclamped without a needleless connector open to air.

Management

This is a Medical Emergency –
Immediately clamp TIVAD non-coring needle extension set
Position patient on their left side head down
Administer oxygen as Nurse / Midwife initiated medication. Notify Medical Officer
Vital sign observations – follow hospitals clinical escalation response
Disinfect hub and attach a needleless connector, try aspirating air from the TIVAD

Bleeding

Reasons why this may occur

TIVAD non-coring needle not clamped without needleless connector open to air

Management

Immediately clamp TIVAD non-coring needle extension set
Disinfect hub and attach a needleless connector
Flush blood from extension set

Extravasation of non-vesicant solutions

Reasons why this may occur

- Non-coring needle dislodged and this causes IV fluids to be administered interstitially

- TIVAD deep within tissue and with shoulder movement can dislodge the non-coring needle
- TIVAD separates from catheter
- Catheter rupture / tear
- Non-coring needle through base plate

Prevention

- Ensure non-coring needle length is sufficient
- No excess of pressure when flushing
- Do not use excessive force on the base plate of TIVAD with the non-coring needle

Management

Extravasation of non-vesicant solutions

Intervention

- Stop infusion immediately
- Aspirate fluid if able
- Notify Medical Officer.
- Remove non-coring needle in consultation with the Medical team
- Apply dressing
- Assess for intravenous access
- Monitor infiltration site for changes and document until healed
- Record any complications, interventions and evaluation of interventions in the patients' medical record
- Complete IIMs notification
- Ongoing observation

Extravasation of vesicant solutions

- Vesicant solutions lead to necrosis of tissue

  Examples of vesicants are:
  - Cytotoxic drugs
  - Hypertonic solutions
  - Acidic or Alkaline solutions

Intervention

- Stop infusion immediately
- Aspirate fluid if able
- Leave non-coring needle insitu until pharmacy contacted
- Consult pharmacist or Hunter Drug Information Service (02 49211278)
- Notify a Medical Officer
- Only remove non-coring needle in consultation with the Medical team
- Administer analgesia
- Complete an IIMs notification
- Commence a wound form
- Consult with the surgical/wound care clinician for advice on wound management

Pinched-off syndrome

Reasons this might occur

If the catheter is placed between 1st rib and clavicle and there is no flow in or out, which can be intermittent depending on the position of the patient and their arm. (see page 9)

Management

- Obtain chest x-ray – observe for narrowing of the catheter
- Roll up towel and place in the middle of the back to open up the gap between 1st rib and clavicle to see if that enables flow in the catheter
- A catheter that is pinching off should be assessed for removal to prevent fracture and embolization of the catheter

Thrombosis

Signs and symptoms of thrombosis (SVC obstruction)
Skin discolouration from the chest and above; enlarged chest veins; shortness of breath; swelling in the arm on the side with cvc, chest, neck, face; pain/discomfort in the arm, TIVAD blocked

Prevention by using the smallest gauge TIVAD catheter for therapy, good vein selection, ultrasound with minimal vein punctures

Management
Early recognition
Consult vascular surgeon
Use of thrombolytic drugs

Patient/carer education

General patient and/or caregiver education should include placement procedure; type of TIVAD placed (e.g. power injectable, number of lumens); importance of carrying TIVAD identification card (e.g. in wallet); routine care, including frequency of flushing; expectations of aseptic technique during access; use of only non-coring needles (including appropriate type for power injection); length of non-coring and identification of potential complications and interventions.

For patients who are receiving infusions at home via an accessed TIVAD, patient and/or caregiver education should include checking the dressing daily; how to dress and undress to avoid pulling at the needle site; protecting the site during bathing; recognizing the importance of stopping the infusion pump and immediately reporting any wetness, leaking, or swelling noted at the site; not to leave the needle extension set open to air; making sure women's bra straps do not rub over the accessed area; and
Immediately reporting

- Any signs or symptoms of pain, burning, stinging, or soreness at the site;
- If they experience lethargy, shivers and shakes and temperature over 38

Related issues

Central venous catheter guideline
Refer to Central Venous Catheter (CVC) HNELHN GandP 11_02

Blood sampling
Refer to Withdrawing Blood from a Central Venous Catheter HNELHD GandP 12_11

Blocked TIVAD
Refer to Management of Blocked Central Venous Catheters Using Alteplase HNELHN GandP 11_01

Infected TIVAD
Refer to Management of Suspected or Proven Infection of Tunnelled Central Venous Catheters and Portacaths HNELHN GandP 11_04

APPENDICES

Recommended Readings

- Guidelines - Central Venous Catheter (CVC) - Adult Document Registration Number: HNELHN GandP 11_02 http://intranet.hne.health.nsw.gov.au/__data/assets/pdf_file/0009/79344/HNELHN_GandP_11_02_Central_Venous_Catheter.pdf
- HNELHD GandP 13_11 Totally Implantable Vascular Access Device (TIVAD)/ Port-a-Cath® - insertion and removal of a non coring needle and management, (hyperlink) guideline and procedure.

Problem Based Questions

Problem based questions

Welcome to the HNELHD adult Totally Implantable Vascular Access Device (TIVAD) / Port-a-Cath® - insertion and removal of a non-coring needle and management assessment.
There are 10 questions in this assessment. Please read the instruction carefully before answering each question. **You must exit the lesson by clicking Menu so your results are recorded in the training database**.

A patient is transferred to your ward and requires intravenous fluids for rehydration. While you are preparing to insert a peripheral cannula the patient mentions that they have a TIVAD. You discuss this with the medical team who chart intravenous fluids and request the TIVAD to be accessed.

Question 1
What should be done for the patient in preparation of inserting a non-coring needle?

- ☐ Verify medical order if available.
- ☐ Undertake required documentation and checking procedure.
- ☐ Check allergies to all materials used including dressings, solutions and non-coring needle.
- ☐ Ensure that the patient has received appropriate information to provide informed consent and, that patient identification, correct procedure and correct site process is completed prior to any procedure.
- ☐ The patient is given a clear explanation of the procedure including turning of the head away from the TIVAD insertion site.
- ☐ Patient's must be able to understand and cooperate with instructions.
- ☐ All the above.

With further questioning the patient states the TIVAD was inserted approximately 12 months ago. Upon examination of the left pectoral area a non-coring needle is already in situ but no documentation of when it was inserted and the patient can't remember.

Question 2
What should be done?

- ☐ Use the non-coring needle
- ☐ Use the non-coring needle if nil erythema around insertion site
- ☐ Replace when the patient is stable and/or within 24 hours
- ☐ Remove non-coring needle immediately and send to pathology

The patient is deemed stable for removal and reinsertion of a non-coring prior to commencing intravenous fluids. You removed the non-coring needle having applied the safety apparatus and placed it immediately into a sharps bin at the bedside. When assessing the TIVAD, the rim can just be palpated due to significant adipose.

Question 3
How do you determine what length non-coring needle should be used?

- ☐ Check the non-coring needle just removed if it had been working properly
- ☐ Ask the patient if not confused
- ☐ Any TIVAD that is not protruding will usually require a minimum 25mm length
- ☐ All of the above

The patient is positioned in the bed and a sterile set up is assembled along with sterile gloves. To disinfect the skin prior to inserting a non-coring needle a friction/scrubbing technique is used.

Question 4
What should be used as the antiseptic agent for skin cleansing?

- ☐ Chlorhexidine 0.5% and Alcohol 70%
- ☐ Chlorhexidine > 0.5% and Alcohol 70%
- ☐ Chlorhexidine 0.5% and sterile water
- ☐ Alcohol 70%
- ☐ All of the above

The skin is prepared and the TIVAD is accessed but blood is unable to be withdrawn.

Question 5
What could be the cause?

- ☐ Non coring needle length to short
- ☐ Catheter tip up against a vessel wall
- ☐ Fibrin clot on the end of the catheter tip
- ☐ Non coring needle does not touch the base of the TIVAD
- ☐ All of the above

Another possible reason is that the non-coring needle was not inserted into the TIVAD but into surrounding tissue. This was the case as a hard base was not felt therefore the needle was withdrawn.

Question 6
In this situation a new non-coring needle is required to access the TIVAD and not use the non-coring needle just removed?

❑ True or ❑ False

A new non-coring needle was used.

Question 7
How many attempts should be made at inserting a non-coring needle before seeking assistance?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

A student has been observing the procedure and is unsure of what can be infused through a TIVAD.

Question 8
You inform the student that which of the following solutions can be infused into a TIVAD?

- ☐ Intravenous fluids
- ☐ Total parenteral nutrition
- ☐ Blood products
- ☐ Chemotherapy
- ☐ Antibiotics
- ☐ Intravenous analgesia
- ☐ All of the above

The TIVAD was accessed successfully as evidenced by blood withdrawal and flushing with 0.9% sodium chloride with no extravasation as there was an absence of swelling or pain reported by the patient.

Question 9
Complete each sentence from the following possible answers

3
occlusive
gauze
7
gauge
position

A. After insertion of a non-coring needle a sterile transparent occlusive film dressing must be applied
B. Before administering and IV fluid or medication, the correct position of the non-coring needle must be ascertained
C. At HNELHD all adult non-coring needles must not remain insitu for longer than 7 days

Upon completion of the procedure you explain documentation requirements to the student.

Question 10
What should be documented?

- ☐ verification of correct patient/procedure
- ☐ the antimicrobial used and sterile aseptic technique
- ☐ length/gauge of non-coring needle,
- ☐ if blood was withdrawn, any extravasation or discomfort or difficulty upon flushing
- ☐ time and date in the medical records and date dressing
- ☐ all of the above

ABBREVIATIONS & GLOSSARY

Abbreviation	Definition
BSI	**Blood stream infection**
CVC	**Central venous catheter**
CVC flush	**Refers to any instillations within a CVC that does not have to be removed prior to use.**
Extravasation	**Inadvertent administration of vesicant medication or non-vesicant solution into the surrounding tissue instead of into the intended vascular pathway.**
Long Term CVC	**Long-term use > 30 days, lasting months to years**
Needleless connector	**Can be:** • **negative fluid displacement,** • **positive fluid displacement or** • **neutral displacement design.** **Should be luer lock**
Port-a-cath / Port	**Totally Implantable Vascular Access Device**
Positive pressure flush	**Apply the clamp of the catheter lumen before completing the flush while maintaining positive pressure.**
Stop-start or pulsating flush	**Advance the syringe plunger of 10 mL of Normal Saline with a forward pulsing motion and then pause.**
TIVAD	**Totally Implantable Vascular Access Device**
Vesicant	**An irritant drug or solution capable of causing injury i.e. blistering or tissue necrosis when it escapes from the vascular pathway into surrounding tissue for example bicarbonate, calcium, 10% dextrose, some cytotoxic drugs**

Appendix 1

TIVAD non-coring needle insertion and removal competency

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Information on source images can be obtained from Pauline Dobson

Pauline.dobson@hnehealth.nsw.gov.au

Learning Package Evaluation Form

Please circle your response to the following questions:

1. The aims and objectives of the learning package were clear and appropriate to your learning needs and goals? ❑ Yes ❑No

2. I have achieved my learning goals? ❑ Yes ❑ No

3. As a result of completing this package I now have a better understanding of accessing & de-accessing a TIVAD ❑ Yes ❑ No

4. The case scenario and readings were helpful? ❑ Yes ❑ No

5. The package was easy to follow? ❑ Yes ❑ No

6. The workload was reasonable? ❑ Yes ❑ No

7. The information and skills I can use from the package are:

8. Some suggestions I would like to make to improve the package are:

9. Further comments I would like to make are:

Thank you for completing this evaluation