Basics of Cancer Care Workshop

“Central Venous Access Device (CVAD)”

Nursing Division,

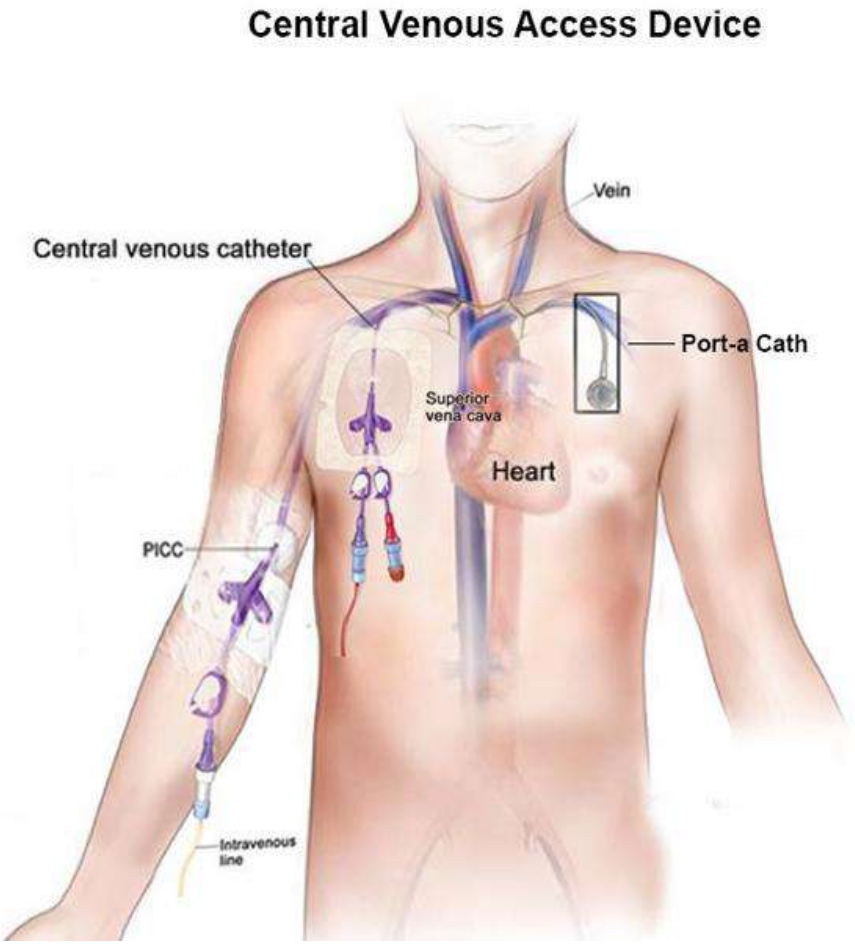
Ministry of Health, Malaysia

Learning Outcomes

By the end of this lesson, learners will be able to:

- Described the different types and complications of central venous access devices (CVADs).
- Demonstrate the clinical competency in the care and maintenance of central venous access devices (CVADs).

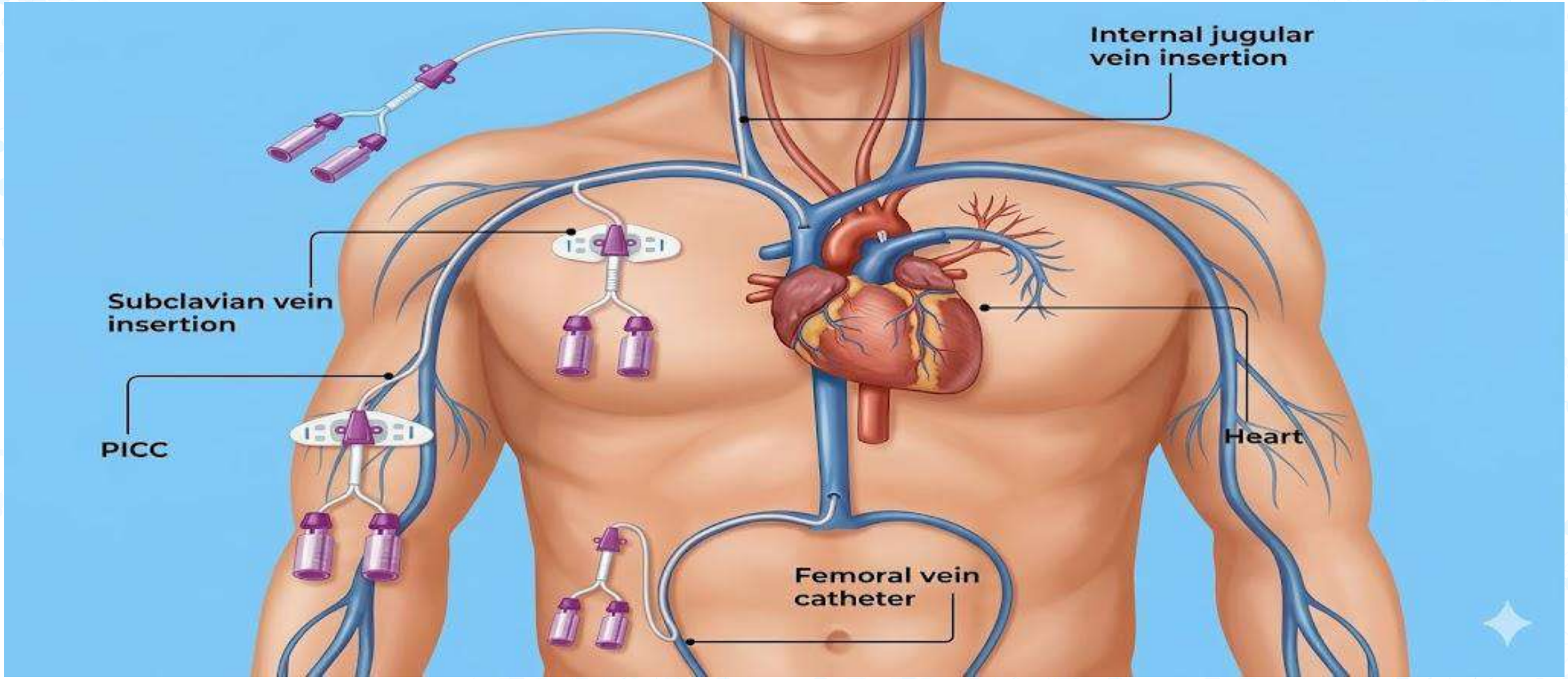
What is CVAD?



- **A Central Venous Access Device (CVAD)**, also known as **central venous catheter or central line,** is a catheters inserted into **a large central vein** or inserted **peripheraly** with the tip positioned centrally.

- The catheter tip is usually positioned in the lower **superior vena cava,** or at **cavoatrial junction.**

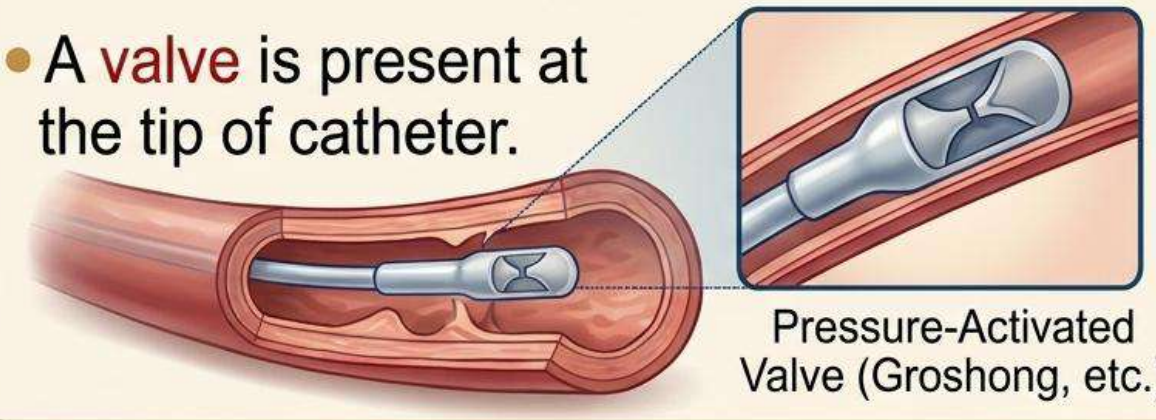
Placement of the CVAD



Type of CVADs

Closed-ended

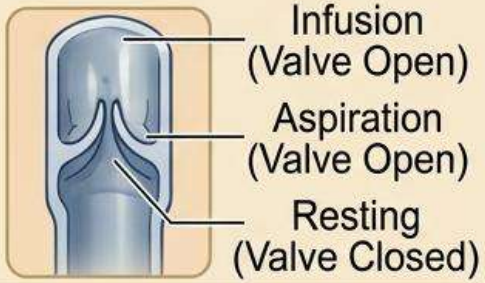
- A valve is present at the tip of catheter.



Pressure-Activated Valve (Groshong, etc.)

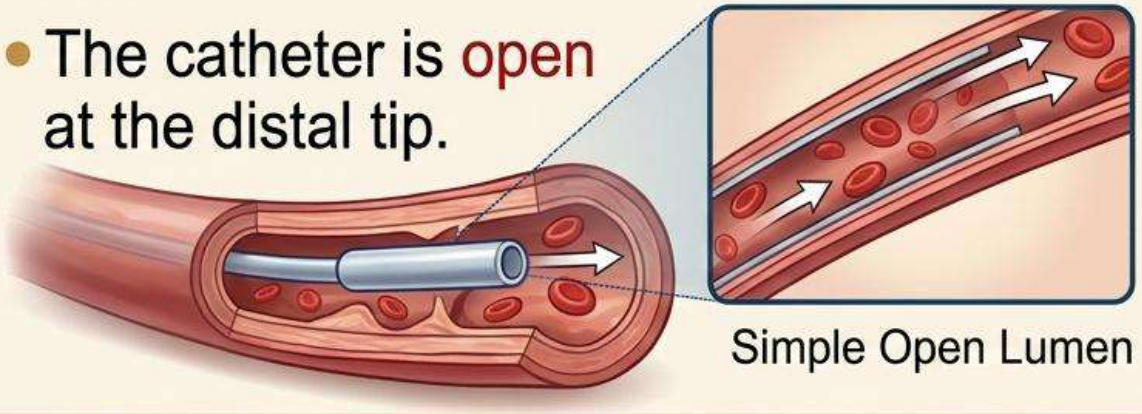
✓ Clamping is not required as the valve is closed except during infusion or aspiration of blood.





Open-ended

- The catheter is open at the distal tip.



Simple Open Lumen

✗ The catheter requires clamping before entry into the system.



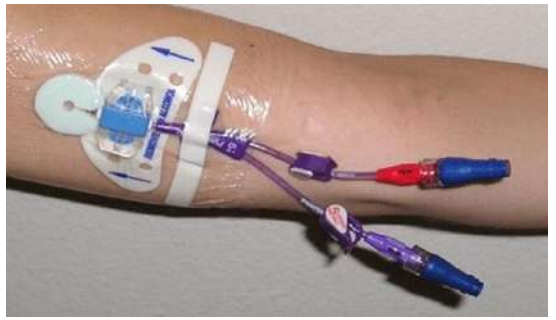
Integrated Clamp (Closed)

- Clamps are usually built into the catheter.

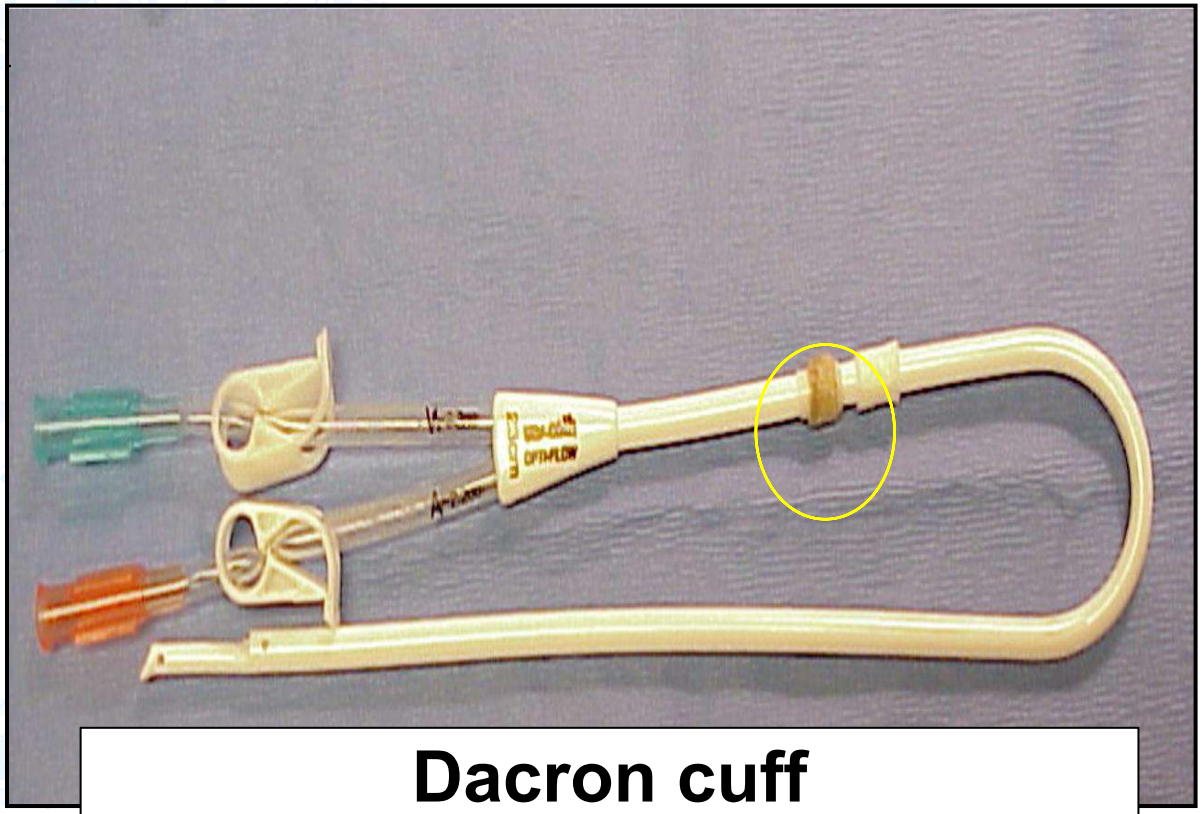
Type of CVADs

1. Tunneled
2. Non-Tunneled
3. Peripherally Inserted Central Catheter (PICC)
4. Implanted Port



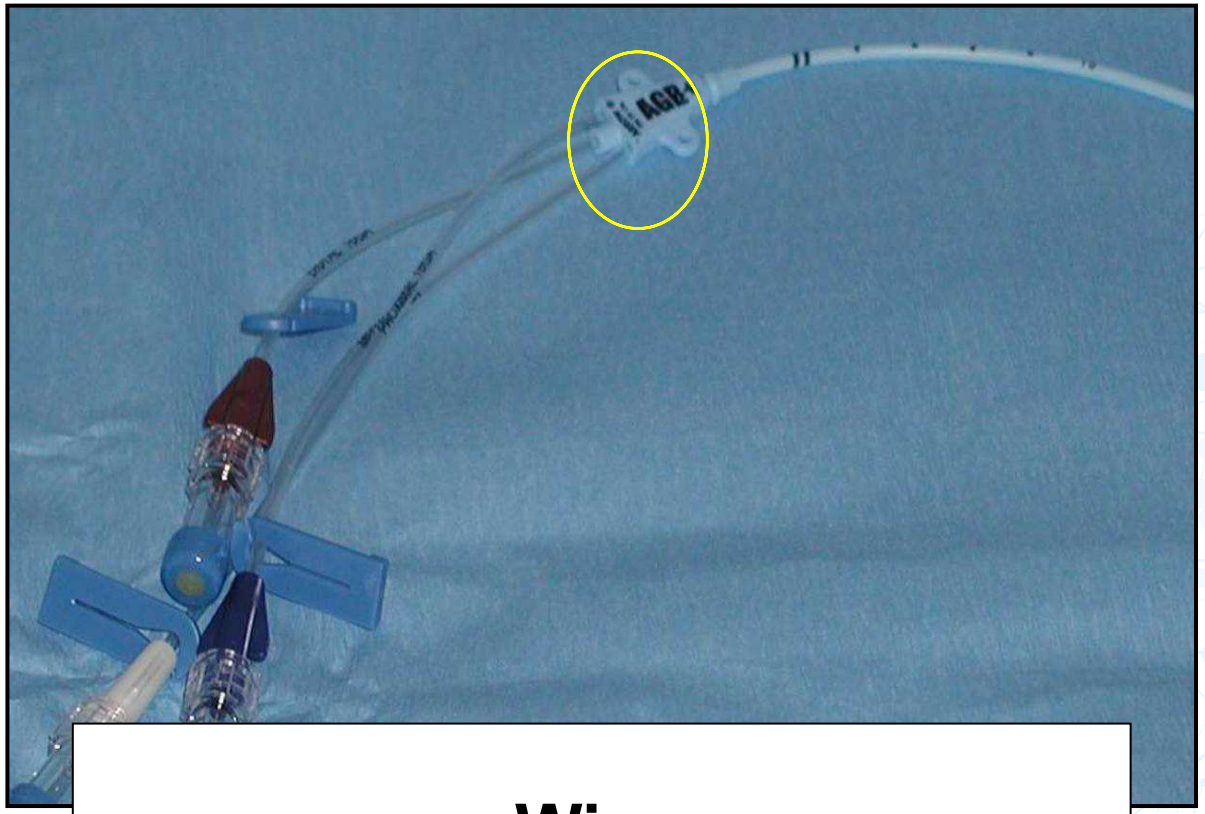
TUNNELED	NON-TUNNELED	PICC	IMPLANTED PORT
• Long-term use, from months to years • Inserted under the skin before entering the central vein – usually in the chest or neck • Low risk of infection – subcutaneous tunnel and cuff helps prevent bacteria from migrating along the catheter tract E.g: **Hickman, Broviac, Groshong**	• Short-term use, from days to weeks • Inserted directly into a central vein without tunneling under the skin – usually in the neck, groin or chest • High risk of infection – direct to the vein without protective tunnel E.g: **Vascath** (temporary dialysis catheter)	• Long-term use, from weeks to months • Inserted into a peripheral vein in the upper arm, with the tip advanced into a central vein • High risk of infection – external device	• Long- term use, from months to years • Inserted under the skin into a central vein, usually in your upper chest, either under surgical or interventional radiology (IR) procedure • Low risk of infection - internal device
			

Differences Between Tunnelled and Non-tunnelled Catheters



Dacron cuff

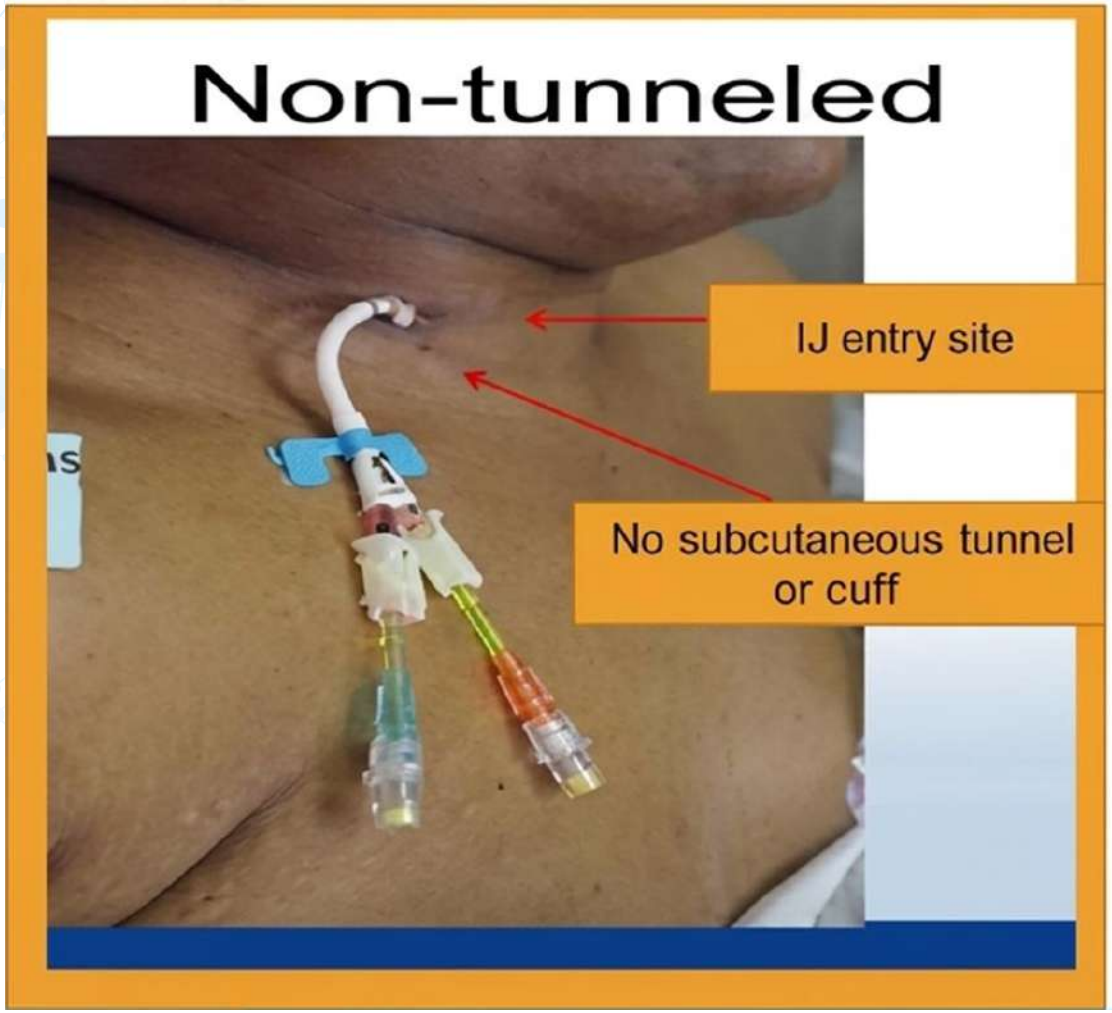
Encourage tissue ingrowth, helps secure the catheter and reduce migration of organism along the catheter tract

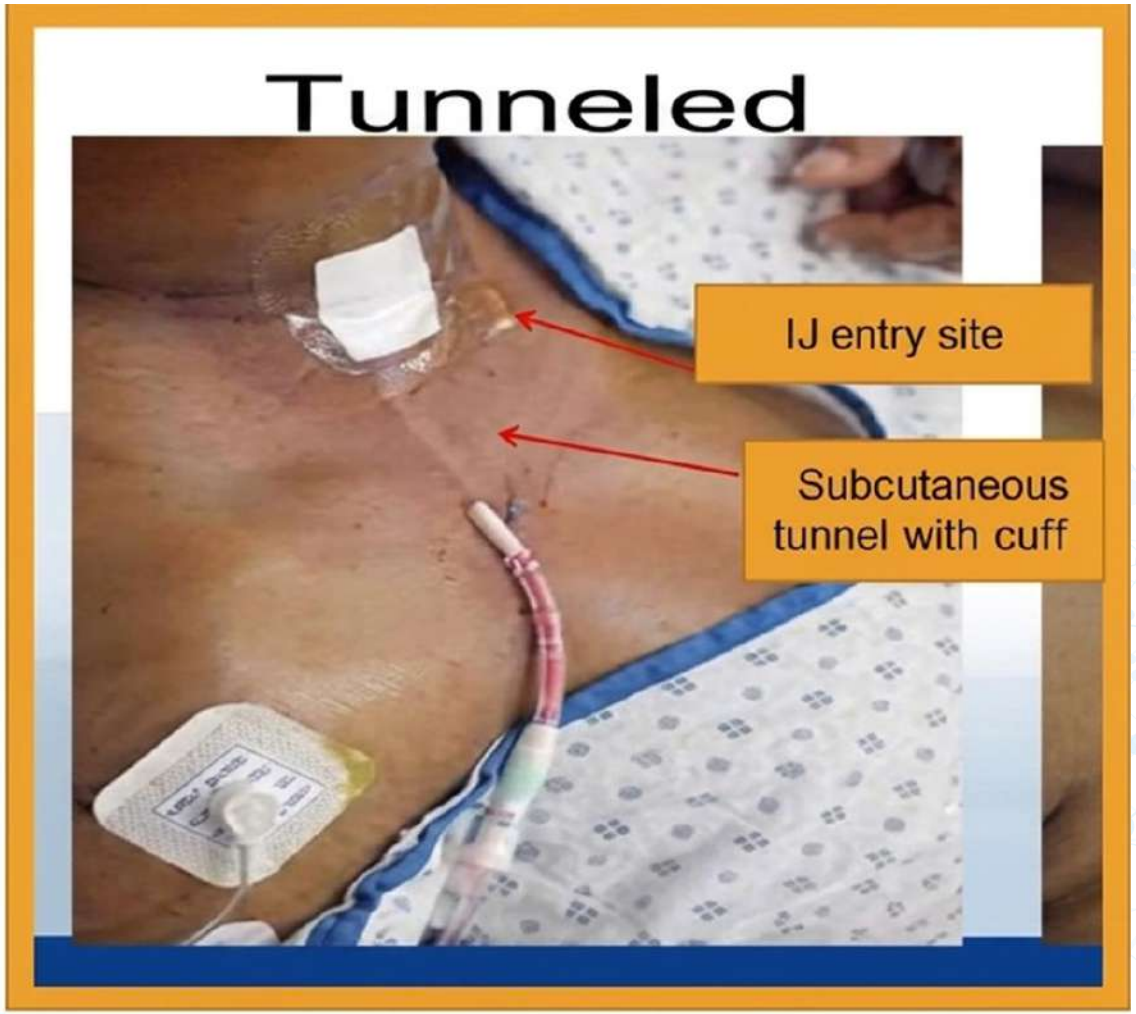


Wing

Used for sutures.

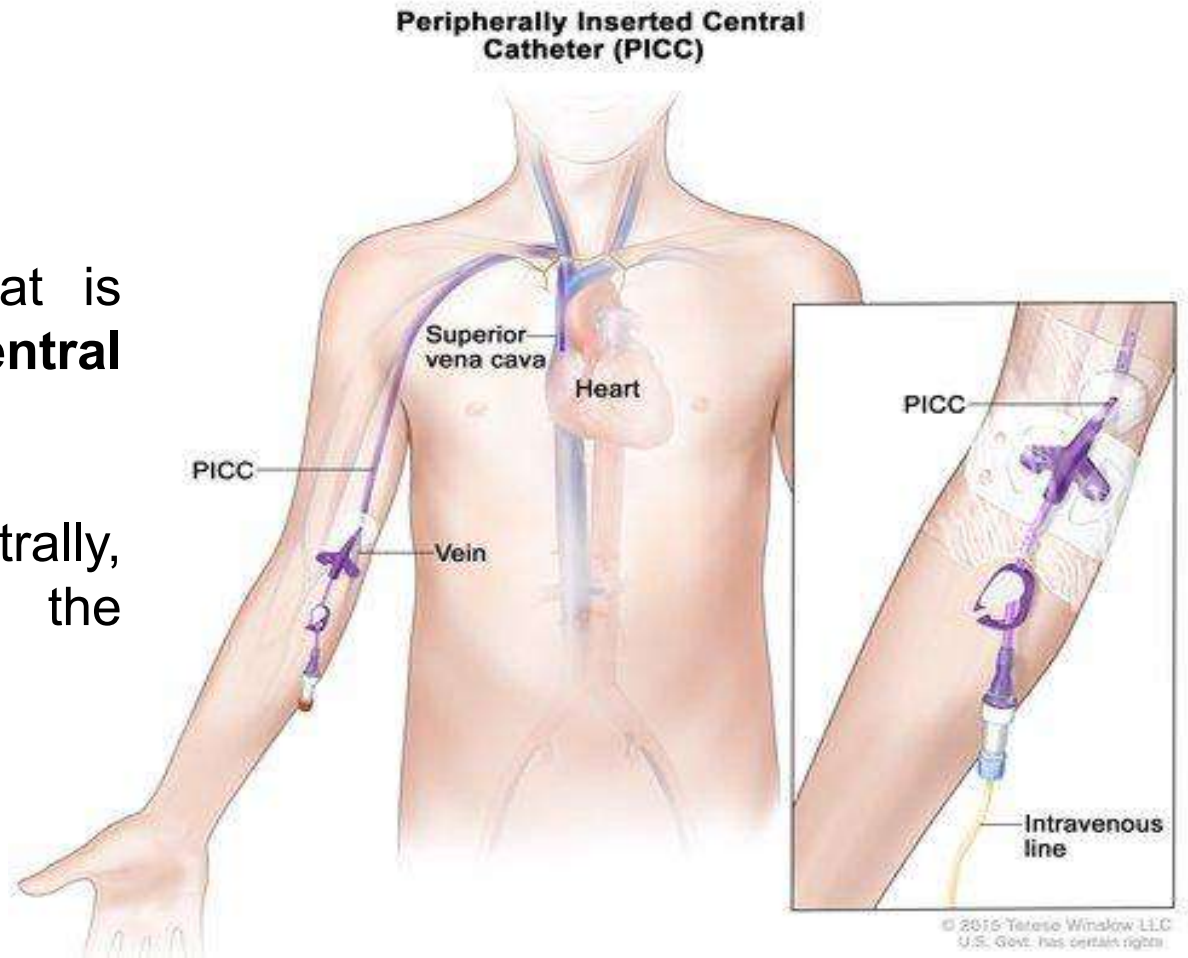
Differences Between Tunnelled and Non-tunnelled Catheters



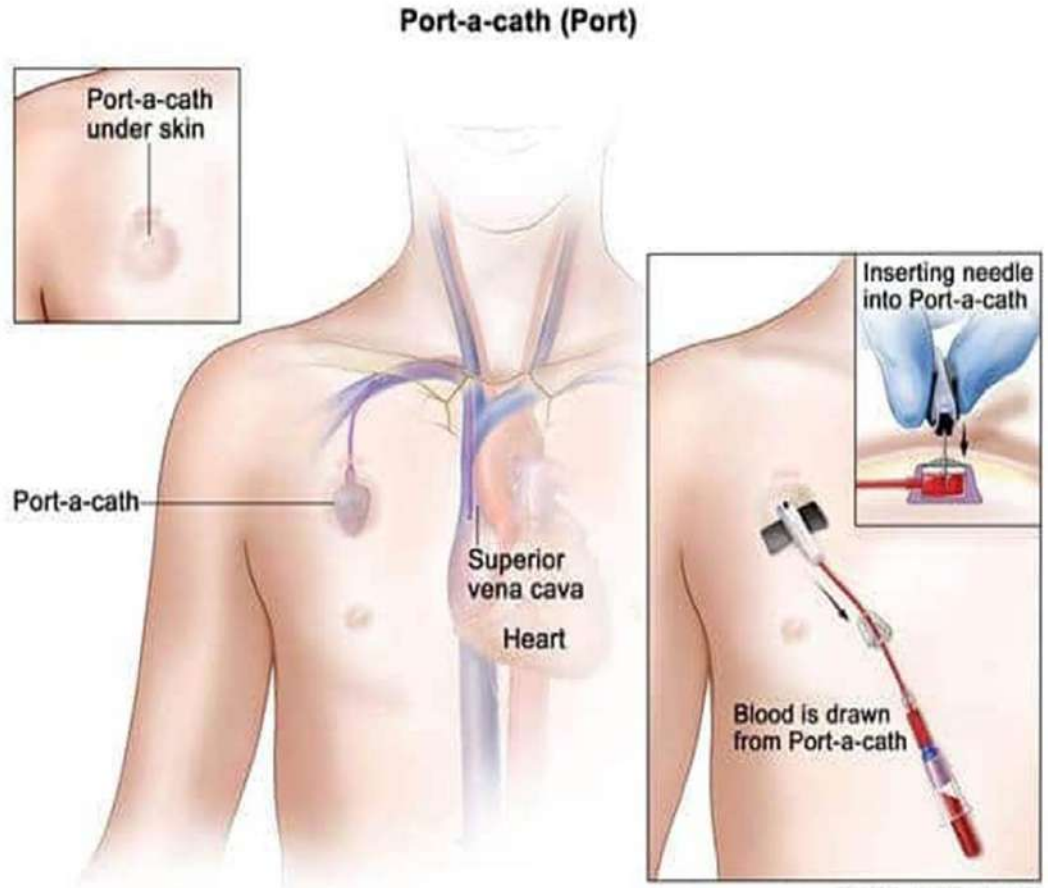


Peripherally Inserted Central Catheter (PICC)

- **Single or multi-lumen** catheter that is inserted via **peripheral vein into a central vein**.
- The catheter **tip** terminates centrally, usually in the **lower SVC** or at the **cavoatrial junction.**

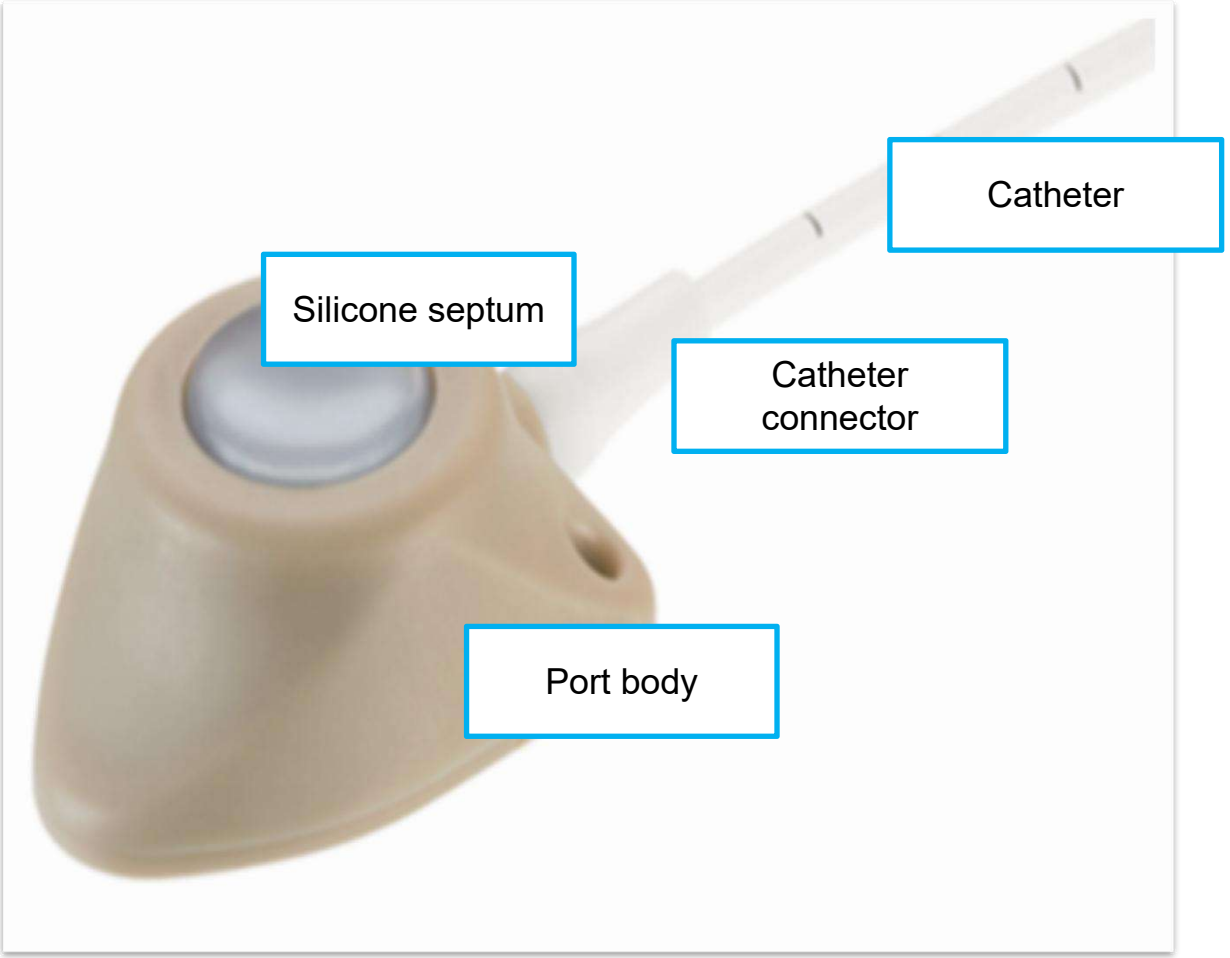


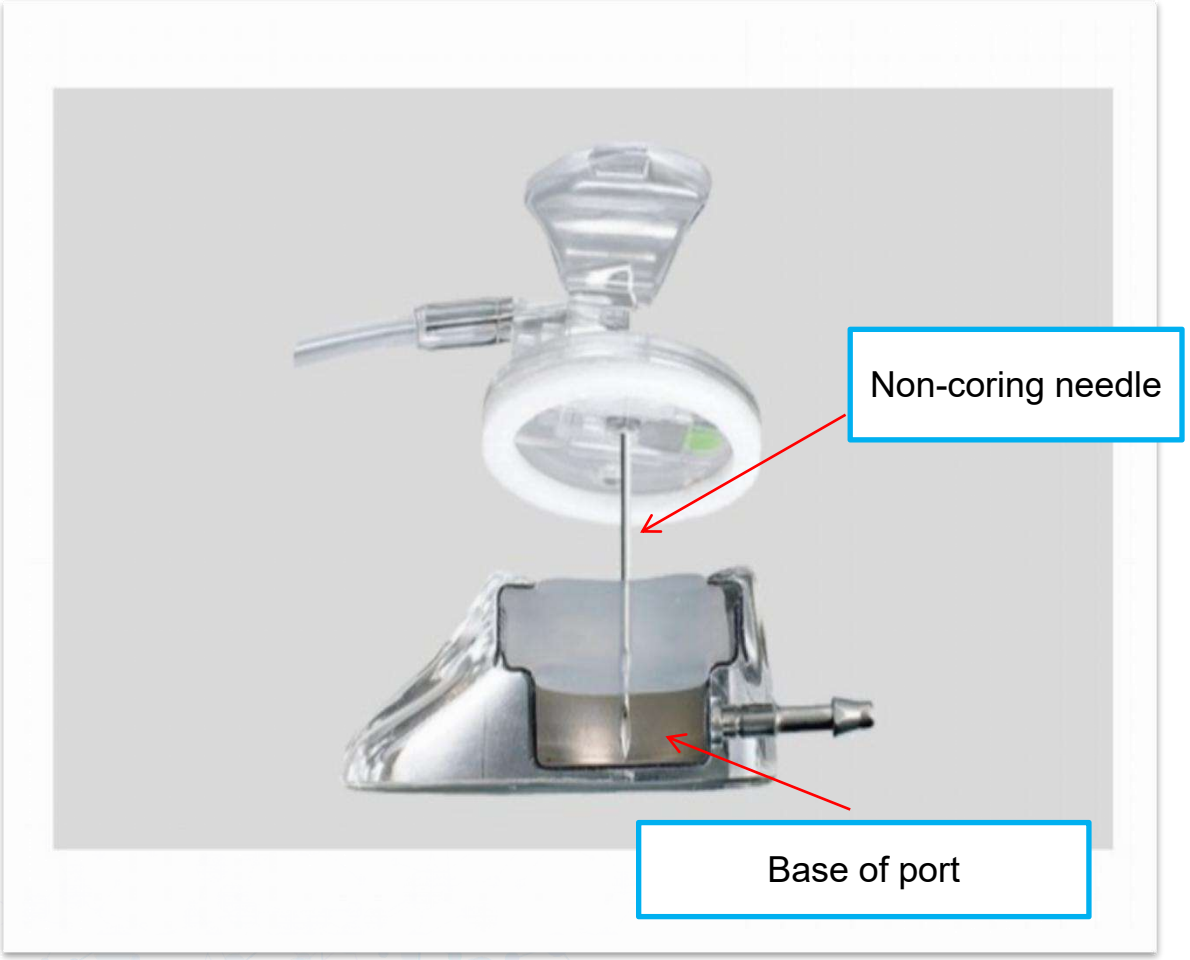
Implanted Port



- Also known as **chemo port.**
- Small port that is **placed under** your skin, most commonly in the **upper chest. It may occasionally be placed in the arm and femoral.**
- The catheter passes through a large vein, such as the **internal jugular or subclavian vein**, with the tip positioned near the **cavoatrial junction.**

Structural Components Implanted Port





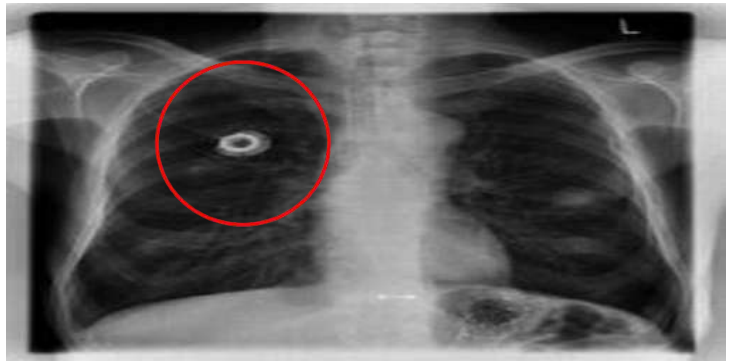
How an Implanted Port is Inserted



- 3 cm incision is made in the skin of the upper & port inserted 5mm under subcutaneous tissue

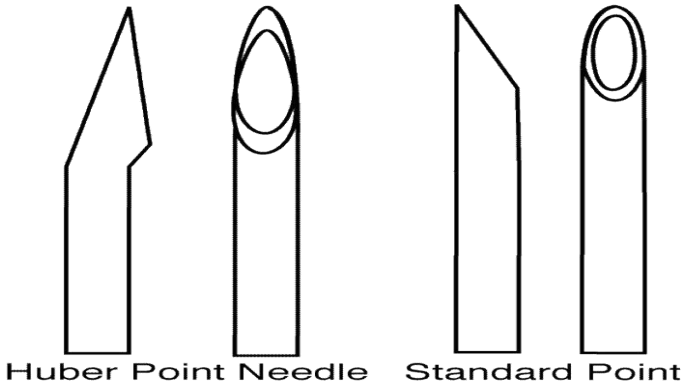


- Suturing the wound is done after port is inserted



- Post procedure chest x-ray or fluroscopy image is obtain to confirm correct catheter tip placement before the port is used

Needle for Implanted Port Access



- Huber / non coring needles were invented to protect silicone septum.



- Need to change every 3 days



- Need to change every 7 days

Size of needle

- 19G
- 20G
- 22G

CVAD

Indication & Contraindication

Indication CVAD

 Chemotherapy Patient	DELIVERY OF CERTAIN MEDICATION/FLUID	➢ Irritant/vesicant chemotherapy ➢ Hypertonic solutions are damaging to peripheral veins
 Patient Factors	POOR PERIPHERAL VENOUS ACCESS	➢ Obesity ➢ Scarred veins from previous cannulation
 Extended Infusions	PROLONGED INTRAVENOUS THERAPIES	➢ TPN ➢ Long-term antibiotic
 Dialysis Procedures	SPECIALIZED TREATMENT	➢ Hemodialysis

CVADs can be use for:



Blood transfusion



Blood sampling



Total parenteral nutrition(TPN)

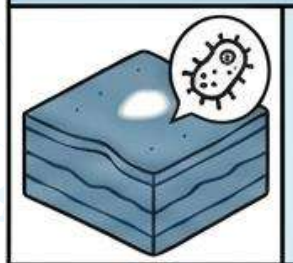
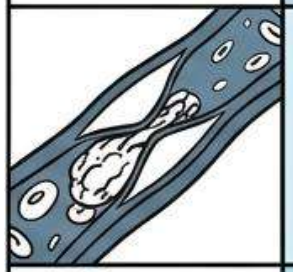


Chemotherapy



Medication/Antibiotic

Contraindication CVAD

	**LOCAL INFECTION AT INSERTION SITE**	➢Cellulitis, abscess, or open wounds over the vein access point can increase the risk of bloodstream infection
	**VASCALAR INYURY**	➢Examples: Traumatic Injuries
	**THROMBOSIS OR STENOSIS OF INTENDED VESSEL**	➢Blood clot that plugs inside of the vein can stopping or slowing blood flow.
	**UNCOOPERATIVE PATIENTY**	➢inability to maintain safe line care

CVAD

Complications

Infection

Causes of infection:

- Poor skin preparation
- Dressing not intact and wet
- Dried blood or new drainage left under the dressing may increase risk of infection
- Immunosuppression
- Bloodstream infection/catheter-related bloodstream infection





Infection

Implanted Port





PICC



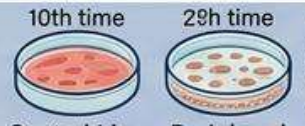




Type of Infection

CENTRAL LINE ASSOCITED BLOOD STREAM INFECTION (CLABSI)	CATHETER RELATED BLOODSTREAM INFECTION (CRBSI)
Definition: **Laboratory** – confirmed primary bloodstream infection that develops when bacteria enter the body through central line	**Clinical Diagnosis:** **Clinical & pathological diagnosis** confirming that bloodstream infection was caused by intavascular catheter
Types of Lines: **Only central lines** (CVCs, implanted port and PICC lines)	**Types of Lines:** **All intravascular line** including both CVCs and peripheral
Source Identification: Lines is present – no others obvious infection source	**Root Cause Proof:** Microbiological proof linking the catheter to blood – catheter **itself is the root cause of the infection**
Blood Culture Method: Standard positive blood cultures	**Paired Culture Method:** **Specialized paired testing** - comparing how quickly bacteria grow in different taken at the same time (central line and peripheral)
Primary Goal: **Surveillance & reporting** (Collecting, analysing and sharing medical data to track diseases trends and improve patient safety)	**Primary Goal:** **Clinical diagnosis** (Identifies a medicon or disease in an individual patient based on direct medical evaluation)





Infection

1) Notify doctor → require blood cultures 

2) If exudate → swab for culture & sensitivity 

3) Specific antibiotic therapy is directed against organisms recovered from cultures 

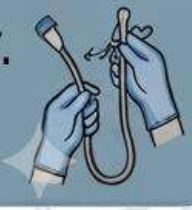
4) Monitor temperature. 

5) Daily/BD dressing according to Dr order 

6) Maintain aseptic technique during dressing, administration of medication or flushing 

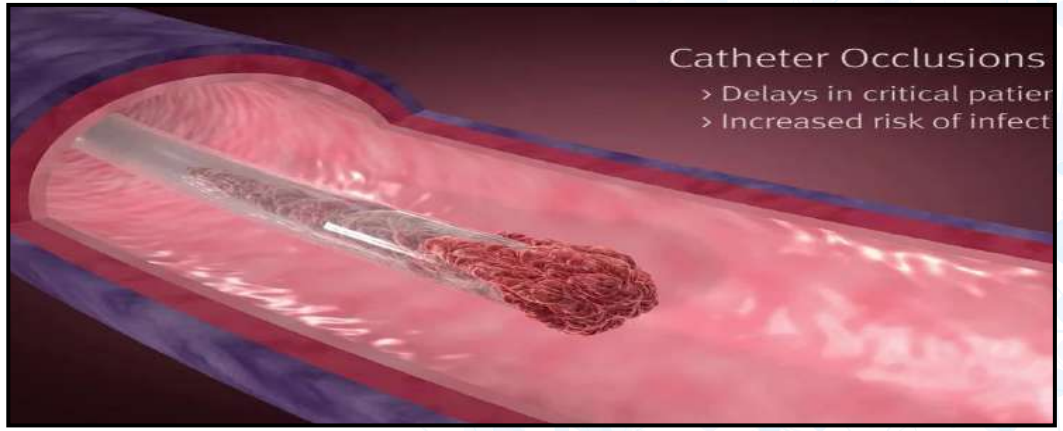
7) Proper hand hygiene – before, during and after procedure 

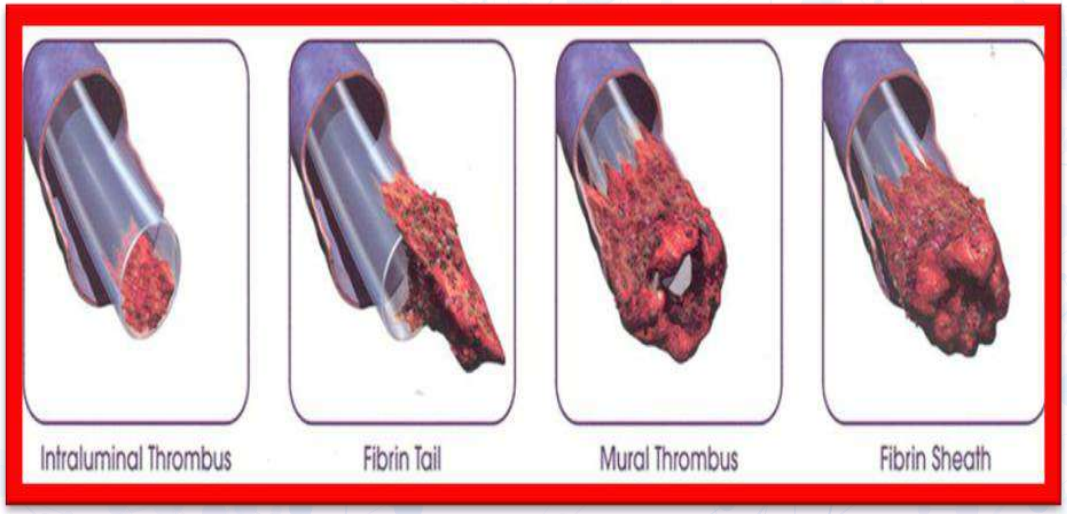
8) Local site infection – may be treated by aggressive site care and antibiotics . 

9) Sepsis require removal of catheter. 

Occlusion

- Occlusion may be partial, withdrawal or complete. If resistance is felt, do not force flush.
- Occurs when the venous access device able to flush but unable to obtain blood return due to blockage at the tip of the catheter or fibrin sheath.
- Causes of occlusion include:
  - injury to the vein wall during insertion or hardened blood in the catheter lumen
  - Inadequate flushing

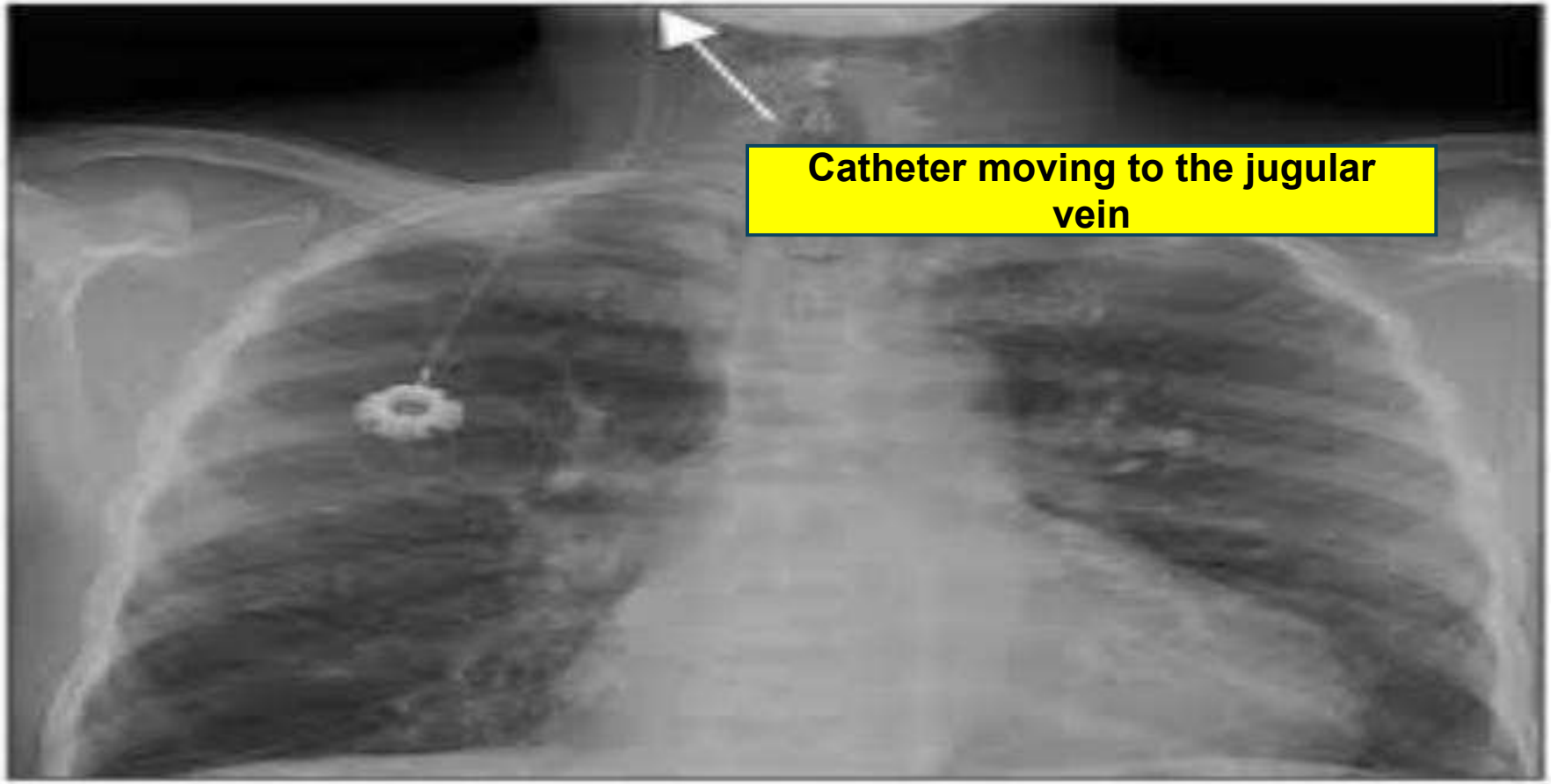




Catheter Tip Migration

PICC	IMPLANTED PORT
• Movement of catheter in or out of insertion site. • It typically occurs during dressing changes or when no securement device has been used to hold the catheter in place. • Catheter tip migration may lead to complications like phlebitis and thrombosis. • Replacement is required because the catheter tip is no longer located centrally.	• If a patient hears the sound of a "waterfall" or "rushing water" in the ear on the same side as the implantable port, it indicates that the catheter tip may have migrated up into the internal jugular vein. • Catheter tip migration should be suspected if there is no blood return, difficulty flushing, or if the patient experiences pain, swelling, or any unusual symptoms during the flushing process. Cause: • Forceful flushing (never force flush a CVAD because this can cause catheter rupture, embolisation or extravasation) • Body movement that increase intrathoracic pressure (sneezing,vomiting or strenuous upper extremity).

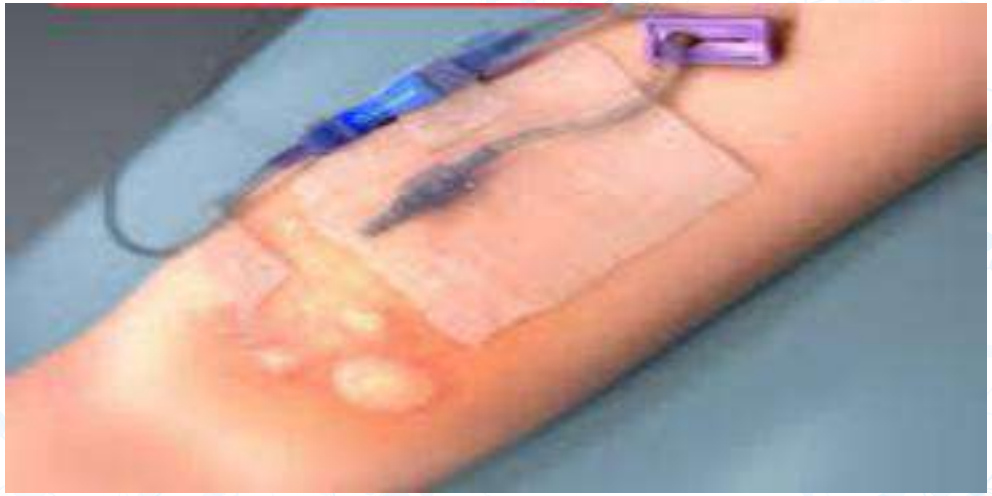
Catheter Tip Migration



Extravasation

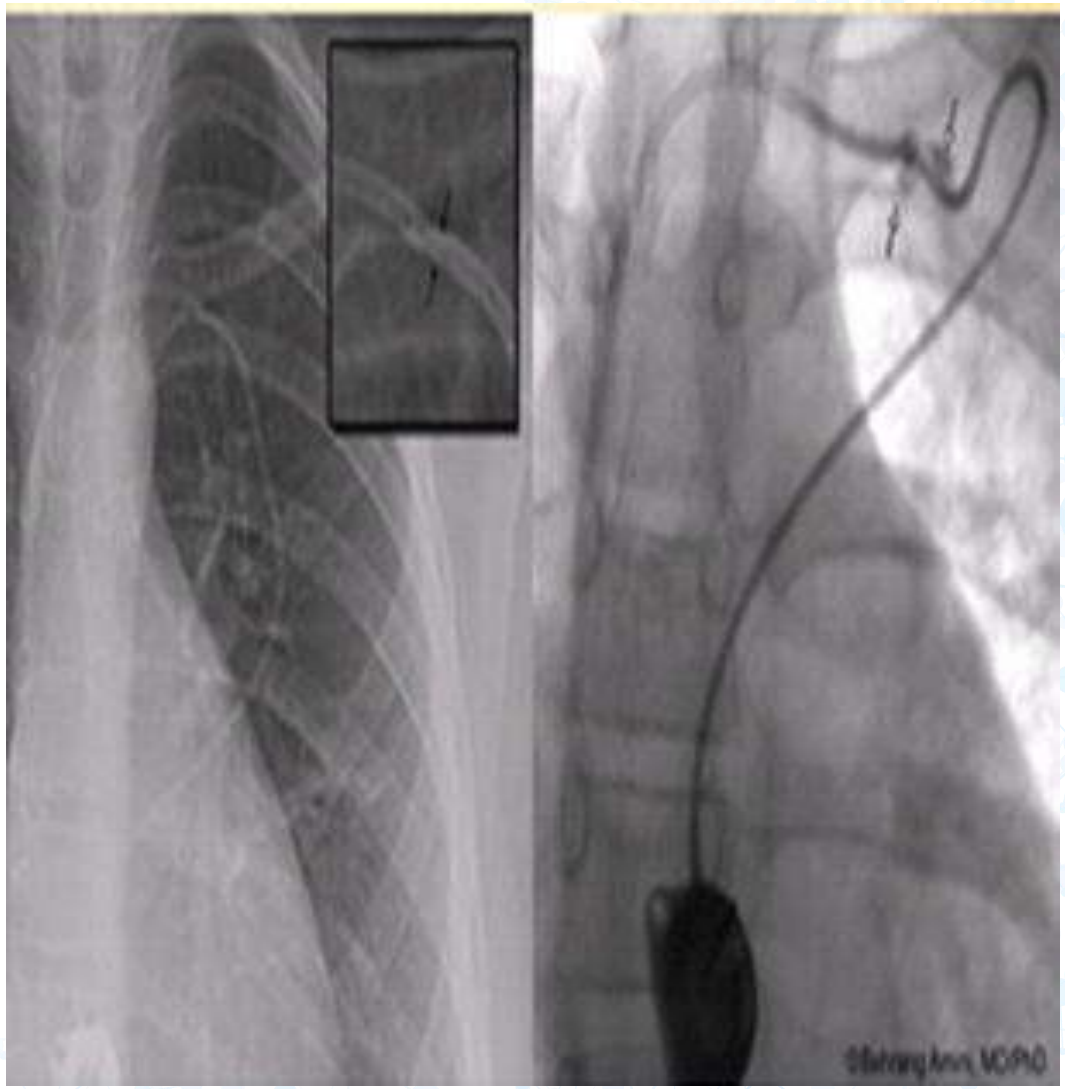
- Extravasation is leakage of cytotoxic drug or potentially harmful medication into surrounding tissue. Cytotoxic extravasation requires urgent management according to protocol
- Early symptom:
  - Pain, burning or stinging
  - Redness or changes in skin color at the port or insertion site
  - Swelling or puffiness
- Late symptom:
  - Blistering
  - Ulceration
  - Severe pain
  - Tissues necrosis





Pinch - Off Syndrome

- Compression and shearing of the catheter between the clavicle and the first rib.
- Suspected when lack of blood return or inability to infuse occurs intermittently.
- It is worsened by sitting and relieved by raising the arms overhead.
- Pinch-off can be recognized on chest X-ray a narrowing of the catheter between the clavicle and first rib.
- It may cause catheter fracture or embolisation and requires urgent radiology review, catheter removal or replacement may be needed.



CVAD

Care & Maintenance

CARE AND MAINTENANCE

WHY IT IS IMPORTANT??

PREVENT INFECTION & COMPLICATION

- **Infection serious if proper hygiene is not maintained.**
- **Infection can lead to complications such as sepsis, which is life-threatening.**

ENSURE PROPER FUNCTIONING OF THE LINE

- **Regular care and maintenance keep the line functioning well.**
- **If not maintained the line correctly it will lead to complication such as catheter occlusion/block.**

Care of Implanted port

- Always use aseptic technique during catheter care and use.
- Change the dressing every 3 days to monitor the site and detect any signs of infection. (redness, warmth, swelling, purulent drainage).
- Change needle weekly or every 3 days – depends on type of needle use.
- Apply a keyhole and transparent dressing at needle chemo port to monitor sign of infection.
- Assess dressing – make sure dressing is clean, dry, intact.
- Inform Doctor immediately if there is any discharge, redness, swelling or pain around the port site.

Maintenance of Implanted Port

- Always maintain positive pressure (forward) on the syringe plunger during flushing or while removing from the injection cap - to prevent any retrograde blood flow into the tip of the catheter which can cause clot.
- Flush chemoport gently. If resistance is felt, do not attempt to force flushing and notify the doctor.
- Maintain flushing routines and techniques.
- Flush the system between administration drugs.
- Avoid mixing incompatible drugs.
- Always ensure the catheter is clamped when cap or line changed.
- Unused port is flushed every 2 months – if have a problem, doctor need to notify first, write in notes and SN remarks in patient's TCA book.

Care of PICC

- Always use aseptic technique during catheter care and use.
- Change the dressing weekly if it is clean, dry, intact and there are no sign of inflammation.
- Change dressing STAT if having blood clots, dirty or wet.
- Dressing every 3 days if having sign of inflammation.
- Apply securement device and monitor sign of infection such as redness, pain, swelling or pus at puncture site.
- Swimming is not recommended because the PICC is an external device and there is infection risk.

Maintenance of PICC

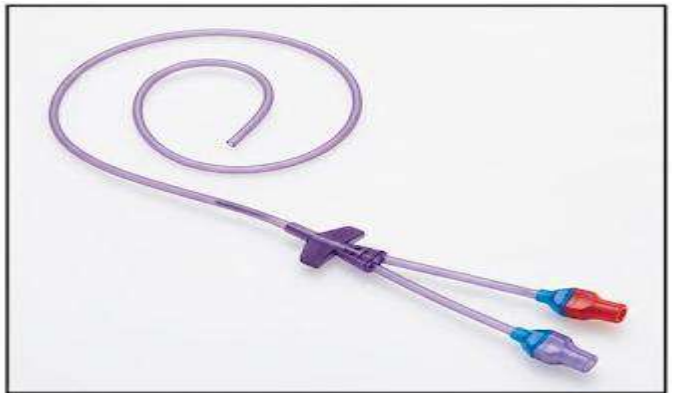
- Flushing frequency for unused PICC depends on catheter type, locking solution and local policy.
- Flush the catheter by using push pause technique/**maintain positive pressure (forward) on the syringe plunger during flushing** to prevent blood clot.
- Maintain flushing routines and techniques.
- Flush the system between administration drugs.
- Avoid mixing incompatible drugs.
- Monitor catheter length to avoid risk of dislodgement.
- Avoid blood pressure readings in the arm with the PICC.

Maintenance of PICC

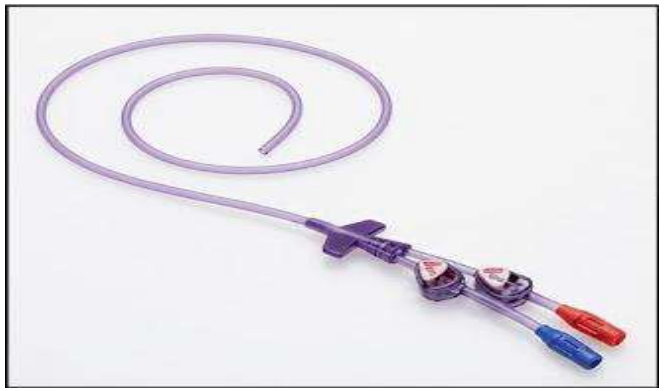
Type of catheter	Frequency flushing
Open-Ended (Non-Valved)	Daily flushing
Closed-Ended (Valved)	Weekly flushing

Catheter Feature	Open-Ended (Non-Valved)	Closed-Ended (Valved)
Requires Heparin Lock?	Yes (To prevent clotting)	No (Saline only)
External Slide Clamps?	Yes (Must be clamped)	No (Valve acts as clamp)
Risk of Blood Reflux?	High (if unclamped)	Low (prevented by valve)

Closed-ended catheter



Open-ended catheter



Securement Device of PICC

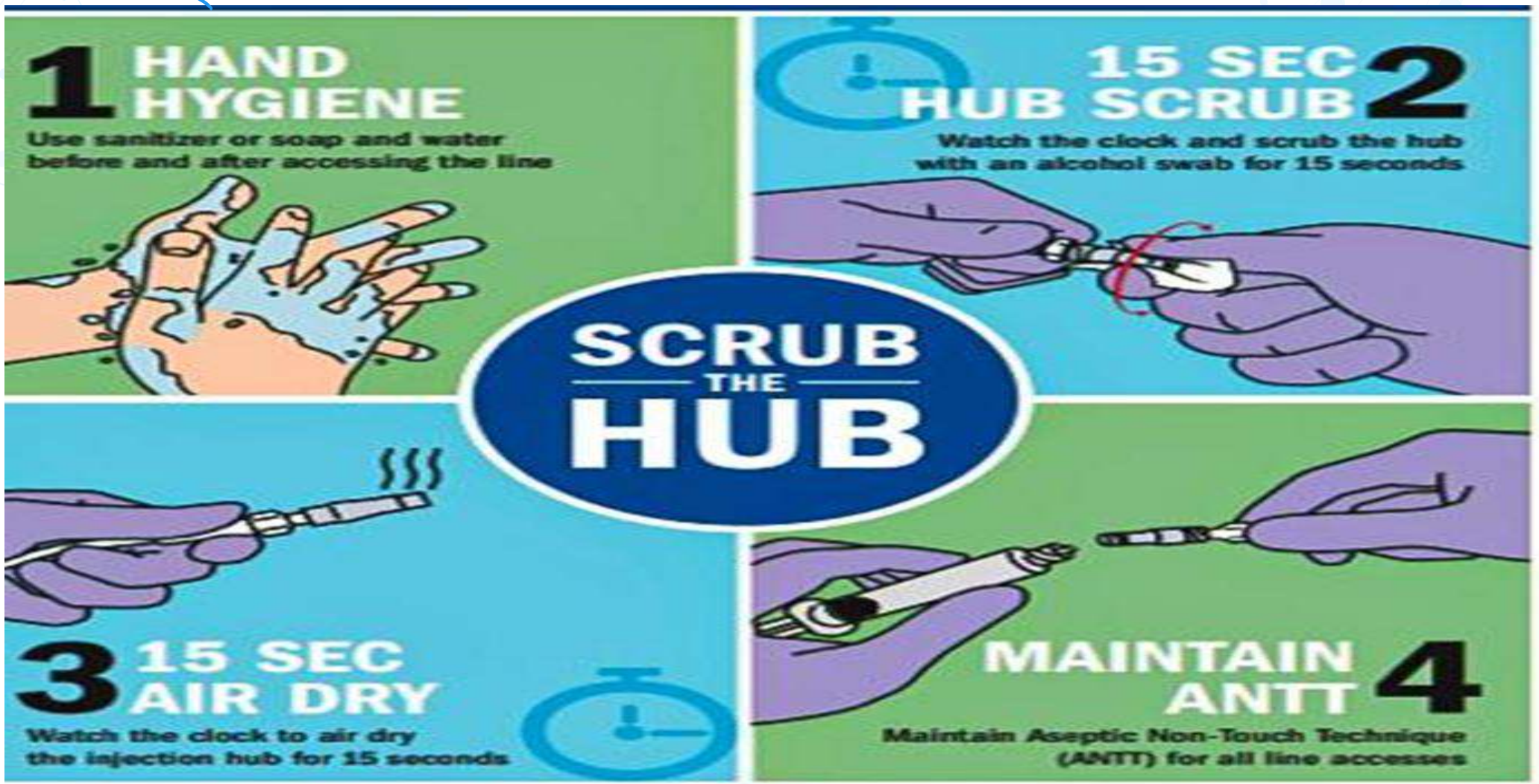


Flushing

- Perform the procedure under strict aseptic technique. Prepare normal saline, as well as heparin saline if required for the specific catheter type.
- Clamp the line before removing the previous needleless connector.
- Perform “Scrub The Hub” - Disinfect the needleless connector using locally approved antiseptic (eg:chlorhexidin) and friction scrub for 15 second using twisting motion and air dry for 15 second.
- Maintain Aseptic Non-touch Technique (ANTT) for all line accesses.
- Attach new needleless and unclamp the line.
- Check blood return before flushing the line.
- Flush the catheter with normal saline by using **push pause technique/maintain positive pressure (forward) on the syringe plunger during flushing.**
- If the catheter is not connected to intravenous fluids, after given medication or after blood taking flushed the lumen with 5ml normal saline and follow by 10mls heparin lock if required for the specific catheter type (open-ended an closed-ended catheter) and clamped line.



Scrub the Hub



Patient with Implanted port Need To Know

- Avoid strenuous upper-limb activity or heavy lifting as it may cause port will migrate or pinch off. Local advise a maximum lifting weight of 5 kg on the side with chemoport.
- Avoid blood pressure readings in the arm if the chemoport placed at the arm.
- Do not apply any oil or lotion at chemoport area.
- An unused port is need to be flushed every 2 month – To maintain patency of chemoport and prevent from block.
- Monitor sign and symptom of infection such as fever, redness, swollen, pain and pus over the chemoport area. If have sign and symptom of infection, go to nearest hospital as soon as possible.
- Wash hand before and after touching the chemoport area.
- Can do ADL's as usual at home.
- Avoid crowded area to prevent from getting infection.
- Swimming may be allowed after wound healing and when the port is not accessed.

Care of PICC at Home

- Dressing :
  - Keeps the site clean and holds the PICC in place.
  - The dressing needs to be changed weekly - If dressing wet, dirty and loose need to change the dressing STAT
- Keep the PICC dry during bathing
  - You can cover it with plastic wrap or a plastic bag to keep the dressing dry.
- Family members or caregiver should be taught how to support PICC care at home.
- Avoid strenuous activity.
- Avoid lifting heavy objects. Local advise a maximum lifting weight of 5 kg on the affected arm, as heavy lifting can cause catheter occlusion or lead to tip malposition.
- Avoid activities that may cause sweating
- Always Keep an emergency kit with. (tape, gloves and gauze).
- Do not recommended swimming – external device.

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