

**M. Sudha Devi****Abstract**

A Peripherally Inserted Central Catheter is long, small, flexible tube that is inserted into a peripheral vein, typically in the upper arm, and terminates in a large vein in the chest to obtain a central intravenous access. It needs to be inserted by specially trained professionals and prepare the patient to keep the PICC line safe with special care in order to prevent complications. Subclavian and jugular line placements may result in pneumothorax (air in the pleural space of lung), while PICC lines have no such issue because of the method of placement.

**Keywords:** Pripherally Inserted Central Catheter; Peripheral Veins; Cannula; Stylet; Consent; Thrombosis; Bung; Sutures; Tear; and Clot.

**Introduction**

A peripherally inserted central catheter (PICC) less commonly called a percutaneous indwelling central catheter is a form of intravenous access that enters the body through the skin (percutaneously) at a peripheral site extends to the superior vena cava (a central venous trunk), and stays in place (dwells within the veins) for days or weeks.

A device was developed in the United States in the 1970s that, when inserted into a peripheral vein and guided into the central vessels, acquires the characteristics of a central catheter. Initially implemented in ICUs, it was called Peripherally Inserted Central Catheter (PICC) Line Insertion. It is a safe alternative of central access of prolonged duration that permits the administration of solutions of high osmolarity and extreme or vesicant pH into the peripheral veins.

**Author Affiliation:** M.Sc. (N), Reader, Medical Surgical Nursing Department, Vellalar College of Nursing, Thindal, Erode, Tamil Nadu 638012, India.

**Corresponding Author:** M. Sudha Devi, M.Sc. (N), Reader, Medical Surgical Nursing Department, Vellalar College of Nursing, Thindal, Erode, Tamil Nadu 638012, India.

E-mail: danramsudha@gmail.com

Received on 06.12.2017, Accepted on 18.01.2018

**Indication**

Many intravenous medications and solutions cause damage to the peripheral venous endothelium and should be administered centrally to avoid this damage. So PICCs can be used for the following infusions.

- Total Parenteral Nutrition
- Chemotherapy
- Blood Transfusion
- Antibiotics
- Intravenous Fluids
- Short infusions for patients with short term infusions for patients with limited venous for therapies that will continue over long period of time.

**Contraindication**

- Lack of peripheral access
- Venous thrombosis
- End-stage renal disease.
- PICC insertion becomes impossible for patients with multiple previous PICCs.

## Insertion

PICC is a long, thin and flexible tube inserted in a peripheral vein in the arm such as cephalic vein, basilica vein or brachial vein and then advanced proximally toward the heart through increasingly large veins, until the tip rests in the distal superior vena cava or cavoatrial junction.

### *Who can insert?*

- Physicians
- Physician assistant
- Radiologist assistants
- Respiratory therapist
- Nurse Practitioner
- Specially trained certified registered nurses
- Radiologic technologist

### *Methods of Insertion*

There are two methods of insertion of PICC

#### *1. Peel – Away Cannula Method*

- Access is established by inserting the cannula and stylet, into a palpable vein in or near the antecubital fossa.
- The stylet is removed and the catheter inserted through the cannula.
- The cannula is then pulled back and peeled away from the catheter.
- This method requires accessible veins at or near the antecubital fossa.

#### *2. Modified – Seldinger Method*

- A vein is accessed with a regular hypodermic needle, an intravenous cannula or an echogenic needle.
- A guide wire is not advanced past the shoulder sheath.
- A nick is made in the skin beside the guide wire, and an introducer sheath with dilator is inserted over the guide wire.
- The guide wire and dilator are removed, and the catheter is advanced through the introducer sheath, which is then pulled back and peeled away.

## Preparation of the patient

- Assess the condition of veins and diagnosis in order to provide access throughout the course of therapy, minimize pain and venous damage, use nursing time efficiently, and be cost effective.
- Explain the patient and family members about risks and benefits of the procedure.
- Get consent from the patient that stating the patient understands the procedure.
- Prior to insertion the patient is encouraged to be well hydrated and if they are unable to achieve this, the giving of 500ml-1000ml of IV fluids is recommended, as dehydration can increase venous problems, making it difficult to cannulate the patient. It is thought that if the patient is well hydrated, there can be a reduction in insertion trauma and phlebitis.
- The patient's arm is kept warm for insertion. This stimulates blood flow and return via the large peripheral veins, making cannulation easier.

## Steps of PICC Placement

The PICC insertion procedure is done in the radiology (x-ray) department or at your hospital bedside. The steps to insert it are:

- The person lies on a flat surface.
- A tourniquet is tied around the patient's arm near the shoulder.
- The arm must be kept straight and still during the procedure.
- Ultrasound pictures are used to choose the vein and guide the needle into the vein. Ultrasound looks inside the body with a device that is moved over the skin. It is painless.
- A local anesthetic cream is applied to numb the area.
- An injection to numb the area is given to decrease discomfort during insertion.
- Insertable portion of a PICC varies from 25 to 60 cm in length.
- Some lines are designed to be trimmed to the desired length before insertion, others are here may be simply inserted to the needed depth with the excess left outside
- Placement of PICC line into arm vein based on either Peel away cannula or Modified –seldinger method.
- The line is usually sealed with a special cap or bung. There may be a clamp to keep the line closed

when it's not being used. Sometimes it divides into two or three lines. This allows to have different treatment at the same time.

- PICC line is also provided with a "wing" having holes for either sutures or an adhesive securing device.
- The nurse sutures the PICC line in place and covers with a sterile bandage.
- It takes 1 - 1 ½ hours to place the PICC line.
- An X-Ray is done to make sure that the catheter is in the right place.

#### Maintenance of PICC line

- To maintain patency, regular flushing with normal saline locking with heparin or normal saline when not in use.
- Never use a syringe smaller than 10 ml for flushing the line because the pressure created by smaller syringes could damage the catheter.
- Blood pressure should not be taken on the arm with a PICC
- Dressing should be changed after 24 hrs or twice a week.

#### Care at Home

- Do not take a bath in a bath tub.
- Cover the insertion site with clear, plastic wrap and tape to keep it dry before showering.
- No swimming and no hot tub.
- Avoid a lot of arm movement and weight lifting.
- Arm may be tender and little uncomfortable for 1-2 days. Give rest to the arm for one day after insertion.

#### Removal of PICC line

The catheter line can be quickly removed by a trained nurse, even in the patient's own home itself. After removal, insertion site is normally bandaged with sterile gauze and kept dry for a few days, during which the wound can close and begin healing.

The tip of the catheter is sent for microscopy culture and sensitivity if patient is systemically unwell at the time of removal of the PICC. In certain units, it is sent as routine investigation.

#### Complications of PICC

- Infection

- Blood Clot
- Air in the PICC line
- Displacement of PICC
- Tear in the PICC line.

#### Benefits of using a PICC

- A PICC is more comfortable compared with the many "needle sticks" that would have been needed for giving medications and drawing blood. The goal is to spare your veins from these frequent "needle sticks".
- A PICC can also spare your veins and blood vessels from the irritating effects of IV medications.
- PICCs can remain in situ for extended periods of time, from seven days to 12 months.
- A PICC can be used in the hospital setting, nursing facility, or at home and can stay in place for weeks or months, if needed.
- A PICC can be used for many types of IV treatments.
- A PICC can be used to obtain most blood tests.

#### Risks during and after placement of a PICC

- There may be slight discomfort during the procedure.
- Bleeding may occur at the insertion site.
- It is sometimes necessary to attempt more than once and it may not be possible to insert the entire length of the PICC.
- During insertion of a PICC, accidental puncture of an artery, nerve, or tendon can occur near the insertion site. However, this is a rare event.
- A clot may form around the catheter in the vein (thrombosis), which can cause swelling and pain in the arm.
- Inflammation in a vein (phlebitis) can develop from the use of all types of IVs, including PICCs.
- An infection may occur at the insertion site or in the bloodstream.
- The PICC can come out, partially or completely, if not well-secured and completely covered.
- The PICC can move out of position in the vein and may need to be removed or repositioned.
- The PICC may become blocked. Medication may need to be used to clear it.

## Conclusion

PICC is an alternative to central venous catheters in major veins such as the subclavian vein, the internal jugular vein or the femoral vein. Subclavian and jugular line placements may result in pneumothorax (air in the pleural space of lung), while PICC lines have no such issue because of the method of placement. Inherent in this process, is a sense of professional responsibility to prepare the patient for management of their role in safe care of their PICC. All staff who care for and access the site require a high standard of education regarding PICCs and should follow the appropriate guidelines.

## References

1. Leig A. Bowe-Geddes., Heather A, Nichols., An overview of peripherally inserted central catheters. *Advanced practice Nursing e - Journal*. 2005;5(3).
2. Mary Faihall., An observational study of peripherally inserted central catheter picc - related complications amongst oncology patients. Victoria University of Wellington. 2008.
3. Solonge Antonia Lourenco, Conceicao viera da silva ohara., Nurses knowledge about the insertion procedure for peripherally inserted central catheter in newborns. 2010 Mar-Apr;18(2).
4. Todd J., Clinical peripherally inserted central catheter and their use in iv therapy. *British journal of nursing*; 1999;8(3):140-4.
5. Vineeth Chopra, Ana Montoya., et al. Peripherally inserted central catheter in skilled nursing facilities: A Pilot Study. *Journal of American Geriatric Society*. 2015 Sept;63(9):1894-1899.
6. <https://clinicaltrials.gov/ct2/show/NCT02489721>.
7. [https://en.wikipedia.org/wiki/peripherally\\_inserted\\_central\\_catheter](https://en.wikipedia.org/wiki/peripherally_inserted_central_catheter).
8. <https://medlineplus.gov/ency/patientinstructions/000461.htm>.
9. <https://www.macmillan.org.uk/information-and-support/treating/chemotherapy/being-treated-with-chemotherapy/picc-lines.html>.
10. <https://www.mountniltany.org/articles/healthsheets/2584>.
11. [www.chop.edu/treatment/peripherally-inserted-central-catheter-picc](http://www.chop.edu/treatment/peripherally-inserted-central-catheter-picc).
12. [www.cpmc.org/learning/documents/nur.piccline-ws.html](http://www.cpmc.org/learning/documents/nur.piccline-ws.html).