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| **Manual**  | **Clinical Practice Guide** | **POLICY** and **PROCEDURE** |
| Section | Clinical Practice |
| **Title** | Peripherally Inserted Central Catheter (PICC) |
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**Policy**

The insertion of a Peripherally Inserted Central Catheter (PICC) will be considered when peripheral intravenous therapy cannot be maintained or when accessibility of the central venous system is needed for administrating intermittent and continuous infusions. The insertion of a PICC must be done using a portable ultrasound and confirmation of catheter tip via tip locating technology or X rays. The insertion of a PICC will be performed by those who have competency in PICC placement. Insertion can be done by trained Physicians or trained Nurses. For the Registered Nurses who will be inserting PICC, they must have met, demonstrated and maintained the competency required for this skill. The insertion of a PICC must be done using the Sherlock 3CG Tip Confirmation System. For Physicians inserting it, a signoff by the Chief of Professional Staff is required.

**Indication**

The insertion of a PICC may be considered when there is a physician order for the insertion.

A PICC line should be considered when an assessment indicates the need for prolonged central placement for the administration of short term and long term therapy, but is not limited to any of the following:

* Administration of irritable medications
* Antibiotics therapy greater than 1 week
* Frequent venous access for infusion or blood and blood products
* Chemotherapy
* Continuous infusions
* Prolonged infusion therapy greater than 1 week
* Limited or difficult to obtain peripheral access
* Total parenteral nutrition (TPN)
* Vesicants
* Critically ill requiring multi lumen access

**Contraindications**

* No order received for the placement of a PICC
* No signed informed consent for the insertion of a PICC line
* Lack of adequate vein access
* Blood work such as, platelets, neutrophils and INRs that are not within the acceptable limits for insertion of a PICC (INR above 2 or Platelets below 50).
* Patients that may not be compliant with PICC care

**Competency Requirement**

The placement of a PICC line using 3CG Tip Confirmation System (TCS) may be done only by a registered nurse who has:

1. Successful completion of online learning material provided by the manufacturer
* Vascular Access Device Selection, Insertion and Management
* Sherlock 3CG Tip confirmation System
1. Successful completion of an on-site preceptorship for PICC insertion with a qualified clinician
2. Successful completion of a basic cardiac arrhythmia interpretation course
3. Successful insertion of a minimum 5PICCs that have been validated by a qualified clinician using Sherlock 3CG (TCS) technology

**PROCEDURE**

**EQUIPMENT**

* Portable ultrasound with Sherlock 3CG (TCS) technology
* Max Barrier PICC kits
* Needle Guide Kit
* PICC line insertion supplies

**PROCEDURE**

1. Ensure that consent for insertion of a PICC line has been obtained
2. Identify the patient using two patient identifiers
3. Enter patient identification into the portable ultrasound
4. Review the patient’s most current blood work if indicated
5. Explain the procedure to the patient and family
6. Perform hand hygiene and don PPE as per BWH policy
7. Position Patient and Perform Ultrasound Pre-scan.
	1. Position the arm for catheter placement. Optimal position is at a 90 degree angle.
	2. Apply tourniquet above the anticipated insertion site.
	3. Perform ultrasound pre-scan.
	4. Select a vein based on patient assessment and pre-scan. Recommended veins are basilic, cephalic, and brachial veins.
	5. Note the maximum vessel depth at catheter insertion site as displayed on ultrasound.
	6. Accurately mark planned insertion site on patient’s arm.
	7. Release tourniquet.

**Determine External Measurement**

* 1. For central placement, the recommended target tip location is the lower 1/3 of the Superior Vena Cava (SVC), close to the junction of the SVC and the right atrium.
	2. Use the following guidelines during patient positioning and measurement.
		1. When possible, ensure patient has both shoulders in contact with the bed. Patient should not be rotated during measurement procedure.
		2. When possible, measure directly on patient’s skin. Measuring over clothing, bedding, existing ECG electrodes, wound dressings, or other personal and/or medical equipment may introduce measurement error.

**Note:** External measurement can never exactly duplicate the internal venous anatomy.

* 1. Measure path from the planned insertion site using the following external landmarks:
		1. Insertion site to axillary crease.
		2. Axillary crease to right clavicular head. Measure to the RIGHT clavicular head for left- or right-sided placements.
		3. Right clavicular head to the right sternal border of the third intercostal space.

**Note:** The first intercostal space may be difficult to palpate due to its proximity to the clavicle.

In cases where target vessel depth is significant, maximum vessel depth may be added to measured path to determine final measurement.

**Prepare Sensor**

1. Attach Fin Assembly to Sensor and place Sensor in holder.
2. Position Sensor on patient’s chest with the top of the Sensor above the sternal notch and centered on the sternum.
3. Prepare and attach external ECG electrodes per the following steps:
4. Ensure electrode locations are oil-free and completely dry.

**Note:** Vigorous cleaning of skin with an alcohol prep pad will help ensure good skin

electrode contact.

1. Attach electrodes to lead wires.
2. Remove backing and press electrodes firmly onto skin at the specified locations.
3. Place black electrode on the patient’s RIGHT shoulder.
4. Place red electrode on patient’s lower LEFT side, inferior to the umbilicus and laterally along the mid-axillary line.
5. Calibrate the Sherlock 3CG\* TCS by selecting CALIBRATE prior to setting up the sterile field to ensure there is no environmental interference.

**Tip:** If calibration fails, remove any items that may be causing magnetic interference (e.g., active motor driven equipment, monitor leads, cell phones, name tags, jewelry, etc.)

**Evaluate baseline ECG waveform.**

1. With the Sherlock 3CG\* TCS running, the external ECG waveform should be visible and stable at this time.
2. Verify that the P-wave is present, identifiable, and consistent on the main screen of the Sherlock 3CG\* TCS.

**Note:** Difficulty in interpretation of the external ECG waveform may be due to procedural issues such as improper connection of the Fin Assembly to the Sensor, poor skin-electrode contact or electrode positioning outside of the recommended locations. Check the security of the Fin Assembly to Sensor connection, as well as the placement and security of the electrodes.

**Note:** Adjust ECG scale, level, and speed as needed during placement to ensure that entire ECG waveforms are visible in the ECG window.

**Sterile Field Preparation**

1. Prepare insertion site and sterile field according to catheter Instructions for use and institutional protocol.
2. If applicable, place the remote control in the remote control sterile cover. Cover the probe and cable with the probe cover per institutional protocol.

**Prepare Catheter**

1. Pre-flush all lumens of the catheter with sterile normal saline to wet hydrophilic stylet. Follow catheter Instructions for use and institutional protocol.
2. Trim catheter to length per the following steps:
3. Measure the distance from the zero mark to the predetermined catheter external measurement.
4. To ensure adequate catheter length to reach maximum P-wave amplitude, it is recommended that up to 5 cm be added to this measurement. Catheter length should be based on clinician measurement technique and experience.
5. Loosen the T-lock connector/stylet assembly.
6. Retract the entire T-lock connector/stylet assembly as one unit until the stylet is well behind the catheter cut location. Do not entirely remove the stylet from the catheter.

**Note:** Catheter depth markings are in centimeters.

1. Using a sterile scalpel or scissors, carefully cut the catheter.
2. Inspect cut surface to ensure there is no loose material.
3. Re-advance the T-lock connector/stylet assembly locking the connector to the catheter hub. Ensure stylet tip is intact.
4. Gently retract the stylet through the locked T-lock connector until the stylet tip is contained inside the catheter.
5. Prior to insertion, ensure that the stylet tip is contained inside and within the catheter but not more than 1 cm from the trimmed end of the catheter.
6. Re-flush the catheter. Remove the syringe after flushing.

**Access Vein**

1. Perform ultrasound and locate vessel. Follow ultrasound system Instructions for Use.
2. Perform microintroduction. Follow catheter Instructions for use regarding micro-introduction technique.
3. Secure guidewire.

**Catheter Insertion**

1. Attach Catheter Stylet to Fin Assembly.
2. Palpate the Fin Assembly through the drape.
3. Form and pinch the drape around the Fin Assembly to conform the drape to the Fin Assembly.
4. Place the stylet connector on the bottom end of the Fin Assembly and slide connector forward until it is fully seated.
5. Lay catheter on the sterile field.
6. Uncoil Catheter Stylet Lead.
7. Perform Final Magnet Tracking Calibration
8. Ensure the catheter tip is at least 12 inches (30 cm) away from the sensor before calibrating.
9. Select CALIBRATE immediately prior to catheter insertion.
10. Once calibration is complete, ask the patient to remain still and do not reposition the patient.
11. Remove guidewire and dilator from microintroducer. Follow catheter Instructions for use

**Catheter Tip Guidance and Positioning**

1. Initially a searching magnifying glass will indicate that the stylet tip is outside the sensor range.
2. Use a slow steady motion while advancing the catheter.
3. Insert the catheter until the magnetic navigation shows the stylet icon moving consistently downward.
4. Continue to SLOWLY advance the catheter until the catheter is inserted to the external measurement.

**Note:** Resistance may be felt when introducing the catheter into the sheath due to an increase in outer diameter (O.D.) The introducer may be partially split, but not removed to facilitate insertion of the catheter past this point if necessary.

1. At this point, the catheter may need to be flushed to stabilize the waveform. If necessary, attach saline-filled syringe. Flush catheter with saline and wait for intravascular ECG waveform to stabilize.
2. Verify that the P-wave on the intravascular ECG waveform is present, identifiable, and consistent on the main screen of the Sherlock 3CG\* TCS.
3. Select “Freeze” on the Sherlock 3CG\* TCS to save the current ECG waveforms on the reference screen. These ECG waveforms can be used as a reference.
4. SLOWLY adjust catheter tip position to maximum P-wave amplitude. Compare the main screen intravascular ECG waveform to the reference screen intravascular ECG waveform while monitoring for P-wave negative deflection.

**Note:** P-wave may continue to increase in amplitude when initial negative deflection is observed. In this case, adjust catheter tip position to maximum P-wave amplitude with no negative deflection.

1. Advance or retract catheter from maximum P-wave to place tip in desired location.

**Note:** catheter exit site marking.

1. Record ECG waveforms at final catheter tip position. Select the “Print to File” button to print/save a procedural record.

**Note:** Selecting the “Print to File” button will send the procedural record to a storage device and approved printer, if connected.

1. Verify Placement Prior to Releasing Catheter for Use.
2. In indicated patients, and under the conditions described by the Instructions for Use, the Sherlock 3CG\* TCS may be used to replace chest x-ray and fluoroscopy for PICC tip location confirmation.
3. By using the Sherlock 3CG\* TCS, ECG waveforms can be unambiguously mapped to specific catheter tip locations in the vasculature. In any situation in which the user cannot unambiguously identify ECG waveforms, the use of chest x-ray or fluoroscopy to confirm final catheter tip location.
4. Using the Sherlock 3CG\* TCS, PICC tip location can be documented for the patient’s chart.

**Complete Remainder of Procedure**

1. Remove the Stylet/T-Lock Assembly.
2. Hold the front portion of the Fin Assembly to stabilize the Fin Assembly and Sensor. Disconnect the stylet lead from the Fin Assembly by pulling the connector toward the bottom of the Sensor.
3. Follow catheter Instructions for use to remove the Stylet/T-Lock assembly from the catheter.
4. Aspirate and Flush. Follow catheter Instructions for use.
5. Secure catheter. Follow catheter Instructions for use and institutional protocol. Confirm that current catheter exit site marking matches catheter exit site marketing noted above.
6. If applicable, locate and secure remote control.
7. Remove drapes, external electrodes and sensor.
8. Remove and discard drapes according to institutional protocol.
9. Remove external ECG electrodes and Sensor from patient.
10. Loosen the cinch ring on the sensor holder and take out the Sensor with Fin Assembly.
11. Remove the Fin Assembly.
12. If applicable, remove remote control from remote control holder.
13. Dispose of the sensor holder, remote control holder and Fin Assembly according to institutional protocol.

**Note:** If applicable, ensure the remote control is not discarded.

**Reference**

Bard Access System, Inc. (2012) , PICC Placement Instruction for Use with Sherlock 3CG Tip Confirmation System Sherlock II TLS Procedure

<http://bardaccess.com/assets/pdfs/ifus/0728446Placement> 3CGSherlockIFUweb.pd