Nursing Management of Venous Access Devices:
Peripherally Inserted Central Catheter (PICC)

Mimi Bartholomay, RN, MSN, AOCN
Denise Dreher, RN, CRNI, VA-BC
Sally Geary, RN, MS, CCNS

Reviewed/Revised Feb., 2019
Peripherally Inserted Central Catheter (PICC)

- **Benefits**
  - Long-term access - dwell time varies (can be > one year)
  - Decreased length of stay in hospital – allows for IV therapy in non-acute settings, i.e., home care /hospice/ skilled nursing facility (SNF)
  - Cost effective compared to all other central VADs
  - Decreased infection rate, as compared with other non-tunneled CVADs
  - Patient satisfaction and comfort
  - Fewer interruptions in IV therapy
PICCs

- Risks:
  - Air embolism
  - Infection
  - Deep vein thrombosis (DVT)
  - Nerve damage
  - Increased heparin usage in some PICCs

- Other considerations:
  - Blood withdrawal can be difficult; may be dependent on catheter length.
  - Over time, multiple insertions can cause venous scarring and decrease the ability to reuse the site
PICC Characteristics

- **Catheter types:**
  - single lumen (SL)
  - double lumen (DL)
  - triple lumen (TL)

- **Catheter sizes:**
  - 2F to 6F

- **Catheter styles:**
  - non-power PICC
  - Power PICC®
  - saline-only or valved PICC (Solo®)

- **Catheter lengths:** cut to specific patient-dependent length
PICC Placement

- Placement
  - Successful placement is highly technique-dependent; requires formal training.
  - A sterile procedure performed at bedside by specially trained IV nurse or by Interventional Radiology.
  - Catheter tip location verified by chest xray (cxr) or using EKG tip positioning system (TPS) technology (see next slide).

- Contraindicated in extremities affected by
  - Axillary lymph node dissection
  - Tissue damage such as burns, cellulitis, fracture, rotator cuff tear
  - Vessel occlusion / DVT (deep venous thrombosis)/SVT (superficial venous thrombosis)
  - Dialysis catheter (AVF) in same arm
  - Vein preservation for future dialysis access needs
  - Newly implanted pacemaker or defibrillator
  - Affected arm s/p stroke
  - Arm edema/lymphedema
PICC Tip Verification

- Via Chest Xray (cxr):
  - CXR is done when P waves on EKG are not present, identifiable, or consistent.
  - Patient is < 18 years of age
  - Verbiage in “Line Properties” section of procedure note: “Placement Verification: post intervention verification pending”
  - Verbiage at end of procedure note: “PICC tip location needs to be confirmed by chest xray due to (reason). Once cxr is read, line will require an ‘ok to use’ order”
PICC Tip Verification

○ Via EKG Tip Positioning System (TPS) (aka 3CG):
  • EKG TPS used when P waves are present, identifiable, and consistent
  • CXR not needed for tip verification
  • Approved for patients 18 years of age and older
  • Verbiage in ‘Line Properties’ section of procedure note: “Placement verification: ECG done by IV nurse”
  • Verbiage at end of procedure note: “PICC tip location in the SVC confirmed by ECG technology. PICC is now ready for immediate use”.
Multi-lumen PICCs

Double Lumen PICC

Triple Lumen PICC

Other PICCs

Bard Solo PICC
(valved, saline flush only PICC)

Solo PICC has characteristic “bubble”

Bard
Power
PICC

Images retrieved from http://www.bardaccess.com/ with permission 10/6/09
PICC Assessment

- Patient comments/complaints (e.g., pain, palpitations, hears something in ear when catheter flushed)
- New cardiac irritability: CXR to verify catheter tip location
- Extremity edema
  - Is extremity cold or mottled in appearance?
  - Do arms appear to be same size? If not...
    - Assess for dependent edema
    - Assess whether patient is ‘favoring’ that arm
    - Check bicep circumferences
    - Rule out DVT
    - Rule out catheter fracture
- Catheter migration (change in external catheter length since insertion):
  - CXR to verify new catheter tip location
  - Hold central-concentration infusates until confirmation of central placement
- Consult with IV Team for any issues or symptoms
PICC Line Care: Flushing
Refer to MGH Nursing Policies and Procedures in Ellucid

<table>
<thead>
<tr>
<th>Type of Catheter</th>
<th>Routine Flushing</th>
<th>Frequency of Flush</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICCs and power-injectable PICCs (e.g. Bard Power PICC)</td>
<td>Adults: 10-20ml of 0.9% saline after infusion</td>
<td>Intermittent use: After completion of any infusion or blood sampling.</td>
</tr>
<tr>
<td></td>
<td>20-30ml of 0.9% saline after blood draw or blood transfusion</td>
<td>Maintenance: Every 24 hours when not in use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adolescents:</td>
<td>After completion of any infusion or blood sampling, every 24 hours when not in use.</td>
</tr>
<tr>
<td></td>
<td>Heparin 10 units/ml; flush with 5ml (50 units).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedi/Toddlers/Infants:</td>
<td>After completion of any infusion or blood sampling, every 6 hours not in use.</td>
</tr>
<tr>
<td></td>
<td>-2F catheter:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heparin 10 units/ml; flush with 1ml (10 units).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-2.6F catheter or larger:</td>
<td>After completion of any infusion or blood sampling, every 12 hours when not in use.</td>
</tr>
<tr>
<td></td>
<td>Heparin 10 units/ml; flush with 2-3ml (20-30 units).</td>
<td></td>
</tr>
</tbody>
</table>
PICC Line Care: Flushing
Refer to MGH Nursing Policies and Procedures in Ellucid

<table>
<thead>
<tr>
<th>Type of Catheter</th>
<th>Routine Flushing</th>
<th>Frequency of Flush</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICCs and power-injectable PICCs (e.g. Bard Power PICC)</td>
<td>Neonates/NICU: Single lumen PICCs are not heplocked. Unused lumens of multilumen PICCs may be heplocked in certain situations such as fluid restriction.</td>
<td>All neonate/NICU infusions, including central line flushes, should be administered using a pump to reduce the risk of catheter fracture.</td>
</tr>
<tr>
<td></td>
<td>Heparin 10units/ml; flush with 1ml (10units)</td>
<td>After completion of any infusion or blood sampling, or every 6 hours</td>
</tr>
</tbody>
</table>
Discontinuing a PICC

- Physician/provider order required to discontinue PICC

- Procedure highlights:
  - Patient should be recumbent in bed
  - Apply slow, steady traction when sliding catheter out
  - Have patient perform Valsalva maneuver
  - Place petroleum-based ointment, a sterile gauze, and occlusive dressing over insertion site. Dressing should remain on for at least 24 hours, or longer until epithelialization occurs
  - Inspect catheter; check tip integrity and length
  - Consider tip culture if infection is suspected

- If difficulty removing catheter, apply warm compresses to arm, shoulder, and chest to decrease venospasm. If catheter remains steadfast, DO NOT FORCE. Secure catheter and notify physician.

- Refer to MGH Nursing Policies and Procedures in MGH Ellucid for full procedure
PICCs: Miscellaneous

○ Maximum infusion rate: as patient condition warrants. Pump maximum infusion rate is 999 ml/hour.

○ Pumps are mandatory for any infusion!

○ NO blood pressure cuff or tourniquet on or above PICC dressing.

○ A new Stat-lock securement device should be applied with dressing and needleless connector change.

○ Designate and label a dedicated lumen if patient to be on TPN. Please be sure to flush and maintain prior to TPN initiation.

○ For multi-lumen power PICCs, always have a power-injectable lumen available for ordered contrast studies.
References

- Original power point 2011: Bartholomay, Dreher, Theresa Evans, Susan Finn, Deb Guthrie, Hannah Lyons, Janet Mulligan, Carol Tyksienski
- MGH Ellucid
- Infusion Nurses’ Society (INS), Infusion Nursing Standards of Practice, 2016