‘PICCING’ The Right Vessel

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Disclosures

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Background

• Peripherally Inserted Central Catheter (PICC) use has increased significantly since their introduction in the 1970s

• Initially used as an alternative to tunnelled long term central lines

• Millions now inserted globally every year

• Tens of thousands of PICCs inserted in Australia every year

- iData Market Research Research 2014
Background

PICCs have become popular because…

• Can be used for hydration, TPN, antibiotics and medications not suitable for peripheral administration

• Great alternative for patients with limited access requiring prolonged IV Therapy

• Over half of all PIVCs fail prematurely - requiring reinsertion (cost: $35 – $45)

PICCs can be safer to insert and manage..

**PICC**
- Arterial puncture
- Nerve injury
- Insertion related thrombosis
- Malposition
- More relaxed coagulation profile

*Post Insertion*
- Phlebitis / Infection
- UEDVT
- Occlusion
- Accidental Removal

**CVC**
- Arterial puncture
- Haemothorax
- Pneumothorax
- Nerve injury
- Tighter coagulation profile

*Post Insertion*
- Infection
- Thrombosis
- Occlusion
- Accidental Removal – air embolism
Device choice should be based on patient assessment

- The **RIGHT trained clinician** (credentialed, has procedural load) inserts…
- The **RIGHT device** (length of dwell, infusate characteristics) into…

**The **RIGHT vessel** (after vascular assessment) for….**

- The **RIGHT patient** (clinical assessment, allergies, coags, GFR etc.) at…
- The **Right time** (early intervention for timely treatment)…
PICCs are not for everyone

- Small brachial veins
- Tortuous vessel pathway
- Previous thrombosis
- Preservation of fistula
- Mastectomy / lymph node dissection
- Fractures / contractures
- Venous depletion from chronic and complex disease
PICCs are not for everyone

Vessel Diameter is Important

• 50% reduction in vessel radius = 94% reduction in blood flow
• Number of studies have found no more than a third of internal diameter of vessel should be taken up by catheter

Easy way to remember:
• 3F PICC = 3mm vessel diameter
• 4F PICC = 4mm vessel diameter
• 5F PICC = 5mm vessel diameter
Can a PICC become a CICC?

Yes but technically considered off label use…

- Peripherally inserted central catheter (PICC) versus Centrally inserter central catheter (CICC)
- Catheter will still terminate in the CAJ / IVC
- Can be used for most clinical applications
- *Not ideal as a substitute for a CVC in the ICU / ED / OR – particularly if on vasopressors / haemodynamic monitoring*
Why a PICC for a CICC?

- Use of a micro puncture kit (21G needle versus 18G needle)
- Large rigid guidewire with CVC kits
- Can be trimmed to length / tunnelled with ease
- Reduce vessel trauma when dilating
- Smaller catheter in bigger vein
- Ideal for clinicians used to inserting PICCs
- Safer approach than standard CVC insertion (but be mindful of introducer in a central vein)
Best sites for PICC/CICC insertion?

- Axillary Vein
- Femoral vein distally placed
- Low approach IJ
- Brachiocephalic
Liverpool experience with PICC/CICCs

- Increasing presentation of patients with venous depletion
- Body habitus or limb contractures precluding PICC placement
- Patients were being put at greater procedural risk inserting CVCs (thin / emaciated patients)
- Very familiar with benefits of micro puncture
- Decision made to use PICCs in lieu of CVCs when appropriate
## Liverpool experience with PICC/CICCs

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
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</thead>
<tbody>
<tr>
<td><strong>Gender, n %</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Age, mean (SD)</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Clinical Category, n %</strong></td>
</tr>
<tr>
<td>Aged Care</td>
</tr>
<tr>
<td>Cardiac</td>
</tr>
<tr>
<td>Colorectal / Upper GI</td>
</tr>
<tr>
<td>General Medical</td>
</tr>
<tr>
<td>General Surgical</td>
</tr>
<tr>
<td>Haematology / Oncology</td>
</tr>
<tr>
<td>ICU</td>
</tr>
<tr>
<td>Neurology</td>
</tr>
<tr>
<td>Outpatients</td>
</tr>
<tr>
<td>Orthopaedic / Trauma</td>
</tr>
<tr>
<td>Renal</td>
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</tbody>
</table>

Jan 2015 – Dec 2016:  
85 PICCs inserted outside the arm
Liverpool experience with PICC/CICCs

<table>
<thead>
<tr>
<th>Device Characteristics</th>
<th>SL PICC</th>
<th>DL PICC</th>
<th>TL PICC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications, n %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>29 (34.1)</td>
<td>13 (15.3)</td>
<td>3 (3.5)</td>
<td>45 (52.9)</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>1 (1.2)</td>
<td>13 (15.3)</td>
<td>3 (3.5)</td>
<td>17 (20.0)</td>
</tr>
<tr>
<td>Poor Vascular Access</td>
<td>9 (10.6)</td>
<td>3 (3.5)</td>
<td>2 (2.4)</td>
<td>14 (16.5)</td>
</tr>
<tr>
<td>Specific Drug Therapy</td>
<td>1 (1.2)</td>
<td>2 (2.4)</td>
<td>3 (3.5)</td>
<td>6 (7.1)</td>
</tr>
<tr>
<td>TPN</td>
<td>5 (5.9)</td>
<td>1 (1.2)</td>
<td>6 (7.1)</td>
<td></td>
</tr>
<tr>
<td>Anatomical Position, n %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axillary vein</td>
<td>18 (21.2)</td>
<td>16 (75.3)</td>
<td>4 (4.7)</td>
<td>38 (44.7)</td>
</tr>
<tr>
<td>Femoral</td>
<td>4 (4.7)</td>
<td>4 (4.7)</td>
<td>2 (2.4)</td>
<td>10 (11.8)</td>
</tr>
<tr>
<td>Internal Jugular</td>
<td>15 (17.7)</td>
<td>18 (21.2)</td>
<td>4 (4.7)</td>
<td>37 (43.5)</td>
</tr>
</tbody>
</table>
Liverpool experience with PICC/CICCs

<table>
<thead>
<tr>
<th>Insertion Outcomes</th>
<th>Axillary Vein</th>
<th>Femoral Vein</th>
<th>Internal Jugular Vein</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complication, n %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arterial puncture</td>
<td>0</td>
<td>1 (1.2)</td>
<td>1 (1.2)</td>
<td>2 (2.4)</td>
</tr>
<tr>
<td>Failed Access</td>
<td>2 (2.4)</td>
<td>0</td>
<td>0</td>
<td>2 (2.4)</td>
</tr>
<tr>
<td>Malposition</td>
<td>2 (2.4)</td>
<td>0</td>
<td>1 (1.2)</td>
<td>3 (3.5)</td>
</tr>
<tr>
<td>Nil Complications</td>
<td>34 (89.5)</td>
<td>9 (90.0)</td>
<td>35 (95.0)</td>
<td>78 (91.8)</td>
</tr>
</tbody>
</table>

- Median Dwell: 16 days (IQR: 8-26)
- Primary reason for removal: No longer required
- No CLABSI reported
Femoral PICC Placement

- Femoral lines traditionally used for short term access
- Up to 3 fold greater risk of CLABSI (compared to SC and IJ)
- Not usually considered as an option for long term therapy (except paediatrics)
- Minimal evidence to date on the effectiveness of ‘appropriately’ placed femoral lines

# Femoral PICC Placement

## Traditional femoral lines:
- Inserted in emergent situations
- Puncture site near inguinal groove and placed
- Difficulty with stabilisation / dressing adherence
- Most area – bad if incontinent

## Tunnelled femoral PICC/CICC:
- Inserted under controlled situations
- Puncture site near inguinal groove
- Subcutaneous tunnel made 10cm distal to puncture site (catheter exit point)
- Initial puncture site dressed and heals over by primary wound intention quickly
Femoral PICC Placement

Traditional femoral line:

Tunneled femoral PICC/CICC:
Femoral PICC Placement – 3 Year Audit

• January 2014 – Dec 2016
• 22 femoral PICCs inserted using the distal approach
• Primary reason for catheter: AB therapy / Poor Access / TPN
• 13 (60%) were SL 4F PICCs
• Median Dwell 7 days (IQR: 4.75)
• Range: 2 days – 50 days
• NO SYMPTOMATIC DVT / NO CLABSI
Conclusion:

- Use of PICCs as CICCs is a viable alternative
- Safe to insert and manage
- Can be tunnelled with ease and used as a long term device
- Tunnelled IJ / Axillary PICCs should be considered for patients having therapy for more than 6 weeks
- Distally placed femoral PICCs are a good option for patients with poor upper extremity / central access
- More clinical trials required
Questions?

Central Venous Access Team – Liverpool Hospital: