THE 5 ‘RIGHTS’ OF VASCULAR ACCESS

PROMOTING VESSEL HEALTH & PRESERVATION:

The ‘RIGHT’ trained clinician will insert:
The ‘RIGHT’ vascular device in the:
The ‘RIGHT’ vessel for the:
The ‘RIGHT’ patient at the:
The ‘RIGHT’ time
1. THE ‘RIGHT’ TRAINED CLINICIAN:

- This means you!

- Appropriate training, supervision and procedural load is what determines outcome – not clinician grade!

- Studies have shown that a clinician who has inserted more than 50 catheters will have half the complication rate of a clinician who has inserted less than 50.


- Phlebitis / thrombosis / infection / malposition can occur with poor insertion technique which will limit device longevity and increase risk of central line associated bacteraemia (CLAB).

- Practice ultrasound with all PICCs not just the ‘difficult’ patients
2. THE ‘RIGHT’ VASCULAR DEVICE:

- Choose the right device!

- Length of therapy:
  - Peripheral Cannula – dwell up to 96hrs
  - Midline Catheter – dwell up to 4 weeks
  - Central venous Catheter – weeks to months
  - Tunnelled / Implanatable Device – months to years

- Ph and Osmolarity of infusate is very important!

- Ph less than 6.5 or greater than 8.5 should be given through CVAD as it will damage endothelial wall of vessel
2. THE ‘RIGHT’ VASCULAR DEVICE – ACIDITY:

- Morphine: 2.5 – 7.0
- Dobutamine: 2.5
- Flucloxicillin: 4.0
- Potassium: 4.0
- Bactrim: 10.0
- Ampicillin: 10.0

<table>
<thead>
<tr>
<th>Substance</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid mine runoff</td>
<td>-3.6 – 1.0</td>
</tr>
<tr>
<td>Battery acid</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>Gastric acid</td>
<td>2.0</td>
</tr>
<tr>
<td>Lemon juice</td>
<td>2.4</td>
</tr>
<tr>
<td>Cola</td>
<td>2.5</td>
</tr>
<tr>
<td>Vinegar</td>
<td>2.9</td>
</tr>
<tr>
<td>Orange or apple juice</td>
<td>3.5</td>
</tr>
<tr>
<td>Beer</td>
<td>4.5</td>
</tr>
<tr>
<td>Coffee</td>
<td>5.0</td>
</tr>
<tr>
<td>Tea</td>
<td>5.5</td>
</tr>
<tr>
<td>Acid rain</td>
<td>&lt; 5.6</td>
</tr>
<tr>
<td>Milk</td>
<td>6.5</td>
</tr>
<tr>
<td>Pure water</td>
<td>7.0</td>
</tr>
<tr>
<td>Healthy human saliva</td>
<td>6.5 – 7.4</td>
</tr>
<tr>
<td>Blood</td>
<td>7.34 – 7.45</td>
</tr>
<tr>
<td>Sea water</td>
<td>8.0</td>
</tr>
<tr>
<td>Hand soap</td>
<td>9.0 – 10.0</td>
</tr>
<tr>
<td>Household ammonia</td>
<td>11.5</td>
</tr>
<tr>
<td>Bleach</td>
<td>12.5</td>
</tr>
<tr>
<td>Household lye</td>
<td>13.5</td>
</tr>
</tbody>
</table>

- Vanoymycin: 2.4 to 4.0
- Tobramycin: 3.0
- Promethazine: 4.0 to 5.5
- Mannitol: 4.5
- Phenytoin: 10.0 to 12.0
- Acyclovir: 11.0
2. THE ‘RIGHT’ VASCULAR DEVICE - OSMOLARITY:

- Osmolarity is the concentration of solutes in a solution
- Tonicity is the response of the cells to the solution
- Osmolarity – in particular hypertonic solutions can cause phlebitis, thrombosis, irritation and infiltration
- Solutions greater than 500 mOsm / litre should be given by a central line – TPN usually 800mOsm / litre
DILUTION IS THE KEY FOR IRRITANT INFUSATES!

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Diameter</th>
<th>Flow Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital/ Metacarpal veins</td>
<td>2.5 mm</td>
<td>≈ 10 ml/min</td>
</tr>
<tr>
<td>Forearm Cephalic / Basilic veins</td>
<td>6 mm</td>
<td>≈ 20 - 40 ml/min</td>
</tr>
<tr>
<td>Basilic upper arm vein</td>
<td>8 mm</td>
<td>≈ 90 - 150 ml/min</td>
</tr>
<tr>
<td>Axillary vein</td>
<td>16 mm</td>
<td>≈ 150 - 350 ml/min</td>
</tr>
<tr>
<td>Subclavian/Innominate vein</td>
<td>19 mm</td>
<td>≈ 350 - 1500 ml/min</td>
</tr>
<tr>
<td>SVC</td>
<td>20 mm</td>
<td>≈ 2000 ml/min</td>
</tr>
</tbody>
</table>
2. THE ‘RIGHT’ VASCULAR DEVICE:

- **Patient Requires IV Therapy**
  - Osmolarity of solution less than 600mOsm pH between 5 and 9, not listed as irritant
  - **Peripheral Access (Good)** three sites or more
    - Duration less than 7 days
      - Maintain by Peripheral Cannula
    - Duration greater than 7 days
      - 2-4 weeks Midline
      - Greater than 4 weeks Peripherally Inserted Central Catheter
  - Osmolarity greater than 600mOsm pH irritant would cause damage to peripheral veins needs maximum venous dilution
    - **Central Access, Intravenous Nutrition, Chemotherapy, Irritants, Hyperosmolar solutions**
      - Duration less than one year
        - Peripherally Inserted Central Catheter PICC or Peripheral Port
      - Duration greater than one year
        - Hickman, Broviac, Groshong or Subcutaneous Port
3. THE ‘RIGHT’ VESSEL:

- Vascular assessment prior to insertion will guide success
- To reduce the risk of thrombosis and vessel irritation - put the smallest possible catheter in the biggest possible vein!
- Catheter should no more than 1/3 the diameter of vessel (INS – 2008)
- Dominant arm vs non dominant arm (right vs left what’s better)
- The upper arm has three main vessels:
  - Cephalic - Tortuous pathway best to keep away
  - Brachial - Good vessel sometimes too close to artery and nerves
  - Basilic - Vessel of choice straightest patchway to brachiocephalic
3. THE ‘RIGHT’ VESSEL – VASCULAR ASSESSMENT:

Vascular assessment should include:

- Is it an artery or a vein?
  - Vein more compressable than artery (use sagittal view)
  - Artery should be pulsatile (also has thicker walls)
  - Use colour to assess flow & doppler if not sure (go by flow not colour!)
  - Check for irregularities in vessel shape

- Vessel diameter – without tournequet! (this does not have to be an exact science!)
- For the mathematically inclined: French size x 0.33 to get mm diameter
- Assess the pathway of the vessel (tortuosity / any stenosis / biforcation)
- Assess flow: longitudinal access / colour on / digital compression of vessel distal to probe
3. THE ‘RIGHT’ VESSEL – VASCULAR ASSESSMENT:

What if the vessel doesn’t compress?

- Could be an artery...
- Could be a nerve bundle (patient will soon let you know!)
- Probably thrombosis...

If the vessel does not compress / is abnormal in shape and no flow can be seen then thrombosis is most likely the cause.
4. THE ‘RIGHT’ PATIENT:

Patient assessment is also important:

- A PICC should be avoided if:
  - Pt has arm paralysis
  - Mastectomy with lymph node dissection
  - Orthopaedic or neurological issues of the upper extremity
  - Vessels being preserved for fistula formation
  - Obviouse thrombosis

- Any allergies to lignocaine / chlorhexidine / latex etc

- Be aware of coagulation abnormalities (this usually doesnt deter an experienced operator – but as a rule InR: <1.5, Platelets > 50,000, APTT between 35 – 45 sec)
Other patient considerations:

- Are they confused or do they have dementia (this should not preclude a PICC but if your a doctor – think like a nurse!)

- IVDU – may need counselling (you know what I mean...)

- Pt activities – I avoid the dominant hand – do they play sport?

- Educate patient to avoid heavy lifting / repetative actions / excessive movement (causes excessive catheter movement and can lead to malposition or thrombosis)
5. THE ‘RIGHT’ TIME:

Early placement reduces patient complication:

- If a patient requires antibiotics for 2 – 8 weeks why insert up to 16 peripheral cannulas and risk chemical / thrombophlebitis – why not insert a PICC?

- The aim should be to complete this type of therapy with the one device

- The longer it takes for a PICC to be inserted the more difficult it may become for the inserter.