### Appendix E: Overview of Vascular

#### Peripheral – Short

**Device Description:**
Catheter, less than 3 inches (7.5 cm) in length; over-the-needle catheter is most common. Inserted by percutaneous venipuncture, generally into a hand or arm vein (Halderman, 2000).

**Conclusions:**
- Peripheral catheters should be used for anticipated IV therapy not greater than 6 days, infusions which are iso-osmotic or near iso-osmotic and whose pH value is between 5 – 9.
- Central access is recommended for vesicant drugs.
- Repeated venipunctures may be needed to maintain IV access.
- Infiltration, phlebitis or catheter obstruction can interrupt therapy.
- Dwell time and types of medications that can be given are limited.

*Halderman, 2000*

#### Peripheral – Midline

**Device Description:**
Between 3 – 8 inches (7.5 – 20 cm) long; inserted within 1.5 inches (3.75 cm) above or below the antecubital fossa. Catheter tip ends in the peripheral vasculature below the axilla (Halderman, 2000).

**Conclusions:**
- Midline catheters should be considered for IV therapy where more than 3 IV catheters may be needed, infusions which are iso-osmotic or near iso-osmotic and whose pH value is between 5 – 9.
- Central access is recommended for vesicant drugs.
- Maintains IV access without repeated venipunctures.
- Requires a large diameter vein such as the basilic vein.
- Upper arm contractures, injury or other vascular or musculoskeletal conditions may prevent successful insertion.
- Types of medications that can be infused are limited.

*Halderman, 2000*
## Access Devices

### DISCUSSION OF EVIDENCE

#### Gauge and Length of Device
- The vasculature shall accommodate the gauge and length (INS, 2000).
- Select the smallest gauge and shortest length (Camp-Sorrell, 1996; CDC, 2002; INS, 2000; Markel Poole, 1999).

#### Length of Dwell
- Three days has been established as the maximum length of time to use peripheral intravascular lines. Health Canada retains 3 days as the upper limit for peripheral sites in all settings (Health Canada, 1997).
- Peripheral veins are prone to phlebitis and subcutaneous perivenous infiltration, and the catheter should not stay in one site longer than 48 – 72 hours (Vanek, 2002a).
- Rotate sites q72 – 96 hours to reduce risk for infection and phlebitis (CDC, 2002).

#### Length of Therapy
- Steel or plastic cannula may be left in place for up to 72 hours (Health Canada, 1997).
- Use a midline catheter or PICC when the duration of therapy will likely exceed 6 days (CDC, 2002).
- Devices used for short term use (Markel Poole, 1999); Short term therapy – contraindicated for therapy longer than approximately 5 days (Vanek, 2002a).
- Use a midline catheter or PICC when the duration of IV therapy will likely exceed 6 days (CDC, 2002).
- For therapy of more than 5 days, to preserve the integrity of the veins and increase client comfort (Camp-Sorrell, 1996).
- Fluids and medications close to normal serum osmolality and pH to prevent vein wall irritation.
- Not recommended for the infusion of parenteral nutrition solutions, vesicants or other irritant medication (Orr & Ryder, 1993).
- Medium term (Markel Poole, 1999); short term 3 days to 6-8 weeks (Vanek, 2002a); intermediate dwell (Lawson, 2003); mean anticipated length of therapy = 13 days (King, 1995).
## CONSIDERATIONS

PICCs are recommended for all infusion therapies. If anticipated therapy exceeds more than one year, a tunneled catheter or implanted port should be considered.

- May be inserted at the bedside or in radiology under fluoroscopy.
- Use of maximum sterile barrier during insertion (CDC, 2002; EPIC, 2001c).
- Low rate of infection.
- Upper arm contractures, injury or other vascular or musculoskeletal conditions may prevent successful insertion (Halderman, 2000).
- Radiographic confirmation of tip location is required prior to use.

## TYPE OF DEVICE

<table>
<thead>
<tr>
<th>Device Description:</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central – Peripherally Inserted Central Catheter (PICC)</strong></td>
<td>PICCs are recommended for all infusion therapies. If anticipated therapy exceeds more than one year, a tunneled catheter or implanted port should be considered.</td>
</tr>
</tbody>
</table>
| A single or double lumen central venous catheter inserted via a peripheral vein – the tip terminates in the superior vena cava (SVC) (Halderman, 2000). | - May be inserted at the bedside or in radiology under fluoroscopy.  
- Use of maximum sterile barrier during insertion (CDC, 2002; EPIC, 2001c).  
- Low rate of infection.  
- Upper arm contractures, injury or other vascular or musculoskeletal conditions may prevent successful insertion (Halderman, 2000).  
- Radiographic confirmation of tip location is required prior to use. |
| **Central – Tunneled Central Venous Catheter** | Requires surgical placement.  
- Cuff secures catheter in place, and prevents bacteria from migrating into the bloodstream (Halderman, 2000).  
- Use optimum aseptic technique, including a sterile gown, gloves, and a large sterile drape for the insertion of central venous catheters (CDC, 2002; EPIC, 2001c). |
| Single, double or triple lumen device, surgically tunneled through subcutaneous tissue to an exit site generally on the chest or abdominal wall. The tip rests in the vena cava. A cuff that lies in the subcutaneous tunnel, around which fibrous tissue grows, helps to secure the device (Halderman, 2000). |
## DISCUSSION OF EVIDENCE

### Length of Therapy
- Duration of IV therapy will likely exceed 6 days – use for clients requiring frequent or continuous access.
- Several weeks or months (EPIC, 2001c; Winslow et al., 1995); medium term (Markel Poole, 1999).
- Intermediate to long term access in general, or the need for central vascular access (Vanek, 2002a).
- Specific diagnoses that are often associated with prolonged needs for reliable access (Bowen Santolucito, 2001).
- IV access greater than 10 – 14 days (Ryder, 1995).
- For therapy lasting more than 6 days to preserve the integrity of veins and increase comfort (CDC, 2002; Camp-Sorrell, 1996).

### Tip Position
- Tip dwelling in the superior vena cava (INS, 2000).
- If the catheter tip is located outside of the vena cava, the catheter is no longer considered a central catheter and should be removed as the tip location may no longer be appropriate for the prescribed therapy (INS, 2000).

### Other considerations
- Client selection criteria – infusion of vesicant or irritating drugs; hyperosmolar solutions, client preference, client location (home setting) (Camp-Sorrell, 1996);
- Consider the use of PICCs as an alternative to subclavian or jugular vein catheterization (EPIC, 2001c).

### Length of Therapy
- Frequent or continuous access (CDC, 2002)
- Use a tunneled catheter or an implantable vascular access device for clients in whom long-term (＞30 days) vascular access is anticipated (EPIC, 2001c)
- Tunneled catheters or totally implanted devices as appropriate for the intended purpose should be used for clients requiring long-term vascular access.
- Greater than 6 months (Winslow et al., 1995); long term (Markel-Poole, 1995),
Assessment and Device Selection for Vascular Access

<table>
<thead>
<tr>
<th>TYPE OF DEVICE</th>
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</thead>
<tbody>
<tr>
<td><strong>Central – Percutaneous</strong>&lt;br&gt;Non-Tunneled Catheter</td>
<td><strong>Recommended for short-term access to the central circulation in critical situations, or when peripheral access is inadequate or inappropriate.</strong>&lt;br&gt;<strong>Not generally recommended for home care, but client circumstances and care requirements should be considered on an individual basis.</strong>&lt;br&gt;<strong>Use optimum aseptic technique, including a sterile gown, gloves, and a large sterile drape for the insertion of central venous catheters (CDC, 2002; EPIC, 2001c).</strong></td>
</tr>
<tr>
<td><strong>Device Description:</strong>&lt;br&gt;A catheter, often with multiple lumens, inserted percutaneously through the subclavian, jugular, or femoral vein (Halderman, 2000).</td>
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<tr>
<td><strong>Central – Implanted Port</strong></td>
<td><strong>Requires a minor surgical procedure for placement and removal.</strong>&lt;br&gt;<strong>When not in use, requires less maintenance than other VADs.</strong>&lt;br&gt;<strong>May preserve a client's body image.</strong>&lt;br&gt;<strong>Medication delivery requires injection through skin (Halderman, 2000).</strong>&lt;br&gt;<strong>Use optimum aseptic technique, including a sterile gown, gloves, and a large sterile drape for the insertion of central venous catheters (CDC, 2002; EPIC, 2001c).</strong></td>
</tr>
<tr>
<td><strong>Device Description:</strong>&lt;br&gt;An implanted reservoir generally placed in the chest or arm, attached to a catheter with tip position in the central vasculature. Infusate is delivered to the reservoir via an external non-coring needle and extension tubing (Halderman, 2000).</td>
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</table>
DISCUSSION OF EVIDENCE

Length of Therapy
- Short-term continuous therapy (5 – 10 days) (Camp-Sorrell, 1996).

Tip Position
- If the catheter tip is located outside the vena cava, the catheter is no longer considered a central catheter and should be removed as the tip location may no longer be appropriate for the prescribed therapy (INS, 2000).
- Tip dwelling in the superior vena cava (INS, 2000).

Length of Therapy
- Use smallest gauge needle and appropriate length to access – change every 7 days (INS, 2000). Needles should be changed frequently enough to prevent skin breakdown. This should be at least every 7 days (Health Canada, 1997).
- Use a tunneled catheter or an implanted vascular access device for clients in whom long-term (30 days) vascular access is anticipated (EPIC, 2001c).
- Long-term, intermittent therapy (CDC, 2002).
- Cuffed tunneled catheters or totally implanted devices as appropriate for the intended purpose should be used for clients requiring long-term vascular access (Health Canada, 1997).
### Assessment and Device Selection for Vascular Access

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<th>DISCUSSION OF EVIDENCE</th>
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<tr>
<td><strong>Subcutaneous Infusions (Hypodermoclysis)</strong></td>
<td>- Can be used for continuous or intermittent infusions of isotonic fluids and selected medications (e.g., s/c opioid infusion) (INS, 2000).</td>
<td>- Rotate sites every 3-7 days, as necessary. Smallest, shortest gauge (INS, 2000).</td>
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<tr>
<td>a) intermittent</td>
<td>- Hypodermocysis fluid administration is appropriate as a short-term measure to restore or to maintain hydration in clients who are mildly dehydrated or who are at risk of dehydration.</td>
<td></td>
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<tr>
<td>b) continuous</td>
<td>- Subcutaneous infusions are as effective as intravenous infusions in restoring and maintaining hydration and are less likely than intravenous infusions to produce fluid overload (O’Keeffe &amp; Geoghegan, 2000).</td>
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<tr>
<td>Device Description:</td>
<td>- In using as an alternative to infusion therapy, lower risk of complications.</td>
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<td>A fine gauge device developed</td>
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<td>specifically for the s/c route, placed</td>
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<td>in the subcutaneous tissue of the upper</td>
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<tr>
<td>arm, chest wall, upper back, abdomen,</td>
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<tr>
<td>thigh etc. as an alternative to vascular</td>
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<td>access, where appropriate.</td>
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