

# Rope Ladder Cannulation of AV Fistulas and Grafts

The full version of this guideline is located on the BC Renal Agency website [www.bcrenalagency.ca](http://www.bcrenalagency.ca). “Guideline at a Glance” summarizes the highlights.

RECOMMENDATION		HA/HD CENTRE								
1.	<p>Match skill level of cannulators to the degree of difficulty of an access to cannulate.</p> <ul style="list-style-type: none"><li>Cannulation is a <i>learned</i> skill which improves with practice.</li><li>Without good cannulation skills, an AVF or AVG can be damaged or destroyed. AVFs and AVGs are patient lifelines!</li></ul> <table><tr><th>Skill Level of Cannulator</th><th>Access Rating Approved to Cannulate</th></tr><tr><td>Novice</td><td>Easy</td></tr><tr><td>Skilled</td><td>Easy &amp; moderately complicated</td></tr><tr><td>Advanced</td><td>Easy, moderately complicated &amp; complicated</td></tr></table>	Skill Level of Cannulator	Access Rating Approved to Cannulate	Novice	Easy	Skilled	Easy & moderately complicated	Advanced	Easy, moderately complicated & complicated	<input type="checkbox"/>
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2.	<p>Attempt initial cannulation only after:</p> <ul style="list-style-type: none"><li>AVF: 4 weeks (often longer) and when signs show maturation has occurred. AVF is assessed by MD or VA RN as “ready to needle.”</li><li>AVG: 2 weeks (often longer) and when swelling in the access limb has gone. AVG is assessed by MD or VA RN as “ready to needle.”</li></ul>	<input type="checkbox"/>								
3.	<p>Use aseptic technique for all cannulation procedures.</p> <ul style="list-style-type: none"><li>Includes careful handwashing and donning clean gloves just prior to disinfecting the access site and needling</li></ul>	<input type="checkbox"/>								
4.	<p>Teach patient to perform regular hand-arm exercises for several weeks/months prior to and resuming 2 weeks post access creation (or after the clips or sutures have been removed) until the access matures.</p>	<input type="checkbox"/>								
5.	<p>Use local anaesthetics to relieve needle discomfort in selected patients.</p> <ul style="list-style-type: none"><li>Topical and intradermal anaesthetics are discouraged due to side effects. Limit use to patients who complain of discomfort or are highly anxious about being “needled.”</li><li>If use anaesthetic, topical anaesthetic is preferred (less vasoconstriction).</li><li>Do not use intradermal injections in poorly developed, edematous, or deep accesses.</li></ul>	<input type="checkbox"/>								

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6.	<p>Needle placement and size:</p> <p><b>New AVFs and AVGs:</b></p> <ul style="list-style-type: none"> <li>For AVFs, start with 17 g needle. For AVGs, use 16 g needle.</li> <li>If have functioning CVC and maturing AVF, start with one needle cannulation. If have an AVG, start with 2 needles. If have a maturing AVF but no CVC, can start with 1 or 2 needles.</li> <li>Place venous needle antegrade (i.e. with the blood flow – i.e. facing venous end of AVF or AVG. Arterial needle may be placed antegrade or retrograde (against the blood flow – i.e. facing the arterial end).</li> <li>Place needles so tips are 7.5 cm (3 in) apart) and are at least 4–5 cm (1.5–2 in) away from the arterial or venous anastomosis. Avoid aneurysms, curves and flat spots.</li> <li>Do not cannulate within 1 in of the anastomosis and cannulate at least 1/4 in from previous site.</li> <li>Increase needle size and pump speed gradually.</li> <li>If the needle gauge sizes and blood pump speeds do not achieve the desired clinical effects (Kt/V or PRU), consult nephrologist about increasing the length/frequency of dialysis treatments. This is better than attempting to use larger needles or run dialysis at higher blood pump speeds when the access is not ready.</li> </ul> <p><b>Established AVFs and AVGs:</b></p> <ul style="list-style-type: none"> <li>Once cannulation has been established, correlate needle gauge, blood pump speed, and clinical condition (Kt/V or PRU).</li> <li>Use the smallest gauge needle that will achieve the desired blood pump speed.</li> </ul> <table border="1"> <thead> <tr> <th rowspan="2">Desired Blood Pump Speed</th><th colspan="2">Recommended Needle Gauge</th></tr> <tr> <th>AVF</th><th>AVG</th></tr> </thead> <tbody> <tr> <td>&lt;300 mL/min</td><td>17 gauge (smallest needle)</td><td>16 gauge</td></tr> <tr> <td>300 – 350 mL/min</td><td>16 gauge</td><td>16 gauge</td></tr> <tr> <td>350 – 450 mL/min</td><td>15 gauge (largest needle)</td><td>15 gauge (largest needle)</td></tr> </tbody> </table>	Desired Blood Pump Speed	Recommended Needle Gauge		AVF	AVG	<300 mL/min	17 gauge (smallest needle)	16 gauge	300 – 350 mL/min	16 gauge	16 gauge	350 – 450 mL/min	15 gauge (largest needle)	15 gauge (largest needle)	<input type="checkbox"/>
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7.	<p>Cannulation techniques:</p> <ul style="list-style-type: none"> <li>AVGs: Always use rope ladder (rotating sites) technique.</li> <li>AVFs: May use rope ladder or buttonhole (same needle site, depth, and angle each time) technique. Buttonhole technique is best for patients who self-cannulate.</li> </ul>	<input type="checkbox"/>														
8.	<p>Cannulation attempts:</p> <ul style="list-style-type: none"> <li>Maximum number of cannulation attempts at any one session = 4 (total for both arterial and venous sites), unless ordered otherwise by MD.</li> <li>All levels of cannulators consult an(other) advanced cannulator after the first unsuccessful attempt.</li> <li>MD is notified after 4 unsuccessful attempts.</li> </ul>	<input type="checkbox"/>														

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9.	<p>Infiltration:</p> <ul style="list-style-type: none"> <li>• If patient <b>has not</b> received heparin, shut off pump, remove needle and apply digital pressure to the exit site.</li> <li>• If patient <b>has</b> received heparin, assess infiltration site to see if needle should be pulled out or left in place with ice applied over the site until the dialysis treatment is complete.               <ul style="list-style-type: none"> <li>• If size of hematoma is stable → leave needle in and apply ice over the site until treatment is complete.</li> <li>• If hematoma is increasing in size → shut off pump, remove needle, and apply digital pressure. Never apply pressure until the needle is completely out.</li> </ul> </li> <li>• Apply ice to affected area of access and instruct patient to continue for 24 hours at home. After 24 hours, patient may apply warm compresses.</li> <li>• Rest the AVF or AVG until resolution of bruising and/or swelling (usually 1 – 2 weeks) (may require a temporary access).</li> <li>• Reinitiate treatments with smaller gauge needles.</li> </ul>	<input type="checkbox"/>
10.	If the AVF or AVG has problems and/or has not matured within the appropriate timeframes and/or is difficult to cannulate, consult a physician or VA RN/coordinator.	<input type="checkbox"/>
11.	<p>Hemostasis:</p> <ul style="list-style-type: none"> <li>• To achieve hemostasis, apply mild, digital, localized, direct pressure, using 2 fingers over the needle sites (remember to apply pressure over the external hole that you can see and the internal hole that is hidden and at an angle to the external one).</li> <li>• Never use clamps or tourniquets (aka straps or site minders) on new AVFs or AVGs or if an access show signs of infiltration, infection, or edema.</li> <li>• Use clamps or tourniquets as a last resort and only on mature AVFs or established AVGs where there are no signs of complications and the flow is adequate. Use only one at a time and never for more than 20 minutes. To ensure that pressure is not too much, check that a thrill is present above and below the compression site. If not, reduce the pressure.</li> </ul>	<input type="checkbox"/>