

Rope Ladder Cannulation of AV Fistulas and Grafts

The full version of this guideline is located on the BC Renal website: [BCRenal.ca](https://www.bcrenal.ca) ► Health Professionals ► Clinical Resources ► Vascular Access ► Cannulation of Fistulas and Grafts. “Guideline at a Glance” summarizes the highlights.

RECOMMENDATION	HA/HD CENTRE								
<p>1. Match skill level of cannulators to the degree of difficulty of an access to cannulate.</p> <ul style="list-style-type: none"> • Cannulation is a <i>learned</i> skill which improves with practice. • Without good cannulation skills, an AVF or AVG can be damaged or destroyed. AVFs and AVGs are patient lifelines! <table border="1" data-bbox="201 810 1279 989"> <thead> <tr> <th>Skill Level of Cannulator</th> <th>Access Rating Approved to Cannulate</th> </tr> </thead> <tbody> <tr> <td>Novice</td> <td>Easy</td> </tr> <tr> <td>Skilled</td> <td>Easy & moderately complicated</td> </tr> <tr> <td>Advanced</td> <td>Easy, moderately complicated, & complicated</td> </tr> </tbody> </table>	Skill Level of Cannulator	Access Rating Approved to Cannulate	Novice	Easy	Skilled	Easy & moderately complicated	Advanced	Easy, moderately complicated, & complicated	<input type="checkbox"/>
Skill Level of Cannulator	Access Rating Approved to Cannulate								
Novice	Easy								
Skilled	Easy & moderately complicated								
Advanced	Easy, moderately complicated, & complicated								
<p>2. Attempt initial cannulation only after:</p> <ul style="list-style-type: none"> • AVF: when signs show maturation has occurred. AVF is assessed by MD or VA RN as “ready to needle.” • AVG: when swelling in the access limb has gone. AVG is assessed by MD or VA RN as “ready to needle.” 	<input type="checkbox"/>								
<p>3. 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"/>								
<p>4. Use aseptic technique for all cannulation procedures.</p> <ul style="list-style-type: none"> • Includes careful hand washing and donning clean gloves just prior to disinfecting the access site & needling 	<input type="checkbox"/>								
<p>5. Use local anaesthetics to relieve needle discomfort in selected patients.</p> <ul style="list-style-type: none"> • 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.” • If use anaesthetic, topical anaesthetic is preferred (less vasoconstriction). • Do not use intradermal injections in poorly developed, edematous, or deep accesses. 	<input type="checkbox"/>								

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6. Needle placement & size:

New AVFs and AVGs:

- For AVFs, start with 17 g needle. For AVGs, use 16 g needle.
- 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.
- 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).
- 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, & flat spots.
- Do not cannulate within 1” of the anastomosis and cannulate at least 1/4” from previous site.
- Increase needle size and pump speed gradually.
- 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.

Established AVFs and AVGs:

- Once cannulation has been established, correlate needle gauge, blood pump speed, and clinical condition (Kt/V or PRU).
- Use the smallest gauge needle that will achieve the desired blood pump speed.

Desired Blood Pump Speed	Access Rating Approved to Cannulate	
	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)



7. Cannulation techniques:

- AVGs: Always use rope ladder (rotating sites) technique.
- 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.



8. Cannulation attempts:

- Max # of cannulation attempts at any one session = 4 (total for both arterial and venous sites), unless ordered otherwise by MD.
- All levels of cannulators consult an(other) advanced cannulator after the 1st unsuccessful attempt.
- If, after two unsuccessful attempts and no signs of infiltration are present, pull the needle and apply warm compresses to the access x 10 minutes prior to attempting cannulation again (vessel may be in spasm).
- MD is notified after 4 unsuccessful attempts.



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<p>9. Infiltration:</p> <ul style="list-style-type: none"> • If patient <i>has not</i> received heparin, shut off pump, remove needle, & apply digital pressure to the exit site. • If patient <i>has</i> 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"> • If size of hematoma is stable ► leave needle in and apply ice over the site until treatment is complete. • If hematoma is increasing in size ► shut off pump, remove needle, and apply digital pressure. Never apply pressure until the needle is completely out. • Apply ice to affected area of access and instruct patient to continue x 24 hours at home. After 24 hours, patient may apply warm compresses. • Rest the AVF or AVG until resolution of bruising and/or swelling (usually 1 – 2 weeks) (may require a temporary access). • Reinitiate treatments with smaller gauge needles. 	<input type="checkbox"/>
<p>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.</p>	<input type="checkbox"/>
<p>11. Hemostasis:</p> <ul style="list-style-type: none"> • Hemostasis is best achieved by applying mild, direct pressure, using two fingers over the needle sites. If the patient is unable to do this him/herself, arrange for a family member or, in the absence of a family member, a nurse to perform this function. • Use of clotting devices (e.g., tourniquets or straps) on AVFs is discouraged because of damage and/or thrombosis that can occur by applying too much pressure. New and developing AVFs are particularly vulnerable to hematoma formation, infiltration, and bruising. • If a clotting device must be used (i.e., all avenues for holding the site have been exhausted), (i) use only on mature fistulas (not on new fistulas) with adequate flow and no signs of complications; (ii) use only one device at a time; (iii) leave on only until the bleeding has stopped and never for more than 20 minutes. 	<input type="checkbox"/>