

This document is a guide for nurses to self-assess their cannulation skills and, in consultation with a renal educator and/or vascular access nurse, to develop a learning plan to further develop their skills. It is particularly useful for nurses new to hemodialysis.

Cannulation is a learned skill which improves with practice. Without good cannulation skills, an AVF or AVG can be damaged.

To prevent damaging accesses, the skills of a cannulator (Table 1) need to match the ease of an access to cannulate (Table 2). Nurses can help with this by:

- Self-assessing their own cannulation skills (novice, skilled or advanced) and working towards furthering their skill development.
- Identifying accesses which are new or complicated and would be better matched to a skilled or advanced cannulator.
- Asking an advanced cannulator, educator or vascular access nurse for help whenever they have a question or would like assistance. There is no shame in asking for help!
- Always consulting with an advanced cannulator after one unsuccessful cannulation attempt.

Table 1: Self-Assessed Skill Levels of Cannulators

Self-Assessed Skill Level	Competencies Consistent with Self-Assessed Skill Level
Novice Cannulator	
<p><i>Resources:</i> Rope ladder cannulation:</p> <ul style="list-style-type: none"> • Guideline: bcrenalagency.ca/node/791 • PPT: bcrenalagency.ca/node/952 • Self-learning package: bcrenalagency.ca/node/952 <p>Topical anesthetics to ease cannulation pain: bcrenalagency.ca/node/854</p> <p>Physical examination of AVF (video): ukidney.com/nephrology-presentations</p> <p>Assessment of newly created AVFs & AVGs:</p> <ul style="list-style-type: none"> • Guideline: bcrenalagency.ca/node/797 	<ul style="list-style-type: none"> • Assesses, cannulates, and troubleshoots needles of established AVFs and AVGs which are <u>easy</u> to cannulate. • Does not cannulate <u>new</u> accesses. Does not <u>initiate</u> buttonhole tracks. • Uses steel needles. • Uses Teflon needles only IF appropriate training has been completed and on an access <u>without</u> complications.
Skilled Cannulator	
<p><i>Resources:</i> Rope ladder cannulation: PPT: bcrenalagency.ca/node/888 Self-learning package: bcrenalagency.ca/node/803 Self-cannulation:</p> <ul style="list-style-type: none"> • Information for patients about self-cannulation: bcrenalagency.ca/node/849 • “How to” self cannulate using BH method: bcrenalagency.ca/node/873 • Caring for your BH track: bcrenalagency.ca/node/838 • BH vacation instructions: bcrenalagency.ca/node/842 	<p>Novice cannulator plus:</p> <ul style="list-style-type: none"> • Assesses, cannulates, and troubleshoots needles of established AVFs and AVGs that are <u>moderately complicated</u>. • Cannulates <u>new</u> accesses. Does not <u>initiate</u> buttonhole tracks. • Uses steel and teflon needles. • Uses ultrasound to support cannulation. • Explores interest in self-cannulation in appropriate patients.
Advanced Cannulator	
<p><i>Resources:</i> Rope ladder cannulation:</p> <ul style="list-style-type: none"> • PPT: bcrenalagency.ca/node/886 • Self-learning package: bcrenalagency.ca/node/783 <p>Buttonhole cannulation:</p> <ul style="list-style-type: none"> • Guideline: bcrenalagency.ca/node/800 • PPT: bcrenalagency.ca/node/887 	<p>Skilled cannulator plus:</p> <ul style="list-style-type: none"> • Assesses, cannulates, and troubleshoots needles of established AVFs and AVGs that are <u>complicated</u>. • Forms <u>initial</u> buttonhole tracks (BH tracks are established by patients/caregivers or by a designated nurse; once established, the track must be cannulated by a patient/caregiver). • Monitors & offers feedback to colleagues re cannulation.

Table 2: Matching Accesses & Cannulators

Access	AVF	AVG
Easy		
Access suited to the skills of a novice, skilled, or advanced cannulator	<ul style="list-style-type: none"> • AVF that has been successfully cannulated with no infiltrations for at least 6 weeks (i.e., <u>established</u> AVF) • Well matured • Vein firm, easily palpated and stable upon palpation (vein diameter of >.6 cm) • Vein superficial (vein depth of <.6 cm with discernible margins) • Area of straight vein available for cannulation • No irregular/dilated areas or aneurysm formations that interfere with cannulation • No collateral veins visible that interfere with cannulation • No edema, bruising, or signs of local infection • Access flow of >500 mL/min • No limb tremors or muscle spasms • Patient is not anxious about needling or restless or confused 	<ul style="list-style-type: none"> • AVG that has been successfully cannulated with no infiltrations for at least 2 weeks (i.e., <u>established</u> AVG) • Palpable, uniform sized graft in a loop or straight configuration • Sufficient surface area for cannulation • No irregular/dilated or edematous areas • No signs of pseudoaneurysm formation • No signs of bruising or local infection • Access flow of >650 mL/min • No limb tremors or muscle spasms • Patient is not anxious about needling or restless or confused
Moderately Complicated		
Access suited to the skills of a skilled or advanced cannulator	<ul style="list-style-type: none"> • Same as criteria for “easy” AVFs but have 1 of the cannulation complications listed under “complicated” AVFs <p>OR</p> <ul style="list-style-type: none"> • <u>New</u> AVF that meets all criteria for “easy” except it has not yet been cannulated for 6 weeks 	<ul style="list-style-type: none"> • Same as criteria for “easy” AVGs but may have 1 of the cannulation complications listed under “complicated” AVGs <p>OR</p> <ul style="list-style-type: none"> • <u>New</u> AVG that meets all criteria for “easy” except it has not yet been cannulated for 2
Complicated		
Access suited to the skills of an advanced cannulator	<ul style="list-style-type: none"> • Same as criteria for “easy” AVFs but have 2 or more of the cannulation complications listed below: <ul style="list-style-type: none"> • Vein not easily palpable (vein deep or inconsistent depth; vein depth of >.6 cm; vein may roll upon palpation) • Vein narrow (vein diameter of <.6 cm) • Poorly defined area of straight vein available for cannulation • Visible dilated area or aneurysm formation that may interfere with cannulation • Visible collateral veins that may interfere with cannulation • Access limb has signs of edema, bruising, or local infection • Recent and repeated infiltrations • Access flow of <500 mL/min • Patient has muscle spasms or limb tremors • Patient is highly anxious about needling or restless and confused <p>OR</p> <ul style="list-style-type: none"> • <u>New</u> AVF that has one or more of the cannulation complications listed above <p>OR</p> <ul style="list-style-type: none"> • <u>Established</u> or <u>new</u> AVF in which a buttonhole track is being established. 	<ul style="list-style-type: none"> • Same as criteria for “easy” AVGs but have 2 or more cannulation complications listed below: <ul style="list-style-type: none"> • Graft difficult to palpate and/or not a uniform size (i.e., may bulge in places) • Graft deep or inconsistent depth (may be flat and/or mushy to palpate) • Limited area available for cannulation • Signs of false aneurysm • Access limb has signs of edema, bruising, or local infection • Recent and repeated infiltrations • Access flow of <650 mL/min • Patient has muscle spasms or limb tremors • Patient is highly anxious about needling or restless and confused <p>OR</p> <ul style="list-style-type: none"> • <u>New</u> AVG that has one or more of the cannulation complications listed above

Assessment of Cannulation Competencies

Cannulation (based on Guideline)		Novice Cannulator			Skilled Cannulator			Advanced Cannulator		
		Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹
1	If patient is highly anxious re needle discomfort, discusses the option of applying/injecting a local anesthetic prior to needling.	✓			✓			✓		
2	Instructs the patient to wash their access with anti-bacterial soap or scrub and water using friction.	✓			✓			✓		
3	Assesses patient and vascular access using:	✓ Differentiates normal from abnormal in well developed, mature AVFs and AVGs; initiates follow-up actions			✓ Differentiates normal from abnormal in well developed, mature AVFs and AVGs; distinguishes some types of abnormalities; initiates follow-up actions			✓ Differentiates normal from abnormal in all types of AVFs and AVGs; distinguishes most types of abnormalities; initiates follow-up actions		
	a) Inspection (look)									
	b) Auscultation (listen)									
	c) Palpation (feel)									
	d) Portable ultrasound	✗			✓ Uses to map vessel prior to cannulation (check vein depth, diameter & length) Knows/ demonstrates: <ul style="list-style-type: none"> • Indications for use of u/s • Basic principles of u/s • How to operate the u/s device • How to visualize the vessel. • How to disinfect probes 			✓ As per Skilled Cannulator plus uses to guide cannulation & to assess problems in vessel. As per Skilled Cannulator plus knows/ demonstrates: <ul style="list-style-type: none"> • How to utilize u/s to guide cannulation. • Understanding of u/s images & abnormalities (e.g., stenosis, aneurysms, calcification, etc) 		
	<i>Reference: Marticorena, R et al, Development of competencies for the use of bedside ultrasound for assessment and cannulation of hemodialysis vascular access, CANNT, 25:4, Oct-Dec 2015. p.p., 28 - 32.</i>									

¹ Peer might include an educator, vascular access nurse, mentor, advanced cannulator, etc.

Assessment of Cannulation Competencies

Cannulation (based on Guideline)	Novice Cannulator			Skilled Cannulator			Advanced Cannulator		
	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹
4 Demonstrates knowledge and follows up signs and symptoms requiring consultation with the physician and/or VA Coordinator (e.g., infection, absence or poor quality of bruit and thrill, edema, aneurysm or pseudo aneurysm formation, inability to achieve appropriate blood pump speed, low arterial or high venous pressure, low access flow rate, and/or unexplained, prolonged bleeding).	✓			✓			✓ Takes independent action on problems if authorized.		
5 Identifies the direction of blood flow at the access site.	✓			✓			✓		
6 Visualizes the site(s) and plans for needle placement.	✓			✓			✓		
7 Ensures clean gloves prior to cleansing and cannulating the site. Changes gloves if contaminated at any time during the cannulation procedure.	✓			✓			✓		
8 Cleanses the site with a cleansing solution and allows skin to dry thoroughly. For AVFs, applies a tourniquet (or B/P cuff) to the access arm tight enough to dilate the veins but being careful not to occlude the flow.	✓			✓			✓		

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Cannulation (based on Guideline)	Novice Cannulator			Skilled Cannulator			Advanced Cannulator		
	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹
9 If desired by the patient, applies/injects the local anesthetic (if using topical anesthetic, may have already been applied by patient at home).	✓			✓			✓		
10 Cannulates and threads the needle down the center of the AVF or AVG using approximately a 25 degree (AVF) or 45 degree (AVG) angle. Assesses the depth of the access and adjusts the cannulation angle accordingly.	✓ Utilizes steel needles only; May use teflon needles IF training provided and access is <u>easy</u> to cannulate			✓ Utilizes steel and teflon needles			✓ Utilizes steel and teflon needles		
11 Once flashback is visible, levels the needle to skin level and slowly advances the needle to the hub. Confirms needle placement by assessing blood flow into the tubing. If no blood returns, carefully adjusts needle.	✓			✓			✓		
12 Assesses carefully for signs of infiltration (i.e., pain, swelling, or discoloration).	✓ Seeks out assistance if signs of infiltration present			✓ Takes action if signs of infiltration present			✓ Takes action if signs of infiltration present		
13 Secures the wings of the needle at the same angle of advancement. Applies adhesive device.	✓			✓			✓		
14 Repeats steps 10 - 13 for the second needle.	✓			✓			✓		
15 Once cannulation has been established, matches needle gauge to blood pump speed.	✓			✓			✓		

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Assessment of Cannulation Competencies

Cannulation (based on Guideline)	Novice Cannulator			Skilled Cannulator			Advanced Cannulator		
	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹
16 Removes adhesive device and then removes the needle slowly and at the same angle that was used for insertion.	✓			✓			✓		
17 After the needle is out, applies mild, localized, digital, direct pressure for 10 — 15 minutes to the needle exit sites of both the skin and graft or vessel wall, using a two digit technique over a haemostatic dressing.	✓			✓			✓		
18 Places an adhesive or gauze pad on the cannulation site or ensure dressing used is secure.	✓			✓			✓		
19 Prior to the patient leaving the unit, assesses and document the quality of the bruit and thrill.	✓			✓			✓		
20 When initiating a new AVF or AVG, contacts physician to reassess heparin orders and heparin stop times (if not already ordered). Reassesses regularly during initial cannulations.	✗			✓			✓		
21 When initiating a new AVF or AVG, demonstrates knowledge of appropriate cannulation sequence and needle sizes:									
a) AVF with functioning CVC in place.	✗			✓			✓		
b) AVF with no functioning CVC in place and all AVGs.	✗			✓			✓		

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Assessment of Cannulation Competencies

Cannulation (based on Guideline)		Novice Cannulator			Skilled Cannulator			Advanced Cannulator		
		Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹	Competency	Self-Assessment	Peer Assessment ¹
22	Uses appropriate technique for forming buttonhole tracks.	✘			✘			✓ Initiates buttonhole tracks		
23	Provides patient teaching re: cannulation: <ul style="list-style-type: none"> • Cleansing of limb prior to dialysis • Rotation of sites or buttonhole site • Cannulation techniques • Pain/fear management strategies • Compression of access for hemostasis following needle removal • Emergency care in the event of a bleed 	✓			✓ Explores interest in self-cannulation			✓ Explores interest in self-cannulation		

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A. Strengths and Areas for Improvement

Self-Assessment	Peer Assessment

B. Learning Plan

Actions	Timelines