

# Overcoming a Key Barrier to Home Dialysis

## The Art of Teaching Buttonhole Self-Cannulation

### Background

Dialysis needles are large and scary! Fear of needles and pain is very real for most people on dialysis, especially at first. Some have true phobia, and need special techniques and interventions to self-cannulate. All patients, once they get used to dialysis, worry about who will put their needles in (and maybe cause access damage that can lead to a hospital stay, surgery, or loss of their lifeline). Some won't travel because they don't want an unknown staff person to cannulate them. All of these fears can reduce quality of life. Patients who cannulate themselves learn to overcome these fears—and this task is not as challenging as it may seem.

Patients who can see and use their hands well enough to place needles *are their own best cannulators*. Why? **They are the only ones who can feel both ends of the needle.** They can better control the needle angle and direction. They can tell when the tip of the needle is in the vessel. Thus, patients are far less likely to infiltrate themselves than a staff member or a care partner. A fistula with one cannulator, i.e. a *self-cannulator*, will work far longer<sup>1-5</sup> and have fewer problems than one with many cannulators.<sup>1-4, 6, 7</sup> Some studies find that self-cannulation is less painful for the patient.<sup>7-9</sup> Oddly, there are very few studies on cannulation technique.

The content in this manual is based on extensive clinical experience and observation. The techniques in this work have been published in peer-reviewed journals. Can your patients succeed with self-cannulation? The answer is **YES!**

In this manual we will discuss:

- 1) **Pre-cannulation Education** - to help patients overcome fear of needles
- 2) **Tandem-hand Cannulation** - guided help in learning to cannulate
- 3) **Buttonhole technique** - faster<sup>7</sup> and less painful<sup>10</sup> than rope-ladder rotation, but with fewer aneurysms and infiltrations;<sup>11</sup> as well as Touch cannulation technique



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*“Because my ultimate aim was to do dialysis at home, I knew I would have to learn to needle myself. But, at first, I could not even watch the nurse needle me! I started by watching her insert needles out of the corner of my eye. Gradually, by an effort of will, I was able to watch the whole process without blinking. I watched her technique very carefully. After doing this for about 6 weeks, I felt ready to take the next step.*

*I visualized myself asking the nurse to allow me to have a turn myself. Finally I took a deep breath and asked to insert my own needle. It was easier than I thought and the nurse commended me on my excellent technique. These needles were the very fine ones used for local anesthetic. I simply repeated the process, when I felt brave enough, to cannulate with the large dialysis needles.” — Home dialysis patient*

This free manual was written by  
Stuart Mott and compiled by the  
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([www.homedialysis.org](http://www.homedialysis.org)).

## 1. Pre-cannulation Education: Countdown to Cannulation

### Four weeks before starting self-cannulation:

- Teach the patient:
  - 1) How his or her access works, fistula vs. graft
  - 2) Why the blood flow rate matters
  - 3) Impact of access flow on dialysis dose
  - 4) Size and type of needles used, including gauge (17, 16, 15, 14), length (3/5", 1", 1-1/4"), and sharp or blunt
  - 5) Presence of any side vessels branching from fistula and why they matter
  - 6) How to assess his or her access before each session: Show how you check the pulse and thrill, then have the patient do it; explain how to recognize problems
  - 7) Anything else your clinic feels is key
- Show the patient how you find the bruit with your stethoscope. Describe the sound and what it means. Then, have the patient find the bruit with his or her own stethoscope and describe the sound. You may wish to use these websites to demonstrate the sounds:
  - [www.asdin.org/displaycommon.cfm?an=1&subarticlenbr=73](http://www.asdin.org/displaycommon.cfm?an=1&subarticlenbr=73)
  - <http://www.fistulafirst.org/professionals/ffbichangeconcepts.aspx>

Your clinic doesn't use stethoscopes to listen to bruits? It should. The KDOQI guidelines say that patients should learn their accesses and check them daily, including the pulse, thrill, and bruit.<sup>6</sup> Training materials such as the *Core Curriculum for the Dialysis Technician*<sup>12</sup> also suggest that the cannulator check the access before cannulation, including the bruit.

It is in your patients' best interests to add this check, and stethoscopes can be very low cost.

### Three weeks before self-cannulation:

Start Pre-cannulation. The Fistula First best practice is:

- Have the patient assess all aspects of his or her access as you've taught, making sure that the access is in good shape for cannulation. This must become a ritual.
- Discuss proper hand washing and the need for cleanliness for a trouble-free access. Have the patient show you how to use the right technique. (Fig 1)

#### NEEDLE LENGTH

Consider needle length. Using unnecessarily long needles can frighten patients and increase the risk of infiltration. Most forearm AV fistulas are shallow, so a 3/5-inch long needle will reduce the risk of infiltration and vessel wall damage. An upper arm or leg access will probably require a 1-inch long needle.



Figure 1

**NOTE:** Avoid using the word "stick," which can stress the patient. Criminals stick up banks and convenience stores. We *cannulate* dialysis accesses!



Figure 2

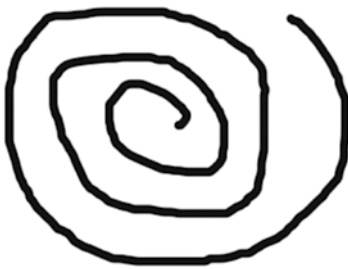


Figure 3

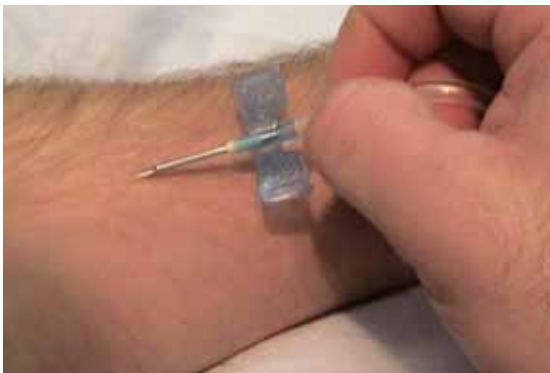


Figure 4



Figure 5

- Put a glove onto the patient's cannulating hand. (Fig 2) Ask, "What does this feel like to you?" Many will say something like, "It's like being on TV, you know, like ER." This is a motivational step that can help engage the patient in the process of taking control of his or her care.

### Two weeks before self-cannulation:

- Have patient assess his or her access.
- Have the patient show you how to prepare his or her access for cannulation, following your clinic's procedure, as you have taught.
- Have the patient wash his or her hands and arm.
- Follow hand washing with a Betadine® soak. Scrub in a spiral motion (Fig 3), moving outward from the cannulation site. Then, have the patient practice this technique.

### One week before self-cannulation:

- Have the patient show you all of the steps you have taught before.
- Follow your clinic's policy for needle gauge. Explain the types of needles you use and why. (For example, our clinic starts with a 17-gauge needle for one treatment, switches to 16 gauge for the next three treatments, then goes to 15 gauge.)

Give the patient a Buttonhole needle to practice with at home. During the next week, the patient can touch the needle to the skin at the sites where the buttonholes will be formed. This practice will help reduce a lot of the fear of the needle and having the needle touch the skin, and can reduce stress when the time comes to self-cannulate. (Fig 4)

### Reading glasses

Be sure you and your patients can see the needle sites! (Fig 5) About 40% of our patients need reading glasses. To check vision, place a small black dot on the patient's arm with a Sharpie®. Have the patient try to line up the needle tip with the dot. If they can't, they need glasses! A patient who wears bifocals may still need reading glasses to cannulate. Local drug and box stores carry reading glasses from 1.5 to 3.0 diopters for \$2–15/pair. "Dollar" stores may even have them for \$1 a pair. Keep a few pairs on hand in the clinic for patients—and staff.



## 2. Tandem-hand Cannulation

During the precannulation phase, you talked the patient through each step and answered questions. Now, it is time to move on to self-cannulation itself.

**Tandem-hand cannulation**,<sup>13</sup> a Fistula First Best Practice, is a hands-on method where you work one-on-one with the patient. NOTE: We show some of the pictures without gloves. This allows you to better see the position of the thumb and forefinger, which is key to this method. They are not of real patients, but rather training photos made with a technician.

**Step 1** - As with all cannulation, handling the needle is the most critical part. The first step in using the Tandem-hand method is learning how to “set” and use the cannulating hand. Sit down in a chair, and anchor your hand by resting it on the patient’s arm. This gives you a solid base. Then, with your fingers “cocked,” the needle tip is at the insertion site. All you have to do to cannulate is move your thumb and forefinger forward. (Fig 6)

**Step 2** - To cannulate, have the patient place his or her thumb and forefinger right behind your thumb and forefinger. Have the patient squeeze your fingers. They need to do this tightly enough to feel your thumb and forefinger moving forward to insert the needle, and feel the needle going through the skin. This lets the patient feel what you feel and go through the motion to cannulate at the same time. Do this for a few treatments, until the patient is ready to move on to the next step. (Fig 7)

When you and the patient feel comfortable with the process, you can move on. Talk with the patient. The time to move on will be different for each one—and comfort is the key to success. When the patient feels comfortable with and is consistent with the process it is time to go to step 3.

**Step 3** - Trade hand positions. You will now place your forefinger and thumb right behind the patient’s thumb and forefinger. This lets you have control in case something should go awry. And, it gives the patient a sense of security that reduces a lot of the stress, hesitation, and jerky movements that might hinder self-cannulation. (Fig 8)

### PHOTO DISCLAIMER

Some of the following pictures are shown without gloves so you can better see the position of the thumb and forefinger, which is key to this method. They are not of actual patients, but rather training photos made with a technician.



Figure 6



Figure 7



Figure 8





Figure 9

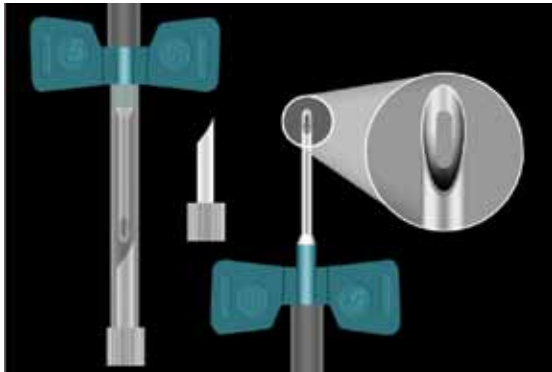


Figure 10



Figure 11

### WEAR GLOVES

A reminder, anyone who may come in contact with the needle or the patient's skin must wear gloves.

### BUTTONHOLE TECHNIQUE CAUTION

The Buttonhole technique can be used only in an AV fistula—NOT a graft. Fistula walls have muscle fibers that will “snap” shut after the dialysis needle is removed, preventing excess bleeding. Artificial graft walls have no muscle fibers, so “coring” will result: the needle cuts a hole in the graft wall, causing it to leak blood into the surrounding tissue, and creating a risk of exsanguination and death.

**Step 4** - Continue the Tandem-hand process until you both feel comfortable and secure that the patient can succeed with minimal supervision. Keep watching closely. Offer encouragement, support, and guidance as needed. (Fig 9)

If at some point, after self-cannulating, the patient wants a staff member to take over, offer that option. Try to find out why, though. The problem may be something as simple as the need for re-education on some point. Even if a patient chooses not to self-cannulate, he or she will know the access and cannulation steps better. This will help ease fears—and empower the patient to catch potential staff errors before they can harm the access.

### 3. The Buttonhole Technique

The Buttonhole technique, or “constant-site” cannulation was developed by Dr. Zbylut Twardowski.<sup>14</sup> It has been in use for about 35 years in Europe. With this method, needle sites are not rotated. Instead, needles are placed into the exact same spot at the exact same angle. It takes 8–10 consecutive treatments to form a tunnel tract.<sup>15</sup> If you have trouble forming a Buttonhole tract, use a sharp needle for a treatment or two until the tunnel is formed. Once there is a tract, change to a blunt Buttonhole needle to avoid cutting the tract with the edge of a sharp needle. (Fig 10)

It is best if the patient forms his or her own Buttonhole tracts. Why? There are only a few positions in which a self-cannulator can comfortably anchor his or her hand to use the right needle angle. It is much easier for a patient to duplicate an angle if the site and angle are ones that are best suited to him or her—not the staff person. Also, if patients are only taught to use blunt needles, they may be at a loss if they choose home hemodialysis and need to start new Buttonholes.

### Cannulating Buttonholes

Show the patient how a Buttonhole is like a pierced earring tract by sliding a needle into an end-cap. For a shallow forearm AV fistula where you will use a short needle, use a quarter of a cap, about  $\frac{1}{4}$ ". For an access that needs a longer needle, such as an upper arm fistula, use that needle and an end-cap cut to about  $\frac{1}{2}$ ". (Fig 11)

**Step 1** - Prior to cannulation, the fistula must be prepared using clinic protocol. The scabs from the last treatment must be removed. This can be done safely in several ways. Let the patient choose the way he or she is most comfortable with.

Scabs can be safely removed with:

- A sterile needle
- Sterile tweezers
- The special pick that comes with certain brands of needles.

Infections due to improper scab removal are the only increased risk factor reported for buttonhole use. They are entirely preventable with good technique.

**CAUTION:** *Use of fingernails, toothpicks, and other non-sterile tools has led to Buttonhole tract infections which can lead to sepsis.*

**Step 2** - Show the patient “Touch cannulation.”<sup>16</sup> The cannulator holds the tubing (not the wings) about 1–2 cm ( $\frac{1}{2}$ – $\frac{3}{4}$  inch) behind the needle. (Fig 12) Holding the tubing lets the cannulator feel what the tip of the needle is doing. This is a Fistula First Best Practice. It is especially useful for buttonholes, as it gives the needle a little “wiggle room” to find its way down the tract. This can help prevent damage. Show the patient how to hold the needle, where to anchor the heel of the hand, and how to “cock” the fingers to cannulate. Show how you grasp the needle so it’s ready to insert: Hold the tubing behind the needle with your thumb and forefinger, then curl all four fingers under it. Remind the patient about hand placement and needle angle. Using a 20° angle will help the needle slide down the vessel wall, and reduce the risk of infiltration. (Fig 13)

**Step 3** - Have the patient anchor his or her hand in a comfortable spot, with fingers cocked, and the needle tip at the buttonhole site. Then all he or she will need to do to cannulate is advance the thumb and finger. (Fig 14)

**BUTTONHOLE OPTIONS IN EUROPE**  
Those of you in Europe and Canada have two options that are not available in North America: a specially designed plastic peg,<sup>17</sup> or a catheter that can be implanted in the needle tract for this purpose.<sup>18</sup>



**Figure 12**



**Figure 13**



**Figure 14**



Figure 15

#### ULTRASOUND BEFORE YOU CANNULATE

New research has found that fistula wall thickness of greater than .13 mm can predict whether a fistula is mature enough to be cannulated. Ultrasound can be used to measure the fistula wall prior to a first cannulation.<sup>19</sup>

**Step 4** - When the patient is ready, have him or her hold the tubing. Using the Tandem-hand technique, place your hand over the patient's hand, so that he or she can guide the needle into the Buttonhole. Watch for the flashback. When this occurs, remove your hand so the patient can finish sliding the needle into the access. Avoid sudden, jerky movements. When you take your hand off and the patient finishes, he or she will see that self-cannulating was a success. This can be an amazing discovery! They may say, "I can do this!" And you can respond, "Yes, you sure can!" (Fig 15)

### Conclusion

Patients who self-cannulate tend to have better access outcomes.<sup>1-5</sup> They don't just rely on their doctors and nurses; they take ownership of their care and control of their lives. They lose their fear of dialysis, of pain, of infiltrations, and of access problems, because they are empowered and no longer dependent. You can help! With good education and encouragement, a large number of patients can self-cannulate. This, in turn, will lighten the staff load. Fewer access problems and hospital stays translate into money saved, too.

Some of our older patients and those with true needle phobia will always want the staff to cannulate them. This should not relieve them of the need to take part in their care. The staff cannulator should start the session with something like, "I'll be cannulating you today," and then say, "Please tell me about your access." An empowered patient should be able to tell you about the thrill, bruit, needle angle, blood flow at last session, etc. Offer to answer questions. This routine in and of itself is a chance to continue the patient's education, which will help you and the patient. With this kind of patient input, cannulation time should be minimal. The patient will alert you to any problems with the access, e.g. spots to avoid, so it is easier for you to succeed on the first try—which makes everyone happy.

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