

Using 'Tandem Hand' Technique to Facilitate Self-Cannulation in Hemodialysis

Stuart Mott

Harold Moore

It is well established that self-cannulation extends the life expectancy of the native arteriovenous fistula (AVF) (Hakim & Himmelfarb, 1998; Huber, Carter, Carter, & Seeger, 2003; Mehta 1991; Perera et al., 2004; Pisoni et al., 2002), is associated with fewer complications (Hakim & Himmelfarb, 1998; Huber et al., 2003; Mehta, 1991; National Kidney Foundation [NKF], 2006; Perera et al., 2004; Verhallen, Kooistra, & van Jaarsveld, 2007), and the process is more comfortable for the patient (Ball, 2006; DaVita, 2007; Verhallen et al., 2007). The use of the buttonhole technique was first reported some 30 years ago (Twardowski & Kubara, 1979; Twardowski, Lebek, & Kubara, 1977), but it has not been significantly utilized in the U.S. The buttonhole technique is particularly attractive for self-cannulation and has been recommended in the NKF's Kidney Disease Quality Initiative (KDOQI) guidelines (2006) as the method of choice for self-cannulators. This article discusses a method found by the authors as successful in teaching patients to self-cannulate.

The Tandem Hand Technique

Phase 1

The patient who is interested in learning to self-cannulate needs to be assigned to a vascular access nurse preceptor who will supply information relative to self-cannulation and discuss with the patient the benefits and possible problems relative to the process of self-cannulation.

Stuart Mott, BS, BA, LPN, is a Vascular Access Nurse, Dialysis Clinic, Inc., Columbia, MO, and a member of ANNA's Central Missouri Chapter.

Harold Moore, MA Ed, BS Ed, BS, is a Research Associate, Division of Nephrology, School of Medicine, University of Missouri, Columbia, MO.

Disclaimer: The analyses upon which this publication is based were performed under Contract Number HHSM 500-2006-NW012C entitled End Stage Renal Disease Networks Organization for the States of Iowa, Kansas, Missouri, and Nebraska; sponsored by the Centers for Medicare & Medicaid Services, Department of Health and Human Services. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. The author assumes full responsibility for the accuracy and completeness of the ideas presented. This article is a direct result of the Health Care Quality Improvement Program initiated by the Centers for Medicare & Medicaid Services, which has encouraged identification of quality improvement projects derived from analysis of patterns of care, and therefore, required no special funding on the part of this contractor. Ideas and contributions to the author concerning experience in engaging with issues presented are welcomed.

Self-cannulation has been shown to decrease complications and extend the life of the arteriovenous fistula. Teaching self-cannulation has been difficult due to patient distress created by the use of needles. This article discusses a technique that has been used in the authors' clinic to teach self-cannulation to incenter patients. The observed use of this technique has helped create a comfortable environment for the patient.

For the new patient, access evaluation and preparation of the access site must be covered prior to discussion of cannulation. In the established patient, a review of this material is necessary to make certain that an understanding of all basic fundamentals exist at a level that will ensure success. Patients will most likely be initially apprehensive and uncomfortable. Many will be apprehensive regarding needles and/or the sight of blood. Most will be apprehensive because it is a new experience and they fear making a mistake, which could cause an access problem. Others will have a "fear" of the needle, and a small percentage will have a true phobia.

Educational materials and methods must be developed by the preceptor to help the prospective self-cannulator overcome these fears. One example might be having the patient watch others being cannulated, and then have the patient watch himself or herself being cannulated. Another option would be that if there is a fear of needles and/or blood, to start by having the patient just glance at himself or herself, or to glance at another patient being cannulated seated close by, each time trying to extend the time watching until the patient becomes comfortable with the sight of his or her own or another person's blood.

If a patient has a fear of all types of needles, instruct the patient on how to hold the needle correctly. After this is accomplished, provide the patient with a blunt buttonhole (Medisystems ButtonHole™) needle set, giving him or her the opportunity to handle the needle in the proper manner (with instruction) and help them become comfortable with the process. The preceptor then should take a blunt buttonhole needle, and communicating with the patient through both dialogue and demonstration, perform the cannulation procedure just as it would be done during a dialysis session, with the exception of actual needle insertion. When the point of insertion is reached, the preceptor touches the buttonhole needle to the skin simulating cannulation. Special consideration should be given to the placement of the base of the hand. It is necessary that the

Figure 1
Cocking of the Fingers Prior to Cannulation



Figure 2
Cannulation with Patient Tandem to Vascular Access Nurse



hand be immobilized by anchoring the heel of the hand on the arm so that with the fingers cocked, the needle tip is at the insertion site (see Figure 1) just prior to cannulation. Only the index finger and thumb move to effect cannulation. This accomplishes two important things: 1) the solid base provides control, and 2) it helps maintain the same angle of insertion for each cannulation, which is vital in the use of the buttonhole technique.

The nurse preceptor then provides the patient with a buttonhole needle and has the patient go through the complete cannulation procedure, culminating in the patient "cannulating" his or her arm by touching it with the needle tip. Again, this helps the patient become comfortable with the procedure, the manipulation of the needle, and the feel of the needle touching the skin. This process is repeated until the preceptor and the patient both feel comfortable that the goals have been met for this phase, and then move on to the next phase. The patient should be provided with the materials (such as site preparation, blunt needles) to continue to practice this process at home several times a day to acquire the "feel" of the process.

Phase 2

Pre-cannulation preparation is carried out following the clinic's prescribed protocol as practiced in Phase 1. It is critical that the patient has had the proper education with demonstrated proficiency in access assessment and disinfection of the access site prior to initiating the self-cannulation process. Once the pre-cannulation protocol is completed to the satisfaction of the preceptor, the cannulation process begins with the patient placing his or her thumb and forefinger just behind the thumb and forefinger fingernail of the preceptor (see Figure 2 – notice cocking of fingers). Some patients even feel the "pop" as the needle enters the fistula. This provides a greater under-

standing and appreciation of the preceptor's explanations and instructions in relation to what the patient is feeling and how it all relates to successful cannulation.

The patient is required to verbalize seeing the flashback, as he or she is in the best position to see it. This also reinforces the concepts of taking an active role and dialog between patient and caregiver. The patient can also communicate to the preceptor what he or she feels, such as pain, which may sometimes be lessened with a minor adjustment of the needle angle. This process is repeated with the second needle. The process should be followed for a minimum of three dialysis sessions before switching to the next phase. Depending upon the patient's and preceptor's evaluations, the process will either be continued or the next phase will be initiated. If there is still a modicum of apprehension, it would be most prudent to continue Phase 2 until both the patient and preceptor are comfortable and then move on to Phase 3.

Phase 3

The roles are now reversed. The patient handles the needle with the preceptor placing his thumb and forefinger behind the thumb and forefinger fingernail of the patient (see Figure 3). This not only gives the patient a feeling of security, but the preceptor can feel what is happening and can verbally guide the patient, and if necessary, the preceptor can very gently guide the patient's hand. This prevents the sense of failure the patient might have if the preceptor stopped and took over the cannulation. At the same time, it allows the preceptor the opportunity to prevent any potential complication. This process is repeated until the patient and preceptor are both comfortable with the patient's cannulation skill and believe the patient is competent to continue unaided. At such time, the patient is then ready to move on to the final phase of learning self-cannulation.

Figure 3
Cannulation with Vascular Access
Nurse Tandem to Patient



Figure 4
Patient-Only Cannulation



Figure 5
Self-Cannulation of a Fistula with a Buttonhole



Phase 4

In this final phase, the preceptor continues to observe the patient closely by offering support, guidance, and encouragement during the first several dialysis sessions based upon the preceptor's assessment of the patient's needs. At this point, the patient is allowed to do his or her own cannulation unaided following the unit's protocol for self-cannulation (see Figure 4). However, it must be stressed that continuing education for the self-cannulator must become routine. It is no less necessary than the continuing education of the staff.

Clinical Observations

Prior to the start of this initiative in July 2008, three patients were self-cannulating at this facility. To date, 20

patients have been trained, 16 of whom are self-cannulating. The mean time spent until learners were self-cannulating independently was 7.8 ± 4.5 (mean \pm SD) dialysis sessions with a range of 3 to 18. Looking at the phases separately, Phase 1 (education) was 2.9 ± 3.0 sessions with a range of 1 to 10; Phase 2 (patient tandem) was 1.9 ± 0.9 sessions with a range of 1 to 3; and Phase 3 (preceptor tandem) was 3.0 ± 2.8 sessions with a range of 1 to 9. These patients have been self-cannulating for a mean of 51.3 ± 5.6 sessions with a median of 48.9. To date, there have been no infections or hematomas in these patients. Of all patients with AVFs, 79% are using the buttonhole technique, and 68% are self-cannulating. The experience of the authors has been that after observing self-cannulation in the unit, other patients ask to be trained. This technique also works well with the cannulation of the buttonhole when using the touch cannulation technique (Mott & Prowant, 2008) (see Figure 5).

The authors observed that some patients appeared to have trouble lining up the needle with the buttonhole when cannulating. Upon discussing this with the patients involved, it was discovered that some patients, including some who wore glasses, felt they could not see well enough. The access nurse purchased several pairs of reading glasses from the local drug store, then had the patients having trouble try cannulation with the glasses, and found that the problem was eliminated. Hence, glasses are now kept in the unit for the use by any patient who feels the glasses help. Visual acuity is an aspect of the self-cannulation process of which the access nurse must be aware to achieve the best results, especially if the buttonhole technique is used.

Discussion

This technique has proven to be very useful in helping

patients become adept in the art of self-cannulation. It must be emphasized that trust and communication between the patient and the preceptor has to be at a high functional level before the process is initiated. It is the preceptor's responsibility to make sure that communication is not only established, but is of this quality in order to insure success. It is also mandatory that the patient demonstrates his or her understanding of the process and is sufficiently knowledgeable of the responsibilities and pitfalls of self-cannulation. This is critical for the success of any self-care process.

In the authors' center, a cannulation method, referred to as the touch cannulation technique, is taught (Mott & Prowant, 2008). With this method, the nurse cannulator holds the needle by the tubing approximately one-quarter to one-half inch behind the wings with the thumb and forefinger directed back towards the palm. The cannulator then rests the palm of his or her hand on the patient's arm, which serves as a solid fixed base, at a position that puts the needle tip in line with the site so that only advancing the needle is required. The needle is then advanced through the tissue into the fistula or graft by pushing forward with only the thumb and forefinger. It must be emphasized that when advancing the needle, only the forefinger and thumb move forward. By keeping the palm firmly seated and motionless on the patient's arm, it is much easier to maintain the proper angle of insertion.

It must be noted that in the case of needle apprehension, the preceptor must determine if he or she is dealing with the "fear" of needles or if the patient is truly needle phobic. True needle phobia is found in 3% to 4% of the U.S. population (Bienvenu & Eaton, 1998; Kleinknecht, 1987) and presents a diphasic cardiac response of initial tachycardia followed by bradycardia along with hypotension, shock, vertigo, diaphoresis, nausea, and though rare, asystole and death (Ellinwood & Hamilton, 1991; Marks, 1988). If a patient presents with a true needle phobia, it may require some intense psychotherapy, but it can be overcome fairly rapidly (Fernandes, 2003). The vasovagal response and bradycardia make true needle phobia less responsive to the usual relaxation techniques or even to sedative use that are commonly employed.

With the provision of constructive cognitive instruction, the patient feels more at ease with the process, thus lessening the apprehension, which in turn leads to the development of a "comfort zone" for the patient and a willingness to try self-cannulation. This comfort zone is further extended when the patient has the preceptor's thumb and finger behind their fingernails in the third phase. This provides a sense of security for the patient that he or she will not make a mistake that could harm the fistula because the vascular access nurse still is involved. The authors believe the judicious use of this method can help patients with fear of cannulation, in addition to allowing patients who are willing to self-cannulate become proficient very quickly. The authors also believe patients gain a sense of control over their own care, which leads to a better overall quality of life Ball,

2005; Harper, 1997; Konner, 2005; Renal Physicians Association (RPA)/American Society of Nephrology (ASN) & American Nephrology Nurses' Association (ANNA), 2008; Verhallen et al., 2007).

Implications for the Nephrology Nurse

This technique is one more tool in the toolbox of vascular access nurses, which when combined with good patient education, can help reduce complications of and extend fistula life. The key is to create a comfortable environment for the learner, which helps to overcome the fear of needles, of learning something new, and of making a mistake that could potentially damage the access. With the patient's hand on the preceptor's, he or she can "get a feel" for the cannulation process. This also takes the patient's focus off the pain involved and places it upon the task. This replacement of focus has been shown to create the impression of less pain.

Summary

Use of good educational techniques is a must. The experience of the authors has been that it takes very little time to have patients cannulating on their own using this method if good techniques are used. Since it is well established that self-cannulation and the buttonhole technique both extend the life of the native fistula, this training technique makes attaining the goal of self-cannulation easier. Since there are fewer problems associated with self-cannulation, increasing its use will also, undoubtedly, have a positive monetary effect for the clinic due to fewer hospital visits, required procedures, and increased longevity of accesses.

References

- Ball, L.K. (2005). Improving arteriovenous fistula cannulation skills. *Nephrology Nursing Journal*, 32(6), 611-617.
- Ball, L.K. (2006). The buttonhole technique for arteriovenous fistula cannulation. *Nephrology Nursing Journal*, 33(3), 299-304.
- Bienvenu, O.J., & Eaton, W.W. (1998). The epidemiology of blood-injection-injury phobia. *Psychological Medicine*, 28(5), 1129-1136.
- DaVita. (2007). *Rope ladder and constant site or buttonhole techniques - Cannulation methods for hemodialysis patients with a fistula*. Retrieved May 9, 2009, from www.davita.com/dialysis/treatment/a/1332
- Ellinwood, E.H., & Hamilton, J.G. (1991). Case report of a needle phobia. *Journal of Family Practice*, 32(4), 420-422.
- Fernandes, P.P. (2003). Rapid desensitization for needle phobia. *Psychosomatics*, 44(3), 253-254.
- Hakim, R., & Himmelfarb, J. (1998). Hemodialysis access failure: A call to action. *Kidney International*, 54(4), 1029-1040.
- Harper, G. (1997). The buttonhole technique of fistula access: A personal experience. *Home Hemodialysis International*, 1, 41-42.

continued on page 325

Using 'Tandem Hand' Technique

continued from page 316

- Huber, T.S., Carter, J.W., Carter, R.L., & Seeger, J.M. (2003). Patency of autogenous and polytetrafluoroethylene upper extremity arteriovenous hemodialysis accesses: A systematic review. *Journal of Vascular Surgery*, 38(5), 1005-1011.
- Kleinknecht, R.A. (1987). Vasovagal syncope and blood/injury fear. *Behaviour Research and Therapy*, 25(3), 175-178.
- Konner, K. (2005). History of vascular access for hemodialysis. *Nephrology Dialysis and Transplant*, 20(12), 2629-2635.
- Marks, I. (1988). Blood-injury phobia: A review. *American Journal of Psychiatry*, 145(10), 1207-1213.
- Mehta, S. (1991). Statistical summary of clinical results of vascular access procedures for hemodialysis. In B. Sommer & M. Henry (Eds.), *Vascular access for hemodialysis - II* (pp. 145-157). Chicago: Precept Press.
- Mott, S., & Prowant, B.F. (2008). The "touch cannulation" technique for hemodialysis. *Nephrology Nursing Journal*, 35(1), 65-66.
- National Kidney Foundation (NKF). (2006). KDOQI clinical practice guidelines and clinical practice recommendations for 2006 Updates: Hemodialysis adequacy, peritoneal dialysis adequacy and vascular access. *American Journal of Kidney Diseases*, 48(Suppl 1), S1-S322.
- Perera, G.B., Mueller, M.P., Kubaska, S.M., Wilson, S.E., Lawrence, P.F., & Fujitani, R.M. (2004). Superiority of autogenous arteriovenous hemodialysis access: Maintenance of function with fewer secondary interventions. *Annals of Vascular Surgery*, 18(1), 66-73.
- Pisoni, R.L., Young, E.W., Dykstra, D.M., Greenwood, R.N., Hecking, E., Gillespie, B., et al. (2002). Vascular access use in Europe and the United States: Results from DOPPS. *Kidney International*, 61(1), 305-316.
- Renal Physicians Association (RPA)/American Society of Nephrology (ASN), & American Nephrology Nurses' Association (ANNA). (2008). Joint position paper on collaboration between nephrologists and advanced practice nurses. *Nephrology Nursing Journal*, 35(3), 314.
- Twardowski, Z.J., & Kubara, H. (1979). Different sites vs. constant sites of needle insertion into arteriovenous fistulas for treatment by repeated dialysis. *Dialysis and Transplantation*, 8(10), 978-980.
- Twardowski, Z.J., Lebek, R., & Kubara, H. (1977). Szecioletnie kliniczne dowiadczzenie z wytwarzaniem lo uytkowaniem wewnetrznych przetok tetniczo-ylnych u chorych leczonych powtarzanymi hemodializami (Six-year experience with the creation and use of internal arteriovenous fistulae in patients treated with repeated hemodialysis) (Polish). *Polish Archives of Internal Medicine*, 57(3), 205-214.
- Verhallen, A.M., Kooistra, M.P., & van Jaarsveld, B.C. (2007). Cannulating in hemodialysis: Rope-ladder or buttonhole technique? *Nephrology Dialysis Transplantation*, 22(9), 2601-2604.

Reprinted from the *Nephrology Nursing Journal*, 2009, Volume 36, Number 3, pp. 313-316, 325. Reprinted with permission of the publisher, the American Nephrology Nurses' Association (ANNA); East Holly Avenue, Box 56, Pitman, NJ 08071-0056; (856)256-2300; FAX (856)589-7463; E-mail: anna@ajj.com; Web site: www.annanurse.org For a sample copy of the journal, please contact the publisher.