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Special Article

Temporary Hemodialysis Catheter Placement by Nephrology Fellows: Implications for Nephrology Training

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The insertion of temporary hemodialysis catheters is considered to be a core competency of nephrology fellowship training. Little is known about the adequacy of training for this procedure and the extent to which evidence-based techniques to reduce complications have been adopted. We conducted a web-based survey of Canadian nephrology trainees regarding the insertion of temporary hemodialysis catheters. Responses were received from 45 of 68 (66%) eligible trainees. The median number of temporary hemodialysis catheters inserted during the prior 6 months of training was 5 (IQR, 2-11), with 9 (20%) trainees reporting they had inserted none. More than one-third of respondents indicated that they were not adequately trained to competently insert temporary hemodialysis catheters at both the femoral and internal jugular sites. These findings are relevant to a discussion of the current adequacy of procedural skills training during nephrology fellowship. With respect to temporary hemodialysis catheter placement, there is an opportunity for increased use of simulation-based teaching by training programs. Certain infection control techniques and use of real-time ultrasound should be more widely adopted. Consideration should be given to the establishment of minimum procedural training requirements at the level of both individual training programs and nationwide certification authorities.
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INDEX WORDS: Central venous catheterization; temporary hemodialysis catheter; clinical competence; medical education; nephrology; infection control; ultrasound.

Achieving proficiency in the placement of temporary hemodialysis (HD) catheters is a requirement of nephrology training stipulated by the Accreditation Council for Graduate Medical Education (ACGME) in the United States[1] and the Royal College of Physicians and Surgeons in Canada.[2]

A survey of nephrology program directors in the United States conducted in 2007 indicated that the insertion of temporary HD catheters was a component of training at nearly all programs, but also concluded that "most programs have limited requirements for the number of procedures trainees need to perform to demonstrate competence."[3(p941)] The American Society of Diagnostic and Interventional Nephrology (ASDIN) guidelines for training state that a minimum of 25 temporary HD catheter insertions, as the primary operator, are required to attain certification,[4] but the basis for this recommendation is not defined and it has not been widely adopted by training programs.[3] The extent to which prior experience predicts procedural competency has not been well studied. However, a single-center study showed that increased clinician experience with central venous catheter (CVC) insertion, defined as the operator having previously placed 50 or more catheters, resulted in fewer mechanical complications and a greater likelihood of successful cannulation.[5] This study, conducted in the intensive care unit (ICU) setting, is limited by having included an undefined number of pediatric patients and not having reported the number of operators that were studied.

Given the suggestion that many procedures traditionally performed by nephrologists, including the insertion of temporary HD catheters, are increasingly being performed by non-nephrologists,[6] the number of temporary HD catheter insertions performed over the course of nephrology training might be reduced such that there is inadequate exposure at some centers to achieve and maintain competency.

Another aspect of procedural competency relates to the adoption of new evidence-based techniques and practices that have been shown to reduce complications. In the past decade, various practices at the time of CVC insertion have been shown to reduce complications, particularly central catheter–associated bloodstream infections (BSIs).[7-20] In addition, the use of

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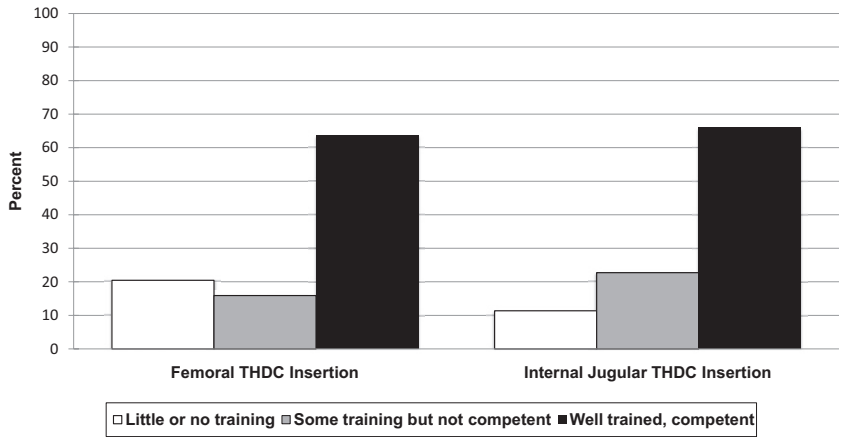

Figure 1. Overall self-perceived training and competency for insertion of temporary hemodialysis catheters (THDCs; n = 44).

real-time ultrasound guidance has been shown to reduce mechanical complications of CVC insertion[8,9] and is now recommended for temporary HD catheter insertions by National Kidney Foundation–Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) and KDIGO (Kidney Disease: Improving Global Outcomes) guidelines.[21,22] The extent to which evidence-based infection control measures and the use of real-time ultrasound guidance for temporary HD catheter insertion have been adopted by nephrologists and nephrology trainees is unknown.

SURVEY OF NEPHROLOGY TRAINEES

We undertook a national survey of nephrology fellowship trainees in Canada in order to define current practices and training for the insertion of temporary HD catheters. In addition, we sought to define the extent to which evidence-based infection control techniques and the use of real-time ultrasound guidance have been adopted.

Detailed methods and complete results for the survey study are available in Item S1 (provided as online supplementary material). A copy of the English-language version of the survey is available in Item S2.

Of 68 adult-nephrology fellowship trainees in Canada, responses were received from 45 (66%). One-third of respondents indicated that they were not adequately trained to competently place internal jugular or femoral temporary HD catheters, with a median of only 5 temporary HD catheters placed in the previous 6 months. Respondents' self-perceived overall training and competency are shown in Fig 1. Seventeen of 44 (39%) respondents indicated that they were less than "adequately trained and competent" to place both internal jugular and femoral temporary HD catheters. Most respondents reported adhering to basic infection control procedures at the time of temporary HD catheter insertion, but <50% of respondents reported "always" using large-sheet sterile drapes. Eighty-five percent reported always using real-time ultrasound guidance for internal jugular temporary HD catheter insertions, but only 57% reported always using ultrasound for femoral insertions. Table 1 lists respondents' training experience with CVC insertion prior to and during nephrology fellowship training.

CURRENT TRAINING FOR PLACEMENT OF TEMPORARY HD CATHETERS

Our results indicate that many trainees believe they are not competent to place temporary HD catheters. In addition, the number of procedures performed and the prior educational experiences related to CVC insertion vary widely. These findings are relevant to a broader discussion of the current adequacy of procedural skills training during nephrology fellowship.

In a survey of 133 nephrologists who completed training in the United States in 2004-2008, approximately one-third reported that they were not "well trained and competent" to insert internal jugular catheters, whereas >90% reported that they felt well

Table 1. Training Received for CVC Insertion

Type of CVC Insertion Training Received	Time When Training Occurred		
	Prior to Nephrology Fellowship	During Nephrology Fellowship	At Any Time
Didactic/lecture-based presentation(s)	12 (27)	8 (18)	17 (39)
Hands-on/experiential bedside-teaching	39 (89)	21 (48)	41 (93)
Simulation-based teaching session(s)	17 (39)	5 (11)	19 (44)
Formal (ie, not bedside) ultrasound training	5 (11)	5 (11)	7 (16)
Did not receive training	4 (9)	16 (36)	2 (5)

Note: n = 44. Values shown as number (percentage).
Abbreviation: CVC, central venous catheter.