



A Survey of Training for Temporary Hemodialysis Catheter Insertion During Nephrology Fellowship in Canada: An Update

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Abstract

Background: Controversy exists as to whether the insertion of temporary hemodialysis catheters (THDCs) should remain a mandatory requirement of nephrology fellowship training in Canada. A survey conducted by our group in 2012 showed that many nephrology trainees reported inadequate training to achieve procedural competence.

Objective: To determine the current practices and training of the insertion of THDCs in nephrology fellowship programs in Canada and how this has evolved since 2012.

Design: A survey study was designed comprising the following sections: demographics, details regarding the number and types of THDCs inserted within the past 6 months of fellowship training, adherence to sterile techniques, the use of ultrasound guidance during THDC insertion, training for THDC insertion received before and during nephrology fellowship, and self-perceived adequacy of training and competence in THDC insertion.

Setting: The survey was distributed by e-mail in May 2018 either directly or through Canadian nephrology training programs.

Participants: Current trainees of Canadian adult nephrology training programs.

Measurements: Descriptive statistics were used to analyze the summarized data. The means and interquartile ranges (IQRs) were used to summarize the number of THDC insertions performed, and the categorical data, including data on training and self-perceived competency, were reported using frequencies and percentages. A chi-squared test was used to evaluate the relationship between those who received simulation-based training and self-perceived confidence in either internal jugular or femoral catheter insertion.

Methods: An online survey, available in both English and French, was distributed to all adult nephrology trainees in Canada in May 2018 either directly or through their respective programs.

Results: Completed surveys were received from 46 of 136 nephrology trainees across Canada (34%). Of those who responded, the median (IQR) number of combined femoral and/or internal jugular THDCs inserted in the past 6 months of fellowship training was 3 (1–6). Eight respondents (17%) indicated that they had not inserted a THDC in the past 6 months. However, only 7 of 42 respondents (17%) indicated that they did not feel competent or adequately trained to perform either femoral or internal jugular THDC insertion.

Limitations: Limitations of the study include participation of trainees at different stages of their training. Many trainees indicated that it was not a requirement to keep a formal log of their procedures performed and likely had recall bias when reporting their procedure details.

Conclusions: Nephrology fellows in Canada are performing fewer THDC insertions compared to 2012 but report higher levels of self-perceived competence and better training. This may be as a result of significantly more simulation-based training. Our data suggest that training to procedural mastery using simulation-based techniques may be a path to ensuring adequate training for THDC insertion despite fewer procedures being performed during training.

Abrégé

Contexte: Une controverse existe à savoir si l'insertion de cathéters d'hémodialyse temporaires (CHT) devrait demeurer une exigence de la formation des néphrologues au Canada. Une enquête menée par notre groupe en 2012 montrait que plusieurs stagiaires en néphrologie jugeaient leur formation insuffisante pour l'acquisition de compétences techniques.

Objectifs: Faire état des pratiques et de la formation actuelles en matière d'insertion de CHT dans les programs canadiens de stages en néphrologie, et témoigner de l'évolution de la situation depuis 2012.



Conception de l'étude: L'étude, sous forme de sondage, a été conçue en incluant les éléments suivants: les données démographiques, les détails quant au nombre et au type de cathéters insérés au cours des six derniers mois de la formation, l'observance des techniques d'asepsie, le recours à l'échoguidage pendant la procédure, la formation reçue sur l'insertion de CHT avant et pendant le stage en néphrologie, et l'auto-évaluation de l'adéquation de la formation et des compétences individuelles en insertion de CHT.

Type d'étude: Un sondage distribué en mai 2018 par courrier électronique, directement ou par l'entremise des programs de formation en néphrologie.

Sujets: Les stagiaires actuels des programs canadiens de formation en néphrologie adulte.

Mesures: Des statistiques descriptives ont été utilisées pour analyser les données agrégées. Les moyennes et les écarts interquartiles (EIQ) ont été employés pour résumer le nombre d'insertions de CHT. Les données catégorielles, y compris les données sur la qualité de la formation et la compétence perçue, ont été rapportées en fréquences et en pourcentages. Enfin, un test χ^2 a évalué le lien entre la compétence individuelle perçue quant à l'insertion d'un cathéter dans la jugulaire interne ou dans la veine fémorale et le fait d'avoir ou non reçu une formation par simulation.

Méthodologie: En mai 2018, un sondage électronique, disponible en anglais et en français, a été distribué à tous les stagiaires canadiens en néphrologie adulte, directement ou par l'intermédiaire de leurs programs respectifs.

Résultats: Des 136 stagiaires ayant reçu le sondage, 46 (34%) l'ont retourné dument rempli. Le nombre médian combiné de CHT insérés dans la veine fémorale et/ou la jugulaire interne au cours des 6 derniers mois de formation était de 3 (EIQ: 1 à 6). Huit répondants (17%) n'avaient pas pratiqué cette procédure au cours des six derniers mois. Néanmoins, seulement 7 répondants sur un total de 42 (17%) ont indiqué ne pas se sentir à l'aise ou suffisamment formés pour pratiquer l'insertion d'un CHT dans la veine fémorale ou dans la jugulaire interne.

Limites: L'étude porte sur des stagiaires à différentes étapes de leur formation. Aussi, plusieurs stagiaires ont indiqué qu'on ne les obligeait pas à tenir un registre officiel des procédures effectuées, leur déclaration pourrait donc présenter un biais de rappel.

Conclusion: Les stagiaires en néphrologie canadiens pratiquent moins d'insertions de CHT, mais signalent une meilleure formation et des niveaux plus élevés de compétence perçue qu'en 2012, un constat qui pourrait s'expliquer par une formation axée sur la simulation de meilleure qualité. Ces résultats suggèrent que l'apprentissage de procédures par des techniques axées sur la simulation pourrait constituer un moyen d'assurer une formation adéquate en insertion de CHT, et ce, malgré le nombre réduit de procédures exécutées pendant la formation.

Keywords

temporary hemodialysis catheter, nontunneled hemodialysis catheter, procedural skills, survey, training, nephrology

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What was known before

Temporary hemodialysis catheter (THDC) insertion remains a core competency of nephrology training programs in Canada. In a 2012 survey, many nephrology trainees in Canada reported inadequate training to achieve competence in THDC insertion.

What this adds

Although nephrology trainees are performing fewer THDC insertions than before, they are reporting better training and self-perceived competence than in 2012. Simulation-based

training may be a useful tool to help trainees achieve competence with fewer procedures being performed.

Background

Controversy exists as to whether the insertion of temporary hemodialysis catheters (THDCs) should remain a mandatory requirement of nephrology fellowship training in Canada.¹⁻⁴ Ensuring adequate training for anyone performing this procedure is an important patient-safety issue, as incorrect technique is likely to increase the risk of complications which can, in some cases, be fatal.⁵ Nonetheless, a survey conducted

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by our group in 2012 indicated that many nephrology trainees in Canada reported inadequate training to achieve competence.⁶ We sought to determine if training practices and self-perceived competence for THDC insertion amongst nephrology trainees in Canada had changed in light of the debate surrounding this issue in recent years.

Objectives

To determine the state of fellowship training for, as well as current practices and self-perceived competence of nephrology trainees in, performing THDC insertion.

Design

We conducted a Web-based survey study composed of 6 sections: demographics, details regarding the number and types of THDCs inserted within the past 6 months of fellowship training, adherence to sterility technique, the use of ultrasound guidance during THDC insertion, training of THDC insertion received before and during nephrology fellowship, and self-perceived adequacy of training and competence in THDC insertion. The survey was similar to one that was conducted by our group in 2012⁶ to allow for an assessment of changes in nephrology training and practices across Canada over this period. The complete survey (English version) is reported in Supplementary Item S1. The survey was made available to potential respondents in both English and French.

Setting and Participants

The survey was distributed by e-mail to adult nephrology trainees across Canada in May 2018, either directly or through their respective training programs. The target population was all adult nephrology trainees, including Royal College fellows and clinical nephrology fellows who were pursuing additional training. Pediatric nephrology trainees were excluded from the survey.

Measurements

Descriptive statistics were used to analyze the data obtained from the survey. The continuous variables, including the number of THDCs performed, were summarized using the mean and interquartile ranges (IQRs). The categorical variables were summarized using frequencies and percentages. A chi-squared test was used to evaluate the relationship between those who received simulation-based training and self-perceived confidence in either internal jugular (IJ) or femoral catheter insertion.

Methods

After obtaining approval from the Ottawa Health Sciences Network Research Ethics Board (Protocol 20180331-01H), an

e-mail invitation that included a link to our Web-based survey was distributed to all adult nephrology trainees across Canada in May 2018, by contacting the program administrators of each nephrology training program. The survey was distributed toward the end of the academic year (beginning July 1) to ensure that trainees were more likely to have undergone at least 10 months of fellowship training. Follow-up e-mails were also sent to each trainee or training program after 4 to 8 weeks as reminders, to increase the participation of the survey.

Results

Completed surveys were received from 46 of 136 nephrology trainees across Canada (34%). The denominator of 136 trainees was determined using the number of trainees reported in the Canadian Post-M.D. Education Registry 2017 to 2018 Annual Census.⁷ Responses were obtained from at least 1 trainee from 13 of the 15 Canadian subspecialty training programs that had at least 1 active nephrology trainee. One nephrology training program was noted to have no active nephrology trainees at the time the survey was distributed. Of those who responded, the median (IQR) number of THDCs, including both IJ and femoral catheters, inserted in the past 6 months was 3 (1-6). This included 8 respondents (17%) who indicated that they had not inserted a THDC in the prior 6 months of training. Of the 8 respondents who indicated that they had not inserted a THDC in the past 6 months, it was noted that at least 1 other trainee from their respective programs reported inserting one or more catheters over this time period. Table 1 reports the types of training for THDC insertion that the nephrology fellows reported as having received during their fellowship, their self-perceived competence for performing THDC insertions, and their adherence to the use of ultrasound and infection-control procedures. Supplementary Item S1 contains the complete survey and combined responses from the English and French versions.

The receipt of simulation-based training during fellowship training was not significantly associated with self-perceived confidence in performing either IJ or femoral THDC insertion ($\chi^2 = 1.29$, $P = 0.26$).

Discussion

Training and self-perceived competence for THDC insertion amongst nephrology trainees in Canada appears to be better than it was in 2012. Only 7 of 42 (17%) nephrology fellows reported that they were not competent to perform either femoral or IJ THDC insertions. Although it can be argued that nobody should feel this way for a procedure that is a requirement of training, in our nearly identical 2012 survey, 33% reported feeling the same way.⁶ It is notable that, at the same time, the median number of THDC insertions reported in the past 6 months was only 3, as compared to 5 in 2012.⁴ Thus, despite trainees reporting performing the procedure less frequently, they are now reporting being better trained and more

Table 1. Selected Survey Results.

Topic		Responses: No. (%)			
		Well trained and competent	Some training but not enough to feel competent		Little or no training
Self-perceived level of training and competence for THDC insertion (n = 42)	Internal Jugular	33 (79%)	6 (14%)		3 (7%)
	Femoral	25 (60%)	10 (24%)		7 (17%)
		No training	Lecture-based/ didactic teaching	Hands-on/ bedside teaching	Simulation-based training
Types of training for THDC insertion received during fellowship (n = 43)		12 (28%)	11 (26%)	21 (51%)	26 (61%)
Types of training for THDC insertion received before fellowship (n = 43)		0 (0%)	21 (51%)	33 (77%)	31 (72%)
		Always	Most of the time	Occasionally	Never
Routine use of ultrasound (n = 41)	Internal jugular (n = 31) ^a	29 (94%)	1 (3%)	0 (0%)	1 (3%)
	Femoral (n = 30) ^b	20 (67%)	2 (7%)	5 (17%)	3 (10%)
Basic infection-control adherence ^c (n = 39)		38 (97.4%)	1 (3%)	0 (0%)	0 (0%)
Use of head-to-toe sterile drape (n = 39)		24 (62%)	9 (23%)	0 (0%)	6 (15%)

Note. THDC = temporary hemodialysis catheter; N/A = not applicable.

^aExcludes 11 (27%) respondents who reported no insertions at that site within last 6 months.

^bExcludes 10 (24%) respondents who reported no insertions at that site within last 6 months.

^cSterile gloves, gown, and face mask (use of all).

likely to feel competent to perform the procedure, particularly at the IJ site. We suggest that this may be the result of a much higher proportion of trainees having received simulation-based training. Sixty percent of respondents reported having received simulation-based training during their nephrology fellowship training. This is in contrast to only 11% of respondents who reported having received simulation-based training in the 2012 survey.⁶ Although the correlation between simulation training and self-perceived competence was not significant statistically, the overall impact of simulation training is difficult to assess in this small sample and also may be underestimated given that 38 of 42 (90%) respondents indicated that they received some form of simulation-based training either before fellowship or during their fellowship training. Trainees may be developing better central line insertion skills due to their earlier exposure to procedural simulation training. Studies have shown that simulation-based training can significantly improve residents' skills in THDC insertion, with fewer needle passes required and increased self-confidence.⁸ More broadly, simulation-based mastery learning (SBML) training programs for central venous catheter insertion have been shown to improve patient outcomes versus traditional training through

a significant reduction in central line associated bloodstream infections.⁹ Simulation-based mastery learning training encompasses basic ultrasound training as well as infection-control measures at the time of THDC insertion. We note that ultrasound use and adherence to infection-control procedures appears to have improved from 2012.⁶ Although the causes for this are likely multifactorial, the increased use of simulation-based training may have played a role. We note that 7 respondents (17%) reported having received SBML training through a course that has been offered at the Canadian Society of Nephrology Annual Meeting on 3 occasions since 2014. This program was previously reported to provide an avenue to effective training to a mastery level outside of that offered at a program level.¹⁰ Such programs provide an opportunity for SBML training for trainees from smaller programs that may not have the necessary infrastructure or expertise to provide it.

Limitations

There are a number of limitations to our study. First, trainees who responded to the survey were at different stages of their nephrology training. Although we deliberately sent out our

survey toward the end of the resident calendar to target those who would have been in a subspecialty training program for a minimum of 10 months, the individual stages of training amongst respondents differ. In addition, since many trainees indicated that their programs did not require them to keep a log of the number of procedures performed, it is likely that in most cases, respondents' estimates are prone to recall bias. Given the nature of the survey study, the results of self-reported competence in THDC insertion may also not accurately represent the true level of competence of each individual trainee.

Conclusion

Our survey suggests that nephrology fellows in Canada are performing fewer THDC insertions while reporting higher levels of self-perceived competence and better training. They are also reporting better adherence to the routine use of ultrasound and basic sterility measures than in 2012. At the same time, many more trainees are receiving simulation-based training. More broadly, our results suggest that simulation-based training may be allowing for adequate training for THDC insertion despite relatively few procedures being performed during training.

Ethics Approval and Consent to Participate

The Ottawa Health Science Network Research Ethics Board (OHSN-REB) approved this study (Protocol ID: 20180331-01H). Participants who proceeded to initiate the survey by clicking a link following an information page regarding the survey were assumed to have provided their consent.

Consent for Publication

All authors have provided consent for publication.

Availability of Data and Materials

Data and materials are available upon request by contacting the corresponding author.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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