CANNT JOURNAL JOURNAL ACITN

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Letter from the Editors

reetings from a very excited edi-Gtorial team at the CANNT Journal. For the first time since the pandemic started, we will be meeting in person in Hamilton, Ontario for the upcoming CANNT Conference 2022 on October 27-29. We have seen our membership progressively decline over the last few years, but we have held on as an organization because CANNT is vital to the nephrology nursing and technological communities. We are witness to the tireless work that is being done both in the background and foreground by the CANNT Board of Directors and CANNT National Office (Events Management Plus). You, the membership, would be reassured at how much is being done to advance our collective interests with the end goal of providing excellent and comprehensive kidney care from diagnosis to the end of life. It is with pride that we are extolling the virtues of everyone connected with the CANNT Conference, particularly the organizing committee for this year's conference. As always, the adage "it takes a village" resonates deeply in the collective efforts to ensure that this year's conference has something for every attendee and, more importantly, to mark the return to the next normal at CANNT. It is apt that the theme is Guiding our way to the future because, in the age of post-initial COVID, we have had to rethink our usual approach to kidney care. This conference will highlight CANNT's commitment to bring the latest innovation and research to our community to provide uninterrupted quality kidney care to our patients.

In this journal issue, we present the article *Perspectives of patients and nephrology care providers from referring nephrology centres on the potential use of a shared care model for the long-term management of stable kidney transplant* *recipients* by Segun et al. (2022). The authors present an initiative to the transfer of transplant recipient care back to the referral centres. In addition, we have included the continuing education series article *Considerations for antibiotic dosing in critically ill patients requiring sustained low efficiency dialysis* by Zhang and Battistella (2022), who explain the pharmacodynamics and pharmacokinetic of antimicrobial use in renal replacement therapy. We hope you enjoy the contributions or our authors.

As always, we invite both budding and seasoned writers to submit manuscripts about topics in nephrology nursing and technological practice that the entire nephrology community might benefit from. We publish observational studies, clinical trials, case reports, solutions to clinical bedside problems, and quality improvement projects in order to advance our collective nephrology practice. All it takes is to have a spirit of inquiry from which ideas flow into a cohesive manuscript. The CANNT Journal is a powerful platform to showcase your literary and practice contributions locally, nationally, and internationally. We look forward to meeting you in person to partake of what the collective nephrology nursing and technological communities have to offer.

Sincerely from your *CANNT Journal* co-editors,



Jovina Bachynski, MN-NP(Adult), RN(EC), CNeph(C), PhD Student



Rosa M. Marticorena, CNS, CNeph(C), DClinEpi, PhD

Message des rédactrices en chef

• 'est avec beaucoup d'enthousiasme Jque l'équipe de rédaction de la *Revue* de l'ACITN vous présente son dernier numéro. Pour la première fois depuis le début de la pandémie, nous nous réunirons en personne à l'occasion du prochain congrès de l'ACITN qui se tiendra du 27 au 29 octobre 2022 à Hamilton, en Ontario. Nous avons assisté à une baisse progressive du nombre de nos membres au cours des dernières années, mais nous avons gardé le cap parce que nous savons que l'ACITN est essentielle pour les communautés des soins infirmiers et de la pratique technologique en néphrologie. Nous sommes témoins du travail acharné qui est réalisé tant à l'arrière-plan qu'au premier plan par les membres du conseil d'administration et le personnel du siège social national de l'ACITN (Events Management Plus). Vous seriez rassurés, chers membres, de voir tout ce qui est accompli pour promouvoir nos intérêts collectifs dans le but ultime de fournir aux patients des soins rénaux complets de grande qualité, et ce, du diagnostic à la fin de la vie. Nous vantons avec fierté les mérites de toutes les personnes engagées dans le congrès de l'ACITN, en particulier les membres du comité organisateur. Une fois de plus, c'est en unissant leurs forces que ces personnes sont parvenues à organiser un congrès qui profitera à chaque participant, et qui, surtout, soulignera le retour à la normale pour les activités de l'ACITN. Le thème du congrès de cette année, En route vers l'avenir, est tout désigné en cette période post-pandémie où nous devons repenser notre approche habituelle des soins rénaux. Ce congrès mettra en évidence à quel point il est important pour l'ACITN de faire connaître à sa communauté les dernières innovations et recherches en matière de santé rénale afin d'offrir aux patients des soins de qualité de façon continue.

Dans ce numéro, nous vous présentons l'article intitulé Perspectives of patients and nephrology care providers from referring nephrology centres on the potential use of a shared care model for the long-term management of stable kidney transplant recipients, dans lequel les auteurs (Segun et al. 2022), décrivent un modèle de soins selon lequel les

receveurs de greffe seraient transférés à nouveau vers la clinique de néphrologie traitante pour y être suivis après la greffe. De plus, vous trouverez un article issu de la série sur la formation continue : Considerations for antibiotic dosing in critically ill patients requiring sustained low efficiency dialysis. Dans ce texte, les auteurs (Zhang et Battistella, 2022) expliquent la pharmacodynamique et la pharmacocinétique des antimicrobiens lorsqu'ils sont utilisés dans le contexte d'une thérapie de remplacement rénal. Nous espérons que vous apprécierez la contribution de nos auteurs.

Comme toujours, nous encourageons les écrivains en herbe ou chevronnés à nous soumettre des manuscrits traitant de soins infirmiers ou de pratiques technologiques en néphrologie et pouvant profiter à l'ensemble de la communauté des services de soins rénaux. Nous publions des études observationnelles, des essais cliniques, des études de cas, des solutions à des problèmes cliniques et des projets d'amélioration de la qualité afin de faire avancer notre pratique collective en néphrologie. Si vous êtes doté d'un esprit d'enquête, vos idées se transformeront naturellement en un manuscrit cohérent. La Revue de *l'ACITN* est une plateforme formidable pour mettre en valeur vos publications et votre pratique aux échelles locale, nationale et internationale. Nous avons hâte de vous rencontrer en personne afin de tirer parti de ce que les communautés collectives des soins infirmiers et de la pratique technologique en néphrologie ont à offrir.

Salutations cordiales de la part des rédactrices de la Revue de l'ACITN,



Jovina Bachynski Sc. Inf., IP (soins aux adultes), inf. aut. (cat. sup.), CNéph(C), aspirante au doctorat



Rosa M. Marticorena ICS, CNéph(C), D.E.S. Épidémiologie clinique, Le Journal ACITN est la publication officielle de l'Association canadienne des infirmiers/infirmières et technologues en néphrologie. 4, rue Cataraqui, bureau 310, Kingston (Ontario) K7K 1Z7.

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Publié quatre fois par année, ce journal est envoyé à tous les membres de l'Association. L'abonnement annuel est: Canada, 80 \$ (+TVH), E.-U., 90 \$, hors du Canada et E.-U., 115 \$. Les publications antérieures, lorsque disponsibles, coûtent 7,50 \$ (+TVH) chacune. Les opinions émises par les auteurs dans ce journal ne sont pas nécessairement partagées par l'Association ni par le corédactrices en chef. Nous invitons les lecteurs à nous faire part de leurs opinions. Toute correspondance devra être envoyée à l'ACITN, au 4, rue Cataragui, bureau 310, Kingston (Ontario) K7K 1Z7.

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President's Report

We are back face-to-face in Hamilton! October 27–29 Guiding our way to the future!

Remember those dates and come join us in Hamilton, Ontario.

We have an exciting opportunity to gather together once again after two years of virtual conferences. Our conference committee and events management team have been working diligently to make it an unforgettable experience. The topics will be relevant to our current healthcare system and our nursing practice. We will be able to reconnect with colleagues we have not seen for the past couple of years. There will certainly be lots of smiles and hugs!

This conference will give us an opportunity to re-evalute the care we deliver. We will be exposed to new treatment options, as well as new technologies that we need to incorporate into our practices. CANNT promises to provide the education and research to keep us up to date and practicing quality care.

CANNT will also be supporting the nurses who are committed to writing

their nephrology certification exam. We will be delivering a session to assist and prepare nurses with strategies for study and sample exam questions, and to navigate the new Canadian Nurses Association exam process. Please sign up for this interactive session if you will be writing the exam or are thinking about obtaining your certification.

I understand we are all experiencing the nursing shortage and are uncertain if attending a conference is possible. Although for many this will be a significant challenge, I believe it is necessary for our professional growth and development. We will be better equipped to care for our patients with kidney disease and improve patient outcomes. Please consider all these benefits and plan to attend this educational event.

So, come help us shape the future of nephrology nursing with your energy, vision, and passion in Hamilton!



Cathy Cake, M.Ed., BN, RN, CNeph(C) CANNT President 2021–2023

Rapport de la présidente

Nous sommes de retour en personne à Hamilton!

Du 27 au 29 octobre: « Orienter notre chemin vers l'avenir »

N'oubliez pas ces dates et joignez-vous à nous à Hamilton, en Ontario.

Nous avons l'extraordinaire chance de nous réunir enfin, après deux ans de conférences virtuelles. Le comité organisateur de la conférence ainsi que notre équipe de gestion des événements ont travaillé avec acharnement pour rendre cette expérience inoubliable. Les sujets abordés seront pertinents pour notre système de soins de santé actuel et pour la pratique des soins infirmiers. Nous pourrons ainsi reprendre contact avec les collègues que nous n'avons pas pu voir ces dernières années. Sourires et embrassades seront certainement au rendez-vous!

Lors de cette conférence, nous pourrons tous réévaluer les soins que nous dispensons. De nouvelles options de traitement ainsi que de nouvelles technologies, à intégrer dans nos pratiques, seront présentées. L'ACITN promet d'offrir les formations et les recherches nécessaires pour que nous restions tous à jour et que nous continuions à prodiguer des soins de qualité.

L'ACITN soutiendra également les infirmières qui s'engagent à passer leur examen de certification en néphrologie. Nous présenterons une séance afin d'outiller et de préparer ces infirmières: stratégies pour étudier, exemples de questions posées, navigation dans le nouveau processus d'examen de l'Association des infirmières et infirmiers du Canada. N'hésitez pas à vous inscrire à cette séance interactive si vous allez passer l'examen ou si vous envisagez de le passer.

Je comprends que nous sommes tous confrontés à la pénurie d'infirmières et que celle-ci peut nous empêcher d'assister à des conférences. Même si cela représente un défi de taille pour plusieurs, je crois que votre présence est essentielle à notre perfectionnement professionnel et à notre développement. Nous serons mieux outillés pour prendre en charge nos patients atteints de maladies rénales et pour améliorer l'état de ces derniers. Je vous encourage à considérer tous ces avantages et à planifier votre participation à cette activité éducative.

Venez donc à Hamilton nous faire profiter de votre énergie, de votre vision et de votre passion pour nous aider à construire l'avenir des soins infirmiers en néphrologie!



Cathy Cake, inf. aut., B. Sc. inf., CNéph(C) Présidente de l'ACITN 2021–2023



Your Board in Action

t is a delight to write to you as your President-Elect/Treasurer for CANNT. I want to extend a sincere thank-you for vour dedication. I continue to be amazed and inspired by the aptitude, talent, and commitment represented by the CANNT Board of Directors and nephrology colleagues throughout Canada. Thank you for everything you do for the advancement of nursing and CANNT, as we strive to achieve new heights in making Canada a healthier, better place. CANNT continues to acknowledge and applaud your hard work in providing exemplary nephrology care.

MEMBERSHIP

Being a part of CANNT allows you to contribute in the innovative, cutting edge development of best practice in nephrological care. CANNT has successfully maintained our membership of 304 as of September 2022. As the CANNT Board of Directors, our goal is to ensure our members are kept up-to-date with developments in healthcare. There are many advantages, and members enjoy many different benefits, including:

- Online access to the quarterly peer reviewed CANNT Journal for all members
- Online access to the Vascular Access Guidelines, Standards of Nursing Practice, and Standards of Technical Practice
- · Discount of the annual conference registration fee
- Educational opportunities at а reduced cost or free to members
- Connections to the latest information and resources related to nephrology nursing and technological practice
- · Networking opportunities with colleagues practicing in your nephrology specialty on a national level
- Opportunities for collaborative networking and problem solving through participation in a refined clinical practice group
- · CANNT awards, bursaries, and research grants offered to individuals

the workplace and/or to further their studies in nephrology

- CANNT represents its membership as affiliates of various organizations and acts as your link to those organizations to help keep you connected and informed
- Access to exclusive job postings

Please help us to share the membership benefits with colleagues and contact us with suggestions to improve membership @ https://cannt-acitn.ca/

JOURNAL

Guidelines for journal article submission can be found under the "CANNT Journal" section of the CANNT website. Please send your manuscripts that present new clinical information or address issues of special interest to nephrology nurses and technologists. E-mail your manuscript to one of our co-editors, Jovina Bachynski or Rosa M. Marticorena, @ CANNT.journal1@ gmail.com.

The CANNT Journal is published four times a year, and will be distributed in an electronic version. Scientific articles are peer reviewed, and manuscripts that present new clinical information or address clinical practice issues of special interest to nephrology nurses and technologists, are accepted. There is also the opportunity for industry partners for sponsored education and advertising.

COMMUNICATIONS

CANNT continues to develop new strategies to promote engagement and communication of timely and relevant information with our members. We continue to support our members with access to timely information. We will continue to provide the necessary resources to support members on our website. CANNT Connection, which is our bimonthly email, is another successful means of communication that provides personalized information on

in recognition of their excellence in a continual basis. If you have an idea, question, or an event to promote please contact Jessica Andrews, our Director of Communications.

ANNUAL CONFERENCE

CANNT National Conference 2022 themed "Guiding Our Way to the Future" will be held in-person at the Hamilton Convention Centre on October 27-29, 2022. CANNT is excited to announce that Mark Matthews will be hosting the CANNT 2022 conference. CANNT has secured conference room blocks at the Sheraton Hamilton Hotel located in downtown Hamilton. The hotel also offers access to the city's premier attractions. Please see https:// cannt-acitn.ca/2022-cannt-conference/ for program schedule and more details. We hope to see you there!

FINANCES

As a "Not for Profit" professional association, our goal is to continue with the development of a robust financial plan that will create stability in these unprecedented times. Our management team continues to work tirelessly to develop new lucrative opportunities with our industry partners and to successfully secure funding to maintain the viability of CANNT. In the vein of maintaining transparency, our association is providing our association membership with the 2021 Annual Report on the CANNT website at https://cannt-acitn. ca/

We thank you for your commitment to our association.

Sincerely,



Alicia Moonesar, DNP, MScN, NP-PHC **CANNT President-Elect/** Treasurer 2021-2023

Votre conseil à l'œuvre

e suis ravie de vous écrire à titre de présidente désignée et trésorière de l'ACITN. Je souhaite vous remercier du fond du cœur pour votre engagement. Les aptitudes, le talent et le dévouement des membres du conseil d'administration de l'ACITN et de nos collègues en néphrologie de partout au Canada ne cessent de m'émerveiller et de m'inspirer. Merci pour tout ce que vous faites pour l'avancement de la pratique infirmière et pour aider l'ACITN à atteindre de nouveaux sommets pour rendre le Canada meilleur et plus en santé. L'ACITN continue de reconnaître et de saluer votre travail acharné, qui est vital pour fournir des soins de santé exemplaires en néphrologie.

ADHÉSION

En tant que membre de l'ACITN, vous avez la chance de contribuer au développement avant-gardiste et novateur des meilleures pratiques en soins néphrologiques. En date du mois de septembre 2022, l'ACITN a réussi à garder ses 304 membres. Au conseil d'administration de l'ACITN, nous visons à faire en sorte que nos membres soient tenus au courant des derniers progrès en santé. Les membres profitent de nombreux avantages, y compris :

- Accès en ligne pour tous les membres à la *Revue de l'ACITI*N, une revue trimestrielle révisée par des pairs
- Accès en ligne aux publications Vascular Access Guidelines, Standards of Nursing Practice et Standards of Technical Practice
- Réduction des frais d'inscription au Congrès annuel
- Possibilités de formations gratuites ou à prix réduit
- Liens vers l'information et les ressources les plus récentes en matière de soins infirmiers en néphrologie et de technologies
- Occasions de réseauter à l'échelle nationale avec des collègues évoluant dans votre spécialité néphrologique;
- Possibilité de collaborer et de contribuer à la résolution de problèmes grâce à la participation à un groupe de pratique clinique attitré
- Prix, bourses et subventions de recherche de l'ACITN attribués pour souligner l'excellence du travail de

certaines personnes ou pour leur permettre de poursuivre leurs études en néphrologie

- L'ACITN représente ses membres dans les diverses organisations auxquelles elle est affiliée et avec lesquelles elle agit comme intermédiaire pour vous tenir au courant et vous informer
- Accès en exclusivité aux avis de postes à pourvoir.

Veuillez partager les avantages de l'adhésion avec vos collègues et communiquez avec nous si vous avez des suggestions sur la façon d'améliorer l'adhésion à l'adresse https://canntacitn.ca/

REVUE

Vous trouverez la marche à suivre pour soumettre un article pour publication dans notre revue sous la section réservée à la *Revue de l'ACITN* du site Web de l'ACITN. Nous privilégions les articles qui portent sur de nouvelles données cliniques ou qui traitent de sujets présentant un intérêt particulier pour les infirmières, les infirmiers et les technologues en néphrologie. Envoyez votre article par courriel à l'une des corédactrices en chef, Jovina Bachynski ou Rosa M. Marticorena, à l'àdresse suivante: CANNT.journal1@gmail.com.

La *Revue de l'ACITN* est publiée quatre fois par année sous forme électronique. Les articles scientifiques sont examinés par des pairs, et les articles qui portent sur de nouvelles données cliniques ou qui traitent de sujets présentant un intérêt particulier pour les infirmières et infirmiers et les technologues en néphrologie sont acceptés. Nos partenaires de l'industrie ont également la possibilité de commanditer des activités de formation ou de la publicité.

COMMUNICATIONS

L'ACITN continue d'élaborer de nouvelles stratégies pour promouvoir l'engagement de ses membres et leur communiquer des renseignements pertinents en temps opportun. Nous continuons de soutenir nos membres en offrant un accès à de l'information actuelle. Nous continuerons de fournir aux membres les ressources nécessaires à leur soutien sur notre site Web. Le *CANNT Connection*, notre bulletin d'information par courriel bimensuel, est un autre moyen de communication efficace qui fournit des renseignements personnalisés de façon continue. Si vous avez une idée, une question ou un événement à promouvoir, veuillez communiquer avec Jessica Andrews, notre directrice des communications.

CONGRÈS ANNUEL

Le Congrès national 2022 de l'AC-ITN sous le thème « Orienter notre chemin vers l'avenir » est censé se dérouler en présentiel au Centre des congrès de Hamilton, du 27 au 29 octobre 2022. L'ACITN est heureuse d'annoncer que Mark Matthews animera le Congrès 2022 de l'ACITN. L'ACITN a réservé des blocs de salles de conférence à l'hôtel Sheraton Hamilton, situé au centre-ville de Hamilton. L'hôtel permet aussi d'accéder aux principales attractions de la ville. Consultez le site https://cannt-acitn.ca/2022cannt-conference/ pour le calendrier du programme et pour plus de détails. Nous espérons vous y voir!

FINANCES

À titre d'association professionnelle « sans but lucratif », notre objectif est de poursuivre l'élaboration d'un plan financier solide qui créera de la stabilité en ces temps sans précédent. Les membres de notre équipe de gestion continuent de travailler sans relâche pour imaginer de nouvelles activités lucratives en collaboration avec nos partenaires de l'industrie et pour réussir à obtenir des fonds pour assurer la viabilité de l'ACITN. Par souci de transparence, notre association fournit à ses membres le Rapport annuel 2021 sur le site Web de l'ACITN à l'adresse https://cannt-acitn.ca/. Nous vous remercions de votre engagement envers notre association.

Cordialement,



Alicia Moonesar, DPI., M. Sc. Inf., IPSPL Présidente désignée et trésorière de l'ACITN 2021–2023

NOTICE BOARD

Canadian Nurses Association (CNA) Exam Timeline. https://www.cna-aiic.ca/en/certification#st-hash.42OltDcz.dpuf

	Spring 2022	Fall 2022
Initial exam or renewal by exam application window	February 28–March 31, 2022	June 1–September 1, 2022
Certification exam window	May 1–15, 2022	November 1–15, 2022
Renewal by continuous learning application window	February 10–No	ovember 1, 2022

• October 27–29, 2022. CANNT National Conference – *Guiding Our Way to the Future*. Hamilton, ON. https://cannt-acitn.ca/2022-cannt-conference/

• November 1–6, 2022. American Society of Nephrology (ASN) 2022 Kidney Week. Orange County Convention Center, Orlando, Florida. https://www.asn-online.org/education/kidneyweek/archives/future.aspx

	Nephrology Certification Re	gistration Status Report 202	2	
NURSES ASSOCIATION	Initial and Renewal by Exam to Renew in 2022	Renewal by Continuous Learning (CL) Hours	Total of Initials and Renewals	Due
	49	20	69	191

Perspectives of patients and nephrology care providers on the potential use of a shared care model for the long-term management of kidney transplant recipients

By Monika Ashwin, Pei Xuan Chen, Michelle Minkovich, Cynthia Selvanathan, Ioana Clotea, Wendi Qu, Franz Marie Gumabay, Heebah Sultan, Olusegun Famure,* and S. Joseph Kim* *Co-senior authors

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AUTHOR NOTE

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CONFLICT OF INTEREST STATEMENT

The authors listed certify that they are not affiliated with or involved in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

ABSTRACT

Although kidney transplant recipients (KTR) are typically managed by transplant nephrologists, the growing KTR population is challenging the capacity of transplant centres. A shared care model (SCM) between transplant and referring nephrology centres is a potential solution. Surveys assessing attitudes, perceived barriers, and potential solutions to facilitate SCM implementation were distributed to KTR receiving care at the Toronto General Hospital kidney transplant program and to providers from referral centres across Ontario. A total of 175 KTR and seven referring nephrology centres were included in our analyses. Based on our survey results, 80 KTR (45.7%) preferred alternate post-transplant care models, with 67 (38.3%) preferring SCM specifically. KTR who lived farther away from the transplant centre and those closer to referral centres, were more receptive to SCM. Providers from referral centres confirmed the need for SCM, identifying insufficient funding, overloaded clinics, and limited resources as implementation barriers, but were open to receiving educational support from transplant centres. SCM is a feasible goal, however additional resources are required.

INTRODUCTION

Kidney transplantation is the treatment of choice for end-stage renal disease (ESRD), with approximately 17,600 Canadians living with a functioning kidney transplant in 2019 (Canadian Institute for Health Information, 2020). Progress in transplant procedures and management has improved life expectancy and overall quality of life of kidney transplant recipients (KTR). This has resulted in more long-term post-transplant patients (Howard, 2001). In 2019, there were 1,789 kidney transplants performed in Canada, which is 520 more than in 2010 (Canadian Institute for Health Information, 2020). At Toronto General Hospital (TGH) alone, more than 150 kidney transplants have been performed each year since 2009. KTR numbers will continue to rise with a mandate from The Ontario Renal Network, a provincial network that funds, organizes, and manages the delivery

of kidney care services, in partnership with Trillium Gift of Life Network, an agency of the Government of Ontario responsible for coordinating and supporting organ donation for transplantation. The mandate strives to improve access to kidney transplantation, optimize patient experience with transplantation, and increase the number of living donor kidney transplants each year (Ontario Renal Network, 2012).

To ensure organ health and prevent immunosuppression-related complications (e.g., diabetes, malignancies, and kidney transplant dysfunction) following transplantation, Canadian KTR are typically followed by transplant nephrologists at tertiary care centres. At TGH, approximately 80% of KTR transplanted between 2000 and 2015 are still actively followed by the transplant program. Furthermore, because of increased longevity, the transplant team manages older patients, who usually require treatments for multiple chronic conditions (Howard, 2006; Adams, 2006; Hariharan, 2006). As a result, the team is directly affected by increased workload and limited resources. They are forced to spend less time with each KTR and add extra clinic hours in an already demanding work schedule, which will inevitably lead to reduced productivity, burnout of healthcare providers, and suboptimal quality of care (Israni et al., 2009; Cohen & Galbraith, 2001; McPake & Burnapp, 2013; Jesse et al., 2015).

In order to achieve optimal patient outcomes, KTR should receive timely delivery of appropriate transplant care. This can be a challenge for KTR who do not live in close proximity to the transplant centre because they need to travel long distances for regular post-transplant follow-up, which can result in higher transportation costs (Mann et al., 2020). Long distance travel proves to be even more difficult for elderly patients or patients with disabilities, as they depend on social support (Kasbia et al., 2014; Yau et al., 2018). Family members might have to take time off work or make travel arrangements for follow-up visits at the transplant centre, which could disrupt daily work and personal activities. The wider adoption of virtual care or telehealth will help to mitigate the need for patients to travel, but does not reduce the number of clinic assessments at the transplant centre or the follow-up care needs of patients.

Some variation currently exists in the structure, processes, and coordination of long-term post-transplant care across different Canadian tertiary care centres. Smaller transplant programs follow all their KTR frequently throughout their post-transplant care (Adult Kidney Transplant Program | Transplant Manitoba, 2020). In contrast, some transplant programs follow all their KTR for a short period after transplantation before transferring a number of them to regional clinics closer to home (Transplantation | Renal Program, 2020). Other transplant programs, such as TGH, may use a combination of these two models based on patients' needs. Recently, the integration of general nephrology practices and transplant centres into long-term partnerships for the management of KTR is increasingly being explored as a post-transplant care model (Howard, 2006; Keough-Ryan et al., 2010). A standardized shared care model (SCM), where KTR are followed by general nephrology and transplant teams after transplantation, has the potential to effectively support increasing rates of transplantation, reduce the burden on transplant teams and KTR, and maintain optimal quality of care (Gupta et al., 2010; Cohen & Galbraith, 2001). Before developing and implementing such a model, it is important to determine whether there would be interest from both patients and general nephrology care providers. Although there are studies that have described attitudes and practices of general nephrologists in providing post-transplant care (Adedoyin et al., 2003; Famure et al., 2019), there is a lack of Canadian studies that have determined the attitudes and concerns of KTR and general nephrology teams regarding SCM.

The objectives of this survey-based study are to characterize attitudes of KTR and general nephrology teams on SCM, determine current general nephrology practices, identify challenges to adopting SCM, and suggest solutions for an optimal model of care.

METHODS

Study Design and Population

This study was based on self-reported, cross-sectional surveys that were administered to KTR and referring nephrology centres from January to March 2018. A convenience sample of KTR transplanted between January 1, 2000 and January 31, 2018 was acquired from the TGH transplant program for the patient survey. We included adult KTR receiving follow-up care in clinics at TGH for their transplant. Eligible KTR were identified by screening through weekly clinic patient lists. The study was introduced to KTR and a brief interview between a research assistant and KTR took place after obtaining verbal consent for participation. To ensure privacy, KTR were approached and interviewed while waiting for their care team in clinic rooms. We excluded KTR who had limited English proficiency from our study. Although we intended to survey all post-transplant KTR about their attitude towards SCM regardless of where they were dialyzed, we later restructured our study design to exclude KTR who had their pre-transplant dialysis at TGH were excluded from the analysis, as they were only familiar with TGH for their nephrology care. As a result, this study focused on non-TGH dialyzed KTR. Data on dialysis centres were obtained from the Organ Transplant Tracking Record (OTTR), the main electronic medical record for transplant recipients at TGH since 2000.

The nephrology provider survey was distributed to a convenience sample of nephrology centres in Ontario that routinely refer ESRD patients to TGH for kidney transplantation. The sampling frame for this survey was obtained from an outreach contact list. The list was acquired during an educational event organized by the TGH kidney transplant program and contained contact information of the resource person at each nephrology centre, such as the director of the nephrology division, program manager, renal nurse coordinator, or administrative staff. We distributed surveys to each centre's resource person, with the intent of receiving one response per site. Twelve nephrology centres were targeted because they have a large number of patients referred to TGH. We contacted the providers and distributed the survey in a Word document by email and sent bi-weekly reminder emails to increase response rate. Approval for this study was obtained from the University Health Network Research Ethics Board.

Survey Tool Development

The surveys were developed through findings from previous studies (Famure et al., 2009; 2019), as well as consultations with experts in the field, including transplant nephrologists and post-transplant coordinators. The patient survey was composed of 25 closed-ended questions and one open-ended question that were categorized into three domains: (A) current post-transplant care model, (B) comfort with general nephrology care (if applicable), and (C) improving post-transplant care. The closed-ended questions included multiple choice (nominal) and Likert scale (ordinal) responses. The open-ended question inquired about the reasons for negative attitudes towards SCM, that is if KTR preferred other care models.

The nephrology care provider survey was composed of thirteen closed-ended and two open-ended questions that were categorized into four domains: (A) general information and clinic structure, (B) communication, (C) services, and (D) training. The closed-ended questions included multiple choice (nominal scale) and numerical (ratio scale) responses. The first open-ended question requested a summary of general nephrology staff and clinic shift numbers, while the second open-ended question was included at the end of survey for additional comments from providers related to SCM.

Data Sources and Management

Completed surveys and responses to decline participation in the study were recorded. Demographic, dialysis, and transplant information for KTR who consented to participate in the study were obtained from electronic patient charts in the Organ Transplant Tracking Record (OTTR) and our in-centre research database, the Comprehensive Renal Transplant Research Information System (CoReTRIS) (Famure et al., 2014). Data collected for this study were audited by research assistants for completeness and accuracy.

Statistical Analyses

Standard descriptive statistics were performed for baseline recipient, donor, and transplant characteristics of all KTR who completed the patient survey. Categorical variables were described using frequencies or percentages. Baseline characteristics were first compared between KTR who wanted to remain under the care of the transplant team and KTR who showed interest in an alternative care model. These characteristics were further compared between KTR with positive attitudes to SCM, KTR who already receive care at a hospital closer to home, and those who would like to be transferred to a hospital closer to home exclusively. Differences across these groups were examined using the chi-square test. A two-tailed p-value of < 0.05 was considered statistically significant. All analyses were performed using STATA, version 12.1 (StataCorp LP, 2011). Descriptive statistics, such as frequencies or percentages, were also employed to summarize opinions on SCM implementation as identified from the general nephrology provider surveys. Negative opinions of SCM from KTR and free-text comments from nephrology care providers were manually reviewed by two independent reviewers and then coded and summarized into themes using qualitative content analysis.

RESULTS

Survey Respondents

Of the 227 KTR who were approached for the study, 211 (93%) completed the patient survey. After excluding KTR who were dialyzed at TGH pre-transplant, 175 (77.1%) were included in our final analyses. Patient characteristics of the study cohort are summarized in Table 1. The majority of KTR were between ages 41 and 64 (56.0%), male (63.4%) and non-white (64.6%).

Out of the 12 referring nephrology centres that were contacted, seven completed and returned the care provider survey. Two different providers from one centre submitted separate surveys; the most complete response was incorporated into our analyses. Care providers who completed the survey included directors of the nephrology division, program managers, renal nurse coordinators, and administrative staff. General nephrology teams were comprised of nephrology physicians and nurses, administrative assistants, pharmacists, dietitians, and social workers (Supplementary Table 1). The majority of referring nephrology centres see more than 60 kidney patients per week in their current capacity.

Patient Attitudes to SCM

A total of 80 KTR (45.7%) preferred alternate post-transplant care models (Table 1), with 67 KTR (38.3%) having a positive attitude towards SCM, 11 KTR (6.3%) interested in being transferred to a regional clinic closer to home, and 2 KTR (1.14%) already receiving post-transplant care from regional clinics closer to home (Supplementary Table 2). The two KTR who had already seen a general nephrologist for their post-transplant care were generally comfortable with general nephrologists managing immunosuppression and kidney graft function. However, they identified that improvements were needed in managing chronic conditions and vaccinations, referring patients to community resources, and encouraging behavioural intervention.

Recipient sex was the only characteristic that was significantly different between KTR who wanted to be followed by the transplant team and KTR who were open to alternate post-transplant care models (Table 1). A higher proportion of females wanted to remain under the care of the transplant nephrologist. KTR who lived farther away from TGH were more receptive to SCM. Of the KTR living more than 500 km from the transplant centres, 58.1% preferred SCM over other models of care (Figure 1). Conversely, those who lived closer to referral centres were also more receptive to SCM, with 65.9% of KTR living between 0.1 and 20 km from the referral centre preferring SCM.

At least 50% of KTR preferred SCM when they had spent between 0.1 and 6 months, 12.1 and 24 months, or 48.1 and 72 months on dialysis before transplant (Figure 2a). The proportion of KTR who were receptive to SCM based on post-transplant time varied from 30% to 42%, with a greater proportion of KTR having a positive attitude after the first post-transplant year (Figure 2b). Reasons why KTR did not wish to participate in SCM were coded into three main themes: "Trust and comfort level", "Convenience", and "Previous negative experience at the referral or dialysis centre". The three themes and their demonstrative quotations are presented in Table 2. Baseline Characteristics Between Patients who Wanted to Remain at Transplant Centre who Preferred Alternate Follow-Up Care Models

Variables	Whole cohort (N = 175)	Like to receive care only at transplant centre (N = 95)	Alternate post-transplant care models (N = 80)	P-value
Recipient Characteristics				
Age				0.418
18–25	15 (8.6%)	6 (6.3%)	9 (11.2%)	
26–40	30 (17.1%)	16 (16.8%)	14 (17.5%)	
41–64	98 (56.0%)	52 (54.7%)	46 (57.5%)	
65+	32 (18.4%)	21 (22.1%)	11 (13.8%)	
Sex				0.024
Female	64 (36.6%)	39 (41.1%)	25 (31.2%)	
Male	111 (63.4%)	56 (58.9%)	55 (68.8%)	
Race				0.810
White	62 (35.4%)	32 (33.7%)	30 (37.5%)	
Non-White	113 (64.6%)	63 (66.3%)	50 (62.5%)	
Employment				0.576
Yes	85 (48.6%)	44 (46.3%)	41 (51.3%)	
No	68 (38.9%)	40 (42.1%)	28 (35.0%)	
Unknown	22 (12.5%)	11 (11.6%)	11 (13.7%)	
Cause of ESRD				0.666
Diabetes Mellitus	44 (25.1%)	24 (25.3%)	20 (25.0%)	
Non-Diabetic Causes	131 (74.9%)	71 (74.7%)	60 (75%)	
Dialysis Modality at Time of Transplant				0.400
In-centre Dialysis	82 (46.8%)	47 (49.5%)	35 (43.8%)	
Home-based Dialysis	50 (28.6%)	25 (26.4%)	26 (31.2%)	
Pre-emptive	38 (21.7%)	22 (23.2%)	16 (20.0%)	
Missing	5 (2.8%)	1 (1.1%)	4 (5.0%)	
Time on Dialysis Pre-Transplant (years)	2.4 (0.2, 4.8)	2.6 (0.2, 4.8)	2.2 (0.3, 4.5)	0.888
Time after Transplant Surgery (years)	4.3 (1.0, 9.2)	4.2 (0.9, 9.9)	4.3 (1.5, 7.2)	0.910
Donor Characteristics				
Donor Type				0.396
Deceased	88 (50.3%)	44 (46.3%)	44 (55.0%)	
Living	87 (49.7%)	51 (52.7%)	36 (45.0%)	
Transplant Characteristics				
Transplant Era				0.563
Before 2007	37 (21.2%)	21 (22.2%)	16 (20.0%)	
2008–2012	41 (23.4%)	18 (18.9%)	23 (28.8%)	
2013–2018	97 (55.4%)	56 (58.9%)	41 (51.2%)	

Figure 1

Patient Attitude to SCM by Distance Between Home Address and Transplant Centre, (A) and Distance Between Home Address and Referral Centres (B)



Figure 2

Patient Attitude to Shared Care by Time on Dialysis Pre-Transplant (A) and Time Post-Transplant (B)



Note. Seven patients had missing data on dialysis time

Table 2

Patient Reasons for Preferring Follow-Up Care Only at Transplant Centre

		rienous negative Experience at hereiral, Blarysis benare
 I have been coming here for 30 years, I don't want to go anywhere else. I already know the doctors here, all my records are here, I feel comfortable at TGH. The system here is perfect. 	work at TGH. It is easier to receive care here. am followed at TGH for other ssues so I can get everything done nere. live very close to TGH so it is not a problem getting here.	 The care at hospital X [hospital closer to home] is not great. The pharmacy there did not carry the meds I needed. I don't like hospital Y [hospital closer to home]. I had problems communicating with them. I don't want to go to hospital Z [hospital closer to home]. I prefer staying here under Dr. A's care.

Provider Attitudes to SCM

Free-text comments from general nephrology providers were coded into commonly occurring themes: "Need for SCM," "Training and experience in transplant care," "Funding required for SCM", and "Potential effects of SCM on workload." These themes and their corresponding quotations are described in Table 3. All providers confirmed the need for SCM, highlighting that SCM would support care closer to home and would be especially important for KTR living in remote communities. As for potential challenges that general nephrology teams face in implementing SCM, providers expressed concerns about insufficient funding (n = 6), overloaded clinics (n = 4) and limited resources (n = 4) (Figure 3a). They were open to receiving continuing education from transplant centres, preferring remote electronic-based modalities, such as web-based resources (n = 8) and pre-tailored oral presentations (n = 7) (Figure 3b).

DISCUSSION

While the majority of KTR are most comfortable remaining under the care of transplant nephrologists, more than 45% are open to alternate post-transplant care models, with 38% preferring SCM specifically. In the past, transplant and general nephrology centres mainly operated independent of each other (Hippen & Maddux, 2018). Transplant centres would follow the post-transplant care of all KTR closely, which is associated with better kidney transplant survival.

However, as the rates of kidney transplantation continue to increase, this model would only remain feasible for centres that continue to have a higher provider-to-patient ratio (Israni et al., 2014). In our study, 11 KTR were interested in being transferred to a general nephrology centre closer to home. While a complete transfer of care would reduce the burden on transplant centres and improve allocation of resources, the transplant team would not remain involved

Perspectives of General Nephrology Providers on SCM

Need for SCM	Training and experience	Funding required	Potential effects of SCM
	in transplant care	for SCM	on workload
 This initiative would support care closer to home in collaboration with the transplant centre. Most patients don't have an issue travelling to the transplant centre, but the weather conditions can play a factor for patients to travel. Having shared-care can help us communicate with the patient and hopefully avoid some travels to the transplant centre. The distance is a huge problem for our patients because some live in remote communities as it is. 	 We have practitioners versed in immunosuppression but they would need extra training in transplantation. It is feasible and also our patients want to come back to our hospital. We would need to have a designated nurse or coordinator who provides follow-up care for KTR if moving forward. Sometimes it is difficult to get the dose ranges for tacrolimus and cyclosporine. We do have experience but knowledge and education would be welcome. 	 There is no funding to support additional workload. This model is unfunded, we need multidisciplinary team care but it is not funded for this group. 	 This may increase clinician and administrative workload for the ordering and following up of blood work and other screening tests. Length and number of follow up clinic visits per patient may also be impacted. This will have an impact. Currently we have a long wait list which we are working on. Once this is under control, we would be happy to participate.

Figure 3

Responses from Referring Nephrology Centres Regarding Challenges to Implementing SCM (A) and Resources Needed from Transplant Centre to Implement SCM





in post-transplant care and will lose follow-up information on KTR. With a standardized SCM, the benefits of both aforementioned models can be achieved: the burden will be reduced at the transplant centres and KTR will still be closely followed without losing their already established relationship with the transplant team. In this way, transplant teams would have more time to address the concerns of recently transplanted or unstable KTR. Moreover, the travel time and costs would decrease for stable KTR (Mann et al., 2020).

Results from our patient survey showed that more KTR had positive attitudes to SCM when they lived further away from the transplant centres and closer to referral centres, suggesting that geographic location influences a patient's choice of a post-transplant care model. Compared to other industrialized nations, Canada is characterized by its large size and relatively few transplant centres. Since general nephrologists work in local community hospitals and dialysis centres, they are more accessible and can offer timely delivery of care to KTR who live in various regions. Our study also showed that patient interest in SCM varied with time on pre-transplant dialysis. This suggests that KTR can form positive relationships with the general nephrology team irrespective of the duration. However, it is important to consider individual patient experiences since two common reasons KTR did not want SCM were previous negative experiences with their general nephrology team and strong positive relationships with the transplant team.

When considering the association of post-transplant time on attitudes to SCM, our results indicated that a greater proportion of KTR were interested in SCM after the first post-transplant year. Further study of the surveyed KTR who were within their first post-transplant year revealed that the majority had a complicated post-transplant course or were followed at TGH for other reasons, which may account for their reluctance to change their care model. Moreover, SCM may not be useful in the first post-transplant year since few changes can be made to the follow-up schedule immediately after transplant (Mann et al., 2020).

Developing an SCM with community-based nephrologists would not come without its share of challenges. One potential barrier that general nephrology providers identified is inadequate training or experience in post-transplant care. Although general nephrology teams are familiar with managing conditions that are common to both ESRD patients and KTR, there are unique aspects of post-transplant care, such as monitoring graft function and immunosuppression levels. A recently published cross-sectional study conducted at TGH found that a majority of general nephrologists who responded to the survey were not comfortable in providing long-term care to KTR (Famure et al., 2019). The primary reason for this reluctance in caring for KTR was a lack of experience in treating immunosuppressed patients (i.e., managing drug regimens and transplant complications, such as rejection and opportunistic infections). Factors such as the number of KTR under the general nephrologist's care, number of years in practice, and relationship with the transplant centre affect experience in immunosuppression monitoring. A unique and critical role may present for Nurse Practitioners with specialized training in transplant to act as facilitators of community-based satellite clinics tailored to caring for transplant recipients.

Due to the variability in experience, it is necessary for transplant centres to support and provide general nephrology teams with educational resources. We identified that general nephrology providers preferred remote electronic-based modalities from our survey results, which is inconsistent with the study by Famure et al. (2019), where respondents identified continuing education courses and review articles as being the most useful educational resources. This suggests that general nephrology care providers, including a combination of physicians, nurses, and administrative staff, have different preferences in educational development tools compared to general nephrologists alone.

Burden on general nephrology teams, in terms of higher patient volumes seen in clinic, may be a result of engagement in post-transplant care. Depending on the centre and practices in place, there are a number of strategies that can mitigate this increased clinician and administrative workload. For instance, referring nephrology centres can designate a specific clinic shift that is reserved for KTR only. Another option is to organize a recurrent "satellite clinic", where transplant nephrologists or coordinators from the nearest tertiary care centre will run post-transplant clinics periodically at the referring nephrology centre. Nurse Practitioners and nurses with transplant training would be essential in facilitating the operation of these clinics. Lastly, post-transplant care is currently not funded under the general nephrology sector of Ontario Renal Network, which poses a challenge to SCM implementation. However, with the establishment of the Health Systems Funding Reform in 2012 (Ontario Ministry of Health, 2012), funding is based on patient needs rather than services. Under this model, funding will follow the KTR even if they are followed at two centres differing in specialty.

LIMITATIONS

This study does have several limitations. First, our study had a small sample size, which limits the statistical power. This study was part of a preliminary needs assessment to gauge patient and provider interest in SCM. Additional research with a larger sample size will be necessary to tailor a suitable SCM for a particular centre such as TGH. Second, our study used a convenience sample of KTR present at their clinic visits during the recruitment period. Therefore, our sample of KTR might be systematically different from those who were not approached or declined to participate for the study. However, it is unlikely that the dates when KTR were scheduled for their appointments could affect their attitude towards SCM (and alternate post-transplant care models). Moreover, KTR were recruited from the clinics of seven different transplant nephrologists, so there would be variation in population composition and transplant care practices. Third, we may have introduced a selection bias by excluding KTR who were dialyzed at TGH before their transplant from our analyses. This exclusion was applied based on the assumptions that these KTR did not have a previously established relationship with any community-based nephrology centre, and that the hospital closest to their home was TGH. Lastly, patient surveys were distributed at a single centre and so our findings may not be generalizable to patient populations at different transplant centres. However, we benefit from conducting the study at a large Canadian teaching hospital that delivers care to a diverse patient population.

CONCLUSION

While there was interest in developing SCM from both KTR and nephrology care providers, this study identified patient and centre-level factors that pose barriers to a SCM and we have proposed some potential solutions. Further research is required in the form of a study to examine the efficacy and feasibility of implementing SCM with referring nephrology centres.

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Supplementary Table 1

Characteristics of Referring Nephrology Centres

Centre Characteristics	Centre A	Centre B	Centre C	Centre D	Centre E	Centre F	Centre G
Number of general nephrologists	5	8	6	3	7	4	7
Number of nephrology nurses/nurse practitioners	5	5	3	3	4	2	6 (5 NPs, 1 RN)
Other staff	6 clerical staffs	4 clerk typists	2 administrative assistants, 2 pharmacists, 2 social workers, 1 indigenous navigator, 1 dietitian	2 administrative assistants, 1 social worker, 1 nurse clinician, 1 dietitian	3 administrative assistants, 2 dietitians, 3 social workers	1 administrative assistant, 2 dietitians, 3 pharmacists, 3 social workers	1 administrative assistant, 2 dietitians, 2 pharmacists, 2 social workers
Number of nephrology clinic shifts per week	6	20	4	2	4-5	2-3	7-10
Average number of patients seen in clinic per week	>60	>60	45-60	16-30	>60	18	>60
Method of patient information record	Paper-based system	Paper and electronic records	Paper and electronic records	Paper and electronic records	Paper and electronic records	Paper and electronic records	Electronic records and electronic transmission
Access to Connecting Ontario	No, but have plans to gain access soon	No, but have plans to gain access	No, but have plans to gain access	No, but have plans to gain access	No, but have plans to gain access	Not available	Yes, have current access
Communication method between centre and TGH	Phone, email, fax	Phone, email, fax	Phone, email, fax	Phone, email, fax	Phone, email, fax	Email	Email
Issues experienced when communicating with TGH	None identified	None identified	Delayed response time, inadequate communication, frequent miscommunication	None identified	None identified	Lack of a funded transplant nurse	None identified
Diagnostic tests conducted at centre	Labs, BMD testing, CMV/ BK polyoma testing, general cancer screening, skin screening, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/BK polyoma testing, general cancer screening, skin screening, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/BK polyoma testing, general cancer screening, skin screening, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/ BK polyoma testing, general cancer screening, skin screening, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/BK polyoma testing, general cancer screening, skin screening, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/BK polyoma testing, kidney allograft ultrasound, kidney biopsy, CV testing and imaging, endocrinology testing and imaging	Labs, BMD testing, CMV/BK polyoma testing, general cancer screening, CV testing and imaging, endocrinology testing and imaging

Supplementary Table 2

Baseline Characteristics Between Patients who Already Receive Care Near Home, who Want to Receive Care near Home Only, and who Want to Receive Care from Both Transplant Centre and Centre Near Home

Variables	Whole	Like to receive	Alternate	post-transplant care model	s (N=80)	P-value
	cohort (N=175)	care only at transplant centre (N=95)	Already receiving care near home (N=2)	Like to receive care at centre near home (N=11)	Like to receive care from TGH and centre near home (N=67)	_
Recipient Characteristics						
Age						0.418
18–25	15 (8.6%)	6 (6.3%)		9 (11.2%)		
			0	0	9 (13.5%)	
26–40	30 (17.1%)	16 (16.8%)		14 (17.5%)		_
			0	4 (36.4%)	10 (14.9%)	
41–64	98 (56.0%)	52 (54.7%)		46 (57.5%)		_
			2 (100%)	6 (54.5%)	38 (56.7%)	
65+	32 (18.4%)	21 (22.1%)		11 (13.8%)		_
			0	1 (9.1%)	10 (14.9%)	
Sex						0.024
Female	64 (36.6%)	39 (41.1%)		25 (31.2%)		_
			2 (100%)	6 (54.5%)	17 (25.4%)	
Male	111 (63.4%)	56 (58.9%)		55 (68.8%)		_
			0	5 (45.5%)	50 (74.6%)	
Race						0.810
White	62 (35.4%)	32 (33.7%)		30 (37.5%)		_
			2 (100%)	7 (63.6%)	21 (31.3%)	
Non-White	113 (64.6%)	63 (66.3%)		50 (62.5%)		_
			0	4 (36.4%)	46 (68.7%)	
Employment						0.576
Yes	85 (48.6%)	44 (46.3%)		41 (51.3%)		_
			0	5 (45.5%)	36 (53.7%)	
No	68 (38.9%)	40 (42.1%)		28 (35.0%)		_
			1 (50%)	4 (36.4%)	23 (34.3%)	
Unknown	22 (12.5%)	11 (11.6%)		11 (13.7%)		_
			1 (50%)	2 (18.2%)	8 (11.9%)	
Cause of ESRD						0.666
Glomerulonephritis	56 (32.0%)	30 (31.6%)		26 (32.5%)		_
			1 (50.0%)	4 (36.4%)	21 (31.3%)	
Diabetes Mellitus	44 (25.1%)	24 (25.3%)		20 (25.0%)		_
			0	2 (18.2%)	18 (26.9%)	
Polycystic Kidney	16 (9.1%)	6 (6.3%)		10 (12.5%)		_
Discuse			0	2 (18.2%)	8 (11.9%)	
Hypertension	13 (7.4%)	11 (11.6%)		2 (2.5%)		_
			0	0	2 (3.0%)	
Other	46 (26.4%)	24 (25.3%)		22 (27.5%)		_
			1 (50.0%)	3 (27.2%)	18 (26.9%)	
					continue	ed

Time of Transplant 74 (42.2%) 32 (40.0%) Conventional 42 (44.2%) hemodialysis 1 (50.0%) 4 (36.4%) 27 (40.3%) Nocturnal 8 (4.6%) 5 (5.3%) 3 (3.8%) hemodialysis 0 1 (9.1%) 2 (3.0%) Home hemodialysis 3 (1.7%) 2 (2.5%) 1 (1.1%) 0 0 2 (3.0%) Peritoneal 47 (26.9%) 24 (25.3%) 23 (28.7%) 1 (50.0%) 1 (9.1%) 21 (31.3%) Pre-emptive 38 (21.7%) 22 (23.2%) 16 (20.0%) 0 3 (27.3%) 13 (19.4%) 5 (2.8%) 1 (1.1%) 4 (5.0%) Missing 0 2 (18.1%) 2 (3.0%) Time on Dialysis Pre-0.888 Transplant (months) *7 missing dialysis start date Pre-emptive 38 (21.7%) 22 (23.9%) 16 (21.1%) 0 13 (20.0%) 3 (33.3%) 0.1–6 11 (6.3%) 5 (5.4%) 6 (7.9%) 0 0 6 (9.2%) 6.1–12 4 (5.2%) 12 (6.9%) 8 (8.7%) 0 1 (11.1%) 3 (4.6%) 12.1-24 18 (10.3%) 8 (8.7%) 10 (13.2%) 0 9 (13.8%) 1 (11.1%) 24.1-48 34 (19.4%) 20 (21.7%) 14 (18.4%) 0 1 (11.1%) 13 (20.0%) 48.1-72 16 (21.1%) 30 (17.1%) 14 (15.2%) 1 (50%) 1 (11.1%) 14 (21.5%) >72 25 (14.3%) 15 (16.3%) 10 (13.1%) 1 (50%) 2 (22.3%) 7 (10.8%) **Dialysis Centre** 0.105 А 20 (11.4%) 13 (13.7%) 7 (8.8%) 0 1 (9.0%) 6 (8.8%) В 19 (10.9%) 12 (12.6%) 7 (8.8%) 0 2 (18.0%) 5 (7.5%) С 7 (4.0%) 1 (1.1%) 6 (7.5%) 0 1 (9.0%) 5 (7.5%) D 11 (6.3%) 6 (6.3%) 5 (6.4%) 0 0 5 (7.5%) Е 9 (5.1%) 4 (5.0%) 5 (5.3%) 0 0 4 (6.0%) F 6 (3.4%) 2 (2.5%) 4 (4.2%) 0 0 2 (3.0%) G 3 (1.7%) 2 (2.1%) 1 (1.25%) 0 0 1 (1.5%) Н 4 (2.3%) 2 (2.1) 2 (2.5%) 0 0 2 (3.0%) Other 96 (54.9%) 54 (56.8%) 36 (45.0%) 2 7 (64.0%) 37 (55.2%)

continued...

Dialysis Modality at

0.400

Time after Transplant Surgery (months)						0.910
<=6	24 (13.7%)	12 (12.6%)		12 (15.0%)		
		_	1 (50%)	3 (27.3%)	8 (11.8%)	
7–12	20 (11.4%)	13 (13.7%)		7 (8.8%)		
			0	1 (9.1%)	6 (9.0%)	
13–24	16 (9.1%)	9 (9.5%)		7 (8.8%)		
		_	0	1 (9.1%)	6 (9.0%)	
25–36	10 (5.7%)	6 (6.3%)		4 (5.0%)		
		_	0	0	4 (6.0%)	
37–60	26 (14.9%)	15 (15.8%)		11 (13.7%)		
			0	0	11 (16.4%)	
>60	79 (45.1%)	40 (42.1%)		39 (48.7%)		
			1 (50%)	6 (54.5%)	32 (47.8%)	
Donor Characteristics						
Donor Type						0.396
Deceased	88 (50.3%)	44 (46.3%)		44 (55.0%)		
			2 (100%)	6 (54.5%)	36 (53.7%)	
Living	87 (49.7%)	51 (52.7%)		36 (45.0%)		
			0	5 (45.5%)	31 (46.3%)	
Transplant Characteri	stics					
Transplant Era						0.563
Before 2000	12 (6.9%)	8 (8.5%)		4 (5.0%)		
			0	2 (18.2%)	2 (3.1%)	
2000-2007	25 (14.3%)	13 (13.7%)		12 (15.0%)		
			0	2 (18.2%)	10 (14.9%)	
2008–2012	41 (23.4%)	18 (18.9%)		23 (28.8%)		
		_	1 (50%)	2 (18.2%)	20 (30.8%)	
2013–2018	97 (55.4%)	56 (58.9%)		41 (51.2%)		

1 (50%)

5 (45.4%)

35 (52.2%)

Considerations for antibiotic dosing in critically ill patients requiring sustained-low efficiency dialysis

By Aaron Jinfan Zhang and Marisa Battistella

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OBJECTIVES

- 1. Compare and contrast sustained low-efficiency dialysis, intermittent hemodialysis, and continuous kidney replacement therapy.
- 2. Describe the pharmacodynamics and pharmacokinetic considerations to antimicrobial dosing in the critically ill patient requiring kidney replacement therapy.

BACKGROUND

A cute kidney injury (AKI) is a common complication of critical illness, affecting 35% of patients admitted to intensive care units (ICU) (Kumar & Singh, 2015; Pickkers et al., 2021). AKI is a sudden episode of kidney damage that happens within a few hours or days, leading to the buildup of blood waste products and difficulty maintaining fluid balance. Sepsis is a heterogeneous clinical presentation defined by physiological changes responding to an infectious etiology. Severe sepsis or septic shock leads to multiple organ dysfunction syndromes and is the primary contributor to almost 50% of AKI incidences in the ICU. AKI in the ICU is associated with a mortality rate of 45%. However, the mortality rate of sepsis-induced AKI has been reported to be as high as 70% (Bagshaw et al., 2007; Doi, 2016; Pickkers et al., 2021).

Approximately 20–30% of patients with severe AKI require kidney replacement therapy (KRT) (Harvey et al., 2021). KRT facilitates volume control, solute removal, correction of acid-base imbalances, and electrolyte disturbances. Sustained-low efficiency dialysis (SLED) is becoming a common dialytic modality in critically ill patients and is considered a conceptual and technical hybrid between intermittent hemodialysis (IHD) and continuous kidney replacement therapy (CKRT) (Brown & Battistella, 2020).

The intersection of AKI, SLED and sepsis afflicts a significant proportion of patients in the ICU with significant morbidity and mortality implications. As such, an understanding of the principles behind appropriate dosing of antibiotics in critically ill patients requiring SLED presents a valuable opportunity to optimize patient outcomes.

SOLUTE AND FLUID REMOVAL IN DIALYSIS

The dialysis circuit begins and ends with venous access and blood return to the patient. In most patients with AKI, the primary method of venous access is through a central venous catheter. Blood is pumped from venous access towards a filter called a dialyzer or artificial kidney outside the body. Blood enters at one end of the filter and is forced into multiple hollow fibers formed by the dialysis membrane. In hemodialysis, blood passes through the hollow fibers and a dialysis solution passes outside the fibers in an opposite direction to the blood-flow to facilitate solute and fluid removal. The blood exiting the filter is then pumped back into the patient's body.

Ultrafiltration describes the process of removing fluid from the patient. In dialysis, the force for ultrafiltration is generated by the pressure gradient of differing flow rates of blood and dialysate. Higher rates of flow are associated with a lower static pressure. As the flow rate of dialysate is usually higher than blood flow, fluid moves from the blood, through the membrane, and towards the dialysate. Convection refers to the transfer of solute across the membrane along with the bulk-flow of fluid during ultrafiltration. This phenomenon is also known as solvent drag. Large and small solutes are transported across the membrane with equal efficiency until the molecular radius of the solute exceeds the pore size of the dialysis membrane. Diffusion refers to solute transfer across the membrane down a concentration gradient and is the primary mechanism of removal of small/low molecular weight solutes (<1500Da) (Brown & Battistella, 2020).

The movement of drugs or other solutes through the dialysis membrane is largely determined by the size of the molecule relative to the size of the pores in the membrane. Modern high-flux membranes can remove drugs with molecular weights of above 20,000Da (Oshvandi et al., 2014). Generally, antibiotics are small molecules and fall below the threshold membrane permeability. As such, factors pertaining to the dialysis circuit that can influence the removal of antibiotics include the surface area of the membrane, the blood and dialysate flow and ultrafiltration rates, and the duration of dialysis therapy.

DIALYSIS MODALITIES

IHD provides rapid solute clearance and ultrafiltration during relatively brief treatments (3-5 hours), whereas continuous therapies provide more gradual fluid removal and solute clearance over prolonged treatment times (optimally 24 hours per day). Generally, SLED uses identical machines as hemodialysis, but is run for an extended period of time using lower blood and dialysate flow rates similar to CKRT. SLED is characterized by treatment times of 8-16 hours, but can be 24 hours in duration, with slower rates of solute clearance and ultrafiltration than IHD, but more rapid than CKRT. As such, dosing strategies used for patients on IHD or CKRT may not be translatable to those on SLED. The primary advantages of SLED are solute, fluid and acid-base control with improved hemodynamic stability compared to IHD, without the use of advanced and expensive machines, labour, and technical expertise required with CKRT (Bellomo et al., 1993; Berbece & Richardson, 2006; Patel et al., 2009). Table 1 compares and contrasts properties of the dialysis modalities that may be used in critical care.

Table 1

Comparing Dialysis Modalities

	CKRT	SLED	IHD
Advantages	Slow volume control with hemodynamic stability and good solute control	Slow volume and solute control, cost efficient with decreased workload	Greater volume removal in shorter period
Disadvantages	Costly and complex, frequent interruptions, continuous anticoagulation, high workload	Limited evidence with drug dosing	High ultrafiltration poorly tolerated, periodic solute and fluid control problematic
Treatment days per week	7 days	5–6 days	3–5 sessions
Hours/treatment	24 hours	8–24 hours	4 hours
Blood Flow (ml/ min)	100–200	200–300	350-400
Dialysate Flow	20–30	300–350	500-800
Anticoagulation	Heparin or Citrate	Heparin or nothing	Heparin or nothing
Hemodynamic stability	+++	++	-

PHARMACODYNAMIC CONSIDERATIONS TO ANTIBIOTIC DOSING

Pharmacodynamics describe the pharmacologic response resulting from a drug once it reaches its site of action. The pharmacodynamics profile of antibiotics, whether it is concentration or time-dependent, often influences the drug dosing regimen. For antimicrobials that are concentration-dependent, a higher concentration relative to the minimum inhibitory concentration (MIC) of the organisms is the best predictor of the rate and extent of bacterial cell death. Antibiotics such as aminoglycosides and quinolones are considered concentration-dependent antibiotics (Table 2). For antimicrobials that are time-dependent, the best determinant of antimicrobial efficacy is the fraction of time the plasma drug concentration is above the MIC of the organism. The timing of antimicrobial administration relative to the initiation and duration of SLED is important to maximize either the time above MIC or peak concentration to MIC ratio in accordance with the pharmacodynamics properties of the drug and is an important consideration to balance the safety and efficacy of therapy (Levison & Levison, 2009).

DRUG PHARMACOKINETICS IN A SEPTIC PATIENT AND CONSIDERATIONS TO ANTIBIOTIC DOSING

Pharmacokinetics describe the movement of a drug through the body and are divided into four major components: absorption, distribution, metabolism, and elimination (Levison & Levison, 2009). Highlighted here are the general principles related to drug pharmacokinetics, the potential changes to these parameters during critical illness, and the considerations for antibiotic drug dosing in critically ill patients requiring SLED.

Table 2

Commonly Used Time Versus Concentration Dependent Antimicrobials

Time Dependent	Concentration Dependent
Penicillins	Fluoroquinolones
Cephalosporins	Aminoglycosides
Carbapenems	Metronidazole
Vancomycin	
Clindamycin	
Macrolides	
Sulfamethoxazole – trimethroprim	

Absorption

Absorption is the rate and extent a medication leaves the administration site and moves into the circulatory system, such as the transition of a drug given orally to systemic circulation. Bioavailability describes the fraction of an administered dose reaching systemic circulation. By definition, the bioavailability of an intravenously administered drug is 100%. For orally administered drugs, absorption depends on the amount of drug absorbed by the gut. Numerous drug and patient-specific variables can influence gut absorption. During critical illness and septic shock, the body's natural physiological response is to shunt blood to vital organs, including the brain and the heart. As such, the body reduces the blood flow and mobility of the gastrointestinal tract and compromises drug absorption from the gut. As enteral absorption is difficult to ascertain in the critically ill, intravenous routes of antibiotic administration are preferred to optimize systemic exposure (Smith et al., 2012).

Distribution

Volume of distribution (Vd) describes how well drugs distribute to the tissues. An important factor to consider in antibiotic therapy is the ability of the drug to penetrate to the site of infection. Generally, hydrophilic medications will remain in the plasma water volume and have a lower Vd, while lipophilic medications often have larger Vd. Often, deep seated infections such as those in the central nervous system or bone, require the use of antibiotics with large volumes of distribution. As drugs with large volumes of distribution have more drug distributed in tissue compared to the blood, these drugs will be dialyzed to a lesser extent (Smith et al., 2012). Examples of antibiotics with higher Vd include macrolides and fluoroquinolones.

A vital phenomenon affecting Vd and the extent a drug can be dialyzed is plasma protein binding. The predominant plasma proteins that drugs bind to are albumin and alpha-1-acid glycoprotein. These proteins are too large to cross the dialysis membrane, and drugs ≥ 80% protein-bound are generally considered not significantly dialyzed. Similarly, highly protein-bound drugs cannot cross cellular membranes and distribute outside the vascular space. As such, high protein binding reduces the extent to which a drug can be dialyzed. High protein binding also reduces the apparent Vd. However, in critically ill patients, many conditions lead to plasma protein levels and binding changes. Accumulating organic acids (e.g. metabolic acidosis in sepsis) can compete with the binding of acidic antibiotics such as penicillins, cephalosporins, and aminoglycosides. In sepsis, increased vascular permeability and protein catabolism can decrease albumin concentrations. In critically ill patients with hypoalbuminemia, highly protein-bound drugs will have a greater fraction of free drug, leading to more significant pharmacological effects and potentially a greater extent of dialysis (Smith et al., 2012).

A patient's fluid status is vital in the antibiotic distribution in the critically ill. Fluid resuscitation is an essential intervention used in many septic patients, thereby increasing total body water. Complicating the increase in fluid status, many patients with septic shock will also have capillary leak syndrome creating an increase in interstitial volume and unpredictable intravascular volume, thereby causing unpredictable serum concentrations of antibiotics. However, the amount of antibiotics in the serum is often the active form responsible for the therapeutic effect. Changes to serum concentration after fluid resuscitation is more profound in hydrophilic antibiotics such as vancomycin, aminoglycosides and B-lactams. The failure to achieve effective serum drug concentrations can lead to therapeutic failure and increases the risk of antibiotic resistance. Strategies such as therapeutic drug monitoring for antibiotics like vancomycin and aminoglycosides, loading doses, reducing the interval between doses or using a continuous infusion for time-dependent antibiotics can support adequate serum concentrations when the Vd is increased (Smith et al., 2012).

Metabolism

The predominant site for drug metabolism is the liver. Drugs that are cleared by the liver are generally not affected by dialysis. However, some data from human studies show that liver drug metabolism may be affected by AKI. During critical illness, alterations in liver enzyme activity, serum protein concentration, and liver blood flow can result in clinically relevant changes in liver drug clearance. Unfortunately, how AKI affects hepatic drug metabolism is limited, and dose adjustments are difficult to predict (Brown & Battistella, 2020).

Elimination

Elimination describes the removal of drugs or their metabolites from the body. The kidney is the primary site of elimination for many antibiotics. However, in an AKI, repeated dosing can result in the accumulation of drugs or active metabolites, which may increase the risk for adverse drug events. Dialysis can replace the role of the kidney in removing drugs from the body. Generally, drugs that are readily eliminated by the kidneys are readily dialyzed. As such, administration of antibiotics is generally timed after or towards the end of dialysis sessions. However, for patients receiving 24-hour SLED, recent evidence suggests that it may be appropriate to dose certain antibiotics comparably to patients with uncompromised kidney function (Brown & Battistella, 2020).

Another important consideration for patients receiving kidney replacement therapy is whether they produce urine, as urine production indicates residual kidney function. If patients are not producing or produce little urine, antibiotic doses should be held on days these patients do not receive dialysis. In contrast, urine production suggests that the patient can eliminate some drugs and is not solely dependent on dialysis for drug elimination (Brown & Battistella, 2020).

CONCLUSIONS

Antibiotic dosing in the critically ill requiring SLED is complex and dynamic. An interprofessional approach should be undertaken with diligent patient assessment and care from the nursing team and medical team with consult from a clinical pharmacist. As there is little in the literature on antibiotic dosing in SLED, an individualized approach for each patient should be undertaken considering the dialysis regimen, patient presentation, and properties of the antibiotic therapy.

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CONTINUING EDUCATION STUDY QUESTIONS

CONTACT HOUR: 2.0 HRS

Considerations for antibiotic dosing in critically ill patients requiring sustained-low efficiency dialysis

By Aaron Jinfan Zhang and Marisa Battistella

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- 1. What are the goals of kidney replacement therapy?
 - a) Volume control
 - b) Drug/toxin and solute removal
 - c) Correction of acid-base imbalances
 - d) Correction of electrolyte
 - disturbances
 - e) All of the above
- 2. Which of the following is true regarding Acute Kidney Injury?
 - a) AKI is not associated with increased risk for mortality in the ICU
 - b) In many instances, acute kidney injury can be managed with kidney replacement therapy and can be reversible
 - c) AKI develops over weeks
 - d) A and B
 - e) All of the above
- 3. Which of the following are true regarding sepsis/septic shock?
 - a) Fluid resuscitation is a common therapy used in the management of sepsis/septic shock
 - b) Serum concentrations of drugs can be difficult to predict in septic shock
 - c) Septic shock can cause multiorgan failure and is a primary contributor to AKI in the ICU
 - d) All of the above
 - e) None of the above
- 4. Which of the following are true related to mechanisms of solute removal in dialysis:
 - a) Ultrafiltration the transfer of solute across the membrane along with the bulk-flow of fluid
 - b) Convection the process of removing fluid from the patient
 - c) Diffusion solute transfer across the membrane down a concentration gradient
 - d) None of the above
 - e) All of the above

- Sustained-low efficiency dialysis is advantageous to intermittent hemodialysis in critically ill as it:
 - a) Uses higher blood and dialysate flow rates for a shorter duration of time to promote better hemodynamic stability
 - b) Uses lower blood and dialysate flow rates for a longer period of time to promote better hemodynamic stability
 - c) Using machines requiring a lower level of technical expertise comparted to intermittent hemodialysis
 - d) Does not require systemic anticoagulation like in intermittent hemodialysis
 - e) Allows for supplementary investigations between dialysis sessions
- 6. Which of the following antibiotics are is most likely to be dialyzed?
 - a) Doxycycline (>90% protein binding, 33-45% excreted in urine, volume of distribution = 0.7L/kg)
 - b) Meropenem (2% protein binding, 70% excreted in urine, volume of distribution = 0.35L/kg)
 - c) Azithromycin (12-52% protein binding, 6-12% excreted in urine, Volume of distribution = 31.1L/kg)
 - d) All of the above are drugs are poorly dialyzed
 - e) All of the above are likely to be dialyzed
- Ms. KL is a 72-year-old woman admitted recently admitted to the ICU for a community acquired pneumonia. Which of the following antibiotic therapy would be most appropriate?
 - a) Ceftriaxone + Azithromycin given intravenously
 - b) Ceftriaxone given intramuscularly
 - c) Amoxicillin/clavulanic acid given orally
 - d) Doxycycline given orally
 - e) Amoxicillin given orally

- 8. Which of the following factors can change the protein binding of pipercillin/tazobactam (a hydrophilic and acid antibiotic), and what is the resultant effect on the extent to which the antibiotic is dialyzed?
 - a) Fluid overload which can increase the amount a drug is dialyzed
 - b) Capillary leak syndrome which can increase the amount a drug is dialyzed
 - c) Metabolic acidosis which can decrease the extent the drug is dialyzed
 - d) Hypoalbuminemia which can increase the extent the drug is dialyzed
 - e) None of the above
- 9. In which of the following antibiotics is therapeutic drug monitoring recommended
 - a) Vancomycin
 - b) Gentamicin
 - c) Meropenem
 - d) A and B
 - e) All of the above
- 10. Mr. AS is a 32-year-old patient being treated for an MRSA bacteremia secondary to a central line infection. He is on vancomycin 1g every 24 hours, is on 8-SLED every day, and is not producing any urine. His vancomycin level is at target and the last dose of vancomycin and SLED therapy was yesterday. However, today, his blood pressure is 90/50 and the team has decided to withhold SLED. How should Mr. AS's vancomycin be managed?
 - a) Continue vancomycin as planned, administer vancomycin 1g today
 - b) Increase the dose of vancomycin to 1.5g every 24 hours
 - c) Increase the frequency of vancomycin to 1g every 12 hours
 - d) Hold today's dose of vancomycin and reassess if vancomycin should resume tomorrow
 - e) Decrease the vancomycin dose to 750mg every 24 hours

CONTINUING EDUCATION STUDY ANSWER FORM

EDUCATION

CE: 2.0 HRS CONTINUING

By Aaron Jinfan Zhang and Marisa Battistella

Post-test instructions:

• Select the best answer and circle the appropriate letter on the answer grid below.

Considerations for antibiotic dosing

in critically ill patients requiring

sustained-low efficiency dialysis

- Complete the evaluation.
- Send only this answer form (or a photocopy) to: CANNT National Office
 4 Cataraqui Street, Suite 310
 Kingston, ON K7K 1Z7
 or submit online to www.cannt.ca
- Enclose a cheque or money order payable to CANNT.
- Post-tests must be postmarked by September 30, 2023.
- If you receive a passing score of 80% or better, a certificate for 2.0 contact hours will be awarded by CANNT.
- Please allow six to eight weeks for processing. You may submit multiple answer forms in one mailing, however, you may not receive all certificates at one time.

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POS Plea	ST-TE se circ	ST Al	NSW ar ansv	ER G ver ch	RID oice:	EVALUATION Strongly disagree Strongly agree
1.	а	b	с	d	e	1. The offering met the stated objectives.12345
						2. The content was related to the objectives.12345
2.	а	b	С	d	е	3. This study format was effective for the content.12345
3.	а	b	с	d	e	4. Minutes required to read and complete: 50 75 100 125 150
4.	а	b	с	d	е	Comments:
5.	а	b	с	d	е	
6.	а	b	с	d	e	
7.	а	b	с	d	е	COMPLETE THE FOLLOWING:
8.	а	b	с	d	e	Name:
9.	а	Ъ	с	d	e	Address:
10.	а	b	с	d	е	

Volume 32, Number 3

CANNT member? 🗆 Yes 🗅 No Expiration date of card _____



After a two-year hiatus of in-person CANNT events, this year's conference will be back in person from October 27-29, hosted at the Hamilton Convention Centre, and promises the opportunity to reconnect, learn, share ideas, and socialize together. Get ready to experience all that CANNT 2022 has to offer:

- Participate in the plenary sessions set to motivate the audience and ignite peak performance while incorporating leading-edge science each talk will be a memorable experience!
- Attend concurrent sessions and workshops suited to all interests. Topics range from kidney transplant, kidney care in Indigenous communities, and innovations in practice, technology, research, and much, much more.
- Engage with our corporate partners, as they showcase their latest products and services. Come prepared with questions and issues—our exhibitors want to hear from you!
- Congratulate your peers on their research and achievements by attending the CANNT Award Ceremony.
- Join your peers and colleagues during the CANNT social events a ghost walk with haunted stories through Hamilton, and a Murder Mystery dinner party!

Immerse yourself in this year's conference theme, "Guiding Our Way to the Future," recognizing the untapped capabilities of both you and your patients. We are excited to welcome nephrology professionals to Hamilton, Ontario! More information is available at www.cannt-acitn.ca

Abstracts

Some of the key strategic goals of CANNT are to disseminate educational materials to CANNT members, profile scientific research, and provide opportunities for nephrology colleagues to network. CANNT's national conference provides an excellent venue for accomplishing these goals of CANNT. However, only a portion of CANNT members is able to attend the national conference annually. Cognizant of this, CANNT is pleased to be printing the abstracts to be presented at this year's annual conference in this issue of the *CANNT Journal*. The following abstracts celebrate the diversity of nephrology topics being investigated and discussed across Canada. We hope you will carefully review these abstracts.

Please contact cannt@cannt.ca to receive information on how to connect the authors about their work.

1. THE EFFECTS OF A MINDFUL SELF-COMPASSION (MSC) EIGHT-WEEK COURSE ON NEPHROLOGY NURSES' LEVELS OF SELF-COMPASSION, BURNOUT, AND RESILIENCE

Jacqueline Crandall, RN(EC), PhD, CNeph(C)^{1,2,3,4} Lori Harwood, RN(EC), PhD, CNeph(C)^{1,2,3} Barb Wilson, RN(EC), MScN, CNeph(C)^{1,2,3} Catherine Morano, MSW, RSW¹

¹Renal Care Program, London Health Sciences Centre, London, Ontario (retired)
²Lawson Health Research Institute, London, Ontario
³Arthur Labatt School of Nursing, Western University, London, Ontario
⁴King's University College, London, Ontario

Purpose: Caring for individuals with chronic kidney disease can place nurses at risk for emotional exhaustion and burnout. This study explored the effects of Germer and Neff's MSC eight-week course on nephrology nurses' self-reported levels of self-compassion, resilience, and burnout.

Method: Using a mixed-methods design and after ethics approval, nurses working in an urban renal program were recruited. Upon consent, participants completed a demographic questionnaire followed by a survey at three time points (pre-, post-, and three-months post the MSC training). The survey contained five validated instruments: (1) Neff Self-Compassion scale; (2) Professional Quality of Life scale; (3) Freiburg Mindfulness Inventory; (4) Maslach Burnout Inventory; and (5) Conner-Davidson Resilience scale. A focus group explored nurses' experiences of the MSC training.

Results: Twelve nurses enrolled in the study, and eight completed all surveys. Results indicated that the MSC training significantly increased nurses' levels of self-compassion and resilience while decreasing levels of burnout. The focus group revealed the central theme of *enhanced resilience*, and subthemes included creating a *community of support, awareness and discovery*, and the *mastery of the techniques*.

Conclusions: In the midst of the COVID-19 pandemic, the MSC training was an effective intervention to gain essential skills for building and maintaining self-compassion and resilience, skills integral to maintaining an effective workforce.

Implications for nephrology care: Ensuring a strong nursing workforce is critical to the quality of nephrology care given now and in the future. The MSC training is one example of how leadership can facilitate good self-care among staff.

2. THE ETIOLOGY AND CLASSIFICATION OF BLOODSTREAM INFECTIONS AMONG PATIENTS RECEIVING DIALYSIS AT LONG-TERM CARE FACILITIES IN 2020-2022

Farahnaz Behrozishad, RN¹, MN, NP Student²

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²D'Youville University, School of Nursing, Buffalo, New York

Background: During the pandemic, long-term care (LTC) facilities had to adjust to numerous new infection prevention and control practices, and cope with the COVID outbreaks. To overcome this challenge, for the first time in Ontario, Humber River Hospital piloted an initiative in which hemodialysis (HD) was administered at LTC facilities instead of having the patients come for in-centre treatments.

Tunneled dialysis catheters (TDC) are commonly used as a vascular access in hemodialysis. Catheter-related bacteremia (CRB) is the most common clinical problem for patients receiving HD, especially for those residing in LTC facilities. CRB leads to increased rates of morbidity and mortality for this patient population.

Purpose: This feasibility pilot study was designed to evaluate the rate of CRB for patients who received hemodialysis at LTC instead of at the hospital.

Methods: LTC facilities located within the previous Central Local Health Integration Network (LHIN) were engaged to participate in this pilot project. Chronic hemodialysis patients receiving outpatient HD were consented and enrolled in the LTC dialysis program. A retrospective cohort review was conducted in 12 different LTC facilities in Toronto, Ontario from April 2020-March 2022.

Results: Forty-two patients were evaluated. Five patients had CRB, and three patients died post hospital admission. Only five CRB (11%) episodes were reported during the two-year time period at LTC facilities, which proved that patients are safe to receive hemodialysis at LTC facilities instead of the in-centre setting.

Conclusion: Offering chronic dialysis in LTC facilities is a safe, efficient, and cost-effective model of care. The risk of CRB is low and dialysis quality is the same compared to the usual in-centre setting. The anecdotal feedback shared by patients and family members validates our assumption that this model of care is patient-centred and conducive to maintaining patients' quality of life.

3. EMPOWERING PATIENTS THROUGH SHARED CARE/SELF-CANNULATION

Lilla Ploszaj, RN, CNeph(C)

Vascular access coordinator, Scarborough Health Network, Scarborough, Ontario

Background: The Scarborough Health Network vascular access team and nursing staff from our in-facility and satellite programs were able to recognize that patients wanted to become more involved in their access assessment, preparation, and cannulation for initiating dialysis. In vascular access, important components of the shared care model are: access preservation, access assessment, and cannulation. Patients are assessed for suitability and encouraged to be active participants in the management and care of their accesses for hemodialysis.

Description: Since February 2019, 11 patients have learned different tasks related to shared care (e.g., AV fistula assessment, infection prevention, and preparation for rope ladder or buttonhole technique self-cannulation). Three patients dropped out, as they did not wish to continue, and one patient received a transplant. One patient was unsuitable due to vision impairment.

Results: By implementing shared care/self-cannulation, the renal program has seen enhanced patient satisfaction such as during educational forums where the patients openly speak about their experiences. Encouraged by their progress, patients are also taking a more active role in various patient committees where they promote self-cannulation and self-empowerment.

Conclusion: The ability to self-cannulate can increase a patient's confidence and offers them a greater sense of control over their treatment. It is important to involve patients and their families to learn shared care tasks, which allows them to become drivers of their care. Through patient empowerment, they can advocate for themselves, inspire others, reinforce proper technique, and help preserve their own vascular "lifelines."

4. INTRODUCING A COACHING PROGRAM TO OPTIMIZE RESILIENCY AND AGILITY PERI-AND POST-PANDEMIC TO RENAL STAFF: AN ADVANCED PRACTICE FELLOWSHIP

Julie Ann Lawrence, RN(EC), MScN, CNeph(C)

Nurse Practitioner, Renal Program, Kidney Care Centre, London Health Sciences Centre, London, Ontario

The impact of the pandemic on all stakeholders and clients is obvious. Certainly, the impact on nurses, allied health, and leaders playing pivotal roles in an arena where clients face multi-morbid conditions can deepen holistic exhaustion and suffering of the team every day. Purposeful coaching can shift individual and group dynamics from catabolic to anabolic energies, thereby enhancing engagement, satisfaction with work/life balance, and work relationships. Consciously shifting from a mindset of suffering, exhaustion, and mental anguish to one dedicated to wellbeing, exceptionalism, happiness, and optimism, can widen one's perception of reality that is based in more positivity. Volatility, complexity, uncertainty, and ambiguity (VUCA) within healthcare may not change. Yet, as individuals and teams, we can learn to respond in a more anabolic manner that serves to enhance self- and team-preservation while also striving for excellence. How can we thrive instead of just survive? With this as the vision (purpose), an Advanced Practice Fellowship was granted permission to implement a coaching program to pilot and explore this manifestation. Research has demonstrated that those who manifest optimism and are informal influencers may, in turn, positively impact teams. When teams are stronger and more effective than the sum of their parts, outcomes include individuals and teams with vigor, resilience, and positive energy. Formal coaching programs are leading-edge interventions in countries outside of Canada, yet these are quickly gaining traction within organizations to enhance pandemic recovery. The implication for renal programs may include coaching models to reduce turnover and burnout of staff, while enhancing retention and recruitment.

5. THE COLLABORATIVE PRACTICE APPROACH OF SLED TREATMENTS IN AN ICU SETTING

Siva Kanthasamy, RN, BA, CNeph(C)

Nephrology Program, University Health Network Toronto General Hospital, Toronto, Ontario

Purpose: This presentation will demonstrate the shared-care responsibilities between hemodialysis nurses and intensive care unit (ICU) nurses during the provision of daily sustained low-efficiency dialysis (SLED) treatment in ICU.

Background: Continuous renal replacement therapy (CRRT) previously has been regarded as superior by ICU practitioners largely due to the amount of convective clearance achieved and the ability to administer treatment independently of nephrology services. SLED is an increasingly popular renal replacement therapy for patients in the ICU. SLED has been reported to provide good solute control and hemodynamic stability. SLED, as a treatment option, has been developed as a conceptual and technical hybrid between CRRT and intermittent hemodialysis (IHD) for patients with cardiorenal syndrome and advanced heart failure.

Nephrologists developed new acute orders set to support transition of the patient from SLED to IHD, ordering parameters including: (1) reduced rate of ultrafiltration for optimized hemodynamic stability; (2) low-efficiency solute removal to minimize solute disequilibrium; and (3) sustained treatment duration to maximize dialysis dose.

Description: During SLED, blood is filtered through countercurrent dialysis flow at 300mL/min and hemofiltration flow at 200 mL/min for varying durations (8, 10, 12, or 24 hours) on a daily or alternate-day basis. All aspects of SLED are handled by hemodialysis nurses before transitioning care to ICU nurses. ICU nurses are responsible for monitoring and adjusting clinical parameters, patient outcomes, and solute levels. **Evaluation**: SLED was studied in critically ill acute renal failure patients. The patients did not experience any episodes of intradilaytic hypotension or other complications.

Implications: SLED has important implications for improved nurse and patient outcomes. SLED can lead to workload reduction for ICU nurses, improved patient safety, significant cost savings, and increased flexibility in the patients' schedules to accommodate other vital therapies such as physiotherapy.

6. COLLECTIVE CONSENSUAL ANALYSIS: SHARING LEARNING AND INSIGHTS FROM AN INDIGENOUS KIDNEY HEALTH RESEARCH INITIATIVE

Mary Smith, NP, PhD¹

Jovina Concepcion Bachynski, MN-NP(Adult),² CNeph(C), PhD Student³

Vanessa Silva e Silva, RN, PhD⁴

¹Volunteer for the Beausoleil First Nation's Kidney Program; Principal Applicant for the Kidney Foundation of Canada's funded research, *Circles towards Indigenous solutions for kidney health: A strength-based approach*, May 2019-June 2022

²Nurse practitioner, University Health Network, Toronto General Hospital, Toronto, Ontario

³Queen's University, School of Nursing, Kingston, Ontario ⁴Assistant professor, Brock University, Department of Nursing, St. Catherines, Ontario

Background: The collective consensual data analytic procedure (CCDAP) is described as a methodology to engage community and further kidney health.

Purposes: We describe the research, *Circles towards Indigenous solutions for kidney health: A strength-based approach*, in relation to its methodology, CCDAP. We depict CCDAP and the processes involved from inception to training to implementation. The intent is to further understand CCDAP and its relevance within research for Indigenous people experiencing kidney disease.

Method: Living experiences from interviews and groups were transcribed verbatim. The data underwent thematic analysis, breaking down the chunked data into minor themes and keywords phrases (KWPs) on PowerPoint slides. The KWPs were read out load and placed on the Microsoft Excel horizontally under major theme headings determined by group consensus. Fifteen themes were identified.

Results: We depict the impact of COVID-19 on the community and travel associated with off-community dialysis and the importance of culturally safe care. For example, one participant reported that "a lot of tests" were booked, but had to be delayed because of COVID-19. The impact of the pandemic was evident in more than half of the themes. Another participant spoke to the hardships associated with hemodialysis travel, stating that "it takes so much effort to travel back and forth." **Conclusion:** The research and methodology need to be consistent with relational community goals with outcomes to contribute to the betterment of the community.

Implications: The implications for nephrology care embrace the potential of the CCDAP methodology to engage Indigenous communities within all phases of the research towards improving kidney health care with Indigenous people.

7. LIVED EXPERIENCES OF THE TRANSPLANT JOURNEY: LEARNING FROM PATIENTS AND FAMILIES

Sandra Davidson, RN, PhD, FAAN, FCAN¹ Kristi Coldwell, BA, CCLS² Carrie Thibodeau, BSc, BA³ Danielle Fox, RN, MN, CNeph(C)¹ Marc Hall, MSc, CCRP¹ Lydia Lauder, BN³ Sarah Dewell, RN, PhD⁴

¹University of Calgary, Calgary Alberta ²Transplant Research Foundation of British Columbia ³Kidney Foundation of Canada, Montreal, Quebec ⁴University of Northern British Columbia, Prince George, British Columbia

Background: The Organ Donation and Transplantation (ODT) system is a complex network of organizations and health authorities. This creates challenges and barriers for patients to navigate the transplant journey and advocate for themselves.

Purpose: 1. To illuminate the patient lived experiences of the Organ Donation and Transplantation (ODT) system in Canada; 2. To identify the needs of donors, recipients, and caregivers within the ODT system and make patient-led and patient-focused recommendations to improve it.

Methods: This convergent parallel mixed-methods study captured data from patients and family caregivers across Canada through eight focus groups (n = 20) and an online survey (n = 944). Survey and focus group questions were co-created with members of a national Patient/Advocate Advisory Committee. Focus group transcripts and openended narrative responses were analyzed using an inductive content analysis approach. Survey data was analyzed using descriptive statistics.

Results: The following overarching themes emerged: (1) More holistic person-centred care; (2) Improved access to accountable care; (3) Collective impact of transplant journey on all facets of life; (4) Navigating uncertainty; (5) Importance of connection; and (6) Advocacy. Five opportunities for improving the ODT system were identified: (1) enhancing mental health support; (2) establishing formal peer support programs; (3) improving continuity of care; (4) improving knowledge acquisition; and (5) expanding access to financial support and other needed resources. **Conclusions:** Based on the findings of this study, recommendations will be socialized to all levels of government, thus informing future ODT system transformation to better meet the needs of the patients.

Implications for nephrology practice/education: Nephrology nurses play a vital role in the holistic care of patients undergoing transplantation. The results of this study will support nurses and other healthcare providers to optimize and individualize care for patients. This knowledge could be further leveraged at a health systems level to improve patient-centred health services delivery for those who are undergoing kidney transplantation.

8. IMPLEMENTATION OF A NEW HEMODIALYSIS CENTRAL VENOUS CATHETER DYSFUNCTION AND ADMINISTRATION OF CATHFLO® (ALTEPLASE) PROTOCOL

Leora Wanounou, MN-NP, CCN(C)^{1,2} Kathleen McIntosh, RN, CNeph(C)¹ Sadie Webster, RN¹ Elizabeth Poisson, RN¹

¹Hemodialysis Unit, Kidney and Metabolism Program, St. Michael's Hospital, Unity Health Toronto, Toronto, Ontario

²Adjunct lecturer, Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, Ontario

In the hemodialysis unit at St. Michael Hospital (SMH) in Toronto, Ontario, our team noticed a rise in the use of Alteplase, which led to a rise in the amount of money the unit spent on this medication. To help streamline the use of Alteplase, an algorithm and protocol was created and implemented. In order to create the protocol, one of the unit nurse practitioners worked with the Vascular Access Nurses (VACs) and the medical director of the hemodialysis unit. After conducting a literature review and seeking out protocols from other hemodialysis units, the team created an algorithm that the hemodialysis nurses could follow and administer Alteplase prn as per protocol.

In the years prior to the creation of the protocol, the hemodialysis unit was spending an average of \$22,300 per month, with a high of \$33,000, on the medication. Since the implementation of the protocol in July 2021, Alteplase use and cost have gone down to an average of \$15,000 per month with the max usage of \$20,900. The implementation of the algorithm and protocol has been successful from a cost perspective, and feedback from the unit nurses has been that it has given them more autonomy and has been easy to follow.

9. WHAT IS WRONG WITH THIS PICTURE: THE HEMODIALYSIS PATIENT FELLS FAINT, YET THE BLOOD PRESSURE IS ELEVATED?

Judy Ukrainetz, RN, BN, CNeph(C)¹ Breanne Linttell, RN² Branko Braam, MD, PhD³

¹Alberta Health Services, Alberta Kidney Care North, Edmonton, Alberta ²Covenant Health, Alberta Health Services, Edmonton, Alberta ³University of Alberta, Edmonton, Alberta

"Oniversity of Alberta, Edinofiton, Alberta

Background: Hypertension and hypotension importantly predict cardiovascular outcomes in hemodialysis patients.

Purpose: A hemodialysis patient reported she felt like fainting during a hemodialysis session while the BP was elevated. This triggered a multi-level analysis of its background.

Description: Our case study involves a 64-year-old female patient dialyzing three times per week for four hours. A single standing BP was 176/71 mmHg and a single sitting BP 169/67 mmHg - she was talking during the measurements answering the nurse's questions. The BP cuff was too large related to the arm circumference and taped in place because the Velcro was not functioning. Home systolic BP readings ranged from 110-130 mmHg while the hemodialysis machine recorded SBPs between 180-200 mmHg. An additional antihypertensive was prescribed and the target weight was lowered. The patient experienced hypotensive symptoms during hemodialysis, but the BP remained high. Multiple manual BP readings taken by a nephrologist and an RN, not part of the hemodialysis team, averaged 110/54 mmHg. Korotkoff sounds during manual readings were incorrectly identified by the patient's nurse. Only one manual device out of five in the HD unit was functioning.

Evaluation/outcome: This analysis revealed technical issues with BP assessment, indicating a discrepancy between a measurement with an oscillometric and manual device. At a higher level, this pointed at educational gaps for the nursing staff regarding BP assessment. Inconsistent BP measurement technique and a lack of standardization of BP measurements and calibration of devices contribute to the variability of BP readings in hemodialysis patients potentially affecting patient cardiovascular outcome.

Implications for nephrology practice/education: This single observation indicates that BP assessment in hemodialysis units is addressed in a systematic way regarding equipment issues, knowledge gaps, and correct BP measurement technique.

10. HEMODIALYSIS ORIENTATION WEEK: IT TAKES A VILLAGE

Jennifer Latulippe, RN, MN, CNeph(C)¹ Tracy Olson, RN, BScN, CNeph(C)¹

¹Department of Nursing Education, St. Joseph's Healthcare Hamilton, Hamilton, Ontario

Purpose: In October 2020, St. Joseph's Healthcare Hamilton (SJHH) Kidney Urinary Program (KUP) initiated an education program, Hemodialysis Orientation Week (HOW), for new nurses, nursing students, and clinical technologists. This monthly comprehensive program includes sessions facilitated by the director, managers, nurse practitioners, modality nurse, vascular access nurses, social workers, registered dietitians, renal pharmacists, certified diabetes educators, clinical nephrology technologists, nephrology research coordinators, nephrologists, and nurse educators.

Description: Incoming staff and students to hemodialysis required education, resources, and skill practice in preparation for their new clinical role. In-person presentations, skill practice sessions, and emergency scenarios were created in advance of the HOW launch. Topics included dialysis machine training, chronic kidney disease, acute kidney injury, hemodialysis, peritoneal dialysis, vascular access, ultrasound use and cannulation practice, hemodialysis bloodwork, anemia management, fluid assessments, wound care, patient modalities, medical escalation policy, collaborative model of care, diabetes care, renal diet, renal medications, and hemodialysis complications and emergencies.

Outcomes: Anecdotally, participants reported that they were very satisfied with the new education program, the availability of resources and quick reference guides. Post orientation surveys are sent to participants each month. This formal feedback has been very positive, and suggestions received have been used to further improve sessions. To date, 62 participants have attended HOW, with sessions facilitated by 34 rotating staff members. SJHH KUP healthcare professionals have provided for and interacted positively with new staff and students to professionally grow in a safe and healthy work environment.

Implications for practice: The current healthcare human resources shortage, particularly in a specialty such as nephrology, may require renal programs to review and update their new staff orientation programs to further support recruitment and retention of staff and students. To provide quality patient care, new hemodialysis staff and students must be prepared and supported with a robust educational program.

11. THE ROLE OF THE RENAL PERFUSIONIST

Jeffrey Bellenie

Senior technologist, St. Joseph's Healthcare Hamilton, Hamilton, Ontario

Since the inception of the St. Joseph's Healthcare, Hamilton (SJHH) dialysis technical department, it was quickly recognized throughout the hospital that the technologists were very capable and proficient at many different skills. The hemodialysis technologists at SJHH are utilized by many departments within the hospital including the maintenance of water treatment systems in other departments. The comprehensive skills of the nephrology technologist have allowed the techs to guide their way into further clinical capacities such as clinical technologist and the role of the renal perfusionist.

The purpose of this presentation is to showcase the role of the renal perfusionist in a multidisciplinary allied healthcare team. The renal perfusionist is trained to facilitate in the procurement of donor kidneys. The presentation is intended to bring to light the skills and knowledge that perfusionist brings to the multi-disciplinary healthcare team. Adherence to all Health Canada standards, methods of procurement, equipment and supplies used, will all be part of the presentation.

The outcomes of having highly trained versatile staff with experience has served the department well. We are able to liaison effectively with the urology surgeons, communicate in timely manner with the recipient coordinators, renal transplant unit and operating room to ensure a positive experience for the recipients and their families while delivering the best possible patient care. The versatility of the SJHH nephrology technologist is unrivaled by any organization to my knowledge. The achievements of this group and their proven track record will surely guide the profession into taking on further roles and responsibilities in the future, as healthcare needs will continually grow.

12. HOME HEMODIALYSIS TECHNOLOGY

Jeffrey Bellenie

Senior technologist, St. Joseph's Healthcare Hamilton, Hamilton, Ontario

The intent of this abstract is to showcase the scope of practice and innovative technologies that are used in the St. Joseph's Healthcare, Hamilton (SJHH) nephrology technical department. We are proud to present that we incorporate several aspects of care that we believe are unique to the SJHH program. Furthermore, we would like to demonstrate how the use of new technology is allowing us to care for our patients now and will guide us into the future.

The general talking points for our presentation/poster will be about specific details about the SJHH program. Such details will include our geographic service area, methods of home installation and set-up, patient education administered by the home dialysis technologist and patient support systems, just to name a few. More specifically, we will present the development and utilization of our local downloadable monitoring system, which was designed within the SJHH technical department. The purpose of this endeavor was to secure a method of observing the dialysis machine function intradialytically while not physically present at the patient's home. The result is a system where we can download logging parameters and view treatment-specific information. The outcome has shown us that we can confirm detailed disinfection history, dialysis frequency and many operational parameters, which can help the technologist troubleshoot the machine.

Using technology to help guide us into the future is an encouraged philosophy and is practiced within the SJHH technical department and promoted in our departmental culture. The changes of today will help implement the use of further technologies that will aide in providing the best patient care quality and experience.

13. LIVING KIDNEY DONATION: THE PREFERRED TREATMENT OPTION FOR CKD PATIENTS

Patricia Hooker, RN¹ Wedlyne Pierre, RN¹

¹Department of Transplant, McGill University Health Center, Montreal, Quebec

To receive a kidney from a deceased donor, the name of the recipient needs to be on a waiting list. The waiting time can be a few months to several years. The success rate for a kidney transplant from a deceased donor is 85–90% after one year. The kidney lasts in its new body on average between 10 to 15 years, whereas the success rate for a kidney transplant from a living donor is higher, at 90–95% after one year. The new kidney lasts on average between 15 to 20 years.

The purpose of our presentation is to raise awareness about living kidney donation with healthcare professionals, patients, and their families. We will provide an overview into what a living donor evaluation entails. We will cover the eligibility criteria to be a potential living donor along with discussing the myths about who can be a donor. In addition, a brief overview of the testing required, statistics on living donation from our program, what happens if the two are not a match, a brief description of how the Canadian Kidney paired donation program works, and how we ship kidneys since the COVID pandemic. As well, we will discuss how to help patients find living donors and what to consider regarding social media. By providing education about the living donor program, we hope to increase the number of living kidney donors. The implications for nephrology practice and education would be to include living donor education as part of the routine information given to CKD patients and their families.

14. A MULTIFACETED PERITONEAL DIALYSIS TRAINING PROGRAM FOR NURSES

Lisa Robertson, RN, BScN, CNeph(C)¹ Jessica Gates, RN, BScN, CNeph(C)¹ Shaguftah Patel, RN, BScN, CNeph(C)¹

¹Peritoneal Dialysis Clinic, St. Joseph's Healthcare Hamilton, Hamilton, Ontario

Purpose: To develop a comprehensive peritoneal dialysis (PD) training program whereby nurses develop a basic competence in delivering PD and managing its complications.

Description: Peritoneal dialysis is a treatment option available to patients with end-stage renal disease. PD is a home therapy that is not available as an in-centre treatment. As a result, patients (or their family members) are either independent with PD or receive assistance from community nurses. When these patients are admitted to hospital, having inpatient nurses trained in PD allows the patient to continue receiving PD during their admission. Community nurses and, at times, the inpatient nurses have limited resources available to them, so need to be competent in the skill.

All initial PD training and routine recertification is provided jointly by the PD clinic and the PD nurse educator. The goal was to create a comprehensive training program that would provide a good foundation on which the nurses could practice safely and independently. Malcolm Knowles' principles of adult education were utilized in creating the workshop and recertification programs. Components of the workshop and recertification include: self-learning package, quizzes, case studies, videos, pictures, discussions, resources, and hands-on practice.

Evaluation and implications for practice: Evaluations from both the workshop and the recertifications have been extremely positive. The workshop and recertifications have been fine-tuned over the years based on feedback and general observations. Overall, nurses demonstrate competence in performing PD and applying concepts learned.

15. GUIDING BEST PRACTICE: ROUTINE USE OF ULTRASOUND IN HEMODIALYSIS IS IMPORTANT TO OPTIMIZE HEALTH, FUNCTION, AND LONGEVITY OF THE AV FISTULA/GRAFT

Christine Morton, BScN, CNeph UK¹ Rick Luscombe, BSN (retired)

¹Director of Renal Clinical Services and Education, Nipro Corporation Canada

In this presentation/workshop, we will review the uses of the handheld ultrasound device to enhance vascular access assessments, and ultrasound-guided needling and troubleshooting when clinically managing the arterio-venous fistulas (AVF) and arterio-venous grafts (AVG) for hemodialysis patients. Management strategies of AVF/AVG are evolving to include the routine use of ultrasound-guided needle insertion, which has been shown to offer short- and long-term health benefits for vascular access. We will review the use of ultrasound for clinical assessment, and how this tool can both enhance best practice and vascular access safety. The presentation will demonstrate how ultrasound can be used for routine assessment of AVF /AVG pre-dialysis to help the nurse with troubleshooting general access problems including needle repositioning during dialysis, as well as its use for ultrasound-guided needling. The simplicity and ease of use of a small handheld ultrasound makes this device easy to learn, handle and use. We will include training tools to assist with developing staff training for routine ultrasound to promote vascular access management and health.

Implications for nephrology care: Optimizing vascular access health and safety by the routine use of ultrasound, takes us another step closer to enhancing vascular access short- and long-term outcomes. Routine use of ultrasound with AVF/AVG enables the healthcare team to clinically manage the access, detect issues during dialysis, and promote optimal long-term access health.

CANNT Journal Manuscript Submission Guidelines

DESCRIPTION

CANNT Journal is a quarterly publication that showcases excellence in nephrology nursing and technological writing through peer-reviewed articles that examine current issues and trends in nephrology nursing and technological practice, education, and research. *CANNT Journal* is the official journal of the Canadian Association of Nephrology Nurses and Technologists and supports the association's mission to serve its membership by advancing the development of nephrology nursing and technological knowledge. The journal is indexed in MEDLINE and CINAHL.

EDITORIAL POLICIES

CANNT Journal welcomes manuscripts related to nephrology nursing and technological education, practice, research, or health policy. The manuscript must be the sole intellectual property of the authors. Once accepted, manuscripts become the permanent property of *CANNT Journal*, and may not be reproduced elsewhere without written permission from the publisher.

We prefer manuscripts that present new clinical information or address issues of special interest to nephrology nurses and technologists. In particular, we are looking for:

- Original research reports
- Relevant clinical articles
- Innovative quality improvement reports
- · Narratives that describe the nursing experience
- · Interdisciplinary practice questions and answers
- Literature or systematic reviews

We also encourage letters to the editor as a way to promote dialogue and alternative perspectives to articles published in *CANNT Journal*. Choose "Letters to the Editor" from the Section dropdown on the submissions page.

SUBMISSION DECLARATION

Submission of the article implies that the work described has not been published elsewhere (except in the form of an abstract or a published lecture), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and responsible authorities where the research was carried out, and that, if accepted, it will not be published elsewhere in the same form without the written consent of the copyright holder. Upon acceptance of the submitted material, the author(s) must transfer copyright ownership to *CANNT Journal*. Statements and opinions contained within the work will remain the responsibility of the author(s).

PEER REVIEW

CANNT Journal operates on a double-blind peer review process. The names of the reviewers will not be disclosed to the author(s) submitting the manuscript, and the name(s) of the author(s) will not be disclosed to the reviewers.

All contributions will be initially assessed by the editors for suitability for the journal. Manuscripts deemed suitable are sent to two independent expert reviewers to assess the quality of the paper. A manuscript will only be sent for review if the editors determine that the paper meets the appropriate quality and relevance requirements in keeping with the particular aim and scope of *CANNT Journal*.

The editors are responsible for the final decision regarding acceptance or rejection of the manuscript. Editors are not involved in decisions about papers that they have written themselves or have been written by family members or colleagues, or which relate to products or services in which the editor has an interest. All manuscript submissions are subject to the journal's usual independent peer review process.

The criteria for acceptance for all manuscripts include the quality and originality of the research or intellectual material, its significance/appeal to journal readership, and the general writing style.

PREPARING THE SUBMISSION

The following components are required for all submissions. Manuscripts that do not meet these requirements will be returned to the corresponding author for technical revisions before undergoing peer review.

The manuscript should be submitted in separate files in the following order: title page; abstract with key words; main text including references; and figures/tables. A cover letter may be supplied at the authors' discretion.

Title page

Include:

- Title of the manuscript (concise and informative)
- Short running title of fewer than 40 characters
- Full names, highest academic degrees, and affiliations of all authors with email address and telephone/fax number of corresponding author
- Authors' institutional affiliations (department, institution, city, country) where research work was conducted
- Any acknowledgements (including disclosure of funding), credits, or disclaimers, conflict of interest statement for all authors

Abstract and keywords

Submit structured or summary abstract of up to 250 words. Word limit includes headers in a structured abstract (e.g., *background*, *purpose*, *method*, *findings*, and *discussion*).

The abstract should be a succinct summary of the major issue, problem, or topic being addressed, and the findings and/or conclusions in the manuscript. It should not duplicate material in the main text. It should not contain subheadings, abbreviations, or reference citations.

Provide up to eight keywords that describe the contents of the manuscript.

Main text (manuscript, reference list)

Main text:

- Maximum length 15-20 pages, double-spaced
- Use the *Publication Manual of the American Psychological Association* (APA) 7th edition (copyright 2020) for style and format guidelines.
- As manuscripts are double-blind peer reviewed, the main text should not include any information that might identify the authors. Therefore, do not include any identifying information (i.e., authors' names).
- Number all pages consecutively in the upper right-hand corner.
- Cite tables/figures consecutively.
- Be sure to approve or remove all tracking changes in your Word document before uploading.

References:

- Use only sources from credible and high-quality journals.
- Double-spaced at the end of the manuscript
- Citations and reference list is to be styled according to the APA 7th edition (copyright 2020).
- Provide URL for all references where available.
- Ensure that every reference cited in the text is also present in the reference list (and vice versa).

Tables/figures

- Submit each table or figure as a separate file, and as editable text and not as an image.
- Prepare tables/figures according to APA 7th edition (copyright 2020).
- Cite tables/figures consecutively in the text, and number them in that order. Do not embed tables/figures in the manuscript text file.
- Number table and figure consecutively in accordance with their appearance in the text and place the title of the table/figure and any table/figure notes below the table/figure body.
- Use tables sparingly and ensure that the data presented in them clarify and supplement, rather than duplicate, results described in the main text. Only tables that are 3 manuscript pages or shorter will be accepted to be published within the article.
- Authors using previously published tables and figures must include written permission from the original publisher. Such permission must be attached to the submitted manuscript.



MANUSCRIPT SUBMISSION

Once the submission materials have been prepared in accordance with instructions in "Preparing the Submission" above, manuscripts must be submitted online at: https://cannt-acitn. ca/journal/ojs/index.php/canntj

New users must click "Register" at the upper right of the page. Once logged in, select "Submissions" from the "About" dropdown.

AFTER SUBMISSION

There are three stages of manuscript review prior to the final decision about the article's status for publication.

Preliminary

Preliminary review by the editors to determine the suitability of the article for peer review. The editors assess all manuscript presentation requirements including style and format of the manuscript.

Editorial peer review

The peer review process determines scholarly merit of the article. All manuscripts are reviewed by two members of the Editorial Review Panel. The acceptance criteria for all papers lie in the quality and originality of the work and its significance to journal readership. Manuscripts are only sent to reviewers if the editors determine that the paper merits further review.

Determination of eligibility for publication

After the peer review, the editors make a decision regarding the eligibility of the article for selection based on the comments and recommendations of the reviewers. Based on the peer review evaluation, the editors make one of the following decisions:

- Accept without revisions
- · Accept after completing minor revisions
- Re-submit after completing major revisions re-review by original reviewers
- Reject

AFTER ACCEPTANCE

Corresponding authors will receive a PDF proof of the article. The page proof should be carefully proofread for any copyediting or typesetting errors. It is the authors' responsibility to ensure that there are no errors in the proofs. Authors should also make sure that any renumbered tables, figures, or references match text citations and that figure legends correspond with text citations and actual figures. Proofs must be returned within the deadline specified by the editors.

Alterations to the proof that are beyond those required to correct errors or to answer queries, or are a reworking of previously accepted material will **not** be allowed. The editors reserve the right to deny any changes that do not affect the accuracy of the content.

POST PUBLICATION

The corresponding author will receive a hard copy of the journal issue as well as a PDF copy of the article.

If accepted, your article must not be published elsewhere in similar form, in any language, without the consent of the publisher. You may not post the PDF file of your copyedited article, or your final published article in any repository or online social media site.

OPEN ACCESS OPTION

Authors of accepted peer-reviewed articles have the choice to pay a fee to allow perpetual unrestricted online access to their published article to readers globally, immediately upon publication. This option has no influence on the peer review process. All manuscripts are subject to *CANNT Journal*'s standard double-blinded peer-review process and will be accepted or rejected based on their own merit.

The article processing charge of \$250.00 is charged on acceptance of the manuscript and should be paid within 5 days by the author(s). Payment must be processed for the article to be published open access.

CONFLICTS OF INTEREST AND SOURCE OF FUNDING

At the time of manuscript submission, authors should disclose any potential sources of conflict of interest, which includes any financial interest or relationship that might be perceived as influencing the authors' objectivity. The existence of a conflict of interest does not preclude publication. Authors must also declare if they have no conflict of interest to declare. Sources of funding should be included on the title page under the heading "Conflicts of Interest and Source of Funding." Each author must complete and submit the journal's copyright transfer agreement, which includes a section on the disclosure of potential conflicts of interest.

COPYRIGHT TRANSFER AGREEMENT

At the time of submission, the submitting author will be presented with the copyright transfer and conflict of interest form. Co-authors will receive an email with instructions to also complete the form in order to proceed with the review process.

EDITORIAL OFFICE CONTACT DETAILS

Jovina Bachynski and Rosa Marticorena, Editors cannt.journal1@gmail.com



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Lignes directrices pour la soumission des manuscrits au *Journal ACITN*

DESCRIPTION

Le Journal ACITN est une revue publiée trimestriellement qui met en valeur l'excellence des écrits sur les soins infirmiers et les technologies en néphrologie par le biais d'articles évalués par des pairs qui examinent les questions et les tendances actuelles de la pratique, de la formation et de la recherche dans ce domaine. Le Journal ACITN est la revue officielle de l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie et soutient la mission de l'association pour servir ses membres en perfectionnant le développement des connaissances en matière de soins infirmiers et de technologies en néphrologie. La revue est référencée dans les bases de données MEDLINE et CINAHL.

POLITIQUES RÉDACTIONNELLES

Le *Journal ACITN* accepte les manuscrits portant sur la formation, la pratique, la recherche sur les soins infirmiers et les technologies de néphrologie ou la politique en matière de santé. Le manuscrit doit être la propriété intellectuelle unique des auteurs. Une fois acceptés, les manuscrits deviennent la propriété permanente du *Journal ACITN* et ne peuvent être reproduits ailleurs sans l'autorisation écrite de l'éditeur.

Nous préférons les manuscrits qui présentent de l'information clinique nouvelle ou qui abordent des problématiques d'intérêt particulier pour les infirmières et infirmiers et les technologues en néphrologie. Plus précisément, nous recherchons :

- Rapports de recherche originaux;
- Articles cliniques pertinents;
- Rapports sur des approches innovatrices en matière d'amélioration de la qualité;
- Textes narratifs relatant une expérience de pratique infirmière ou technologique;
- Textes sous forme de questions et de réponses sur la pratique interdisciplinaire;
- Revues de littérature ou revues systématiques.

Nous encourageons également les tribunes libres sous forme de courrier des lecteurs comme moyen de promouvoir le dialogue et des perspectives de rechange aux articles publiés dans le *Journal ACITN*. Veuillez choisir « Courrier des lecteurs » dans le menu déroulant de la Section sur la page des soumissions.

DÉCLARATION RELATIVE À LA SOUMISSION

La soumission de l'article laisse entendre que l'œuvre décrite n'a pas été diffusée autre part (sauf sous la forme d'un résumé ou d'une présentation orale publiée), qu'elle n'est pas à l'étude pour publication ailleurs, que sa publication est approuvée par tous les auteurs et les autorités responsables où la recherche a été réalisée, et que, si elle est acceptée, elle ne sera pas publiée ailleurs sous la même forme sans le consentement écrit du titulaire du droit d'auteur. À l'acceptation du document soumis, le ou les auteurs devront transférer la propriété du droit d'auteur au *Journal ACITN*. Les déclarations et les opinions contenues dans l'œuvre demeurent la responsabilité de l'auteur ou des auteurs.

ÉVALUATION PAR LES PAIRS

Le *Journal ACITN* fonctionne selon un processus d'évaluation par les pairs à double insu. Les noms des évaluateurs ne seront pas divulgués à l'auteur ou aux auteurs qui auront soumis le manuscrit, de même que le ou les noms des auteurs ne seront pas divulgués aux évaluateurs.

Toutes les contributions seront initialement évaluées par les rédactrices en chef pour leur pertinence à la revue. Les manuscrits réputés acceptables sont envoyés à deux experts indépendants qui en évalueront la qualité. Un manuscrit ne sera envoyé pour évaluation que si les rédactrices en chef déterminent que le manuscrit répond aux exigences de qualité et de pertinence appropriées, conformément à l'objectif et au champ d'application particuliers du *Journal ACITN*.

Les rédactrices sont responsables de la décision définitive en ce qui a trait à l'acceptation ou au rejet du manuscrit. Les rédactrices en chef n'interviennent pas dans les décisions relatives aux articles qu'elles-mêmes ont rédigés ou que des proches ou des collègues ont écrits ou encore qui portent sur des produits ou services pour lesquels elles sont en conflit d'intérêts. Toutes les soumissions de manuscrit font l'objet du processus habituel d'évaluation par les pairs indépendants de la revue.

Les critères d'acceptation de tous les manuscrits comprennent la qualité et l'originalité de la recherche ou du matériel intellectuel, son importance ou son attrait pour le lectorat de la revue et le style d'écriture en général.

PRÉPARATION DE LA SOUMISSION

Les éléments suivants sont requis pour toutes les soumissions. Les manuscrits qui ne répondent pas à ces exigences seront renvoyés à l'auteur-ressource en vue de révisions techniques avant d'être soumis à l'évaluation par les pairs.

Le manuscrit doit être soumis en fichiers séparés dans cet ordre : page titre; résumé avec mots clés; corps du texte incluant les références; et les figures ou les tableaux. Une lettre de présentation peut être fournie à la discrétion des auteurs.

Page titre

Inclure :

- Titre du manuscrit (concis et descriptif)
- Titre court comptant moins de 40 caractères
- Nom complet, diplôme de plus haut grade et affiliations de tous les auteurs, adresse courriel et numéros de télé-phone/télécopieur de l'auteur-ressource
- Affiliations institutionnelles des auteurs (département, établissement, ville, pays) où les travaux de recherche ont été réalisés
- Tous les remerciements (y compris la divulgation du financement), les crédits ou les avertissements, un énoncé de conflit d'intérêts pour tous les auteurs

Résumé avec mots clés

Soumettre un résumé structuré ou succinct de 250 mots au maximum. La limite de mots inclut les en-têtes dans un résumé structuré (p. ex., *contexte*, *objet*, *méthode*, *résultats* et *discussion*).

Le résumé doit être une description succincte de la question, du problème ou du sujet principal abordé dans le manuscrit, ainsi que les résultats ou conclusions présentés. Il ne doit pas reproduire le corps du texte. Il ne doit pas contenir de sous-titres, d'abréviations ou de citations de référence.

Fournir jusqu'à huit mots clés qui décrivent le contenu du manuscrit.

Corps du texte (manuscrit, liste de référence) Corps du texte :

- Longueur maximum de 15 à 20 pages, à double interligne
- Se servir du guide de style *Publication Manual of the American Psychological Association* (APA), 7^e édition (droit d'auteur 2020) pour les lignes directrices en matière de style et de format
- Comme les manuscrits font l'objet d'une évaluation par des pairs à double insu, le corps du texte ne doit inclure aucune information pouvant servir à identifier les auteurs. Par conséquent, il ne faut pas inclure de renseignements d'identification (p. ex., noms des auteurs)
- Paginer sans interruption dans le coin supérieur droit
- Citer les tableaux ou les figures à la suite
- S'assurer d'approuver ou d'éliminer toutes les modifications de suivi de votre document Word avant le téléversement

Références :

- N'utiliser que des sources publiées dignes de foi et de qualité
- À double interligne à la fin du manuscrit
- La liste de citations et de références doit être conforme au guide de style de l'APA, 7^e édition (droit d'auteur 2020)
- Fournir les adresses URL pour toutes les références, le cas échéant
- S'assurer que toutes les références citées dans le texte figurent dans la liste de référence (et vice versa)

Tableaux ou figures

- Soumettre chaque tableau ou figure dans un fichier séparé, sous forme modifiable et non sous forme d'image
- Préparer les tableaux ou les figures selon le guide de style de l'APA, 7^e édition (droit d'auteur 2020)
- Citer les tableaux ou les figures à la suite dans le texte et les numéroter dans cet ordre. Ne pas incorporer les tableaux ou les figures dans le fichier texte du manuscrit
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- Utiliser les tableaux avec retenue et s'assurer que les données qui y sont présentées clarifient et complètent les résultats décrits dans le corps du texte, sans toutefois les reproduire. Seuls les tableaux sur 3 pages de manuscrit ou moins seront acceptés aux fins de publication dans l'article.
- Les auteurs qui utilisent des tableaux ou des figures précédemment publiés doivent inclure l'autorisation écrite de l'éditeur original. Cette autorisation doit être jointe au manuscrit soumis.

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APRÈS LA SOUMISSION

L'examen du manuscrit se déroule en trois étapes avant que la décision ultime soit prise sur le statut de l'article aux fins de publication.

Examen préliminaire

Examen préliminaire par les rédactrices en chef afin de déterminer la pertinence de l'article aux fins d'évaluation par les pairs. Les rédactrices en chef examinent toutes les exigences de présentation de manuscrits, notamment le style et le format du manuscrit.

Évaluation rédactionnelle par les pairs

Le processus d'évaluation par les pairs détermine la valeur scientifique de l'article. Tous les manuscrits sont évalués par deux membres du comité d'évaluation rédactionnelle. Les critères d'acceptation pour tous les textes reposent sur la qualité et l'originalité de l'œuvre et sur son importance aux yeux du lectorat de la revue. Les manuscrits sont envoyés aux évaluateurs uniquement si les rédactrices en chef décident que le texte mérite un examen plus approfondi.

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Après l'évaluation par les pairs, les rédactrices en chef prennent une décision concernant l'admissibilité de l'article à la sélection en se fondant sur les commentaires et les recommandations des évaluateurs. Selon l'évaluation par les pairs, les rédactrices en chef prennent l'une des décisions suivantes :

- Accepter le manuscrit sans modifications
- Accepter le manuscrit une fois les modifications mineures apportées
- Soumettre de nouveau le manuscrit une fois les modifications majeures apportées – réévaluation par les évaluateurs d'origine
- Rejeter le manuscrit

APRÈS L'ACCEPTATION

Les auteurs-ressources recevront une épreuve en format PDF de l'article. L'épreuve d'imposition doit être soigneusement relue afin de détecter toute erreur d'édition ou de composition. Il incombe aux auteurs de s'assurer que les épreuves sont exemptes d'erreurs. Les auteurs doivent également s'assurer que les tableaux, les figures ou les références renumérotés correspondent aux citations du texte et que les légendes des figures correspondent aux citations du texte et aux figures réelles. Les épreuves doivent être renvoyées dans le délai précisé par les rédactrices en chef.

Les modifications apportées à l'épreuve qui vont au-delà de ce qui est nécessaire pour corriger des erreurs ou pour répondre à des questions ou qui constituent un remaniement du matériel précédemment accepté **ne** seront **pas** permises. Les rédactrices en chef se réservent le droit de rejeter toute modification qui n'influe pas sur l'exactitude du contenu.

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L'auteur-ressource recevra une copie papier du numéro de la revue ainsi qu'une copie PDF de l'article.

S'il est accepté, votre article ne doit pas être publié nulle part ailleurs sous une forme similaire, en toute autre langue, sans le consentement de l'éditeur. Vous ne pouvez pas publier le fichier PDF de votre article révisé ou de votre article définitif publié dans un service d'archives ou sur un site de médias sociaux en ligne.

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Les auteurs d'articles acceptés dans le cadre d'une évaluation par les pairs peuvent choisir de payer une redevance pour permettre aux lecteurs du monde entier d'accéder en ligne à leur article publié, sans restriction et à perpétuité, dès sa publication. Cette option n'a aucune influence sur le processus d'évaluation par les pairs. Tous les manuscrits font l'objet d'un processus standard d'évaluation par les pairs à double insu et seront acceptés ou refusés en fonction de leur propre valeur.

Des frais de traitement de l'article de 250,00 \$ sont facturés à l'acceptation du manuscrit et doivent être payés dans les cinq (5) jours par le ou les auteurs. Le paiement doit être traité pour que l'article soit publié en accès libre.

CONFLITS D'INTÉRÊTS ET SOURCE DE FINANCEMENT

Au moment de la soumission du manuscrit, les auteurs doivent divulguer toute source potentielle de conflit d'intérêts, ce qui inclut toute relation ou tout intérêt financier qui pourrait être perçu comme influençant leur objectivité. La présence d'un conflit d'intérêts n'empêche pas la publication. Les auteurs doivent également déclarer qu'ils n'ont aucun conflit d'intérêts à déclarer. Les sources de financement doivent figurer sur la page titre sous la rubrique « Conflits d'intérêts et source de financement ». Chaque auteur doit remplir et soumettre le formulaire d'entente de transfert du droit d'auteur de la revue, lequel comprend une section sur la déclaration de conflits d'intérêts potentiels.

ENTENTE DE TRANSFERT DU DROIT D'AUTEUR

Au moment de la soumission, l'auteur qui soumet un manuscrit recevra un formulaire d'entente de transfert du droit d'auteur et de déclaration de conflits d'intérêts. Les coauteurs recevront des directives par courriel pour aussi remplir le formulaire afin d'amorcer le processus d'évaluation.

COORDONNÉES DU BUREAU DE LA RÉDACTION

Jovina Bachynski et Rosa Marticorena, rédactrices cannt.journal1@gmail.com