



CANNT|ACITN

Canadian Association of Nephrology Nurses and Technologists

L'Association canadienne des infirmières et infirmiers et des technologues de néphrologie

CANNT JOURNAL JOURNAL ACITN

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By Amanda Carroccia and Marisa Battistella



Sharing Our Stories DOWN BY THE RIVER

CANNT | ACITN 2019
October 24-26 EDMONTON Alberta



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Letter from the Editor

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In this issue, we are granted inside-baseball access into the world of post transplant care. An important mandate of the *CANNT Journal* is to showcase excellence in nephrology writing on topics that encompass all aspects of nephrology care, i.e., from pre-dialysis to a palliative approach to renal care. Over the years, we have been afforded glimpses into the different areas of nephrology nursing and technological practice that are not necessarily familiar to us. This issue is no different.

Famure et al.'s submissions, *Assessing the perceptions of kidney transplant recipients regarding their post-transplant primary care and Barriers to the long-term care of kidney transplant recipients: A survey of general nephrologists in Canada*, provide important information on the sustainability of post-transplant care for kidney transplant recipients (KTRs). This can have a significant impact on the nephrology staff in general, particularly for nurses in both dialysis and transplant care settings, as we seek ways to ensure that our KTRs remain healthy post-transplant. As the saying goes, it takes a village ... In *Barriers*, Famure et al. look at the perceptions and attitudes of Canadian nephrologists towards caring for KTRs. Surprisingly, it appears that general nephrologists in Canada are not very comfortable in the management of post-transplant care of KTRs. In *Perceptions*, it seems that the majority of the KTRs are comfortable with their care by the primary care physicians. Famure et al. note that these family physicians are an underutilized resource, which has important implications for comprehensive post-transplant care. Underlying all this is the value of a collaborative model of patient care, which is an ideal that all of us in this interconnected world of nephrology should ascribe to.

In this issue, Carroccia and Battistella provide a fulsome discussion on the prevention and treatment

of hepatitis C (HCV). As a stark reminder, the authors note that there is no vaccine that protects against HCV infection, underscoring the need for the adherence to effective prevention strategies in HCV transmission, particularly for patients on dialysis. The authors, however, reassure that, although HCV is a public health concern in CKD, it is estimated that it should become rare by 2025 with the implementation of current screening guidelines and effective treatment strategies.

In keeping with the theme of *Sharing our stories down by the river* for CANNT 2019, we proudly present the abstracts that will be showcased in Edmonton on October 24–26. This collection of abstracts captures the varied interests of the four corners of renal replacement therapy: peritoneal dialysis, hemodialysis, transplant, and conservative/palliative approach to care. There is something for everyone. Edmonton 2019 promises to deliver another banner year of oral and poster presentations. Please take a moment to read through the abstracts. May these abstracts inspire a spirit of inquiry in each and every one of you to share what works best in your practice, or question and, thus, improve upon, elements in your practice that do not. The *CANNT Journal* is exactly the platform for everyone to do this. I am on a perpetual quest to publish original research papers, relevant clinical articles, innovative quality improvement reports, and narratives that describe the nephrology nursing (and technological) experience. Publishing such pieces is an enriching process of nurturing authors and their quality work. I would love to hear from budding and seasoned authors who have something to share about their experience in topics related to renal care in Indigenous communities, peritoneal dialysis, and pre-dialysis care, to name just a few.

Finally, in 2018, it was noted that the *CANNT Journal* was venturing

into limited open-access (OA) publication with the publication of Marticorena et al.'s research study (*Ultrasound evaluation of intraluminal needle position during hemodialysis: Incidental findings of cannulation complications*, 28(2), 39–46). After careful review, the Board of Directors has agreed to open this option to prospective authors and their published work. All manuscripts under consideration for publication in the *CANNT Journal* undergo a rigorous peer review and editing before they are deemed ready for publication. With the advent of limited OA at this time, authors may now have the option to

pay a fee to grant online access to their respective articles to the online community at large. The *CANNT Journal* is an internationally known peer-reviewed publication whose published works are often cited, but not accessible to non-members of CANNT. Expanding the reach of OA to our authors will ensure access to such important work on a truly global scale.



**Sincerely,
Jovina Bachynski,
MN, RN(EC),
CNeph(C)
Editor, CANNT
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Le Journal ACITN est la publication officielle de l'Association canadienne des infirmiers/ infirmières et technologues en néphrologie, a/s 4 Cataraqui St., Suite 310, Kingston, ON K7K 1Z7, téléphone : (613) 507-6053, télécopieur : 1-866-303-0626, Courriel : cannt@cannt.ca. 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 disponibles, 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, 4 Cataraqui St., Suite 310, Kingston, ON K7K 1Z7.

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JOVINA BACHYNSKI

Lettre de la rédactrice en chef

Ce numéro nous offre un accès d'initiation dans le monde des soins postérieurs à la transplantation. Un mandat important du *CANNT Journal* est de promouvoir l'excellence de la littérature en néphrologie sur des sujets qui englobent tous les aspects des soins néphrologiques, de la prédialyse à l'approche palliative des soins rénaux. Au fil des ans, le journal a donné un aperçu de domaines divers et parfois méconnus des soins infirmiers et de la pratique technologique en néphrologie. Ce numéro n'y fait pas exception.

Les articles de Famure et ses collaborateurs, « *Assessing the perceptions of kidney transplant recipients regarding their post-transplant primary care* » et « *Barriers to the long-term care of kidney transplant recipients: A survey of general nephrologists in Canada* », fournissent des renseignements importants sur la durabilité des soins postérieurs à la transplantation pour les receveurs d'une greffe rénale. Ces informations peuvent avoir d'importantes répercussions pour l'ensemble du personnel en néphrologie, particulièrement pour les infirmières et infirmiers qui travaillent à la fois en dialyse et en transplantation, étant donné que l'on cherche des façons de s'assurer que les receveurs d'une greffe rénale demeurent en santé après leur transplantation. Comme le dit le proverbe, ça prend tout un village... Dans « *Barriers* », Famure et ses collaborateurs s'intéressent aux perceptions et aux attitudes des néphrologues canadiens envers les soins fournis aux receveurs d'une greffe rénale. Étonnamment, il en ressort que les néphrologues généraux du Canada ne sont pas très à l'aise avec la prise en charge des soins postérieurs à la transplantation fournis aux receveurs d'une greffe rénale. Dans « *Perceptions* », il semble que la majorité des receveurs d'une greffe rénale sont satisfaits des soins prodigués par les médecins en soins primaires. Famure et ses collaborateurs remarquent que

ces médecins de famille constituent une ressource sous-utilisée, ce qui est lourd de conséquences pour la prestation de soins postérieurs à la transplantation complets. Tout ceci repose sur la valeur d'un modèle collaboratif de soins aux patients, un idéal auquel nous devrions tous souscrire dans l'univers interconnecté de la néphrologie.

Dans ce numéro, Carroccia et Battistella procèdent à une discussion approfondie de la prévention et du traitement de l'hépatite C (VHC). Les auteurs font remarquer qu'il n'y a aucun vaccin qui protège contre l'infection par le VHC, rappel brutal soulignant la nécessité d'adhérer à des stratégies de prévention efficaces contre la transmission du VHC, surtout pour les patients dialysés. Cependant, les auteurs se font rassurants en expliquant que même si le VHC est une préoccupation de santé publique en matière d'insuffisance rénale chronique, on estime que le nombre de cas devrait diminuer d'ici 2025 avec la mise en œuvre des lignes directrices de dépistage actuelles et de stratégies de traitement efficaces.

Dans l'esprit du thème *Sharing our stories down by the river* du congrès annuel 2019 de l'ACITN, nous sommes fiers de partager les résumés qui seront présentés à Edmonton du 24 au 26 octobre. Cette collection de résumés regroupe les intérêts variés des quatre volets du traitement de suppléance rénale : la dialyse péritonéale, l'hémodialyse, la transplantation et l'approche palliative/conservatrice des soins. Chacun y trouvera son compte. Le congrès annuel 2019 d'Edmonton promet d'être une autre année exceptionnelle en matière d'exposés oraux et de présentations sur affiches. Je vous invite d'ailleurs à prendre un moment pour parcourir les résumés. J'espère qu'ils inspireront à chacun d'entre vous un esprit de curiosité qui vous amènera à partager ce qui fonctionne le mieux dans

vosre pratique, ou à remettre en question – et donc à améliorer – ce qui fonctionne moins bien. Le *CANNT Journal* est la plateforme tout indiquée pour que tous puissent y parvenir. Je cherche toujours à publier des travaux de recherche originaux, des articles cliniques pertinents, des rapports novateurs d'amélioration de la qualité, et des récits décrivant l'expérience des soins infirmiers (et de la technologie) en néphrologie. La publication de tels textes constitue un processus enrichissant qui soutient les auteurs et leurs travaux de qualité. J'aimerais énormément entendre ce que les auteurs, débutants comme chevronnés, ont à partager sur leur expérience en matière de sujets liés aux soins rénaux dans les communautés autochtones, à la dialyse péritonéale et aux soins de pré-dialyse, pour ne nommer que ceux-ci.

Enfin, en 2018, il a été mentionné que le *CANNT Journal* se lançait dans la publication en libre accès limité avec la publication de l'étude de recherche de Marticorena et coll. (« *Ultrasound evaluation of intraluminal needle position during hemodialysis: Incidental findings of cannulation complications* », 28[2], 39–46). Après un examen minutieux, le Conseil

d'administration a accepté d'offrir cette option aux auteurs intéressés et à leurs travaux publiés. Tous les manuscrits considérés pour publication dans le *CANNT Journal* sont soumis au préalable à un processus d'évaluation et de révision rigoureux par les pairs avant d'être prêts à être publiés. Actuellement, avec l'introduction du libre accès limité, les auteurs peuvent désormais avoir l'option de payer les droits d'accès en ligne à leurs articles pour l'ensemble de la communauté en ligne. Le *CANNT Journal* est une publication de renommée internationale évaluée par les pairs dont les travaux publiés sont souvent cités, mais non accessibles aux personnes qui ne sont pas membres de l'ACITN. En élargissant la portée du libre accès à nos auteurs, nous nous assurerons que des travaux aussi importants seront accessibles à l'échelle mondiale.



**Cordialement,
Jovina Bachynski,
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Message from the President

We recently celebrated the Canadian Nurses Association (CNA) *National Nursing Week* on May 6–12, 2019. The theme this year was *Nurses: A Voice to Lead—Health for All*, which was developed by the International Council of Nurses (ICN). *National Nursing Week* “draws attention to nurses, increasing the awareness of the public, policy-makers and governments of the many contributions of nursing to the well-being of Canadians” (CNA, 2019). I reflected on this statement and began to wonder how each of us expands our self-awareness that we are the leaders in kidney healthcare delivery in Canada. The leadership opportunities and voice that each of us possesses is a fundamental part of our profession and is supported by our expert content knowledge, highly advanced assessment skills, effective communication abilities, commitment and respect. Nursing is one of society’s

most valued and trusted professions. It is, therefore, up to us to use our voice to lead each and every day in our practice to improve the care and outcomes of people living with kidney disease. We can make a substantial difference if we continue to advocate for our patients, promote the value of our profession and push for improvements within the renal healthcare systems where we work.

I have said this in the past and I will repeat it—the sustainability of CANNT is determined by our membership and our annual conference attendance. I want each of you to use your voice to recruit your peers to become a member, visit our website, reach out to me to hear more about our professional association, become involved in CANNT, and bring your voice to engage others to join CANNT. Together we can strengthen our association and continue to advance our profession, advocate for the interests

of our membership, and provide value to our community of renal professionals.

CANNT embraces all renal professionals and acknowledges your contributions to caring for our renal community of patients and families across Canada. As your president, I want you to know that I will continue to “speak up” for nephrology nurses and technologists at every opportunity that comes my way.



**With respect,
Janice MacKay
CANNT President
2018–2020**

REFERENCE

Canadian Nurses Association. (2019). *National Nursing Week 2019*. Retrieved from <https://www.cna-aic.ca/en/events/national-nursing-week#datetime>

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Le mot de la présidente

Nous avons récemment célébré la Semaine nationale des soins infirmiers de l'Association des infirmières et des infirmiers du Canada (AIIC), qui s'est déroulée du 6 au 12 mai 2019. Cette année, le thème était Une voix faite pour diriger – La santé pour tous, proposé par le Conseil international des infirmières (CII). La Semaine nationale des soins infirmiers « attire l'attention sur les infirmières et infirmiers, sensibilise davantage le public, les responsables des politiques et les gouvernements aux nombreuses contributions que les soins infirmiers apportent au bien-être de la population canadienne » (AIIC, 2019). Je me suis penchée sur cet énoncé et j'ai commencé à me demander comment chacun de nous arrive à prendre conscience de son rôle de chef de file en matière de prestation de soins de santé rénaux au Canada. Nos voix et nos occasions d'exercer une influence constituent un aspect fondamental de notre profession, soutenues par notre expertise, nos compétences très avancées en évaluation, nos aptitudes de communication efficaces, notre engagement et notre respect. Les soins infirmiers sont

l'une des professions les plus valorisées et dignes de confiance de notre société. C'est donc à nous d'utiliser notre voix pour donner l'exemple chaque jour dans notre pratique en vue d'améliorer les soins et les résultats pour les personnes atteintes de néphropathie. Nous pouvons avoir un poids considérable si nous continuons à défendre les intérêts de nos patients, à promouvoir la valeur de notre profession et à réclamer des améliorations dans les systèmes de soins de santé rénale au sein desquels nous travaillons.

Je l'ai dit par le passé et je continuerai à le répéter : la pérennité de l'ACITN est déterminée par ses membres et leur participation au congrès annuel. Je veux que chacun de vous utilise sa voix pour recruter des membres parmi ses pairs, visite notre site Web, communique avec moi afin d'en savoir plus sur notre association professionnelle, s'investisse dans l'ACITN et encourage les autres à rejoindre l'ACITN. Ensemble, nous pouvons renforcer notre association et continuer de faire progresser notre profession, de défendre les intérêts de nos membres et d'ajouter de la valeur à notre

communauté de professionnels travaillant en néphrologie.

L'ACITN accueille tous les professionnels de la néphrologie et reconnaît l'attention qu'ils portent aux patients et aux familles qui composent notre communauté de la néphrologie partout au Canada. En ma qualité de présidente, je veux que vous sachiez que je continuerai de défendre les intérêts du personnel infirmier et des technologues en néphrologie chaque fois que j'en aurai l'occasion.

Recevez mes salutations distinguées.



Janice MacKay
Présidente de
l'ACITN 2018-2020

RÉFÉRENCE

Association des infirmières et des infirmiers du Canada (2019). *Semaine nationale des soins infirmiers 2019*. Accessible à l'adresse : <https://www.cna-aiic.ca/fr/activites-speciales/semaine-nationale-des-soins-infirmiers#datetheme>



We are very excited to welcome Canadian nephrology professionals—nurses, technologists, administrators, researchers, pharmacists, and more—to CANNT/ACITN 2019 hosted in Edmonton, Alberta! As is our tradition, this year’s conference promises a multitude of learning opportunities for all nephrology professionals.

Experience all the CANNT/ACITN 2019 has to offer:

- Collaborate, network, and learn as we “*share our stories down by the river*” in nephrology nursing and technological practice.
- Participate in the plenary sessions, concurrent sessions, workshops, poster presentations, and learning opportunities presented by our members and corporate sponsors.
- Join your colleagues at this year’s CANNT/ACITN Evening of Entertainment—a not-to-be-missed social evening at the River Cree Entertainment Centre!

Whatever you choose, this year’s conference is sure to be an event to remember.

Hosted at the River Cree Resort and Casino, this conference will re-energize, motivate, and engage you! Register today! CANNT/ACITN 2019 information is available at www.cannt.ca

ABSTRACTS

CANNT/ACITN’s mission is to provide leadership and promote excellence in nephrology care through education, research, and communication. CANNT/ACITN’s goals encompass the promotion of best practice through the provision of educational and networking opportunities, and the promotion of evidence-based practice. CANNT/ACITN’s national conference, CANNT/ACITN 2019, is the perfect platform for accomplishing these goals. We are pleased to print the abstracts that will be presented in oral and poster formats at this year’s annual conference in this issue of the *CANNT Journal*.

The following abstracts celebrate the diversity of key topics in nephrology nursing and technological practice that are being investigated and discussed across Canada. It is our hope that CANNT/ACITN members interested in pursuing a profiled topic will contact the CANNT/ACITN National Office at 613-507-6053 or cannt@cannt.ca to receive information regarding how to contact the respective author about their work. We encourage you to carefully review these abstracts!

ORAL PRESENTATIONS

1. IMPROVING CARE AND OVERCOMING BARRIERS THROUGH LEARNINGS FROM OUR PATIENTS AND FAMILIES

Ethel Macatangay, MHSM, BScN, RN, CNeph(C), Scarborough Health Network, Scarborough, ON
Andrea Goertzen, BN, RN, CNeph(C), MB
Angela Robinson, RN, (CNeph(C), BC
Sharon McDonald, BN, RN, CMSN(C), CNeph(C), NL

SIGNhd is a vendor-sponsored nursing interest group specializing in home dialysis. This forum allows for shared practices and approaches to care within dialysis programs throughout Canada. In sharing inspiring patient and family stories about overcoming difficult barriers to home hemodialysis (HHD) and demonstrating success in carrying out HHD independently, HHD nurse leaders learned some valuable lessons in hearing each respective patient's story.

Patients know themselves best, especially when it comes to their capabilities and limitations. As care providers, we are often quick to make assumptions about our patients and families' abilities to do HHD successfully as the "lens" we use often reflects our own biases and perceptions on what would constitute a "successful start" onto home hemodialysis.

We will share patient and family stories from four home hemodialysis programs across Canada (Newfoundland, Manitoba, British Columbia, and Ontario) and the innovative solutions developed in helping to support patients and their families complete their hemodialysis successfully at home.

Teaching patients and families the clinical aspects of HHD, and enabling them to apply their own strategies, as part of the care plan, are what leads to success. Care providers having the patience and willingness to work with their patients and families to create integrated and individualized strategies that dealt with what would otherwise have been barriers to HHD led to ideal patient and family outcomes in all patient stories shared among members of our nursing interest group.

2. RENAL TRANSPLANT: A LICENSE TO EAT?

Susan L. Martin, RD, University of Alberta Hospital, Edmonton, AB

Does a new kidney mean saying good-bye to old dietary restrictions? Spoiler alert: No. Follow the journey of a patient with chronic kidney disease as they venture to navigate the world of diet and kidney transplantation. Discover what the kidney transplant diet encompasses, as we review dietary recommendations that can help patients recover from surgery, maintain nutritional requirements, and minimize side effects of immunosuppression. Food safety, food-drug interactions, and the risk of post-transplant diabetes will be discussed. This presentation brings to light the impact that healthy eating can have on successful kidney transplantation.

3. ECO FUTURE USING ECO FEATURES IN DIALYSIS: WATER AND DIALYSATE SAVING WITHOUT COMPROMISING ADEQUACY

Maria Teresa Parisotto, RN, Fresenius Medical Care

Introduction: The current trend towards "greening" dialysis is evident. "Going green", however, requires more than just the desire to do the right thing; it requires careful management of natural resources consumption.

Objective: To provide adequate Kt/V while reducing dialysate consumption by adapting the dialysate flow to the blood flow rate using a ratio ≤ 1.2 .

Method: 1,969 patients from 24 dialysis centres were enrolled for a follow-up from January until November 2014. The parameters evaluated were: dialysate flow rate, treatment time, Kt/V, and blood flow rate.

Results: The project period parameters were analysed and compared to previous treatment results. The dialysate flow rate was reduced from 488.2 ± 77 mL/min to 420.7 ± 71 mL/min ($p < 0.0001$) while increasing treatment time from 236 ± 14 min to 240 ± 20 min ($p < 0.0001$). This resulted in a reduction of dialysate consumption from 115.21 litres to 100.97 litres per treatment. The dialysate saved in 11 months was 2,036 litres (requiring 3,054 litres of water for production) per patient.

Although dialysate consumption decreased, the dialysis dose improved from a Kt/V of 1.47 ± 0.43 in January 2014 to a Kt/V of 1.79 ± 0.39 in November 2014 ($p < 0.0001$). Moreover, an increase in the blood flow rate from 382.8 ± 55 mL/min to 394.2 ± 61 mL/min ($p < 0.0001$) was achieved.

Conclusion: Considerable savings in dialysate and water were achieved; the Kt/V recommended by the European Renal Best Practices guidelines was achieved in every patient. Thus, the use of technology can be beneficial with regard to quality, costs optimization, and environment.





4. Peritoneal dialysis (PD) unit orientation for new PD nurses: the London Health Sciences Centre (LHSC) checklist approach

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For many years, PD staff at the London Health Sciences Centre PD Unit remained consistent with minimal staff turnover. An unprecedented number of retirements left our PD unit staffed with only one to two expert PD staff nurses. This presented many challenges including the need to have enough “seasoned” staff to train new patients and staff, as well as provide home visits, clinic follow-up, and ongoing troubleshooting and problem-solving to minimize patient attrition.

Join us on a journey of PD orientation from program development to implementation and follow-up. This presentation will follow the story of the clinical administrator, clinical consultant, and novice PD nurse as they navigate PD orientation.

This presentation will explore the steps in developing our PD Staff Nurse Orientation Plan, as well as share the tool that was developed and provide feedback from nurses who utilized the new plan for PD orientation.

5. Our unique vascular access approach: Transhepatic central venous catheter

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Purpose: A plan to establish functional non-conventional vascular access (VA) became necessary for our patient’s survival. This case report describes a unique approach for a patient who is not a candidate for conventional VA procedures.

Description: Our patient had multiple thrombosed upper extremity arteriovenous (AV) accesses, bilateral central vein occlusion, several catheter-related bacteremias and hospitalizations, and is currently receiving dialysis with a tunneled femoral central venous catheter (CVC).

After discussion with interventional radiologists, vascular surgeons, and nephrologists, the plan of care included establishing short-term central VA, removing the CVC, and surgical placement of a left leg AV graft (AVG) as the definitive VA.

The interventional radiologist considered translumbar and transhepatic catheter approaches; however, due to the possibility of thrombosis of the inferior vena cava with a translumbar approach and the plan for placement of a leg AVG, our patient was scheduled for a transhepatic approach.

Evaluation and outcomes: A right tunneled transhepatic catheter was successfully inserted, and the CVC was removed. Five days later, a left leg AVG was placed, and cannulation was initiated 25 days after surgery. The transhepatic catheter was removed 38 days after surgery.

Implications for nephrology practice/education: Due to the risks of bleeding, dislodgement, and catheter migration associated with transhepatic catheters, the patient was hospitalized and closely monitored. Nurses on the nephrology unit and in hemodialysis played a vital role ensuring the catheter remained in situ, and successfully maintained cannulation, thereby allowing for the removal of the transhepatic catheter. Our single patient experience proved to be highly successful and may be considered for patients who have exhausted conventional VA options.

6. What’s bugging your patient?

Margie Kensah, RN, CNeph(C), Baxter Healthcare Canada

Description: This presentation includes information on identifying infection in PD including: (1) a review of the ISPD recommendations on peritonitis rates, and (2) discussion of lab tests that are commonly used to diagnose peritonitis, taking a “behind-the-scenes” look at how the specimens are processed including the WBC count with differential, the Gram stain, and culture and sensitivity. In addition, several common peritonitis-causing organisms will be presented, with description of their attributes and the suggested treatment. The 2016 ISPD Guideline update on catheter removal and re-insertion is also reviewed. Finally, key management strategies to help prevent peritoneal dialysis-related infections will be discussed in terms of the importance of root cause analysis, catheter placement, training programs, connection methods, exit-site care, as well as prevention of bowel-source infections. Real scenarios will be discussed throughout this presentation.

Target audience: PD nurses and nephrology staff members and nurses (chronic kidney disease, transplant, and hemodialysis) who wish to expand their knowledge related to infectious complications. It will also benefit nurses studying for their CNeph(C) exam.

Learning objectives:

1. Identify infections related to PD.
2. Describe lab tests that are commonly used to confirm diagnosis of peritonitis.
3. Discuss attributes of common peritonitis-causing organisms.
4. List key management strategies to help prevent peritoneal dialysis-related infections.

7. Six domains of quality: Evaluating an intradialytic exercise program

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Description: There is a growing interest in exercise programs in hemodialysis (HD) units. Intradialytic exercise (IDE) programs have primarily focused on measures of physical function. However, the literature on program structure and processes is limited. We applied the six domains of quality: effectiveness, appropriateness, accessibility, efficiency, acceptability, and safety to evaluate an IDE program over a 13-month period in Alberta Kidney Care North dialysis outpatient centres.

Evaluation and outcomes: Our strongest domain of quality was effectiveness. From 275 baseline assessments conducted, the six-minute walk test improved from a baseline of 243 m ($SD = 143$ m) to 298 m ($SD = 145$ m) ($p < 0.001$), and the 30-second sit-to-stand outcome measures improved from 4 ($SD = 0.9$) to 9 ($SD = 5.12$) ($p < 0.001$) at six months. The weakest quality domain was acceptability. Follow-up data at six and 12 months were missing for approximately 70% and 85% of the cohort, respectively. Program discharge criteria were not defined. Therefore, an explanation for incomplete reassessment data such as illness, transplant, death, loss of interest, or decline in reassessment was unknown. Adherence rates were unknown due to an apparent low level of HD unit staff engagement to document exercise participation.

Implications: Our IDE program is effective. However, we must develop a comprehensive set of common quality indicators to improve acceptability. To conduct a Plan-Do-Study-Act (PDSA) cycle, detailed information on acceptability is required including reasons for program discharge and for non-attendance at reassessments, program participation, and discharge criteria, and a measure of patient satisfaction with the IDE program.

8. A quality improvement initiative for catheter-related bacteremia

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Purpose: To develop a standardized approach for the diagnosis, management, and treatment of catheter-related bacteremia (CRB).

Description: Long-term use of central venous catheters (CVC) for hemodialysis (HD) is associated with increased morbidity, mortality, infection, and hospitalization. Programs are encouraged to implement strategies known to reduce infection, including the importance of hand washing for staff and patients, timely and appropriate diagnosis and treatment of catheter-related infections, and reducing long-term catheter use in suitable patients.

The vascular access coordinator, in collaboration with home HD nurses, renal pharmacist, educator, and manager, initiated a CRB working group with the goal of implementing program-wide best practices and quality improvements (QI) aimed at reducing CRB. At monthly meetings, the team reviewed best practices and recommendations, examined local practices, and created CRB documents to develop a standardized approach for our HD patients on conventional, short daily, and nocturnal therapies.

Evaluation/outcomes: After consulting the nephrologists regarding appropriate medication, dosing, and treatment duration, CRB documents were sent to nephrologists, nurse practitioner, renal pharmacists, program managers, and medical director for review and approval, and implementation across our program. As a result of our QI initiative, all episodes of CRB for home and facility-based HD patients are reviewed, and confirmed CRB are reported monthly and results shared with staff.

Implications for nephrology practice/education: The home hemodialysis nurses' valuable contribution facilitated





a program-wide QI initiative for the diagnosis, management, and treatment of CRB. Nurses reported that the QI initiative was collaborative, improved knowledge sharing, and assisted them in informed discussions with the nephrologist and nurse practitioner when advocating for their patients.

9. Fluid control in hemodialysis patients: Too much, too little or just right

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Managing fluid in patients on hemodialysis (HD) is one of the essential aspects of treatment. Studies have shown how chronic fluid overload is strongly linked to mortality (Wizemann, et al., 2009) and, on the flip side, removing too much fluid is linked to morbidity and the loss of residual renal function (McIntyre, 2010). Looking at these together, we can see the importance of accurate methods of determining how much fluid to remove during hemodialysis.

The purpose of this presentation will be to discuss how the Body Composition Monitor (BCM) works using the technology of “bioimpedance” to help determine a patient’s dry weight and the benefits of using this technology alongside clinical assessment. We will discuss the pathways of how the BCM is being integrated into becoming a standard practice of care for patient on hemodialysis at the University of Alberta Hospital. Some of the challenges and successes in introducing a new concept into the hemodialysis world will also be explored. Overall, the presentation will highlight the importance of using an objective measurement of hydration status, the BCM, to help guide fluid management.

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10. Home dialysis patients’ perspectives on the utilization of patient-reported outcomes: Keep me involved!

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Introduction: Patient-reported outcomes (PROs) have increased in importance as a means of improving person-centred care. However, the integration of PROs in dialysis remains unexplored. Further, patients living with end-stage kidney disease on dialysis have not been consulted about how they would like their PRO information to be used in their care.

Purpose of study: The purpose of this research was to explore how home dialysis patients would like their PRO information to be used in their routine care.

Method: Using a qualitative descriptive design, we conducted six patient focus groups (n=27), and seven patient interviews (n=7). The average age of the 34 patient participants was 53.2 years. The majority were men [21/34 (61.8%)]. All interviews and focus groups were audio-recorded, transcribed, and coded using NVivo. Thematic analysis was undertaken to answer the research question.

Results: Home dialysis patients identified that they would like their PRO data to be used in their care for: (1) following-up on “How are you doing?”; (2) integrating with “the big picture” over time; (3) sharing information within and across healthcare providers; and (4) engaging in shared decision-making.

Conclusion: As recommended by these participants, use of PRO reports and trends over time may enable patients to participate in their care, as they collaborate with their multidisciplinary care providers.

Implications for nephrology care: Integrating PROs in kidney care may create opportunities for home dialysis patients to advocate for themselves and join in decision-making, thereby, promoting a person-centred approach to care.

11. Maximizing vascular access team capacity enhances patient and family engagement and outcomes

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Background: Early vascular access education of the patients living with chronic kidney disease is important to ensure their understanding of the optimal form of vascular access when choosing their modalities (i.e., hemodialysis). Achieving this goal can also be reached through the establishment and integration of a comprehensive Vascular Access Team that follows the patient across the full continuum of care in providing access education, assessment, monitoring, and maintenance.

Description: Having a designated Vascular Access Team and standardized access education for patients and families have been proven to decrease expenses and increase efficiency. Furthermore, patient education improves patient satisfaction and quality of care through enabling informed decision for suitable access when choosing hemodialysis.

Results: By developing and implementing the VA Team and providing standardized vascular access education, we have seen an increase in AV fistula use and decrease in CVC use in prevalent patients on hemodialysis (61% of CVC and 39% of AVF/AVG). We have noticed, therefore, an increase in compliance for access creation and reduction in the follow-up calls regarding clarification preparation for access surgery and care. Moreover, we have seen a decrease in no-shows for access interventions (3.7% in 2015/2016 vs 1.5% in 2017/2018). Additionally, having a collaborative partnership with the interventional radiology staff enables access to care for urgent interventions versus hospitalization.

Conclusion: It is imperative to have the VA Team in the patient's journey. The team members are interdependent, and work in collaboration with the patients and families, and other essential services to enhance access to care.

12. Renal transplant assessment of transgender patient: A case report

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The number of individuals with gender identity issues who are seeking medical attention appears to be increasing over time. Access to medical care for gender non-conforming patients is impacted by various barriers including structural barriers, gender-based discrimination, and transphobia. Transgender patients represent a minority of Canadians with end-stage renal disease (ESRD); however, this population has unique and important considerations in terms of assessment for renal transplantation. We present the case of a young patient transitioning from female to male, who presented for assessment for renal transplant. We review the unique considerations from the medical, hormonal, surgical, and psychological standpoints relevant to his care. This case highlights the importance of a multi-disciplinary team for transgender individuals as they transition their ESRD therapy to renal transplant and throughout their subsequent gender-affirming procedures and treatments.





13. X-ray vision CCPD: What's really going on during the night

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Objectives: The Peterborough Regional Health Centre Peritoneal Dialysis (PD) unit first introduced remote monitoring of continuous cyclic peritoneal dialysis (CCPD) in June 2018. It is a two-way, web-based remote monitoring system between the patient and the PD clinic, providing daily data of therapy. Our goal was to increase compliance, and to improve communication between the patient and the PD team.

Method/process: The PD team transitioned 75% of our patients on CCPD to remote monitoring by training them on a new automated PD cyclers that would enable remote monitoring. Once our patient transitioned to remote monitoring, we could quickly identify issues, and were able to make prompt changes to the cycler settings and PD prescription from our desktop, as needed. To ensure safety, our first priority was to transition patients who were marginal and who were non-adherent to their therapy.

Outcomes: Through the implementation of a remote monitoring system, we were able to ensure safety and compliance in patients on PD. The PD team also identified potential patient issues, and were able to act appropriately in a timely manner.

Conclusion: This method of monitoring appears to increase the communication between the PD team and the patient while ensuring safety of the patient. This also gives the patient the autonomy they need to remain independent at home.

14. Decreasing incidences of peritonitis through home visits and retraining

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In 2016, the Ontario Renal Network (ORN) began collecting peritonitis rates across all provincial home dialysis programs. With more than 90 peritoneal dialysis (PD) patients, Humber River Hospital had the second highest infection rate in the province with 0.5 cases per year at risk. We utilized the data collected to drive quality improvement (QI) in the program with the goal of reducing peritonitis rates.

The QI team identified three main areas for improvement. The first initiative was to perform an initial home assessment for all potential PD patients. We also conducted standardized home assessments every four months and post peritonitis in our prevalent PD patients. Through these visits, we identified environmental risk factors and poor technique, which placed patients at an increased risk for infection. The third strategy was to implement a PD clinic care bundle, which assessed the patient's hygiene and catheter care at every clinic visit. Our home dialysis team met on a monthly basis to discuss root causes for each peritonitis event and evaluated the efficacy of the interventions.

For the Q2 18/19 fiscal year, the peritonitis rate has dropped to 0.10 cases per year at risk compared to the provincial average of 0.21. The decrease in peritonitis can be attributed to the implementation of the aforementioned strategies intended to reduce the risk factors for peritonitis through continued assessment, education, and reinforcement of proper PD techniques.

15. Mental illness in hemodialysis: An urban outpatient unit approach

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Psychiatric illness is common among patients with chronic disorders, particularly in those with end-stage renal disease (ESRD). A review by Kimmel et al. (1998) indicated that the following mental disorders were frequently observed in ESRD: depression, dementia and delirium, drug-related disorders (such as alcoholism), schizophrenia, and personality disorders. These disorders account for 1.5 to 3.0 times higher rate of hospitalization among patients on dialysis compared to those with other chronic illnesses, resulting in significant morbidity (Schmidt & Holley, 2017).

Patients maintained on hemodialysis (HD) are more likely to be hospitalized for a psychiatric disorder than are those treated with peritoneal dialysis. The difference in hospitalization rates is probably due to an increased incidence among patients on HD of disruptive behaviors that may lead to hospitalization (Kimmel et al., 1998). There is a paucity of data relating to the effectiveness of therapeutic

interventions in the treatment of psychiatric disorders occurring in patients with ESRD. It is unclear if the management is less successful and, thus, hospitalization is more common. Resistance to therapy may also contribute to higher hospitalization rates. Although few studies relating to the treatment of psychiatric disorders occurring in patients with ESRD exist, general recommendations for treating such individuals based upon outcomes among those without chronic kidney disease can be made.

This oral presentation focuses on pharmacological and non-pharmacological treatment of the three most common psychiatric illnesses (i.e., depression, anxiety, and dementia) in patients on HD in the form of case studies. Therapy will incorporate inter-professional collaboration and guidance from the Ontario Renal Network's (ORN) "Your Symptoms Matter" initiative.

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16. A pioneer approach: The first patient on home intradialytic parenteral nutrition (IDPN)

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Purpose: Through the Ontario Renal Network's (ORN) mandated target of 28% of patient's dialyzing at home, we continue to consider uncommon methods to keep established patients on home hemodialysis (HHD) supported at home whilst ensuring optimal, patient-focused outcomes. One established patient on HHD experienced complex health challenges resulting in profound malnutrition requiring intradialytic parenteral nutrition (IDPN), which was implemented at home as the first such case in Canada.

Method/description: It was identified through blood work, normalized protein nitrogen appearance (nPNA), quad muscle length density (QMLT), physical assessment, and intake reporting that the patient's nutritional needs were unmet. IDPN was recommended by our renal dietitian after a trial of oral intake proved insufficient to provide adequate nutrition for this patient. There was immediate buy-in from the patient and caregiver to trial IDPN with further desire to retain HHD and IDPN, which was implemented through additional training to enable the safe administration of IDPN at home. An 18-year program experience with IDPN allowed us to mobilize an extension to HHD with IDPN. We were able to engage

key stakeholders in a collaborative effort to support this patient's newly identified nutritional needs.

Routine quantitative markers validate the cost to the program versus benefit to the patient, and continue presently.

Evaluation/outcome: This patient was able to remain at home and receive the nutrition that was required to restore best possible health outcomes as correlated with baseline quantitative data.

Next steps: Continue to monitor and support patient, and discontinue IDPN when no longer required.

17. Demystifying myths in nephrology

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Providing quality care to nephrology patients requires constant acquisition of knowledge and continuous re-evaluation of existing medical beliefs and practices. As healthcare providers, we should critically evaluate standard practices and question whether or not the practice is "fake news." If evidence or logic is lacking in medicine, it may be a medical myth.

Purpose: The purpose of this oral presentation will be to critically examine several nephrology myths and to encourage the questioning of widely accepted practices and beliefs.

Description: Using a case study approach, we will discuss several nephrology-related concepts including the pathophysiology of hyperkalemia and treatment, fluid management and resuscitation, contrast nephropathy, diuretic administration, acute kidney injury mortality/morbidity, and the pathophysiology of acute tubular necrosis.

Evaluation/outcome: Upon completion of this presentation, participants will be able to "bust" a few myths.

Implications for practice: It is our hope that participants will reflect upon controversial topics and facilitate discussion in their respective fields, and promote practice change based on best medicine.





18. Perspectives of patients and multi-care kidney clinic providers on a shared-care model for the long-term management of stable kidney transplant recipients

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Purpose: Although Canadian kidney transplant recipients (KTRs) are conventionally managed by transplant nephrologists, the growing KTR population has begun to challenge the capacity of transplant centres (TCs) to provide long-term care. Adopting a shared-care model (SCM) between multi-care kidney clinics (MCKCs) and TCs has been proposed to address this issue. We investigated attitudes of KTRs and MCKC providers on SCM, identified barriers to adopting SCM, and suggested solutions to provide an optimal model of care.

Methods: Self-reported, cross-sectional surveys were distributed to adult KTRs receiving follow-up care at our TC during regular clinic appointments, and to MCKC teams across Ontario. Survey domains included: general information of KTRs and MCKCs, attitudes and perceived barriers to SCM, and recommendations to facilitate SCM implementation.

Results: Of the 217 KTRs who were approached, 175 were included in our analyses. Sixty-seven KTRs (38%) had a positive attitude towards SCM. KTRs were more receptive to SCM when they lived farther from the TC, with all KTRs living over 500 km away preferring shared-care over other models. MCKCs that completed the provider survey (n=7) expressed concerns about insufficient funding (n=6), overloaded clinics (n=3) and limited resources (n=3), but were open to receiving continued educational support from TCs in the form of web-based resources and pre-tailored oral presentations (n=7).

Conclusions: Both patients and providers are interested in standardized SCM. Among providers, lack of funding is the most commonly identified implementation barrier.

Implications: Shared-care between TC and MCKC is a feasible long-term model. However, additional educational, clinical, and financial support will be required.

19. Surgical site complications in kidney transplant recipients: Incidence, risk factors, and outcomes in the modern era

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Background: Post-transplant immunosuppressive regimens inherently compromise wound healing, including at the surgical site. Transplant recipients are, therefore, especially susceptible to surgical site complications (SSC), such as infections and wound dehiscence. We aimed to assess the incidence, risk factors, outcomes, and economic impact of SSC in a large diverse population of kidney transplant recipients (KTR).

Methods: We conducted a single-centre, retrospective cohort study of adult KTR transplanted from January 1, 2005 to December 31, 2015, excluding patients with simultaneous multi-organ transplants, and prior non-kidney

transplants. The Kaplan-Meier product-limit method was used to determine the incidence of SSC. Risk factors and outcomes were evaluated using Cox proportional hazard models.

Results: The cumulative incidence of SSC within 30 days post-transplant was 4.19 (95% CI: 3.26-5.39, per 100 person-years). Increased recipient body mass index (HR=1.07, 95% CI: 1.02, 1.12), longer cold ischemic time (HR=1.05, 95% CI: 1.01, 1.09), and being transplanted from 2010-2012 (HR=2.32, 95% CI: 1.23, 4.36 [versus 2005-2009]) were found to be risk factors for SSC. SSC was not associated with increased hospital readmissions. Median hospital costs incurred by patients with SSC was \$2238.46 greater than that of patients with no SSC.

Conclusion: Higher patient BMIs, longer cold ischemic time, and transplants from 2010-2012 were factors associated with developing SSCs.

Clinical implications: Home care has frequently been used to treat SSC in the modern era. A greater understanding of modern kidney transplant cohorts and clinical management practices may help to reduce incidence of SSC post-transplant and minimize hospital costs.

20. Development and implementation of clinical decision support for acute kidney injury: Measurement of frontline healthcare providers' perceptions and experiences

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Quality improvement (QI) initiatives are effective strategies for enhancing healthcare delivery and improving patient outcomes. However, QI initiatives can have

significant effects on workflow. Thus, involvement of end users in the development and implementation can optimize accessibility and uptake. Here we describe the perceptions and experiences of healthcare providers during the development and implementation of clinical decision support for acute kidney injury (AKI).

An AKI clinical decision support initiative was developed to improve recognition and management on surgery units in Alberta. Frontline providers were involved in the development of unit-specific processes for AKI care. Nursing staff, physicians, and pharmacists were invited to complete pre-implementation surveys to assess the awareness of AKI, usability surveys for the electronic tools, and semi-structured interviews to obtain feedback and refine processes.

Pre-implementation surveys indicated that it was *important* to improve AKI care on the participating units. Clinical staff reported that the electronic tools were easy to use and accessible. During post-implementation interviews, nursing staff reported that the initiative *increased AKI awareness* and has *potential for improving patient care*. The initiative is being evaluated continuously through usability surveys and interviews during the post-implementation period.

This AKI clinical decision support initiative was co-developed with end-users, and is being refined regularly to increase sustainability. Clinical staff report high usability of the electronic tools, and adequate uptake of the recognition and management processes. Full evaluation of the initiative will identify the impact of this initiative on patient outcomes, including progression of AKI, length of hospital stay, and healthcare costs.





21. Introducing a novel multidisciplinary approach to dialysis modality education

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Purpose: Modality education is traditionally provided by a renal navigator who presents a comprehensive review of patient options, including transplant and supportive care. Patients may not be prepared to receive this information when it is provided, or may not receive it in a timely manner if dialysis is started urgently. Ensuring that all patients receive timely modality education in a manner that minimizes psychological distress and fosters self-reflection ensures that patients feel supported and choose an option aligned with personal values and lifestyle.

Project description: In September 2018, the Kidney Urinary Program at St. Joseph's Healthcare Hamilton incorporated a health psychologist role to support home therapy patients and collaborate with the renal navigator to provide decision-making support and psychological treatment following modality education. This novel multidisciplinary approach to modality education is the first of its kind in Ontario, and perhaps nationwide.

Outcomes: Preliminary data indicate that the overwhelming majority (82%) of patients declared peritoneal dialysis (PD) as their first choice of modality. Data collection is ongoing. Complete data comparing modality declarations before and after initiation of this approach will be presented.

Implications: Home therapies, PD and home hemodialysis, confer added benefits to the patient over facility-based hemodialysis, and are less costly. Benefits of increasing PD uptake include more control over dialysis schedule, more freedom for personal activities, slower kidney decline, fewer dietary/fluid intake restrictions, and cost savings to the healthcare system. Benefits of this novel multidisciplinary approach include greater patient satisfaction with healthcare services and their own modality decision.

22. Home hemodialysis technical considerations—The Alberta perspective

Ed Doppler, BSc, EET, CET, Clinical Engineering, Alberta Health Services, Calgary, AB
Shripal Parikh, ASCT, cdt, Clinical Engineering, Alberta Health Services, Calgary, AB

Home hemodialysis is a popular and often preferred choice of dialysis in Canada. It offers lifestyle choices and health benefits that are otherwise not so much available to patients undergoing treatment in the hospital environment. Since patient dialysis at home is unsupervised, it is imperative that patient safety becomes the highest priority for the healthcare provider. A multidisciplinary approach is required to cover all aspects of home hemodialysis. The technical team is an important part of that team.

This presentation will detail the role of biomedical/dialysis technician personnel as an integral part of the healthcare provider team in Alberta. Challenges faced from starting patients on home dialysis to providing continual equipment care and support will be discussed, and solutions to problems will be outlined. A complete quality assurance program for adherence to current Canadian Standards Association (CSA) standards will be outlined and discussed. In achieving these goals and meeting these challenges, a patient-centric approach is always maintained.

23. The hemodialysis machine—Then, now, and beyond...

Christopher Brookes, BSc, Hemodynamic Technologist, Department of Dialysis, McGill University Health Centre, Montreal, QC

This presentation will be a personal retrospective of the advent of hemodialysis and the equipment needed to perform the treatment based on my 30-plus years of experience in the field of nephrology and dialysis.

The main topic of discussion will be an explanation of how the hemodialysis machine has advanced to improve the safety and efficiency of dialysis treatments from the 1970s to the present. As equipment evolved, a comparison of the technologies used will be discussed. This discussion will include the advancement of equipment to meet some specific needs, such as the introduction of more biocompatible dialyzer membranes, hemofiltration (HF), hemodiafiltration (HDF), treatment efficiency (Kt/V), blood volume monitoring and trending, and the requirements of improved peripheral equipment utilized to enhance

the advancements in hemodialysis treatments. Lastly, the improvements in water treatment will be briefly presented.

In concluding this presentation, a discussion regarding further evolution and technologies of the hemodialysis machine, with respect to the requirements of the nephrology environment such as home and self-care, and reduced water use will be presented.

24. Venous needle dislodgment: A preventable cause of significant harm and death in hemodialysis patients

Natalie Ferraro, RN, Kidney Care Clinical Manager, SCH Hemodialysis Unit, Niagara Health System, St. Catharines, ON

Hemodialysis (HD) is a life-sustaining treatment. Adverse side effects and occasional life-threatening clinical complications can occur. Venous needle dislodgment (VND) is one of the most serious incidents that can occur during the HD treatment. If the blood pump is not stopped, either by activation of the dialysis machine's protective system or manually, the patient can bleed to death within minutes. The Kidney Care Program at Niagara Health commits to using best practice measures to drive improvements in care. VND prevention ("The Project") was piloted, implemented, and evaluated. A quality improvement initiative aimed at eliminating VND occurrences.

In the last year, Niagara Health has created a collaborative special project workgroup to review VND occurrences and consequences. Preventative strategies and resources were developed for frontline staff and patients. From this work, a risk assessment tool and clinical care pathway were created. Standard securement and taping practices were established, and a trial of an external moisture monitoring system was implemented at three participating centres.

A robust education plan for frontline staff was created through best practice and evidence-based literature. The Kidney Care Program will promote sustainability by routinely collecting and reviewing observational data. Review and modification will be done annually with PDSA cycles. Collaboration with patients was an integral part of the development of educational material to identify their role in safe care and prevention.

Everyone has a role in making healthcare safer. Improving safety in our organization requires active engagement by senior leaders, providers, managers, staff, and patients. The VND project is one example of our organization's commitment to promoting safety and reducing harm events.

25. Social support: The peritoneal dialysis experience

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Background: Peritoneal dialysis (PD) is as effective as other renal replacement therapies, but it is cost-saving and allows patients to maintain their independence at home. Unfortunately, technique failure is common, and social support is necessary for PD success.

Aim: To examine how patients, their family, and nurses view social support and its role in PD management.

Method: This was a qualitative descriptive study. Patients (n=15), family members (n=6) and nurses (n=11) from an adult PD program in Calgary underwent audio-recorded interviews between January and May 2018. Conventional content analysis, using the four types of social support (emotional, instrumental, informational, and appraisal) as an analytic framework, was used to analyze the text data.

Results: Social support was important, impacting the PD experience and technique failure. Sub-themes emerged when participants described social support in the context of home PD therapy. These themes included: addressing emotional needs and managing emotional support with PD and life tasks; accessing information, receiving information,





and learning; and affirmation/external reassurance and self-confidence. The social support needs of patient and family members varied, and were dependent on their existing support networks and individual perspectives of support.

Conclusion: Social support is multi-faceted and an important part of the PD experience. To sustain patients on PD, it is imperative that the breadth of social support needs be understood and individualized to the patient.

Implications: Having a better understanding of social support may help inform healthcare providers who support people on PD and enable patients to continue managing their therapy at home.

26. Calciphylaxis (calcific uremic arteriopathy): A case of a multi-intervention Approach

Paulina Bleah, MN, NP-PHC, Department of Nephrology, University Health Network, Toronto, ON

Calciphylaxis or calcific uremic arteriopathy (CUA) is a rare disorder that is typically seen in patients with end-stage renal disease (ESRD) on dialysis (Harris, Kiaii, Lau, & Farah, 2018). CUA-attributed mortality rates in the literature range from 45% – 80% at one year, with cause of death mainly due to sepsis (Harris et al., 2018). It is characterized by progressive cutaneous necrosis associated with small- and medium-sized vessel calcification (Harris et al., 2018; Olaoye & Koratala, 2017). Treatment requires a multi-intervention approach to address this challenging disease.

Case presentation: A 53-year-old male with ESRD on intermittent hemodialysis presented to the hemodialysis unit with painful skin ulceration to the right leg and necrotic ulcers with eschars to the left leg. His past medical history was significant for hypertension, diabetes, and atrial fibrillation. A clinical diagnosis of CUA was made, and the patient was admitted to hospital for management. His lab presentation indicated elevated phosphate and parathyroid hormone, and borderline calcium levels. Medication history was significant for warfarin, calcium

carbonate, and calcitriol. Management of CUA required a multi-intervention, which included: (1) sodium thiosulfate; (2) discontinuation of all medications that may contribute to CUA including warfarin, calcitriol, and calcium carbonate; (3) initiation of sevelamer carbonate (Renvela®) and cinacalcet; (4) intensified hemodialysis; (5) local wound care and pain management; and (6) hyperbaric oxygen therapy. The patient tolerated the treatment, and dramatic clinical improvement in terms of wound healing were noted within three weeks. After two months of treatment, the patient wounds healed, and he was discharged home.

Discussion: This case illustrates that multi-intervention approach to CUA management can be successful in treating this group of patients (Harris et al., 2018).

REFERENCES

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27. Water quality in home hemodialysis (HHD) programs: Review of standards and barriers to their implementation

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Background: Water quality is critical for ensuring the safety of dialysis patients. Since the use of home hemodialysis (HHD) is growing across Canada, there is a need to understand factors affecting water quality.

Method: This research involves two studies: (1) a scoping review and (2) a barriers assessment. A scoping review was conducted to compare existing standards for microbiological and physico-chemical parameters of water for dialysis. A qualitative approach was utilized for the assessment of barriers to implementing standards via semi-structured interviews with health professionals (n=10) at home hemodialysis (HHD) programs in Alberta. During interviews, participants were asked to identify key issues and challenges within each step of the quality management process that could affect the water quality.

Results: National (n=22) and international (n=4) standards and guidelines were identified from Europe, USA, Germany, Canada, Japan, & Australia/New Zealand. Key themes were: (1) quality criteria for dialysis water and dialysate; (2) approaches to meeting them; (3) implementation

of standards/guidelines; (5) monitoring criteria; (6) evaluating adherence; and (7) limitations. The burden on dialysis technicians is greater compared to in-centre units because of factors such as source water quality, seasonal variations, and patient's geographical location (urban or rural). The key areas of concern are patient adherence, water sampling procedures, logistics, appropriate dialysis technicians to patient ratio, and home conditions.

Conclusion: In comparison to in-centre units, dialysis technical staff face unique challenges with water quality management for HHD. Sophisticated risk assessment techniques need to be adopted to develop local data driven water quality management practices.

28. Everything you wanted to know about PD but were afraid to ask!

Gina Ongjoco, BScN, RN, CNeph(C), Baxter Healthcare

Description: This presentation will cover the basics of peritoneal dialysis (PD) including continuous ambulatory peritoneal dialysis (CAPD), automated peritoneal dialysis (APD), peritoneal equilibration testing (PET), and PD adequacy. It will follow the dialysis journey of two patients (Purdeep on CAPD and Luca on CCPD) and their experiences with their renal replacement therapy.

It is designed for nephrology staff members and nurses (chronic kidney disease, transplant, and hemodialysis) who wish to expand their knowledge related to the basics of PD. It will also benefit nurses studying for their CNeph(C) exam.

Learning objectives

1. Develop an understanding of the basic principles of peritoneal dialysis as well as the types of peritoneal dialysis (CAPD and APD).
2. Develop a basic understanding of guidelines (KDOQI, ISPD, and CSN) related to peritoneal dialysis adequacy and the peritoneal equilibration test (PET).

29. If I only knew then what I know now: Enhancing patient self-management of chronic kidney disease using an electronic health tool

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Purpose of study: To co-design a chronic kidney disease (CKD) patient self-management electronic health (eHealth) tool with patients and their caregivers.

Method: A research team of patient partners, researchers, clinicians, policymakers, and web developers co-designed a CKD patient self-management web-based tool. Our patient-oriented research (POR) is a multi-phase study that included both quantitative and qualitative methods to identify needs and preferences for self-management support identified by patients with CKD and their caregivers. Patient and caregiver stories were shared with team members to illustrate self-management experiences and prioritize components for the CKD patient self-management eHealth tool. Co-designing the eHealth tool was an iterative process that included patients and caregivers in the development and testing phases.

Results: Nine content areas, including understanding CKD, diet, medication, finances, symptoms, travel, mental and physical health, work/school support, and emotional, social, and psychological support were identified, along with preferences for information within these areas. Preferred features included visuals, interactive components, on-the-go access, links to resources, and access to personal health information. Feasibility and usability testing are underway, with launch of the tool in Fall 2019.

Conclusion: Patient engagement in the co-design of a CKD self-management eHealth tool guaranteed that preferences and needs most relevant to patients and their families were included.

Implications for nephrology care: Patients with CKD have multiple needs that differ between individuals based on the complexity of their illness, as well as supports and resources available to them. Although traditional CKD self-management support is important, a CKD patient self-management eHealth tool can complement existing services and provide tailored, timely support to patients and caregivers.





30. Canada's funniest home hemo

Brandon Beaudry, CET, Manager, Clinical Engineering, COV/AHS Renal Support, Alberta Health Services, Edmonton, AB

Join us for a fun-filled look at the world of technical support for the home hemodialysis patient.

The success of home dialysis takes the support of all the members of a highly skilled and experienced clinical and technical team. It takes people who are compassionate about the health and well-being of patients, and a desire to ensure that the patient is not burdened by their condition, but rather is able to incorporate their critical treatment into their daily lives and activities.

Technical support of home patients on dialysis is unique within the clinical engineering community. No other program across the country, other than the home hemodialysis programs, requires biomedical technologists to deal so directly with patients, let alone support them in their own home environment.

31. The EMPATHY initiative: bringing nursing back to the bedside

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Patients with end-stage renal disease have a high symptom burden. Patients on hemodialysis experience multiple symptoms, which significantly impact their quality of life, health outcomes, and overall well-being. The EMPATHY Initiative is evaluating the use of symptom management tools to systematically identify, discuss, and manage patient-reported symptoms in hemodialysis units. Outcomes include: patient experience, symptom management, and provider experience in hemodialysis units.

In EMPATHY, patients complete surveys every two months using either the Integrated Palliative Care Outcome Scale (IPOS)–Renal (i.e., a symptom assessment tool) or the EQ-5D-5L tool (i.e., an overall measure of quality of life), or both. Patient results are summarized in a Symptom Report Card, which categorizes their concerns as “not present”, “mild”, or “moderate to severe”. These results will help clinicians facilitate a discussion of the identified symptoms, address patient concerns, and begin a management plan. Treatment aids have been developed, and are available to support the management of symptoms. These include symptom guidelines for clinicians and handouts for patients to encourage self-management. The initiative is currently being implemented in Alberta Kidney Care-South in a phased approach.

Although data collection is currently underway, preliminary feedback from patients and staff has been positive. Patients have reported feeling included, and appreciate the opportunity to discuss their concerns. Multiple patients have reported a reduction in the severity in their symptoms. Staff reported that the process has helped identify patients they can support and feel that it has led to a collaborative environment with a more coordinate approach to patient care.

32. Standards to support quality management of kidney dialysis

Jason Maahs, Water Operations Manager, Baxter, Mississauga, ON
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A quality management system (QMS) establishes consistency in, and control of, processes and documentation, towards the highest degree of safety and quality for the dialysis providers, clients, and staff. A QMS gives assurance that policies, procedures, and processes are in compliance with Canadian standards, and thus dialysis providers and impacted stakeholders should be educated on the importance of adherence to these standards.

Standards that have been developed on the topic of QMS in kidney dialysis including the following:

1. CSA Z364.6, *Quality management for kidney dialysis providers* is a core standard for a QMS specific to kidney dialysis processes and equipment, for use in a healthcare facility or home setting for the purpose of providing safe, reliable kidney dialysis treatments and care. This QMS is based on accepted principles of risk management to ensure the safety, quality, and efficacy of dialysis, regardless of method, and to ensure the safety of personnel, clients, and caregivers.
2. The basic requirements for hemodialysis and peritoneal dialysis performed in a home setting are fundamentally similar among organizations. However, the methodology may vary. The **second edition** of CSA Z364.5, *Safe installation and operation of hemodialysis and peritoneal dialysis in a home setting* was developed to provide

nephrology personnel with best practice to deliver quality treatment and provide expert guidance for their clients. Adherence to this standard will contribute to providing safe and efficient delivery of such in-home dialysis treatments.

3. Quality management is a topic across many Kidney Dialysis standards, including the ISO Z23500 series.

The goal of this presentation is to raise awareness amongst dialysis providers and other relevant stakeholders about the existence of these standards and the importance of quality management in the provision of kidney dialysis.

33. Development of a standardized shared-care model for the long-term management of stable kidney transplant recipients

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Purpose: Higher transplant volumes and extensive post-transplant follow-up place a strain on the limited resources of transplant centres. Effective long-term management of kidney transplant recipients (KTRs) is warranted to alleviate this strain and improve working capacity of these specialized centres while maintaining optimal care.

Description: A standardized shared-care model that integrates general nephrologists (GNs) and multi-care kidney clinics (MCKCs) with the transplant team can improve efficiency and quality of care provided to KTRs. To explore established protocols and strategies that could be adopted in developing this model, a literature search was conducted using MEDLINE and CINAHL (1970-2016) with the terms: “kidney transplant”, “long-term”, “community”, and “care”. In-depth consultations with transplant and general nephrology teams were held to discuss the logistics of the proposed model.

Outcomes: After screening, fifteen articles were included for review. These articles identified procedures that needed to be considered prior to shared-care implementation, such as outlining the responsibilities of each team, a timeline for follow-up visits, and methods of communication. Based on recommendations reported in literature and from consultations, a comprehensive set of guidelines was created to provide a framework to the model, document overarching procedures, and facilitate coordination between centres.

Implications for nephrology practice: Implementing shared-care would reduce burden on transplant centres and allow resources to be distributed more efficiently. GNs and MCKCs would get more involved in management of KTRs, thus permitting transplant teams to focus primarily on addressing concerns of recently transplanted or unstable KTRs. Shared-care would also bring care closer to home for KTRs, improve accessibility, and reduce travel costs.

34. Patient accessibility to the renal dietitian and its impact on phosphate results

Tracy Gower, P.Dt, Nova Scotia Authority Renal Program
Pamela Dill, P.Dt, Nova Scotia Authority Renal Program
Anastasia Kleronomous, P.Dt, Nova Scotia Authority Renal Program

The role of the renal dietitian (RD) is diverse. Advice is often complex and changing depending on the stage of chronic kidney disease and the individual needs of the patient. Dietary adherence is essential to reducing serum phosphate. Accessibility to a renal dietitian can have great impact on the reduction of hyperphosphatemia. This study examined RD impact on serum phosphate in dialysis patients.

A total of 20 patients who were dispensed Compassionate Tums® (January 1, 2018 to February 21, 2019) were reviewed. Serum phosphate levels were measured on 12 occasions in this evaluation period. Average phosphate result for patients receiving weekly RD education





was 1.75 mmol/L. Average phosphate result for patients receiving less contact from an RD was 2.25 mmol/L.

Results indicated that patients who have face-to-face contact with a renal dietitian on a weekly basis fare better in meeting phosphate targets. Having access to a renal dietitian prompted discussion of phosphate binder adherence and facilitation of refills. Weekly nutrition education regarding oral intake of phosphates, organic, and inorganic phosphate additives, timing of Tums® with meals, and dose of drug per volume of food improved serum phosphate results.

35. Emotional intelligence and above the line provision of renal care: How can we be our best selves in a vexatious world?

Julie Ann Lawrence, MScN, RN(EC), CNeph(C), Nurse Practitioner, Renal Program, Kidney Care Centre, London Health Sciences Centre, London, ON

The interfacing of renal health professionals with patients/families is a rewarding experience. Many of us as care providers entered into the renal field and remain here years, if not decades, later. Yet, over time, nurses and allied health professionals can suffer from empathy fatigue, frustration, or even burnout. Likewise, our patients who have a high burden of one/multiple chronic disease(s) can further challenge our goal to arrive to work as our 'best selves'.

During this presentation, a framework of emotional intelligence will be presented that has been used in a large teaching centre and modified for presentation to renal staff. In our experience, staff are encouraged to hone skills in emotional intelligence in order to cultivate a higher level of insight and self-awareness of their own beliefs and actions. A platform for viewing the world differently, and working in an environment that encourages 'above the line' interaction and practice, facilitates discovery and skill in handling one's own emotions as well as the emotions and responses of others.

36. Burnout and empowerment among hemodialysis nurses working in Quebec

Christina Doré, PhD, RN, Professor, Faculty of Nursing, University of Quebec, Abitibi-Témiscamingue, Mont-Laurier, QC

The nursing profession is known to be stressful with high rates of burnout. Research indicates that empowerment is a positive strategy to support the practice and well-being of nurses at work, and that professional websites could promote their empowerment and reduce their risk of burnout. Currently, there is no information to assess the severity of burnout or the empowerment status of hemodialysis nurses in Quebec. The purpose of the presentation is to report the results of a mixed study: an online quantitative survey of 308 hemodialysis nurses found that 38% had high levels of emotional exhaustion, 69% had moderate levels of structural empowerment, and 64% of moderate levels of psychological empowerment. Structural and psychological empowerment were significantly related to burnout. Then, a participatory approach using focus groups with a total of seven hemodialysis nurses and consultations with an advisory committee resulted in recommendations on the requirements to be included in a website. The results indicate that a future professional website for hemodialysis nurses should include: professional information, continuing education, information on healthy living habits and networking. This research has important implications for nurses, practice, and research. Overall, burnout levels were high among hemodialysis nurses in Quebec, similar to other North American results, and the hemodialysis nurses were in favor of creating a website to meet their professional and personal needs.

37. Parts control system for provincial dialysis technical support – Design philosophies and capabilities

Brandon Beaudry, CET, Manager, Clinical Engineering COV/AHS Renal Support, Alberta Health Services, Edmonton, AB

Clinical engineering at Alberta Health Services Edmonton has designed a web-based software program that is being used to manage the parts inventory of the renal dialysis technical support team. The program captures more accurate parts usage across all teams. In addition, we support the local technical college co-op summer student program.

This session will review the capabilities of the application and its design philosophy as it applies to a province-wide technical support team. This in-house design has given us full visibility of our provincial stock across eight facilities, minimized redundant ordering, reduced dead stock, maximized pricing discounts, and created a more efficient reorder process.

POSTER ABSTRACTS

1. Sharing practices and standards to improve sustainability of home hemodialysis globally

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SIGNhd Global (Special Interest Group of Nurses for Home Hemodialysis) is a vendor-sponsored nursing interest group of home hemodialysis nursing professionals from Canada, U.K., France, Finland, and the U.S.A. Our group was established in November 2018, and together our goal is to improve service delivery and treatment options for patients on home hemodialysis, and their partners and caregivers globally to stimulate home hemodialysis growth.

By using the formula *Home Dialysis Growth* = (New Patients + Maintenance) – Loss, and through our discussions and shared experiences, we found globally that there are similar issues with service delivery and population increase in the following areas of home therapies:

1. Sustainability of services
2. Expansion and maintenance of the home hemodialysis population
3. Production of robust systems to support its availability to a wider population.

In conclusion, we found that varying financial models and aspects within the healthcare systems influence service, delivery, and available resources. Home hemodialysis nurses within each of their organizations can make a huge impact by adopting practice recommendations by our global collaboration in order to promote home hemodialysis as an accessible and safe option, and have a positive impact on its growth.

2. The open referral model: A partnership approach to supporting increased patient complexity

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In Ontario, there are two primary community dialysis settings: hospital satellite and independent dialysis clinics. Among these clinics, only nine sites offer an open referral model allowing patients to dialyze in their community while retaining their original nephrology care team. In analyzing the patient demographics at three of these clinics, the overall complexity of these community patients has increased and now matches the average patient demographics of a chronic hemodialysis patient in Ontario. This increase is likely a result of the strategic growth of home modalities and ongoing capacity pressures at hospital renal programs.

A growing patient complexity has highlighted the importance of establishing strong partnerships with local renal programs, in particular ensuring patient access to emergency, inter-professional, and non-direct care services. This presentation will focus on how a partnership with a local





renal program facilitated a 50% increase in physician presence and addressed the 85% of patients who either never saw or only saw when needed a renal dietitian, pharmacist, or social worker. Analyzing both the needs of these patients, as well as the strategies to assist them, will help to highlight the supports required for the growing complexity of patients dialyzing at open referral model clinics.

3. Say NO to transmission: Only you can protect you

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Audrey Gyles, MSN, RN, Humber River Hospital, Toronto, ON

Purpose: The purpose of this quality initiative is to prevent and reduce contamination-related transmission of microorganisms relative to healthcare-associated-infection in the in-centre hemodialysis (ICHD) patient population.

Description: Patients on hemodialysis are susceptible to infectious diseases due to their reduced immunity and risk of exposure to microorganisms (Park et al., 2018). Contact transmission is the main route of microorganism transmission among the ICHD population. It is, therefore, imperative to protect patients and staff from potential contamination. An initial audit of the cleaning and disinfecting processes of ICHD machines and stations by nurses and hemodialysis assistants was completed with permission using the BC Renal – Dialysis Station Routine Disinfection Checklist. Practice gaps were identified with routine cleaning and disinfecting of dialysis machines and stations. A new hemodialysis policy alongside a “Dialysis Station Cleaning and Disinfecting Checklist” (DSCDC) (BCPRA, 2016) was developed for staff following the audit using feedback from the healthcare team. The policy and DSCDC highlight the use of personal protective equipment, hand hygiene, isolation strategies, and the cleaning and disinfection of hemodialysis machines and stations. Staff education will be provided on the new process. Post education, three- and six-month trials of the new policy and DSCDC will be implemented in anticipation of reducing contamination-related transmission of microorganisms among ICHD patients and gathering feedback.

Outcomes: To reduce contamination-related transmission of microorganisms among ICHD patients, as it pertains to healthcare associated-infection by means of staff education on the correct technique of cleaning and disinfecting hemodialysis machines and stations. Evaluation will encompass ongoing DSCDC audits.

Implications for nephrology practice: To develop provincial guidelines on cleaning and disinfecting dialysis stations for ICHD programs in Ontario.

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4. Citrate used as an anticoagulant for needling in hemodialysis

Jennifer Larson, BSN, RN, CNeph(C), St. Paul's Hospital, Saskatoon, SK

Alara Procyshen, BSN, RN, CNeph(C), St. Paul's Hospital, Saskatoon, SK

Paulo Bautista, RN, St. Paul's Hospital, Saskatoon, SK

Sodium citrate 4% may be used to prevent clotting when needling arteriovenous fistulae and grafts. In our facility, we had two practices to help prevent clotting within the needles. We would flush heparin 1:1000 units through the needle and then withdraw the solution leaving drops clinging to the lumen of the tubing. We would also alternatively fill the needle with normal saline prior to needling. Due to a constant concern regarding supply of heparin, our unit converted to dalteparin, which resulted in the removal of heparin from our unit, and conversely, removed our ability to use heparin to prevent clotting in the needles. Our normal needling practice is to needle with a syringe attached to the needle, but the needle is dry and we fill it with blood once positioning is confirmed.

The purpose of our literature review was to see if anyone else had ever used citrate to prevent clotting and to gather literature about the safety of the use of citrate for this purpose, as well as for other uses of citrate, and volume used and safety of use.

The purpose of our poster presentation will be to detail our experience in using citrate as an anticoagulant when needling and provide some information on the safety of this practice. This could have implications for other units needing an alternative to heparin, or just a safer product than heparin.

5. Surviving to thriving—A patient's perspective of transitioning to home therapy

Rhonda M. MacNeil, BScN, RN, CNeph(C), Alberta Kidney Care South, Medicine Hat, AB

Surviving defined is to remain alive after the cessation of something. **Thriving**, however, means to prosper, flourish, or be successful. This poster presentation will follow

three gentlemen as they transitioned from surviving with hemodialysis to thriving with a home dialysis therapy. As an outside observer, the author was able to witness them flourishing in their journey to regain independence and, while doing so, we all gained so much more.

This poster presentation will share the decisions and information utilized to personalize the journey to home therapy. It will answer some questions for those thinking about going home: “Am I too old to do home hemodialysis?” “Will I still be able to referee basketball with PD?” “Will I be able to travel?” “Can I still garden?”

Three gentlemen were interviewed and, through this process, we discovered why they chose to change to a home-based dialysis therapy. What influenced their decision to change modality? What struggles did they have transitioning, and how did they overcome barriers? Benefits will be identified from their perspective, as well as valuable insight that can be shared with others who may be reluctant to make the switch to home. What helped them succeed? What resources can the healthcare team provide to support their journey? As a patient educator, the pride in watching them continue to THRIVE is empowering.

6. Patient-reported outcomes in home dialysis: Development of workshops for multidisciplinary clinicians

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Robin Cohen, PhD, Division of Palliative Care, Departments of Oncology and Medicine, McGill University; Lady Davis Institute for Research, Jewish General Hospital, Montreal, QC

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Amynah Mevawala, PhD(c), Faculty of Nursing, University of Alberta, Edmonton, AB

Scott Klarenbach, MD, MSc, FRCPC, Faculty of Medicine & Dentistry, Division of Nephrology, University of Alberta, Edmonton, AB

Purpose: The Canadian Institute for Health Information emphasizes the need for integration of patient-reported outcomes (PROs) into clinical care to improve health outcomes and deliver person-centred care. Our purpose was

to understand the educational needs of a multidisciplinary team in home dialysis and develop workshops to support routine utilization of PROs.

Method: This qualitative inquiry involved nurses, physicians, dietitians, social workers, and people on peritoneal and home hemodialysis in Alberta Kidney Care North where PROs were collected as part of standard care. Data were collected through six clinician focus groups (n=29), six patient focus groups (n=27), and seven patient interviews (n=7). Participants were asked about their current use of PROs, how PROs could be utilized, barriers in practice, and areas in which they needed support. Interpretive description was used as an approach to analysis.

Results: Neither patients nor clinicians had previously received systematic training on the use of PROs, nor did they know how to use PRO scores. Four areas of educational need were identified:

1. PRO use and interpretation in clinical practice (e.g., introduction of PROs to patients, workflow, consideration of longitudinal trends)
2. Patients' valuing of, and relationship to, the use of PROs in their own care
3. Strategies for PROs to support communication/coordination within the team (clinicians, patients, referrals)
4. Routine integration of PROs as a fundamental change to practice

Conclusion/implication: These data have informed the co-design by practitioners and researchers of workshops currently being offered to clinicians as an intervention over the next year of our study.





7. Improvements in quality of life and outcome in patients using HDx dialyzers compared to high-flux dialyzers

Lok Yick, BScN, RN, In-center Hemodialysis, Scarborough Health Network – General Hospital, Scarborough, ON
Betty Choi, BScN, RN, CNeph(C), In-center Hemodialysis, Scarborough Health Network – General Hospital, Scarborough, ON

Purpose: Within hemodialysis, there are various types of dialyzer used in treatments. The most commonly used dialyzer is the high-flux dialyzer. Many patients experience multiple symptoms during and after dialysis, which include fatigue, pruritus, diarrhea, and restless leg syndrome. These symptoms are detrimental to the physical, emotional, and social aspects of their daily life. With new technology and improvements, a new type of dialyzer, HDx, that targets clearance of middle size molecules was developed in an attempt to improve the patients' quality of life. We will be evaluating how HDx dialyzer affects each patient's quality of life and outcome.

Method: Patient selection for the switch to the HDx dialyzer is done in collaboration with the nephrologists. Two criteria are considered when switching patients from high-flux dialyzers to HDx dialyzers: poor outcome from dialysis and dialysis-induced symptoms. Patients are asked to complete a survey regarding their change in quality of life after switching dialyzers.

Results: Data collected from surveys and bloodwork have shown improvements in patients from using the HDx dialyzers.

Conclusion: HDx dialyzers have been shown to increase in the quality of life and decrease in dialysis-related symptoms on a daily basis. The HDx dialyzers can be considered as a dialyzer option in the Scarborough Health Network (SHN) nephrology programs for patients meeting the criteria.

Implications for nephrology care: In order to continue to support and improve hemodialysis patient outcomes, our hospital program will continue to use HDx dialyzers for patients who meet the selected criteria.

8. From caring to sharing—A multidisciplinary approach to supporting renal patients

Susan E. Roussy, BScN, RN, CPL Ambulatory Hemodialysis, Lakeridge Health, Oshawa, ON
Michelle K. Donoghue, RN, CPL Regional Nephrology Program, Lakeridge Health, Whitby, ON

Previously, caring for patients on dialysis tended to focus on the clinical components of care. Health care models shifted from a provider focus to patient-centred models of care. The focus of the clinical practice leader (CPL) continues to be to facilitate the paradigm shift from “caring to sharing.” This journey is also supported by the Ontario Renal Network (ORN), as they enable renal programs to practise more person-centred care (PCC).

Recognizing the impact of chronic kidney disease on patients, utilizing the results of the ORN's patient surveys, and feedback from the program's Patient and Family Advisory Council, an initiative was identified to address a gap in the care planning for in-centre hemodialysis patients.

The initiative should utilize an approach that includes both the identification of medical goals, as well as patient goals. The best patient care occurs when true inclusiveness is a fundamental philosophy. This inclusiveness means listening to, informing, empowering, and involving patients in their plan of care.

Historically, the opportunities to include both nursing and allied health input into the patient's care plan were limited to formal multidisciplinary meetings. The development of consistent standardized multidisciplinary rounding was identified as an option to the meetings, and was intended to develop and incorporate an inclusive model of care planning to improve our PCC. This practice initiative was implemented to empower patients and family to actively share their individual vision and goals of care. It has been well received and is moving us forward from a “caring to sharing” philosophy.

9. Adopting palliative care in the dialysis unit

Terri McAuslan, RN, Satellite Dialysis Unit, Bluewater Health, Sarnia, ON
Terri Pask, BScN, RN, Palliative Care, Bluewater Health, Sarnia, ON

At our community hospital, in a program unique in Ontario, the Regional Renal Team has invited the hospital's palliative care team to expand their care to the outpatient dialysis unit in support of patients with advanced chronic kidney disease.

Patients are gently introduced to the hospital's use of the palliative approach for people who may not be considered “end of life”. They have an opportunity to meet with the palliative care physicians and nurse to assess their individual needs and discuss options to ensure quality of life, including symptom management. Pain relief during dialysis is an issue for many patients whose pain is significantly aggravated by sitting for three to four hours.

From June 2017 to February 2019, approximately 90 patients have benefitted greatly from this approach. Those patients who have chosen to end dialysis and become “end-of-life” patients have experienced a smooth transition, since they already know the palliative care team, and vital conversations about goals of care, substitute decision makers, and power of attorney have already taken place.

The Renal Network team strongly believes in palliative care, and this outstanding collaboration between the two teams has exceeded our expectations. Key quotes from Renal Network leaders and palliative care team leaders will illustrate this point. This presentation will also describe the integration process of the palliative care service, early successes, and lessons learned. Data will be shared from early outcome measures, including palliative physician referrals, required symptom management, care planning, and transitions of care.

10. Journey of the peritoneal dialysis (PD) catheter—From creation to termination

Mina Kashani, BHSN, RN, CNeph(C), Department of Nephrology, St. Michael's Hospital, Toronto, ON
Niki Dacouris, BSc, Department of Nephrology, St. Michael's Hospital, Toronto, ON

Our hospital is a tertiary care centre located in downtown Toronto. Our home dialysis program offers home PD and home emodialysis (HD), as well as facility-based HD and nocturnal HD. We follow more than 100 patients on PDs. Both laparoscopic and interventional radiologic (IR) PD catheter insertions are performed in our program. Initially, only IR insertions were offered; laparoscopic insertions were introduced as of January 2012 in our program to provide another option with fewer limitations.

In order to evaluate PD catheter outcomes between the two methods, we created a database to capture the journey for our PD catheters (all events and procedures from the time of insertion). Data can be easily exported and trends can be observed over time. Capturing the data also enables us to have a better understanding of what some of the issues may be that could lead to PD catheter malfunction and/or failure. The database structure can serve as a template for other programs/sites lacking electronic capture in this area. Furthermore, it has proven to be a useful tool in research projects. Current areas of interest in our program include the following:

1. Comparison of the outcomes of laparoscopic and interventional insertions
2. Success or failure rates of PD catheter insertions
3. Reasons for malfunction and their intervention (e.g., peritonitis, PD leak, in-flow and/or outflow obstructions, hernia, manipulation, and revision)
4. Examination of the causes of PD catheter failure (i.e., mechanical failure or membrane failure)

11. Compassionate Tums® initiative in dialysis patients

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Annette Veith, PPA, Nova Scotia Health Authority Renal Program
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Patients on dialysis with chronic kidney disease may develop mineral bone disease (CKD-MBD). As part of CKD-MBD, patients develop hyperphosphatemia, which is associated with increased morbidity and mortality. Although phosphate binders are essential in the management of hyperphosphatemia, calcium (Ca)-based phosphate binders are not covered under the Provincial Formulary.





The Renal Mineral Bone Quality Team developed an interdisciplinary initiative to provide Compassionate Tums® to patients who identified cost as a barrier to compliance with Ca-based phosphate binders. Patients who were dispensed Compassionate Tums® in the first eight months of this project (October 5, 2017 to June 15, 2018) were reviewed. Serum phosphate levels were compared before and after they had been provided with a three-month supply. A total of 39 patients received Compassionate Tums® during the project evaluation period. The mean phosphate level before enrollment was 2.3 mmol/L versus 1.9 mmol/L after enrolment ($p = 0.0054$). A majority (68%) demonstrated a reduction in serum phosphate.

The team identified several benefits to patients, primarily a significant reduction in phosphate levels after enrolment. Other benefits include a reduction in financial burden, reinforcement of education on phosphate binders, and improvement in drug access.

12. Supportive care pilot program

Nancy Hemrica, BScN, RN, Kidney Urinary Program, St. Joseph's Healthcare, Hamilton, ON

Debra Filmore, RN, CNeph(C), Kidney Urinary Program, St. Joseph's Healthcare, Hamilton, ON

Brooke Cowel, BScN, RN, Kidney Urinary Program, St. Joseph's Healthcare, Hamilton, ON

As we worked to support the Ontario Renal Network's (ORN) strategic plan to implement a palliative approach to care, we noted a gap in service for those patients choosing conservative renal care instead of a renal replacement modality. We recognized this patient population could benefit from some crisis management and end-of-life planning, as well as support to stay well for as long as possible. Home and community care is often challenging for patients and families to navigate, and many experience a delay in service involvement until the patient is in crisis. We wanted to find a way to provide for more upstream care that would support a patient at all points in their end-stage renal disease (ESRD) journey.

We began a unique partnership with the seven hospices within our general community that agreed to be the point of contact for the patients. Each hospice offers a variety of day wellness programming that help to engage and offer a social outlet for patients and their families, as well as the support of a nurse and palliative physician for more focused care. The patient still receives the specialized renal care from our regional centre and their nephrology team, and now they have an extra layer of support from our community partners to ensure we have created complete wraparound care.

13. Home hemodialysis—A choice to make!

Meenakshi Sudarshan, C.dt, Renal Engineering Technologist, Home Hemodialysis Program, Toronto General Hospital, University Health Network, Toronto, ON

Tosin Afolabi, CET, Renal Engineering Technologist, Home Hemodialysis Program, Toronto General Hospital, University Health Network, Toronto, ON

Goal: The focus of the presentation is to identify, assess, and measure the quality of life of patients in home hemodialysis (HHD) program at UHN. This poster will also discuss in detail how quality of life differs between patients undergoing home versus in-centre hemodialysis.

Introduction: The nephrology program at the Toronto General Hospital (University Health Network [UHN]) is a leader in the field of kidney failure. It is considered to have one of the world's largest home and nocturnal hemodialysis programs, and a thriving home peritoneal dialysis program. These programs offer new freedom and hope for patients, enabling them to tailor their dialysis treatment to their home environments. This method of dialysis also provides the best dialysis outcomes for patients with chronic renal failure. The home hemodialysis program at UHN is committed to increasing the number of patients on home dialysis through its unique technical support system.

Description: The cost of hemodialysis is a concern as the prevalence of end-stage renal disease (ESRD) increases. Although HHD has been described as less expensive than in-centre hemodialysis, the proportion of patients performing HHD has been increasing. UHN has been providing HHD treatments to more than 100 patients consistently for the past 10 years.

The authors will discuss UHN's newly-introduced Innovation Clinic, which offers easy transition for patients on home hemodialysis from hospital training to set-up at home, and the second machine policy, which would allow patients to have an additional dialysis machine at their cottage property for a limited period of time. In addition, the authors will highlight the critical and challenging aspects of covering a vast geographical area by the technological department. Finally, there will be a focused discussion on how the home hemodialysis technological department at UHN has simplified the process of the initial home assessment, and the installation and maintenance of equipment.

Evaluation: The authors will evaluate of the patient's quality of life through the following means:

- Technical visits made by renal engineering technologists during the year
- Frequency of emergency or hospital visits by home hemodialysis patients
- Use of the continuous on-call technical support by the technological department
- Coordination of services with patient's routine work or school life to accommodate their needs.

Conclusion: Innovative services provided by UHN's technological department have the potential to help patients achieve quality of life and lead normal lives as they undergo home hemodialysis.

14. Reminiscence Therapy (RT)

Kathleen M Gerrior, RN, CNeph(C), GNC(C), Renal Unit, Nephrology Department, Kingston Health Science Centre, Kingston, ON

Introduction: At the Belleville Dialysis Clinic (BLDU) in Belleville, Ontario, the average age of patients is 75 years. Reminiscence therapy (RT) is a non-pharmacological intervention that improves self-esteem and provides the older patient with a sense of fulfillment and comfort, as they look back at their lives.

Purpose of the project: RT is the importance of spending time talking to the patients about their enjoyable recollection of past events. The sharing of these experiences with an attentive listener allows both parties to achieve a connection and rapport. In turn, this connection fosters a relationship in which reminiscing helps individuals feel better about the present and more hopeful about the future.

Description: I have chosen nine patients (10% of the patient population) to interview. I have asked open-ended questions such as, "Where were you born?" Follow-up questions included: "Do you have siblings?" and "Are you married?" The intent is for the patients to share their thoughts and feelings. Dr. Robert Butler (gerontologist, author on healthy aging, and first director of the National Institute on Aging) had previously stated that "people like to talk about the past", but if the memory is sad or difficult, we can learn to allow time for silences and emotion with active listening. Reminiscing is really good old-fashioned storytelling, which, as a form of communication, should never go out of style.

Evaluation/outcomes: I have observed staff and patients reminiscing enjoyably common subjects from their earlier years. The sense of fulfillment and comfort has been demonstrated by laughter. I have also observed active listening demonstrated by a close encounter interview to assist through a difficult situation.

Implications for practice: The practical application of this project has been utilized to reduce stress in a difficult situation, be it distraction during an initial cannulation or reviewing life events in end-of-life discussions.

15. Improving patient and visitor hand hygiene rates and reducing clutter to reduce harm

Nma Jerry, RN, Multi-Organ Transplant Unit, Toronto General Hospital, University Health Network, Toronto, ON
Robyn Huizenga, RN, Multi-Organ Transplant Unit, Toronto General Hospital, University Health Network, Toronto, ON

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Complications associated with hospital-acquired infections (HAIs) are a major cause of morbidity and mortality for hospitalized patients (World Health Organization, 2017). Transplant patients are particularly vulnerable to the spread of infection, making infection prevention and control (IPAC) an important area of focus when working with this patient population (Fishman, 2017). Despite ongoing interventions to reduce the spread of HAIs, the multi-organ transplant (MOT) unit at Toronto General Hospital (TGH) continues to experience a heavy burden of isolated patients.

Over the past year, MOT nurses took on the challenge of tackling hospital-acquired infections by addressing non-conventional risks factors that potentiate the spread of infection. The primary interventions included improving patient and family member hand hygiene rates, as well as addressing unit clutter, which prevents thorough environmental disinfection. Although much attention has been focused on improving the rates of healthcare provider hand hygiene, efforts to directly involve patients in their own hand hygiene have remained relatively absent in IPAC initiatives. Despite this under-representation, the literature strongly recommends the need for programs that engage patients in hand hygiene. Patients' hands are an important medium for spreading pathogens and can transmit HAIs by coming in contact with healthcare workers, their environment, and susceptible areas on their own body, including the mouth, surgical sites, wounds, and intravascular devices. Low rates of patient and family member hand





hygiene prompted the initiation of several interventions on the transplant unit, including the implementation of a new admission package designed to prompt staff to engage patients and their visitors in key IPAC education at the time of admission.

In addition to patient and family member engagement in IPAC initiatives, a quality improvement project aimed at addressing unit clutter was launched. Thorough disinfection of surfaces in acute care settings is linked to lower rates of hospital-acquired infections (Daniels, Earlywine, &

Breeding, 2019). Clutter prevents the proper disinfection of surfaces and can pose a significant infection risk for hospitalized patients. The objectives of this project were to “shine the light on the environment” by increasing the awareness of how the environment plays a significant role in the spread of HAIs. Staff and patients were engaged in decreasing the amount of severely cluttered rooms, and the waste generated by clutter was highlighted. Data collection evaluating project impact indicates increased awareness of the importance of engaging patients and families in IPAC initiatives.

Engaging patients and family members in infection control ensures that they have the knowledge and support available to protect themselves and others from infection. Doing so aids in the health promotion and improved well-being of the patient population, as well as reducing the significant financial burden associated with high isolation rates.

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NOTICE BOARD

- Canadian Nurses Association (CNA) Exam Timeline.

<https://www.nurseone.ca/certification/renewing-your-certification#sthash.IDBqg5i7.dpuf>

	Spring 2019	Fall 2019
Initial exam or renewal by exam application window	Jan. 10–March 31, 2019	June 3–Sept. 12, 2019
Certification exam window	May 1–15, 2019	Nov. 1–15, 2019
Renewal by continuous learning application window <i>Apply by June 1 to save 10% on your renewal fee</i>	Jan. 10–Nov. 1, 2019	

N.B. CNA will provide 20% discount for initial certification, re-certification, and re-write examination fees in 2019 to active members of CANNT. For more information, contact the CANNT National Office at cannt@cannt.ca

- **September 14–17, 2019.** 48th Annual European Dialysis and Transplant Nurses Association/European Renal Care Association (EDTNA/ERCA) International Conference: *New Pathways I the Renal Setting – Caring Together by Integrating Modern Technology Based on Knowledge and Education*, Prague, Czech Republic. www.edtna-erca.com
- **September 18, 2019.** Nephrology Health Care Professionals' Day (celebrated every third Wednesday of September annually)
- **October 24–26, 2019.** Canadian Association Nephrology Nurses and Technologists (CANNT) 51st National Symposium 2019: *Sharing our Stories Down by the River*, River Cree Resort and Casino, Edmonton, AB. www.cannt.ca
- **November 5–10, 2019.** The American Society of Nephrology (ASN) 2019 Kidney Week, Walter E. Washington Convention Center, Washington, DC. www.asn-online.org
- **May 2–5, 2020.** ISPD-EuroPD Joint Congress, Scottish Event Campus (SEC), Glasgow, Scotland. www.ispd-europd2020.com



Nephrology Certification Registration Status Report 2019

Initial and Renewal by Exam to Renew in 2019	Renewal by Continuous Learning (CL) Hours	Total of Initials and Renewals	Due
31	39	70	272

Perceptions of kidney transplant recipients regarding their post-transplant primary care

By Olusegun Famure, Myra Nina Caballero, Anna Li, Laura Rivera, Nicholas Phan, Monika Ashwin, Pei Xuan Chen, Leslie Adcock, Jeffrey Schiff, and S. Joseph Kim

ABSTRACT

Kidney transplant recipients (KTRs) are typically referred to their primary care physicians (PCPs) for routine medical care within six months following transplant, a period that is deemed to be the most critical period in which KTRs remain under the care of transplant nephrologists. This study explores KTR perceptions regarding post-transplant primary care. A

self-administered questionnaire was distributed to adult KTRs who were transplanted between January 2002 and February 2011, were at least six months post-transplant, and were receiving follow-up care at Toronto General Hospital. The survey assessed KTR views on PCP performance, comfort level with PCPs, self-management support, and perceived barriers to optimal care. A total of 502 KTRs (78%) completed the survey. Seventy-six percent indicated that the PCP was one of their healthcare providers. Among them, 53% reported their PCPs recommended services of other healthcare providers. Although 77% of KTRs strongly confirmed the importance of effective health self-management, only 50% strongly felt competent executing self-management strategies. KTRs are generally comfortable with their PCPs; however, better utilization of other healthcare services and self-management tools is necessary.

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Solid-organ transplantation is the treatment of choice for end-stage organ failure (McCashland, 2001; Wolfe et al., 1999). A total of 1,263 solid-organ transplants were performed in Ontario in the 2017-2018 fiscal year, with 54% of them being kidney transplants (Trillium Gift of Life Network [TGLN], 2018). This statistic represents a 15% increase in the of kidney transplants in Ontario since 2008 (TGLN, 2008). With improvements in surgical techniques and post-transplant care, the one-year graft survival rate for the organ transplant population has improved significantly, and is currently greater than 90% (Gupta, Unruh, Nolin, & Hasley, 2010; McGuire et al., 2009). As the number of organ transplants gradually increases and the survival rate improves, chronic health conditions such as diabetes, cancer, cardiovascular disease, and osteoporosis are becoming increasingly prevalent and are emerging as major causes of morbidity and mortality (Heller, Prochazka, Everson, & Forman, 2009; Kasiske et al., 2000; Broemeling, Watson, & Prebtani, 2008; Gourishankar, Jhangri, Tonelli, Wales, & Cockfield, 2004; Villeneuve et al., 2007; Kasiske, 2001; Silikensen, 2000).

The increase in the number of long-term patient survivors with multiple post-transplant chronic conditions has imposed a large burden on the few Ontario transplant centres that manage transplant recipients, particularly kidney transplant recipients (KTRs) (Gupta et al., 2010; McGuire et al., 2009). This strain on the healthcare system calls for the promotion of more effective strategies such as self-management (Barr et al., 2003; Wagner, Austin, & Von Korff, 1996). Due to insufficient human and economic resources at such centres, transplant recipients are typically referred to their primary care physicians (PCPs) for routine medical care within six months following transplant (McCashland, 2001; McGuire et al., 2009). In Ontario, all PCPs have completed a minimum of two years of post-graduate training.

The issue of PCPs' potential lack of experience in post-transplant management raises the question of whether transplant recipients receive adequate care that addresses their complex presentation from the PCPs. One aspect of this is the perception of transplant patients regarding their primary care provider. It is particularly important to better understand whether patients feel comfortable with their PCP's management of preventive care measures and chronic disease, as well as whether they are receiving sufficient support in the realm of self-management. No study to date has been conducted in Canada to assess organ transplant recipients' perception of the quality of chronic disease management by PCPs.

In order to investigate how transplant patients in Ontario view the care they receive, a survey-based study among KTRs was conducted. KTRs are the largest population of solid organ transplant recipients, and primary care issues in this population, such as increased risk of malignancies, opportunistic infections, and metabolic complications, are also similarly observed in other solid organ transplant populations. The objective of this study was to ascertain the perceptions of adult KTRs regarding their post-transplant primary care. More specifically, this study aimed to assess patient perceptions with respect to: (1) the quality of primary healthcare services received; (2) the attitudes and practice patterns of their PCPs in the management of chronic disease and self-management support; and (3) potential barriers to optimal care that currently exist.

METHOD

Sample Frame

This was a self-reported, cross-sectional, survey-based study. A convenience sample of KTRs was obtained between May 2012 and February 2013 from the Toronto General Hospital (TGH) kidney transplant program in Ontario. The inclusion criteria consisted of adult patients (older than 18 years of age) who received a kidney transplant between January 1, 2002, and February 28, 2011; were at least six months post-transplant; and were currently receiving post-transplant follow-up care at TGH. Weekly screening of upcoming clinic patient lists identified eligible individuals. Eligible patients were approached in person by research staff upon arrival at the clinic. Research staff introduced the study, obtained verbal consent for participation, and administered a paper copy of the survey to study participants. Patients were approached a second time to follow up on any questions they had regarding the study and to collect the completed surveys. For the purposes of this study, language barriers, visual impairment, or disinterest toward study participation constituted a basis for excluding patients from study enrolment. This study was reviewed and approved by the Research Ethics Board of the University Health Network.

SURVEY TOOL DEVELOPMENT

The MEDLINE and PubMed databases were searched to identify peer-reviewed English-language articles published between January 1996 and December 2010. The primary

search terms used were *organ transplantation*, *chronic disease management*, *primary health care*, and *primary care physician*. Titles and abstracts of articles identified from the search were screened. Articles were included if they met at least one of the following criteria: the scope of the article concerned the management of chronic or long-term conditions; the focus of the article was on adult solid-organ (kidney, heart, liver, or lung) transplant recipients; and the article addressed issues surrounding disease management by PCPs and/or transplant centres. Reference lists of relevant articles were also searched.

Based on findings from the literature review, key components of chronic disease management were identified. These included: the formation of a multidisciplinary team of healthcare providers, implementation of preventive medicine, physician education and training, patient self-management support, and effective communication among health care providers (Barr et al., 2003; Wagner et al., 1996; Bodenheimer, 2003; Ouwens, Wollersheim, Hermens, Hulscher, & Grol, 2005; World Health Organization [WHO], 2002; Singh, & Ham, 2006; Cunzel, & Laederach-Hofmann, 2000; Health Council of Canada, 2007; Wagner, Austin, et al., 2001; Weingarten et al., 2002; Davis, Thomson, Oxman, & Haynes, 1996; Ciccone et al., 2010; Wallace, 2005; Ofman et al., 2004; Norris et al., 2002; Norris, Glasgow, Engelgau, O'Connor, & McCulloch, 2003; Wagner, Glasgow, et al., 2001; Grol, 2001; McAlister, Lawson, Teo, & Armstrong, 2001; Bia et al., 2010). The components of chronic disease management were used as a point of focus for the domains of the patient survey in addition to other domains that were required to address the study objectives. The domains assessed included: demographic information; physician expertise, comfort level, and performance; chronic disease management; patient self-management support; and barriers to optimal care.

The survey was divided into four sections. The first section ascertained demographic characteristics of patients (age, gender, race, involvement of a PCP in their post-transplant follow-up care). The second section addressed patients' perceptions of physician knowledge, comfort level, and performance. The third section dealt with patient self-management support. The fourth section investigated patients' satisfaction with the healthcare services provided by PCPs. Survey respondents answered 15 multiple choice and Likert-scale questions, several of which included a section allowing for free-text comments to elaborate on responses. There was also a general comment section at the end of the survey. Prior to distribution, the survey was piloted to identify any issues regarding clarity of question syntax and organization. This information was then used to revise the survey prior to implementation.

DATA ANALYSIS

Tabulation of descriptive statistics for each survey item was conducted in Stata® Data Analysis and Statistical Software. Qualitative content analysis was conducted on the free-text comments. Emerging themes were mapped onto existing items to identify areas not previously captured with regards to barriers to optimal primary care and

types of services required.

RESULTS

Survey Respondents

After screening for eligible patients, 646 KTRs were approached for this study (Figure 1). Of these, 502 individuals completed and returned the survey, resulting in a response rate of 77.7%. However, each question received varying levels of response. The demographic information is outlined in Table 1. More than half of the study participants were between the ages of 40 and 65 (59.0%) and male (57.8%). Almost

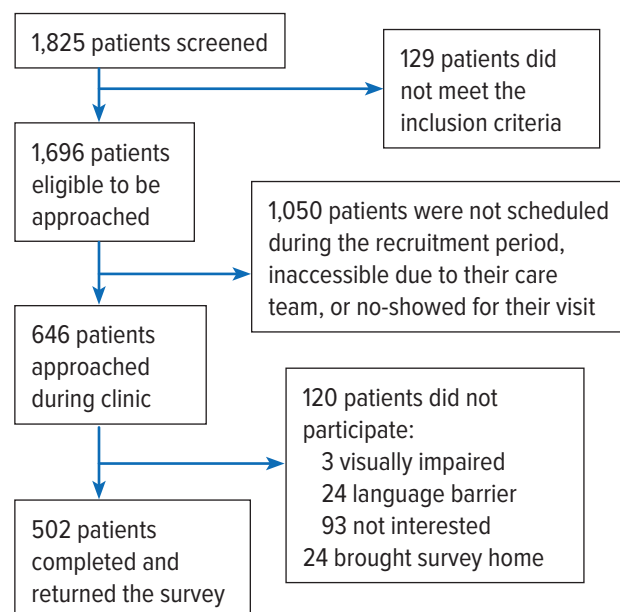


Figure 1. Patient Eligibility Screening and Exclusion

Table 1. Demographic Information (N = 502)

Characteristic	Respondents N (%)*
Age range (years)	
18–39	95 (18.9)
40–55	157 (31.3)
56–65	139 (27.7)
66–74	81 (16.1)
> 75	25 (5.0)
Sex†	
Male	290 (57.8)
Female	205 (40.8)
Race	
White	331 (65.9)
Black	37 (7.4)
East Asian	45 (9.0)
South Asian	54 (10.8)
Aboriginal	3 (0.6)
Other	23 (4.6)
Family physician involved in care	
Yes	381 (75.9)
No	113 (22.5)

* Not all KTR answered all questions.

† One individual had multiple answers for this question.

two-thirds were Caucasian (65.9%), and three-quarters indicated a PCP has been involved in their post-transplant care (75.9%).

Post-Transplant Primary Care

Among the KTRs with a PCP, most have been under the physician's care for more than three years (65.8%) (Table 2). Although most respondents (75.9%) indicated that their PCP managed non-transplant-related issues, only 32.8% stated that chronic medical conditions were under their PCP's management. Approximately half of the KTRs (52.8%) reported that their PCP recommended them to the

Table 2. Post-Transplant Primary Care (n = 381)

Survey Question	Respondents n (%)*
Time under PCP's care	
< 6 months	15 (3.9)
6 months–1 year	31 (8.1)
1–2 years	37 (9.7)
2–3 years	41 (10.8)
>3 years	251 (65.8)
Areas of care managed by PCP	
Chronic medical conditions	125 (32.8)
Vaccinations	250 (65.6)
Periodic health examinations	275 (72.2)
Immunosuppressive drug therapy	21 (5.5)
Educational support/counselling	60 (15.7)
Specialist referrals	180 (47.2)
Non-transplant related issues	289 (75.9)
Cancer screening	87 (22.8)
Diabetes screening	53 (13.9)
Other	16 (4.2)

* Not all respondents answered all questions.

Table 3. Involvement of Other Health Care Professionals (n=381)

Survey Question	Respondents n (%)*
PCP recommended services of other health care professionals	
Yes	201 (52.8)
No	154 (40.4)
Other health care professionals visited since transplantation	
Dietician	82 (40.8)
Pharmacist	122 (60.7)
Physiotherapist	47 (23.4)
Occupational therapist	13 (6.5)
Social worker	26 (12.9)
Psychiatrist	16 (8.0)
Nurse/Nurse practitioner	30 (14.9)
Chiropodist	24 (11.9)
Other	56 (27.9)

* Not all respondents answered all questions.

services of other healthcare professionals. The proportion of patients using the services of various healthcare professionals is shown in Table 3.

Level of Comfort with Family Physician's Care

To assess patients' perceptions regarding their PCP's management of preventive care measures (Figure 2a) and chronic disease management practices (Figure 2b), KTRs were asked to rate their comfort level on a scale from 1 to 5. A score of 1 indicated they were *very uncomfortable* and 5 indicated *very comfortable*. Patients were generally

comfortable (85%) when their PCPs prescribed preventive care measures, but were more divided in their comfort rating with approximately 40% expressing a level of comfort and discomfort, respectively, when the PCP titrated/adjusted their immunosuppressive drug therapy. Overall, approximately 70% of the patients were comfortable with their PCP's chronic disease management practices.

Patient Self-Management Support

A list of conditions prevalent in transplant populations was provided and patients were asked to select chronic

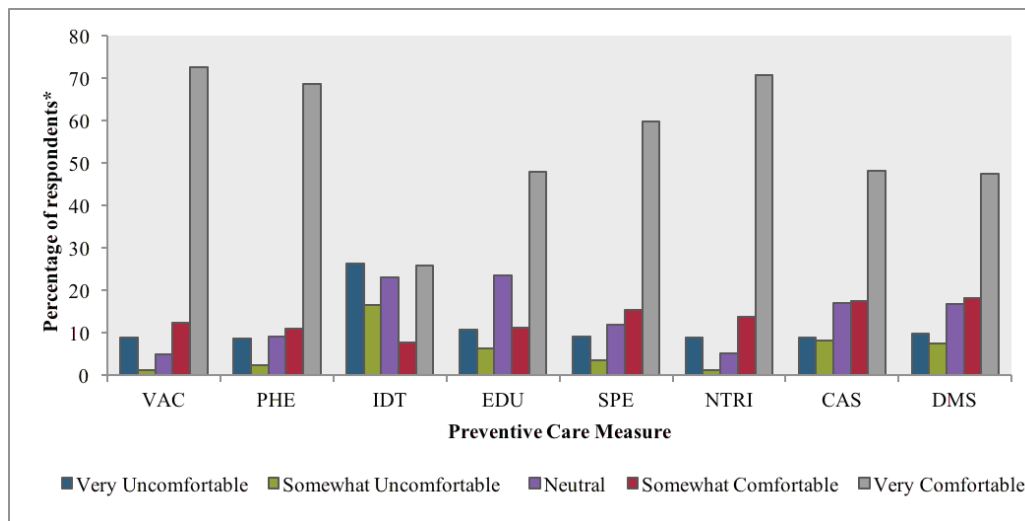


Figure 2a. KTRs' comfort level with PCP management of preventive measures. Percentage of KTR respondents is plotted in comfort level bins for various preventive care measures: VAC=vaccination; PHE=periodic health examinations; IDT=immunosuppressive drug therapy; EDU=educational support/counseling; SPE=specialist referrals; NTRI=non-transplant-related issues; CAS=cancer screening; DMS=diabetes screening.

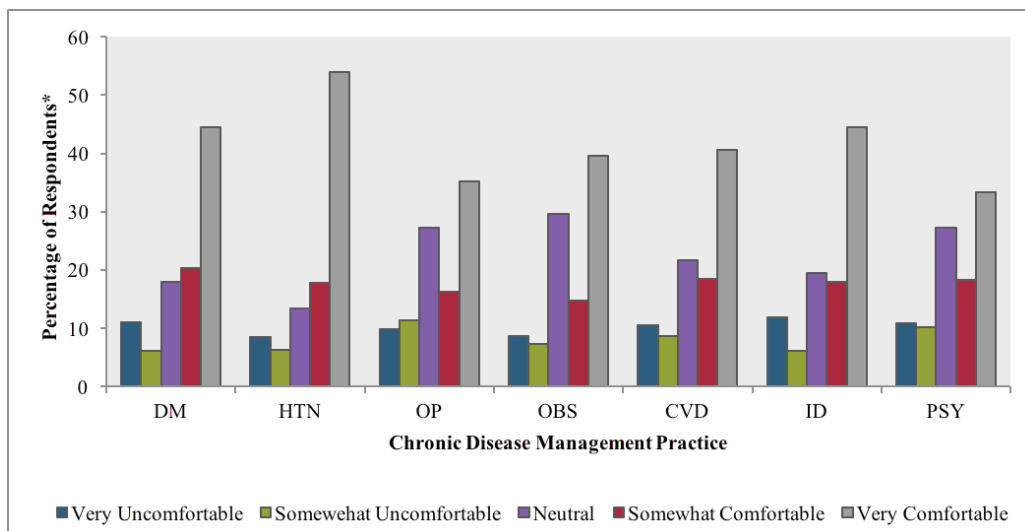


Figure 2b. KTRs' comfort level with PCP management of chronic diseases. Percentage of KTR respondents is plotted in comfort level bins for various chronic disease management practices: DM=diabetes management; HTN=hypertension control; OP=osteoporosis management; OBS=obesity management; CVD=cardiovascular disease risk factor modification; ID=infectious disease control; PSY=psychological disorder management.

*Not all respondents answered all questions. Plot denominators only include respondents who did answer the question and who did not indicate this question was not applicable.

medical conditions that they currently manage independently (Table 4). Chief among them were hypertension (54.2%) and diabetes (31.5%). Although 76.6% of patients strongly agreed that effective self-management of health conditions is important, only 50.4% strongly agreed that they felt competent doing so. Some participant suggestions for promoting self-management included education on transplant medications, reminders about vaccinations, and information about community supports. Patients also rated their impression of their PCP's performance in various areas related to self-management on a scale of 1 to 5, with 1 being *poor* and 5 being *excellent*. The majority of KTRs (86%) rated their physicians positively in a number of self-management support domains, including encouraging behavioural interventions, educating about health conditions, and working together to achieve optimum health (Figure 3).

Improving Patient Care

To better ascertain which services were deemed lacking and impediments to ideal post-transplant care, KTRs were asked to prioritize a list of patient services and then factors that prevented them from receiving the type and quality of care they desired (Table 5). Less than half of the KTRs surveyed were satisfied with their care (46.6%) and two-thirds indicated that they did not experience any barriers (63.3%). In addition to these responses, patients felt that better access to other healthcare professionals would be

Table 4. *Patient Self-Management (n = 381)*

Survey Question	Respondents n (%) [*]
Chronic conditions KTR currently self manage	
Cardiovascular disease	53 (13.9)
Diabetes	120 (31.5)
Hypertension	206 (54.2)
Osteoporosis	102 (26.8)
Obesity	76 (19.9)
Cancer	23 (6.0)
Psychological disorder management	42 (11.0)
Other	31 (8.1)
None of the above	62 (16.3)
It is important to know how to effectively self-manage my health conditions after my transplant	
Strongly disagree	15 (3.9)
Somewhat disagree	1 (0.3)
Neutral	7 (1.8)
Somewhat agree	47 (12.3)
Strongly agree	292 (76.6)
I feel competent in managing my own health conditions	
Strongly disagree	18 (4.7)
Somewhat disagree	10 (2.6)
Neutral	35 (9.1)
Somewhat agree	107 (28.1)
Strongly agree	192 (50.4)

^{*} Not all respondents answered all questions.

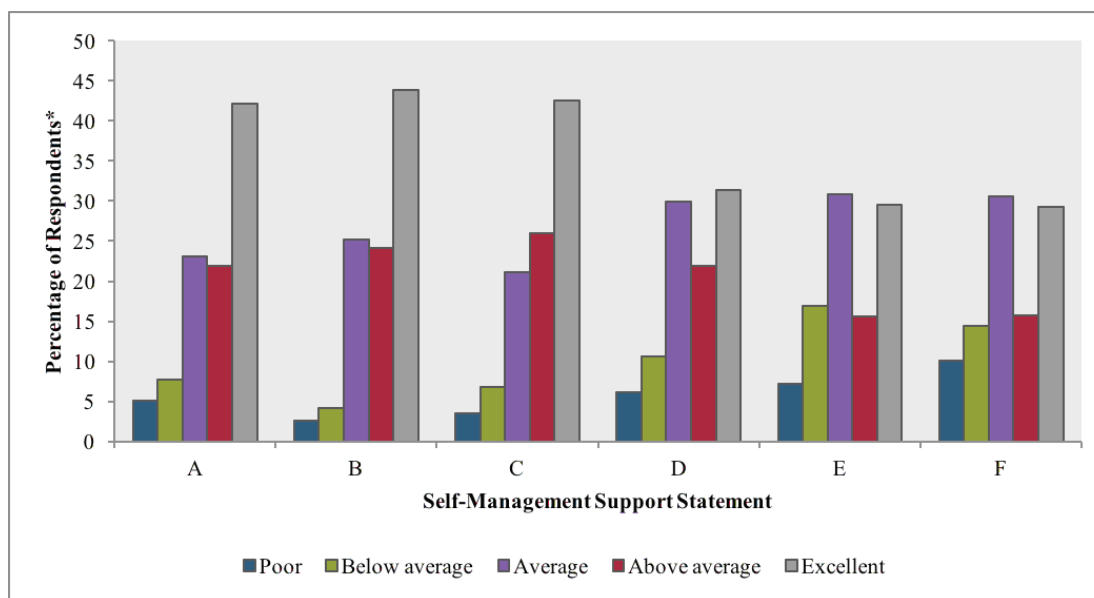


Figure 3. KTR rating of PCP performance in self-management support of health conditions. Percentage of KTR respondents is plotted in rating bins for various statements regarding the support provided by their PCP for self-management. Statements given included: (A) educating me about my health conditions; (B) encouraging me to make behavioural interventions; (C) working with me to set goals to achieve optimal health status; (D) helping me identify issues or health concerns; (E) referring me to use community resources; and (F) providing psychological support to help me cope with any emotional/social stresses.

^{*} Not all 381 respondents answered each question. The denominators for each statement represent the individuals who did answer the question and who did not indicate this question was not applicable.

Table 5. *Improving Care for KTR (N = 502)*

Survey Question	Respondents N (%)*
Services required to improve quality of patient care	
More time with my family physician during clinic visits	69 (13.7)
More access to other health care professionals	98 (19.5)
More educational materials	79 (14.7)
More access to community resources	83 (16.5)
More reminders regarding transplant care	76 (15.1)
More frequent communication with family physician	69 (13.7)
Other	
None	28 (5.6)
	234 (46.6)
Barriers to optimal post-transplant care	
Lack of financial support	51 (10.2)
Lack of social support	20 (4.0)
Lack of emotional support	32 (6.4)
Lack of educational support	23 (4.6)
Lack of practical support	30 (6.0)
Language/cultural barrier	18 (3.6)
Other	18 (3.6)
None	318 (63.3)

* Not all respondents answered all questions.

beneficial (19.5%). Patients' lack of financial support to address their healthcare needs, such as taking time off of work to attend regular clinic visits, was the most prevalent obstacle (10.2%).

Emerging Themes in Free-Text Responses

Of the 502 questionnaires completed, 125 KTRs (24.9%) provided free-text comments that were eligible for coding. Commonly occurring themes included: "Improvements needed in coordination and communication with the medical team", "Services required to address language barriers", "Interest in tools for self-management", "Financial barriers", and "Self-management/educational support issues." Important themes and corresponding demonstrative quotations are described in Table 6.

DISCUSSION

Our study suggests that the majority of KTRs (85%) with a PCP are comfortable with their physician's care with respect to preventive care and chronic disease management. This suggests that PCPs are an underutilized resource who can play a greater role in post-transplant care. Our study also showed that only 50% of patients with a PCP indicated that the services of other healthcare professionals were recommended to them. For these complex patients, the incorporation of additional members of the healthcare team (e.g.,

continued on page 42...

Table 6. *Summary of Patient Perception Themes Emerging from Free Text Responses*

Theme	Selected Quotations from KTR Free Text Responses
Improvement needed in coordination and communication with medical team	<ul style="list-style-type: none"> • "Need someone who could coordinate the results and notes provided by all the specialists I see and make decisions regarding my overall health" • "The transplant team should contact my family physician to remind him of his support after transplant." • "Send a newsletter to patients "regularly" that keep them informed about related issues, advice, nutrition {family doctors are not overly familiar with transplantation and need to be sent a general package that informs them / gives them basic info regarding dos and don'ts, medication interactions, important things to consider during care}, research into new anti-rejection meds; very disappointing to see no such newsletter sent by email."
Services required to address language barriers	<ul style="list-style-type: none"> • "[I would like] more social workers who speak my language to address the emotional and psychological stresses after transplant." • "Due to my language barriers, it's better for me to receive reminders [...] via email or text message." • "[The issue is] more of a language barrier than anything."
Interest in tools for self-management	<ul style="list-style-type: none"> • "Please create a form of activity to continue and reinforce the self-care management to a kidney transplant patient." • "[I would like] reminders [for] flu shots, etc. [and] more education [related to] transplant meds." • "[I would like knowledge of] supports available i.e. [regarding] health regimen: diet/exercise in our community and access to community supports."
Inadequate management of psychosocial issues	<ul style="list-style-type: none"> • "I would like to see more support from a psychological viewpoint: how chronic illness affects workplace/earning potential, family life, sex, body image, emotional stability." • "Offer a list of therapists (psychiatrist/psychologist) to help patients post-transplant especially those therapies that are covered by OHIP (psychologists)." • "[There should be] referral or [establishment] of support groups."

nutritionists, pharmacists) has been shown to improve patients' quality of life (Bodenheimer, 2003; Ouwens et al., 2005). Therefore, KTRs should be encouraged to seek the services of their PCPs and receive appropriate referrals from their PCPs to other healthcare professionals. In addition, forming a standardized collaborative care model between PCPs and transplant nephrologists could improve quality of care and alleviate the current burden on transplant centres.

KTRs who had PCPs listed in their electronic health records were screened to be approached for this survey-based study. Despite this screening method, almost a quarter of respondents indicated a PCP was not involved in their post-transplant care. It is possible that the proportion of KTRs without a PCP at our centre is actually greater than originally estimated. There may be at least three factors contributing to this observation: (1) Patients may have been lost to follow-up post-transplant or during the several years spent on dialysis prior to transplant; (2) there may be a lack of access to the PCP; or (3) KTRs may not be comfortable seeking primary care and default to relying on their transplant centre. A recent Ontario study reported approximately 9% of a stratified random patient sample did not have a PCP (Reid et al., 2009). Among patients without a physician, the majority (27%) indicated a lack of access, whereas 13% listed alternative healthcare access (Reid et al., 2009). Based on our present study, transplant nephrologists at our centre may frequently supplement the role of PCPs.

Coupled with a collaborative care approach for improved chronic disease management is the idea of patient self-management support. In this study, KTRs positively rated their physicians in several domains of self-management support and acknowledged the importance of independently managing their medical conditions. A smaller proportion of patients were positive about their own abilities. There is strong evidence that self-management interventions are associated with improved clinical outcomes across a variety of chronic conditions (WHO, 2002). Since the management of a chronic health condition is ultimately under the direct control of the patient, self-management support may be an important intervention in chronic disease care (Barr et al., 2003).

Some of the limitations of this study deserve note. First, the study population was not randomly sampled from the potentially eligible pool of patients; rather, a convenience

sample of patients present at their clinic visits during the recruitment period was used. As a result, it is possible that the KTRs who were sampled were systematically different from those patients who were not available to be approached. It is unlikely, however, that the calendar dates on which follow-up visits were booked are related to patients' perceptions of their primary care. Second, this study reflects the perceptions of patients at one transplant centre and may not be representative of all KTRs in Canada. Third, it should be noted that our survey did not define self-management skills and, thus, patients may have interpreted self-management differently, and their perceptions may not accurately reflect their degree of competency in self-management. Fourth, the aim of this study was to ascertain the comfort level that KTRs have with their PCP, impediments to optimal care, and attitudes toward self-management. Thus, the *perception* of care versus the *actual* quality of care provided by the PCPs to the KTRs were outside the scope of this study. Last, a significant proportion of patients approached declined to participate because of disinterest, language barriers, and other factors; this may have an impact on the generalizability of our study results.

In summary, this novel study provided insight into the state of primary care for KTRs known to a large Canadian transplant centre. In general, KTRs have a positive perception of their PCPs, want them involved in their post-transplant care, and would like their help in facilitating self-management of their chronic health conditions. The refinement of patient healthcare management in the primary care setting warrants continued attention and collaboration, as solid-organ transplantation and associated post-transplant chronic disease continue to increase in prevalence. Similar surveys focusing on PCPs are needed to directly ascertain the comfort level and expertise of family physicians in managing chronic conditions. A more complete perspective regarding the issues surrounding the quality of primary healthcare provided to transplant patients would also be beneficial.

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Barriers to the long-term care of kidney transplant recipients: A survey of general nephrologists in Canada

By Olusegun Famure, Heebah Sultan, Mirriam Mikhail, Nicholas Phan, Monika Ashwin, and S. Joseph Kim

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ABSTRACT

Although kidney transplant recipients (KTRs) in Canada have traditionally been followed by transplant nephrologists, the growth of the KTRs population has begun to overwhelm the capacity of transplant centres to continue providing long-term care. Study objectives were to describe practices and attitudes of general nephrologists towards managing KTRs, identify barriers, and determine an optimal care model. A self-reported, cross-sectional survey consisting of eight domains was distributed using Canadian Society of Nephrology email membership list. All 54 (70%) respondents who completed the survey were exposed to kidney transplantation during their nephrology training, with over 80% indicating at least three months of training. Only 46% felt comfortable in managing KTRs. Insufficient continuing education and experience in transplant medicine were primary reasons for reluctance in managing KTRs. Collaborative care with regular follow-up by general and transplant nephrologists for clinically stable KTRs is considered optimal; however, this will require educational and clinical support from transplant centres.

Kidney transplantation is the treatment of choice for most patients with end-stage renal disease (ESRD) and is increasingly being performed (Abecassis et al., 2008). In 2012, more than 17,000 Canadians were living with a

functioning kidney transplant (Canadian Institute for Health Information [CIHI], 2015). Kidney transplant recipients (KTRs) represent a unique patient population who require ongoing medical care to not only maintain the transplanted kidney, but to also manage and prevent a number of chronic conditions and potential complications associated with transplantation (American Society of Transplantation [AST] Kidney-Pancreas Committee, 2009). Although advancements in immunosuppressive therapies have dramatically improved short-term outcomes for KTRs, they have greatly increased the risk of developing chronic conditions post-transplantation (Kaplan & Meier-Kriesche, 2004). Furthermore, kidney function in KTRs is rarely normal and may further contribute to the exacerbation of co-morbidities (AST Kidney-Pancreas Committee, 2009).

Traditionally, KTRs in Canada have been followed by transplant nephrologists in tertiary care academic centres (Prasad, Nash, Keough-Ryan, & Shapiro, 2010). Recently, the growing population of KTRs has overwhelmed the capacity of the few existing transplant centres to provide continued long-term care (Howard, 2006). Although transplant nephrologists are crucial for the initial care and stabilization of KTRs, these focused goals may lead to a lack of attention surrounding a number of chronic conditions (AST Kidney-Pancreas Committee, 2009). A healthcare system that supports effective teamwork between several healthcare providers can improve the quality of patient care, enhance patient safety, and reduce workload issues (Oandasan et al., 2006). This may be particularly true for the management of chronic conditions that commonly arise in KTRs, including cardiovascular disease, infection, cancer, anemia, and bone disease. Community-based general nephrologists are increasingly providing long-term care to KTRs (Obhrai et al., 2010). General nephrologists are likely to treat these patients for their chronic kidney disease (CKD) pre-transplant, and may be able to follow them more closely throughout their lifetime to improve long-term outcomes (Lodhi & Meier-Kriesche, 2011). The provision of care in a community setting may also alleviate the burden on both transplant centres and KTRs who must travel long distances for follow-up visits at a transplant centre (Howard, 2006). Thus, effective long-term care of KTRs requires the establishment of a collaborative care practice model, which transitions medically stable KTRs from the transplant centre to community-based centres.

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To develop a collaborative care practice that ensures KTRs receive comprehensive and coordinated high-quality care, it is necessary to first identify the gaps that exist in the current model of care. No studies, however, have specifically investigated the barriers experienced by general nephrologists as their practices expand to include the long-term care of KTRs in Canada; furthermore, no studies have examined the extent to which general nephrologists are involved in the long-term management of KTRs. The only known study that was conducted in Canada demonstrated that short-term graft and patient outcomes were similar across 13 transplant centres and satellite clinics in Canada, supporting the provision of care to KTRs in community-based centres, as a feasible alternative to transplant centres (Prasad et al., 2010). The study, however, was restricted to general nephrologists from satellite clinics affiliated with a transplant centre. These nephrologists may differ substantially from community-based general nephrologists in their training and education, the availability of resources and services, and their level of collaboration with transplant nephrologists. In view of this knowledge gap, the need to investigate whether these barriers and their practical solutions are relevant to general nephrologists practising in Canada today is justified.

The primary objective for this study was to describe the practices and attitudes of general nephrologists towards the delivery of long-term care to KTRs in Canada. The secondary objectives were to identify the barriers in delivering long-term care to KTRs at both the provider and institutional levels and to examine potential approaches to developing an optimal model of care delivery.

METHOD

Study Design and Population

A self-reported, cross-sectional survey was used to systematically collect information from general nephrologists and was distributed to the members of the Canadian Society of Nephrology (CSN). The target population for this study was general nephrologists who were certified by the Royal College of Physicians and Surgeons of Canada to practise nephrology in Canada. For the purpose of this study, general nephrologists were defined as nephrologists (specialists in the diagnosis and treatment of patients with kidney disease or hypertension) who practised in a community-based centre (outside a transplant centre) and treated primarily adult patients. General nephrologists were excluded if they practised at a transplant centre, were retired, worked only in a non-clinical setting, and/or provided care primarily to pediatric patients.

The sampling frame for this study was obtained from CSN, consisting of an email membership list of all practising general nephrologists in Canada. General nephrologists who were known to be practising out-of-scope were pre-screened and removed from the sampling frame. The remaining general nephrologists were screened at the time they were invited to participate in the study. The survey was distributed to general nephrologists who were members of

CSN, via their email membership in October 2014, with two follow-up reminders. The questionnaire was distributed using Fluid Surveys.

A comprehensive literature review conducted pertaining to the provision of collaborative care in nephrology did not identify a validated survey to evaluate the general nephrologists' practices, attitudes, and barriers related to care delivery for KTRs, which, therefore, led to the development of a novel survey. The questionnaire for the study was developed through findings from previous research and through consultations with experts in the field, which included transplant nephrologists. The questionnaire consisted of 38 close-ended questions and one open-ended question that were categorized into eight domains based on the literature review results: (a) attitudes, (b) patient care, (c) collaborative care, (d) experience, (e) resources, (f) continuing medical education, (g) training, and (h) general information. The 37 close-ended questions included multiple choice (nominal and ordinal), Likert-scale (ordinal), and numerical (interval and ratio) response categories. The open-ended question was included at the end of the questionnaire for respondents to provide comments to improve the delivery of care to KTRs.

The questionnaire was pre-tested in 2011 by 25 general nephrologists practising in Toronto, Ontario. Based on the results of the pre-test and the respondents' feedback, the questionnaire was appropriately modified. The pre-test resulted in a response rate of 76%, and was conducted to identify: (a) poor question wording and ordering; (b) errors in questionnaire layout and instructions; (c) problems with the computer software application; (d) problems caused by the respondent's inability or unwillingness to answer the questions; (e) appropriate response categories for close-ended questions; and (f) anticipated timing for questionnaire completion and response rate.

STATISTICAL ANALYSIS

Descriptive analyses were done using t-test for continuous variables and by chi-square test (and Fisher's exact test for small cell counts) for categorical variables. All analyses were performed in STATA 12.1 (Statacorp, College Station, TX).

RESULTS

The survey was completed by 55 general nephrologists currently working across Canada (Table 1). One quarter of those who responded have been practising nephrology for five to 10 years, followed by almost another quarter for 11 to 15 years, and over one-third have been practising for more than 15 years. Sixty-nine percent of the general nephrologists practised in a major metropolitan area, and 47% of them practised in Ontario, followed by 15% in British Columbia, and 13% in Alberta. Eighty-five percent of the respondents worked in an academic/teaching hospital, and greater than two-thirds of their patient care was in a group practice setting.

Table 1. *Characteristics of General Nephrologists Who Completed Survey*

Characteristics of Nephrologists	Percentage	<i>p</i>
Years independently practising as a nephrologist		0.199
<5 years	16%	
5-10 years	25%	
11-15 years	24%	
16-20 years	9%	
21-25 years	11%	
>25 years	15%	
Centre location		0.00
Major metropolitan area	69%	
Mid-sized city	18%	
Other (Suburbs, small town or rural, other)	13%	
Patient care setting		0.00
Academic/teaching hospital	85%	
Community-based hospital	15%	
Private office/clinic	0%	
Community clinic	0%	
Long-term care, rehab, or complex continuing care facility	0%	
Organization of patient care setting		0.00
Solo practice	0%	
Partner practice	15%	
Group practice	69%	
Inter-professional practice	15%	
Other	2%	

Training in Kidney Transplantation

More than two-thirds of the general nephrologists received three to six months of formal training in kidney transplantation during their nephrology residency. Less than half spent 0-25% of their training in outpatient settings, whereas 44% spent anywhere from 26-50% of their training in outpatient settings. Ninety-five percent of the general nephrologists received some exposure to managing patients with failing kidney grafts, followed by 87% who have assessed kidney transplant candidates, and 82% who had been exposed to kidney transplant biopsies and pathology; over two-thirds of the general nephrologists were involved in the assessment of potential living kidney donors, and over one-third were exposed to the management of kidney-pancreas transplant recipients (Figure 1). Fifty-six percent of general nephrologists received their kidney transplant training over 10 years prior, whereas less than 10% of the general nephrologists pursued additional kidney transplant training beyond the requirements of the nephrology residency.

Kidney Transplant Knowledge and Experience

Of the 45% of the general nephrologists who identified as being providers of follow-up care to KTRs, most had either only 0-5 (46%) or over 30 (43%) KTRs under their care (Supplemental Table 1). There was considerable difference in the level of comfort the general nephrologists had in recognizing (Figure 2a) and managing (Figure 2b) various complications following kidney transplantation. They were *very/reasonably comfortable* in recognizing acute rejection (73%) followed by calcineurin inhibitor nephrotoxicity (60%), chronic rejection (60%), and recurrent disease in the kidney allograft (60%). General nephrologists were less comfortable in recognizing other immunosuppressive drug toxicities and opportunistic infections compared to the previous complications (11% vs. 25%, respectively). Although more than 50% of general nephrologists were still *very/reasonably comfortable* in recognizing these

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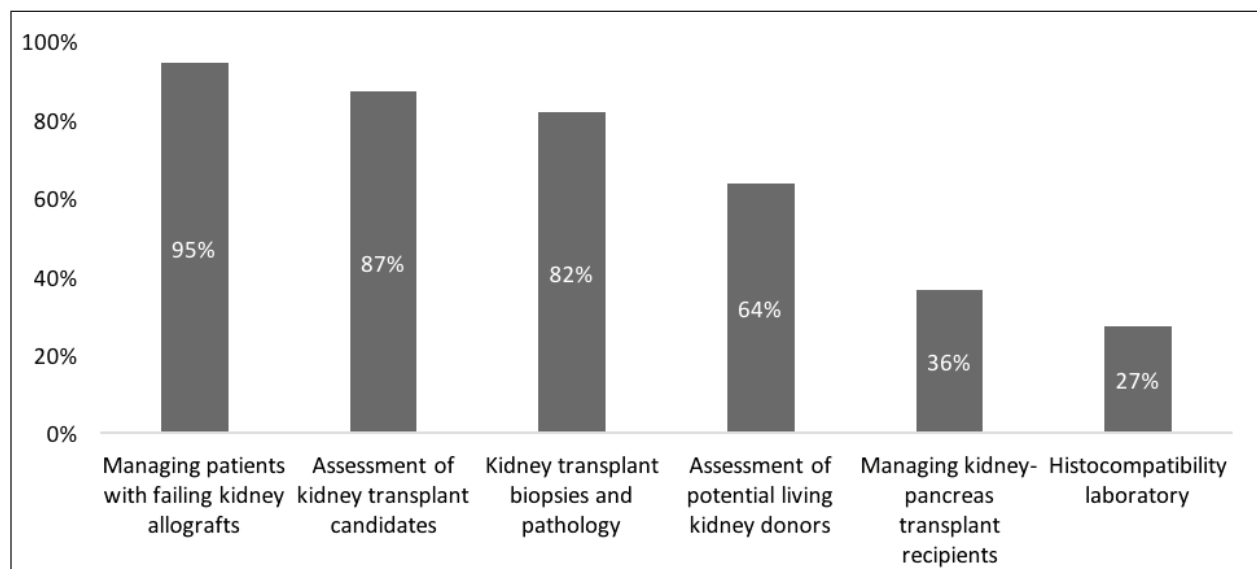


Figure 1. Experience in Areas of Kidney Transplantation

Supplemental Table 1. Survey Responses from General Nephrologists

Section 1: General Information				Section 2: Training in Kidney Transplantation			
	n	Percentage	p		n	Percentage	p
Years independently practising as a nephrologist				Fraction of kidney transplant experience spent in outpatient setting			
<5 years	9	16%	0.199	0–10%	11	20%	0.003
5–10 years	14	25%		11–25%	15	27%	
11–15 years	13	24%		26–50%	24	44%	
16–20 years	5	9%		>50%	5	9%	
21–25 years	6	11%					
>25 years	8	15%		Pursued dedicated period of kidney transplant training beyond nephrology residency requirements			
Centre location				Yes	5	9%	0.000
Major metropolitan area	38	69%	0.000	No	50	91%	
Mid-sized city	10	18%					
Other (Suburbs, small town or rural, other)	7	13%					
Patient care setting				Section 3: Kidney Transplant Knowledge and Experience			
Academic/teaching hospital	47	85%	0.000	Comfort in providing long-term care to kidney transplant recipients			
Community-based hospital	8	15%		Very/Reasonably comfortable	25	45%	0.154
Private office/clinic	0	0%		Somewhat comfortable	16	29%	
Community clinic	0	0%		Not Very/Not At All comfortable	14	25%	
Long-term care, rehab, or complex continuing care facility	0	0%					
Organization of patient care setting				Comfort level in recognizing acute rejection in kidney transplant recipients			
Solo practice	0	0%	0.000	Very/Reasonably comfortable	40	73%	0.000
Partner practice	8	15%		Somewhat comfortable	11	20%	
Group practice	38	69%		Not Very/Not At All comfortable	4	7%	
Inter-professional practice	8	15%					
Other	1	2%		Comfort level in recognizing chronic rejection in kidney transplant recipients			
				Very/Reasonably comfortable	33	60%	0.000
				Somewhat comfortable	13	24%	
				Not Very/Not At All comfortable	9	16%	
				Comfort level in recognizing calcineurin inhibitor nephrotoxicity in kidney transplant recipients			
				Very/Reasonably comfortable	33	60%	0.000
				Somewhat comfortable	18	33%	
				Not Very/Not At All comfortable	4	7%	

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Section 3: Kidney Transplant Knowledge and Experience	n	Percentage	p	Section 3: Kidney Transplant Knowledge and Experience	n	Percentage	p
Comfort level in recognizing other immunosuppressive drug toxicity in kidney transplant recipients				Comfort level in managing other immunosuppressive drug toxicity in kidney transplant recipients			
Very/Reasonably comfortable	31	56%	0.000	Very/Reasonably comfortable	24	44%	0.052
Somewhat comfortable	18	33%		Somewhat comfortable	21	38%	
Not Very/Not At All comfortable	6	11%		Not Very/Not At All comfortable	10	18%	
Comfort level in recognizing recurrent disease in the kidney allograft in kidney transplant recipients				Comfort level in managing recurrent disease in the kidney allograft in kidney transplant recipients			
Very/Reasonably comfortable	33	60%	0.000	Very/Reasonably comfortable	27	49%	0.046
Somewhat comfortable	14	25%		Somewhat comfortable	14	25%	
Not Very/Not At All comfortable	8	15%		Not Very/Not At All comfortable	14	25%	
Comfort level in recognizing opportunistic infections in kidney transplant recipients				Comfort level in managing opportunistic infections in kidney transplant recipients			
Very/Reasonably comfortable	29	53%	0.009	Very/Reasonably comfortable	26	47%	0.046
Somewhat comfortable	12	22%		Somewhat comfortable	11	20%	
Not Very/Not At All comfortable	14	25%		Not Very/Not At All comfortable	18	33%	
Comfort level in managing acute rejection in kidney transplant recipients				Provision of follow-up care to kidney transplant recipients			
Very/Reasonably comfortable	23	42%	0.389	Yes	25	45%	0.500
Somewhat comfortable	15	27%		No	30	54%	
Not Very/Not At All comfortable	17	31%		Approximate number of kidney transplant recipients under care			
Comfort level in managing chronic rejection in kidney transplant recipients				0–5 patients	13	46%	0.000
Very/Reasonably comfortable	21	38%	0.708	6–10 patients	1	4%	
Somewhat comfortable	18	33%		11–20 patients	1	4%	
Not Very/Not At All comfortable	16	29%		21–30 patients	1	4%	
Comfort level in managing calcineurin inhibitor nephrotoxicity in kidney transplant recipients				>30 patients	12	43%	
Very/Reasonably comfortable	31	56%	0.001	Average time spent with kidney transplant recipients on clinical care as compared to non-transplant patients			
Somewhat comfortable	14	25%		Shorter	12	39%	0.798
Not Very/Not At All comfortable	10	18%		About the Same	9	29%	
				Longer	10	32%	

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Section 3: Kidney Transplant Knowledge and Experience	n	Percentage	p	Section 5: Clinical Workload	n	Percentage	p
Average time spent with kidney transplant recipients on reviewing test results as compared to non-transplant patients				# of outpatient (general nephrology and/or transplant) seen per week			
Shorter	5	17%	0.007	0–15 patients	8	15%	0.194
About the Same	18	60%		16–30 patients	17	31%	
Longer	7	23%		31–45 patients	18	33%	
				>45 patients	12	22%	
Average time spent with kidney transplant recipients on administrative activities as compared to non-transplant patients				# of inpatient (general nephrology and/or transplant) seen per week			
Shorter	4	14%	0.004	0–15 patients	37	67%	0.000
About the Same	18	62%		16–30 patients	15	27%	
Longer	7	24%		31–45 patients	2	4%	
				>45 patients	1	2%	
Section 4: Communication With Transplant Centres	n	Percentage	p	# of hours per week spent rounding hemodialysis unit			
Completeness of patient information provided by kidney transplant program upon transfer of care				0–1 hours	12	22%	0.131
Excellent	7	27%	0.357	2–3 hours	15	27%	
Good	10	38%		4–6 hours	15	27%	
Fair	5	19%		7–10 hours	5	9%	
Poor/Very Poor	4	15%		>10 hours	8	15%	
Ability to readily contact nurse coordinators and/or nephrologists at transplant centre when need arises				Section 6: Resources	n	Percentage	p
Always	15	58%	0.003	Appropriate hospital expertise and resources in the following domains to support the follow-up care of kidney transplant recipients			
Most of the time	10	38%		Laboratory	47	85%	0.000
Sometimes/Infrequently/Almost Never	1	4%		Diagnostic Imaging	53	96%	
				Pathology	46	84%	
Routinely discuss all kidney transplant recipients at centre or in practice with referring transplant nephrologist				Infectious Disease	45	82%	
I regularly meet or teleconference with the transplant nephrologist	9	16%	0.141	Cardiology	52	95%	
I contact the transplant nephrologist only when an issue arises	12	48%		Endocrinology	44	80%	
I rarely/have yet to speak with the transplant nephrologist	4	36%		Clinical setting in which kidney transplant recipients are seen by general nephrologists			
Belief that regularly scheduled meetings with transplant nephrologist would improve quality of care delivered to kidney transplant recipients				Centre does not follow kidney transplant recipients	5	9%	
Yes	16	64%	0.162	Central clinic with other nephrology patients	4	7%	
No/Uncertain	9	36%		Central clinic dedicated to kidney transplant recipients	44	81%	
				Office clinic with other nephrology patients	0	0%	
				Office clinic dedicated to kidney transplant recipients	1	2%	
				Other	3	6%	

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Section 6: Resources	n	Percentage	p	Section 8: Continuing Medical Education	n	Percentage	p
Designated nurse/coordinator who provides follow-up care to kidney transplant recipients along with general nephrologists				Kidney transplantation part of personal CME activities			
Yes	47	85%		Almost always	7	13%	0.000
No/Uncertain	8	15%		Frequently	7	13%	
				Sometimes	13	24%	
				Rarely	25	45%	
				Not at all	3	5%	
Section 7: Attitudes	n	Percentage	p	Consider attending a CME course on the long-term management of kidney transplant recipients			
Best model of care for the long term management of kidney transplant recipients				Definitely	9	16%	0.114
Followed exclusively at the transplant centre	17	31%	0.002	Likely	13	24%	
Shared-care with regular follow-up by both the general nephrologist and transplant centre commencing when the patient is stable	24	44%		Possibly	15	7%	
Mainly followed by the general nephrologist with transplant centre involvement as needed commencing when the patient is stable	7	13%		Unlikely	14	27%	
Other	7	13%		Never	4	25%	
Openness to providing future follow-up care to kidney transplant recipients if not doing so currently				Most useful educational resources to keep up with latest advances that impact management of kidney transplant recipients			
My colleagues and I would be open to providing follow-up care to kidney transplant recipients	4	15%		CME Courses	36	65%	
I am open to providing follow-up care to kidney transplant recipients but some/all of my colleagues are reluctant to do so	7	27%		Review Articles	36	65%	
Some/all of my colleagues are open to providing follow-up care to kidney transplant recipients but I am reluctant to do so	1	4%		Web-Based Resources	29	53%	
My colleagues and I are currently not planning to provide follow-up care to kidney transplant recipients	8	31%		Newsletters	2	4%	
Other	6	23%		Other	7	13%	
				Usefulness of detailed and evidence-based protocols on long-term management of kidney transplant recipients in clinical practice			
				Yes	39	71%	
				No	8	15%	
				Uncertain	8	15%	

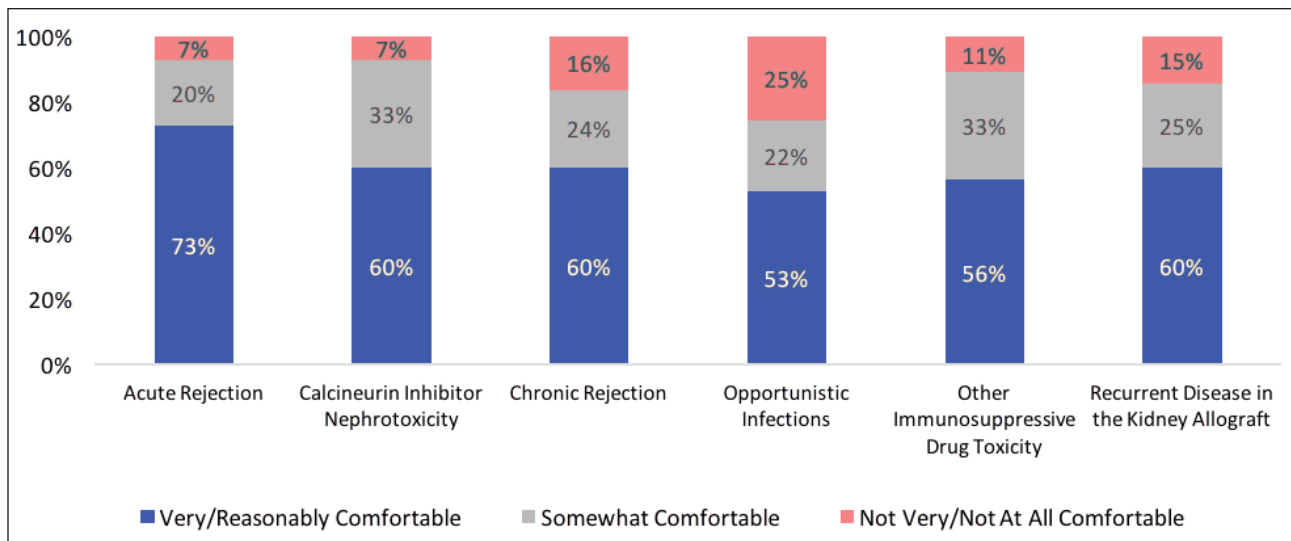


Figure 2a. Level of Comfort in Recognizing Kidney Transplant Complications

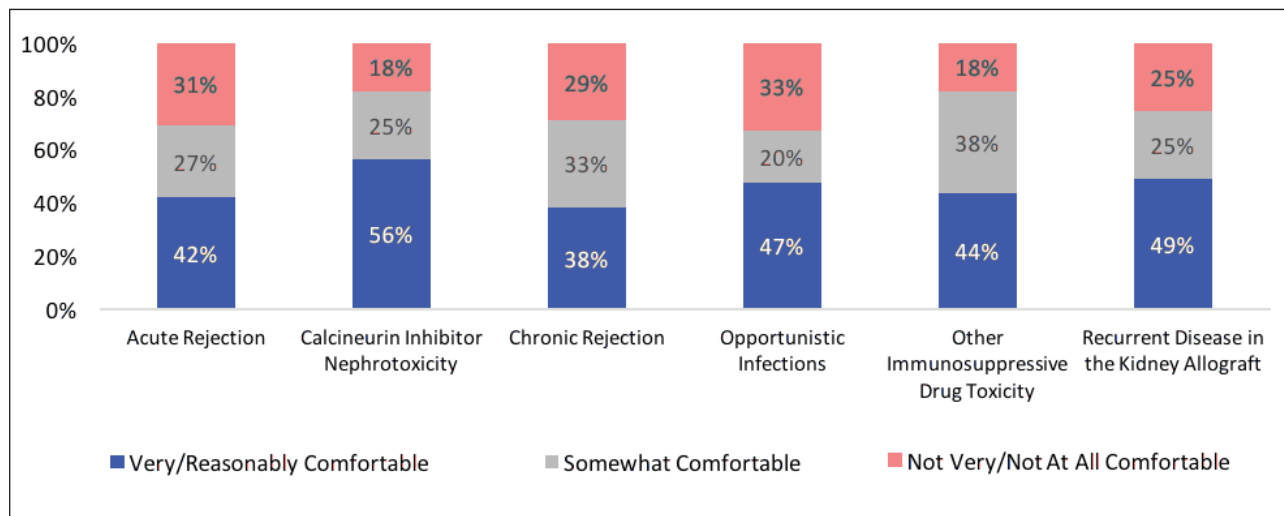


Figure 2b. Level of Comfort in Managing Kidney Transplant Complications

complications, a quarter identified that they were *not at all/not very comfortable* in recognizing complications associated with opportunistic infections. In managing these kidney transplant complications, general nephrologists were *very/reasonably comfortable* in the management of calcineurin inhibitor toxicity (56%) and recurrent disease (49%). There was a general level of discomfort in managing the majority of these complications with general nephrologists reporting either being not at all or not very comfortable in managing opportunistic infections (31%), acute rejection (31%), and chronic rejection (29%).

Sixty-seven percent of the general nephrologists identified that their greatest clinical challenge in caring for KTRs was chronic rejection, followed by both infectious and non-infectious complications (62% and 60%, respectively) (Supplemental Figure 1).

Communication with Transplant Centres

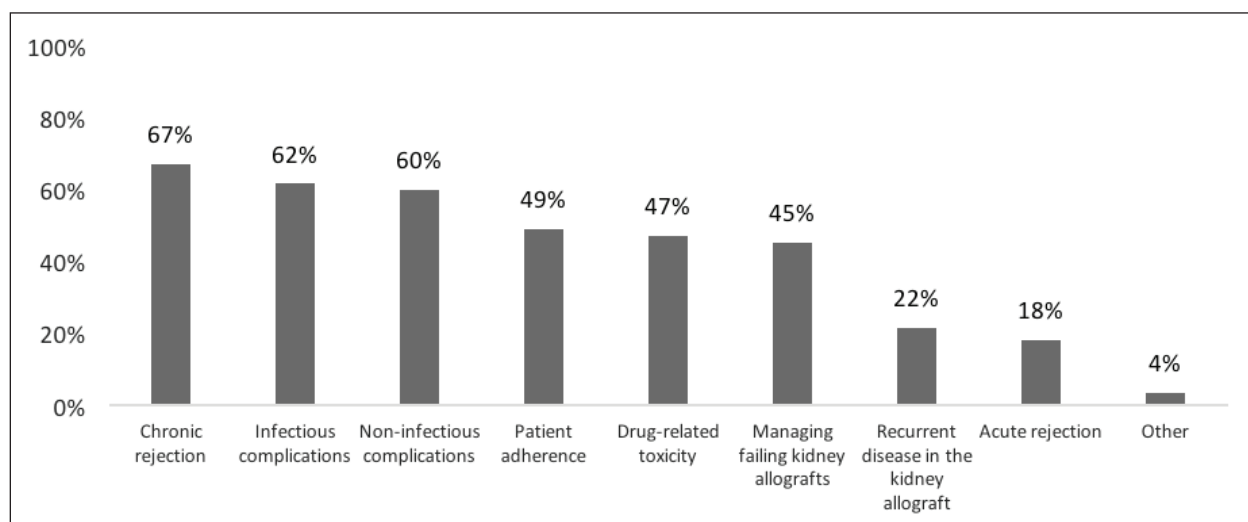
Sixty-five percent of the general nephrologists who provide follow-up care to KTRs rated the completion of patient information provided to them by the kidney transplant program upon transfer of care as being *excellent/good* (Supplemental Table 1). Thirty-eight percent of these nephrologists identified that they are always able to readily contact the nurse coordinators and/or nephrologists at the transplant centre when the need arises, although 36% identified that they rarely or have yet to speak with the referring transplant nephrologists. More than two-thirds of the general nephrologists who provide care to KTRs believe that regularly scheduled meetings with a transplant nephrologist to discuss patient issues would improve the quality of care delivered to KTRs at their centres.

Clinical Workload and Available Resources

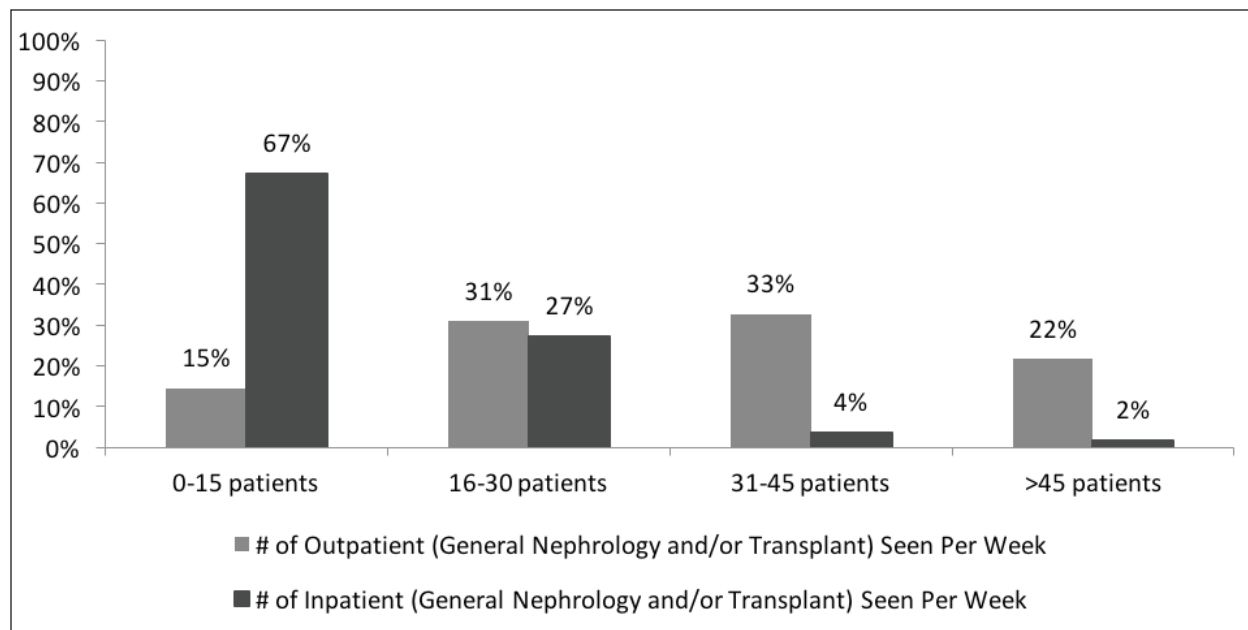
Eighty-one percent of the general nephrologists see KTRs at a central clinic dedicated to these patients at their centre, and more than 85% of them have a designated nurse or coordinator who provides follow-up care along with the general nephrologist at their centre (Supplemental Table 1). Thirty-three percent of the general nephrologists see between 31-45 outpatients (both general nephrology and/or transplant patients) on average per week and 67% see 0-15 inpatients on average per week (Supplemental Figure 2). Almost half of the general nephrologists spent an average of 0-3 hours per week rounding in the hemodialysis unit (Supplemental Table 1). Twenty percent of the general nephrologists identified that their hospital does not have (or they were uncertain of) the appropriate experience and resources in the area of endocrinology to support the follow-up care of KTRs, followed by infectious disease and pathology.

Attitudes on Providing Care to KTRs

Forty-four percent of the general nephrologists identified that the best model of care for the long-term management of KTRs is to have shared care with regular follow-up by both the general and transplant nephrologists after the KTRs is deemed stable (typically six to 12 months post-transplant) (Figure 3). More than 30% felt that the best model would be to have the KTRs followed exclusively at the transplant centre. Of those general nephrologists who are currently not following KTRs, 31% identified that they are not currently planning to provide follow-up care, whereas 27% identified that they are open to the idea of providing follow-up care though some/all of their colleagues are reluctant to do the same (Supplemental Table 1). Only 15% of the general nephrologists identified that they and their colleagues would be open to providing follow-up care to KTRs. One of the primary reasons accounting for



Supplemental Figure 1. Clinical Challenges in Caring for KTRs



Supplemental Figure 2. Number of Patients Seen by General Nephrologists Per Week

the reluctance of some general nephrologists to provide care for KTRs was their level of discomfort in managing immune-compromised patients (78%), followed by worry of clinical overload with other nephrology patients (49%), and limited resources available at the hospital and/or clinic (44%) (Figure 4). Insufficient or inadequate communication with the transplant centre was identified by one-quarter of the general nephrologists as a reason for hesitance in providing care for KTRs.

Continuing Medical Education

Forty-five percent of the general nephrologists identified that they rarely make kidney transplantation a part of their personal continuing medical education (CME) activities (Supplemental Figure 3a), and 52% are unlikely or never likely to consider attending a CME course on the long-term management of KTRs (Supplemental Figure 3b). Educational resources that were identified by the general nephrologists as being the most useful in keeping up-to-date with the latest advances that impact the

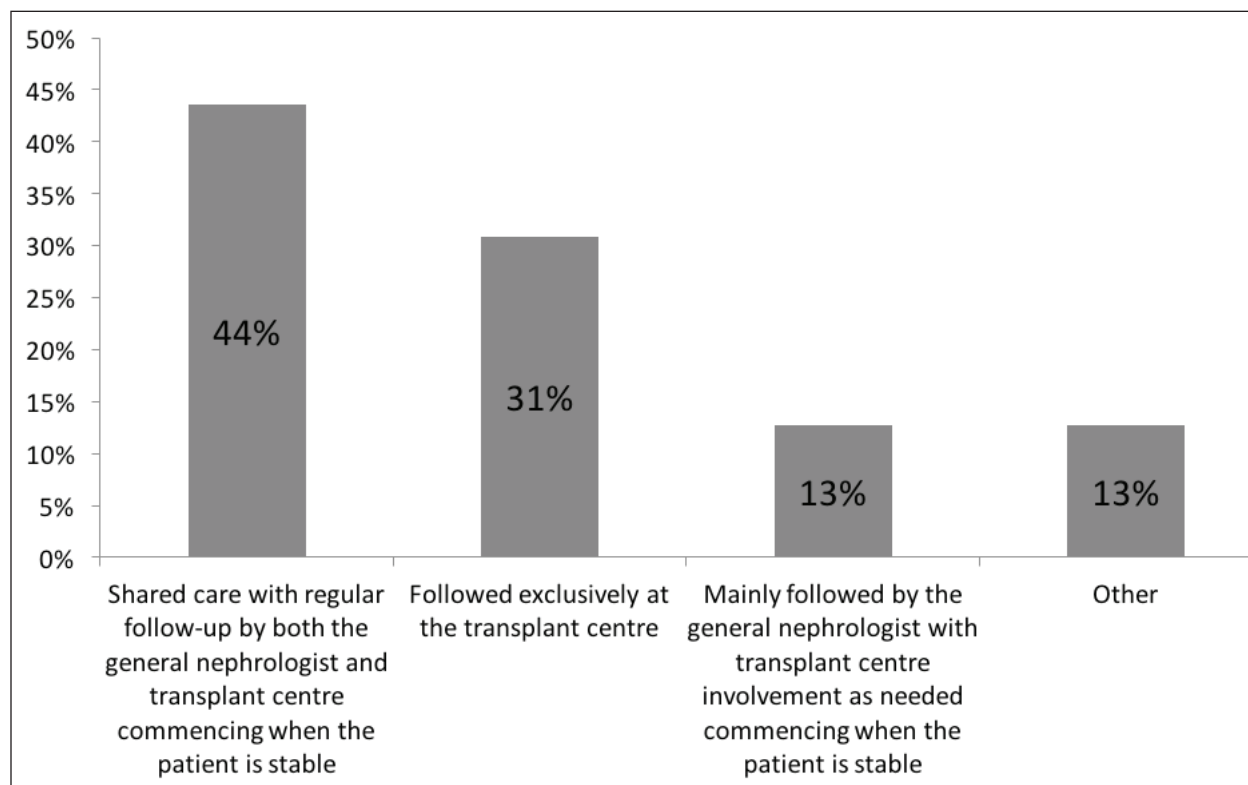


Figure 3. Best Model of Care for Long-Term Management of KTRs

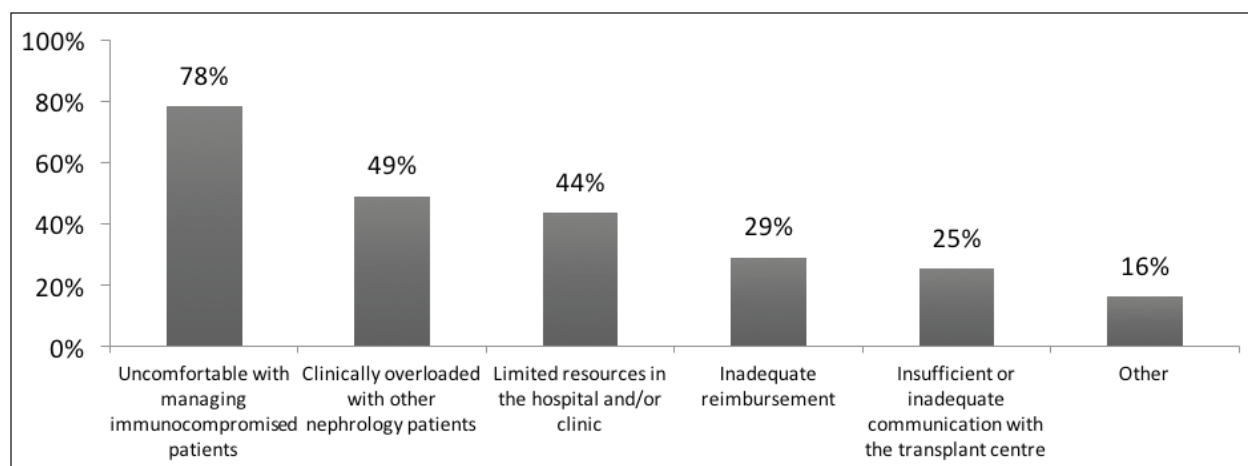
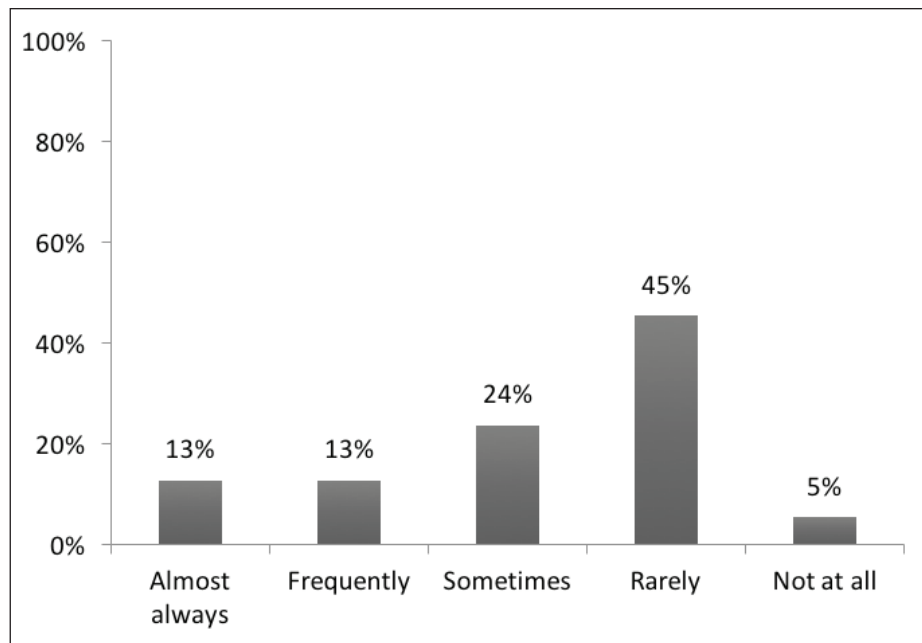
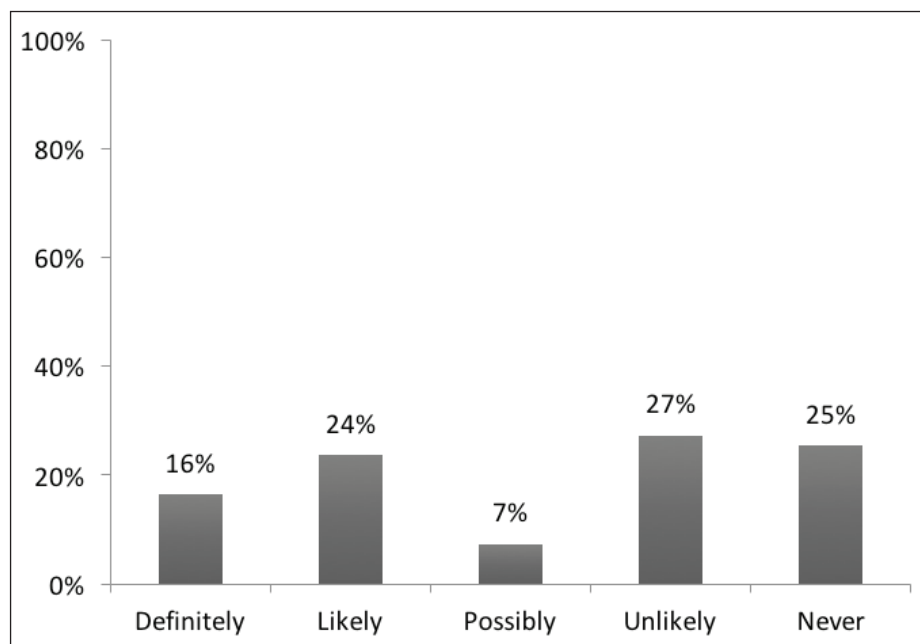


Figure 4. Reasons for Reluctance in Providing Kidney Transplant Care



Supplemental Figure 3a. Current Attendance of CME Activities on Kidney Transplantation



Supplemental Figure 3b. Future Consideration of Attending CME on Long-Term Management of KTRs

management of KTRs were CME courses and review articles (65% for both), followed by web-based resources (53%) (Supplemental Table 1). More than 70% of the general nephrologists would find detailed and evidence-based protocols on the long-term management of KTRs useful in their clinical practice.

DISCUSSION

To our knowledge, this is the first study to collect data on the perceptions and attitudes of Canadian nephrologists toward caring for KTRs. Overall, general nephrologists are

significantly more comfortable recognizing the complications associated with kidney transplantation than managing them. This aligns with approximately two-thirds of respondents identifying chronic rejection, infectious complications, and non-infectious complications as the greatest clinical challenges in caring for KTRs. Despite 95% of general nephrologists being exposed to the management of patients with failing kidney grafts during their training and 82% being exposed to kidney transplant biopsies and pathology, results indicate that the general nephrologists are not very comfortable in the overall management of

KTRs. However, less than half of the respondents identified managing failing kidney allografts as one of the greatest clinical challenges in caring for KTRs, indicating that any reluctance is more likely associated with transplant complications, immunosuppressive drug toxicities, and opportunistic infections. This may suggest that general nephrologists do not feel confident in making decisions about the care of KTRs or that the resources and services needed to make these decisions are not available.

Reluctance in caring for KTRs may also be attributed to a lack of awareness or misperception regarding post-transplant care. Forty-nine percent of general nephrologists cited clinical overload as the reason for their reluctance to take on the care of KTRs. Among respondents who do provide care to KTRs, the time spent reviewing test results and administrative activities for KTRs is about the same as non-transplant patients (60% and 62%, respectively); 39% identified that the time spent providing clinical care for KTRs is shorter than that for non-transplant patients. These results raise the possibility that respondents not treating KTRs may not fully be aware or may be overestimating the time requirements and complexity associated with post-transplant care. Although several factors remain consistent in the care of a patient pre- and post-transplant, such as proneness to urinary tract infections and a heavy burden of infection, there are major differences in the care of these two patient populations, and the workload differs accordingly, with a greater emphasis placed on preventative and prophylactic care, immunosuppression management, and identifying allograft rejection in post-transplant patients (de Souza & Olsburgh, 2008; Snyder et al., 2009). With the evolution of immunosuppressive agents, clinical outcomes have also changed significantly, with a dramatic improvement in graft rejection rates, graft survival, and increased patient stability (Howard, 2006; Oandasan et al., 2006; Prasad et al., 2010). Misguided beliefs regarding the level of complexity and time requirements in caring for KTRs may result in general nephrologists hesitating to undertake post-transplant care.

For a collaborative care practice to be put into place, it is imperative that general nephrologists be knowledgeable and comfortable regarding the clinical management of KTRs. Based on our survey, one of the primary reasons some general nephrologists are reluctant to provide care to KTRs is their level of discomfort in managing immune-compromised patients (78%). This is further corroborated by a survey conducted in the United States that indicated that general nephrologists' involvement with respect to immunosuppressive decision-making was influenced by the number of KTRs under the nephrologist's care, the number of years in the practice, and the relationship with the transplant centre (Howard, 2001). Thus, experience and availability of resources both play a crucial role in the comfort levels of general nephrologists when undertaking care for KTRs. Seventy-one percent of respondents said they would find detailed and evidence-based protocols on the long-term management of KTRs useful in their clinical practice.

Aside from protocols provided by the transplant centre, the American Society of Transplantation has outlined guidelines for the management of transplant patients in the community setting, outlining key aspects of consideration and suggestions on the distribution of clinical responsibilities and recommendations for referral to the transplant specialist (AST Kidney-Pancreas Committee, 2009). These guidelines serve as an excellent foundation by which a comprehensive protocol may be developed.

Although CME activities are a viable option for expanding the knowledge base of the management of KTRs, 41% of respondents reported that they rarely take part in them, and 52% said they were unlikely to or never considered attending CME activities focused on the long-term management of KTRs. Alternative forms of medical education should be considered and implemented to increase understanding among a targeted audience of general nephrologists. Brimmer et al. (2009) found that although print and online courses were equally requested by physicians working with patients suffering from chronic fatigue syndrome, an online course resulted in 94% of all overall award certificates, indicating that online resources may not only be more accessible, but also more utilized. Hence, for the purposes of educating general nephrologists on matters regarding provision of care for KTRs, it may be useful to target those specifically who will be involved in collaborative care through specialized CME workshops, conferences, or seminars that may also be offered online to accommodate distance learning. The focus of such activities should be on areas of long-term care management that would increase the comfort level of general nephrologists in caring for KTRs, such as immunosuppression, which the majority of respondents (78%) did not feel comfortable managing. Specialized events or lecture series can be held at the transplant centre to both discuss commonly encountered issues and to strengthen the relationship between the general and transplant nephrologists, creating a more solid foundation for collaborative care.

A collaborative model of patient care both alleviates the burden on transplant centres and allows general nephrologists to continue the care of KTRs with *ad hoc* assurance and guidance from transplant specialists. To implement such a model, it is necessary to develop standards of care, protocols, and guidelines, and to identify suitable centres of excellence to ensure the successful follow-up of KTRs. According to Howard (2006), a key factor in the continuity of patient care is the establishment of an open and regular line of communication by which general and transplant nephrologists can facilitate the transfer of care. This bi-directional communication and availability of the transplant nephrologists for phone consultation will provide the patient with optimal and timely treatment and will also allow the general nephrologists to be more comfortable in making adjustments to immunosuppressive medications (Howard 2001). By focusing on the provider (i.e., general nephrologist) rather than the institution, the transplant nephrologist can develop a direct and professional relationship with the former. Furthermore, a collaborative

model of care will empower community centres to care for KTRs with the flexibility and assurance of having a transplant centre, most often a tertiary institution, supplement their care with both infrastructure and human resources. This will serve to distribute the burden of patient care, with the transplant nephrologists providing kidney-specific resources such as biopsy testing and pathology and the general nephrologists undertaking general patient care, including immunosuppression regulation, and blood monitoring.

There are several limitations to our study. First, we were unable to determine the response rate, since we did not know how many general nephrologists partake in the email membership. Furthermore, almost half of the respondents were practising in Ontario and more than two-thirds were practising in major metropolitan areas, indicating that the sample is not entirely representative of the national population of general nephrologists. In conjunction with general nephrologists from local community hospitals, our next steps will be directed towards piloting a collaborative care model for patients who received their kidney transplant at Toronto General Hospital. The quality and standard of collaborative care will be assessed by comparing outcomes

of KTRs who are undergoing shared care with those who remained under the care of the transplant nephrologists. A survey will also be created and distributed to the shared care KTRs in order to thoroughly evaluate the program.

CONCLUSION

This cross-sectional study identified confidence in the management of post-transplant care as a limitation to collaborative care and suggested a number of ways by which this may be remedied. Suitable resources, including CME activities, should be made available to general nephrologists, and an open line of communication with the transplant nephrologists should be maintained at all times. Additional research in the form of a pilot study will be conducted and will be evaluated by participating KTRs to examine the utility of a collaborative care model in a community setting.

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Prevention and Treatment of Hepatitis C Virus Infection in Chronic Kidney Disease

By Amanda Carroccia and Marisa Battistella

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OBJECTIVES

After reading this article, the reader will be able to:

1. Describe the epidemiology and pathophysiology of hepatitis C virus (HCV) Infections.
2. Discuss the diagnostic tests and recommended screening protocol to detect hepatitis C.
3. Illustrate the changes in the landscape of hepatitis C treatment with a focus on the drug properties of the first-line treatment regimens in chronic kidney disease (CKD), and, in particular, the hemodialysis (HD) population.
4. Summarize strategies to prevent hepatitis C transmission in the hemodialysis unit.

INTRODUCTION

Hepatitis C virus (HCV) is an enveloped, single-stranded RNA virus that was first discovered in 1989 (Webster, Klenerman, & Dusheiko, 2015). In 2017, the World Health Organization (WHO) referred to hepatitis C infection as a pandemic disease affecting 71 million people globally, and leading to approximately 400,000 deaths each year. Approximately, 70-80% of acute viral hepatitis C cases will progress to chronic disease (defined by the presence of virus in the blood for more than six months). Chronic hepatitis C infection may then progress to hepatic fibrosis and liver cirrhosis in 20–30% of patients after 30 years (Spengler, 2018). Although there is currently no vaccine available to protect against hepatitis C infection, it is estimated that, by 2025,

hepatitis C should become a rare disease with the implementation of current screening guidelines and treatment of all identified cases (Buckley & Strom, 2016).

The virus is transmitted sexually, perinatally, and, most commonly, percutaneously (i.e., illicit drug use, needle-stick injuries, iatrogenic transmission through dialysis) (Spengler, 2018). Furthermore, the hepatitis C viral genome can vary with each infection. The viral genome sequence can be further classified as one of six major genotypes. The prevalence of each of these genotypes can vary geographically. The predominant genotypes circulating in North America are genotypes 1a and 1b as depicted in Figure 1 (Messina et al., 2015).

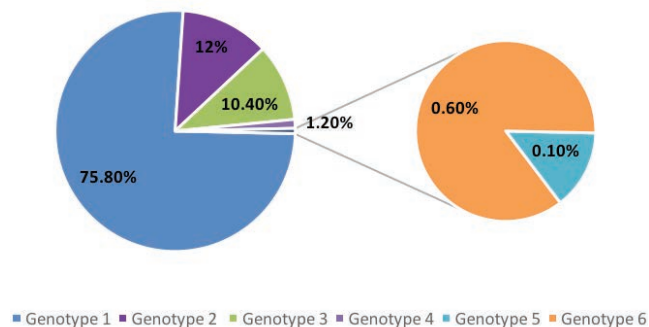


Figure 1. Estimates of hepatitis C virus seroprevalence for each genotype in North America

The burden of hepatitis C is further recognized in chronic kidney disease (CKD). The prevalence of HCV infection may be higher in patients with CKD (including patients undergoing hemodialysis and increasing with the number of years on dialysis) than in the general population (Kidney Disease: Improving Global Outcomes (KDIGO) Hepatitis C Work Group, 2018). According to the 2004 Dialysis Outcomes and Practice Patterns Study (DOPPS), the prevalence of HCV infection in patients on hemodialysis is approximately 13.5% (Fissell et al., 2004). Furthermore, CKD is one of the more common extrahepatic manifestations of HCV infection (KDIGO Hepatitis C Work Group, 2018).

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DIAGNOSIS AND SCREENING OF HEPATITIS C VIRUS INFECTION

Only 25%–30% of patients acutely infected with hepatitis C will present with symptoms (i.e., fevers, right upper quadrant pain, jaundice, an acute rise in serum aminotransferases), whereas patients chronically infected are mostly asymptomatic (Shah et al., 2018). Since most patients infected acutely or chronically are asymptomatic, screening is necessary to detect infection and transmission of the virus. There are two available assays used to detect hepatitis C virus: (1) Immunoassay, which detects the presence of HCV antibodies (Anti-HCV), and (2) Nucleic Acid Test (NAT), which quantifies the amount of HCV RNA in the blood. The NAT assay is more expensive. It should also be noted that samples collected for NAT to test for patients with HCV on dialysis should be drawn before dialysis, because hemodialysis sessions reduce the viremia level through an unclear mechanism. The interpretation of each test result for each assay is presented in Table 1 (KDIGO Hepatitis C Work Group, 2018) (KDIGO Hepatitis C Work Group, 2018).

There is guidance provided by the KDIGO 2018 clinical practice guideline on initial screening and follow-up screening of hepatitis C virus in CKD. The work group suggests that all patients should be screened at the time of initial evaluation of CKD; upon initiation of in-center hemodialysis or upon transfer from another dialysis facility or modality; upon initiation of peritoneal dialysis or home hemodialysis; and at the time of evaluation for kidney transplantation. Follow-up screening should be done using either assay in in-center hemodialysis patients every six months, and the frequency of screening should be increased in units with a new HCV infection (to help identify the presence of transmission) (KDIGO Hepatitis C Work Group, 2018).

Table 1. Interpretation of Hepatitis C Virus Assays

Anti-HCV*	HCV-NAT**	Interpretation
+	+	Acute or chronic HCV infection depending on clinical context
+	–	Resolution of HCV infection (successfully treated or spontaneously cleared)
–	+	Early acute HCV infection; chronic HCV in the setting of immunocompromised state; false anti-HCV negative or false HCV-NAT positive
–	–	Absence of HCV infection

*Anti-HCV= Immunoassay that detects hepatitis C virus antibodies

**HCV-NAT= Nucleic Acid Test to detect hepatitis C virus in the blood

TREATMENT OF HEPATITIS C VIRUS INFECTION

The goals of therapy for treating a hepatitis C infection include (Spengler, 2018):

1. Eradicating the virus in the case of acute or chronic HCV infection. The sustained virologic response (SVR), defined as undetectable serum HCV RNA (less than 10–15 units/mL) 12 weeks after the end of treatment, is used as a surrogate marker to denote cure.
2. Preventing or reversing liver disease progression to cirrhosis, liver failure, and hepatocellular carcinoma.
3. Preventing spread of infection.

According to the joint guideline by the American Association for the Study of Liver Diseases (AASLD) and the Infectious Diseases Society of America (IDSA), the many benefits, both intrahepatic and extrahepatic, that accompany HCV eradication outweigh the risks of therapy. It is, therefore, recommended to initiate treatment for all patients with chronic HCV infection, except those with a short life expectancy (less than 12 months) that cannot be remediated by HCV treatment, liver transplantation, or another directed therapy (AASLD-IDSA, 2018).

Throughout the last 30 years, the landscape of therapeutic options to treat hepatitis C infection has evolved. Treatment was previously limited to interferon-based therapies and ribavirin, until the recent development of the potent direct-acting antiviral agents (DAA) (Webster et al., 2015). There are now regimens available for all HCV genotypes, with cure rates exceeding 90%. Treatment is also based on disease severity, comorbidities and prior treatments received. Furthermore, these agents have been associated with an improvement in hepatic and extrahepatic outcomes, and prevention in progression of liver disease (Shah et al., 2018).

MECHANISM OF ACTION OF ANTIVIRALS

There are three classes of direct-acting antivirals, which can be classified by the mechanism of how they interfere with the replication cycle of the virus (Table 2). The hepatitis C virus undergoes viral uptake by receptor-mediated endocytosis on the target cell, the human hepatocyte, and lymphocyte. HCV strand RNA is released into the cytoplasm and initiates translation of the viral polyprotein at the endoplasmic reticulum membranes, which is then cleaved by the combined action of host and viral proteases. The target of action for the NS3/4A protease inhibitors (one group of DAA therapy) is the viral NS3 and NS4 protein, which are proteases that cleave the HCV polyprotein. The next step in the viral replication cycle is the transformation of the endoplasmic reticulum into vesicles. These vesicles give rise to the membranous web which is the site of HCV replication via a RNA-dependent RNA polymerase. The target for the second group of DAA therapy, the NS5A inhibitors, is the NS5A protein, which does not have enzymatic activity, but is essential for the formation of this membranous web. Lastly, the amplification of the HCV genome by the RNA-dependent RNA polymerase NS5B is a pivotal step in the HCV life cycle, and is inhibited by the third group of

DAA-nucleos(t)ide analogue inhibitors (NIs) and non-nucleos(t)ide analogue inhibitors (NNIs). NIs inhibit the NS5B polymerase by mimicking the polymerase substrate leading to false termination of the newly synthesized HCV RNA chain, whereas NNIs cause a conformational change of NS5B (Spengler, 2018).

Table 2. *Direct-Acting Antivirals Available in Canada*

NS3/N4 Protease Inhibitors (-PREVIR)	NS5A Complex Inhibitors (-ASVIR)	NS5B Polymerase Inhibitors (-BUVIR)
Glecaprevir	Daclatasvir	Sofosbuvir (Nucleoside inhibitors)
Grazoprevir	Elbasvir	Dasabuvir (Non-nucleoside inhibitors)
Paritaprevir	Ledipasvir	
Voxilaprevir	Ombitasvir	
	Pibrentasvir	
	Velpatasvir	

TREATMENT OF HEPATITIS C IN CHRONIC KIDNEY DISEASE

Therapeutic alternatives to treat hepatitis C in CKD have been very limited. Traditional therapies such as interferon-based therapies have been poorly tolerated (i.e., fevers, flu-like symptoms, cytopenias) due to prolonged exposure in patients with poor kidney function, and ribavirin causes hemolytic anemia despite initiation or increased dosing of erythropoietin stimulating agents in the CKD population (KDIGO Hepatitis C Work Group, 2018). The direct-acting antivirals have proven to be effective and well-tolerated, and certain combination products do not require a dosage reduction, regardless of renal function. The work group of the 2018 KDIGO guidelines has provided recommendations for the preferred direct-acting antiviral regimens in varying degrees of renal dysfunction. When the eGFR is greater than 30 mL/min (CKD G1-G3b), any available drug regimens can be used. In Canada, the available drug regimens include grazoprevir-elbasvir (Zepatier®) for treatment of genotype 1 and 4 infection; ledipasvir-sofosbuvir (Harvoni®) for treatment of genotypes 1, 4, 5, and 6 infection; paritaprevir-ritonavir-ombitasvir-dasabuvir (Holkira Pak®) for genotype 1 infection; paritaprevir-ritonavir-ombitasvir (Technivie®) for genotype 4 infection; sofosbuvir-daclatasvir (Sovaldi®+Daklinza®) for genotypes 1 and 3 infection; and, lastly, glecaprevir-pibrentasvir (Mavyret®) and sofosbuvir-velpatasvir (Epclusa®) for treatment of all genotypes (Shah et al., 2018). When the eGFR is less than 30 mL/min (CKD G4-G5 and on hemodialysis), treatment is limited to two first-line drug combinations: grazoprevir-elbasvir and glecaprevir-pibrentasvir. (KDIGO Hepatitis C Work Group, 2018).

Grazoprevir-Elbasvir (Zepatier®)

Grazoprevir-elbasvir (Zepatier®) is a combination of a NS3/4A protease inhibitor and a NS5A inhibitor, and has activity against genotypes 1a, b, and 4. The dose does not need to be adjusted for reduced renal function (Table 3) since both agents are predominantly metabolized by CYP3A and 90% excreted in feces with minimal renal clearance (less than 1%) (KDIGO Hepatitis C Work Group, 2018). In a study of efficacy and safety (C-SURFER trial), patients with HCV genotype 1 infection and advanced kidney disease receiving grazoprevir-elbasvir achieved a sustained virologic response of 99% at 12 weeks post-therapy, and these patients experienced a similar adverse event rate as those reported in the group randomized to receive placebo. The most common adverse events (greater than 10% frequency) reported were headache, nausea, and fatigue (Roth et al., 2015).

Glecaprevir—Pibrentasvir (Mavyret®)

Glecaprevir—pibrentasvir (Mavyret®) is also a combination of a NS3/4A protease inhibitor and a NS5A inhibitor, and has activity against all six genotypes. The dose does not need to be adjusted for reduced renal function (Table 3), as elimination is primarily through the biliary system, and renal excretion of each agent is negligible (KDIGO Hepatitis C Work Group, 2018). In a study of efficacy and safety (EXPEDITION-4 trial), patients with HCV (genotypes 1-6) infection and advanced kidney disease receiving glecaprevir-pibrentasvir achieved a high rate of sustained virologic response (98% of patients), and no patient had virologic failure, irrespective of HCV genotype, the presence or absence of cirrhosis, or other baseline factors. Adverse events that were reported were pruritus (20%), fatigue (14%), and nausea (12%) (Gane et al., 2017).

PREVENTION OF HEPATITIS C VIRUS TRANSMISSION IN HEMODIALYSIS UNITS

Regardless of the current infection control practices and virologic follow-up to detect HCV, more than 50% of all healthcare-associated HCV outbreaks from 2008 to 2015 reported to the Centers of Disease Control and Prevention occurred in hemodialysis settings (KDIGO Hepatitis C Work Group, 2018). In order to reduce transmission, the KDIGO 2018 guidelines comment on the efficacy of commonly used strategies. Adhering to standard infection control procedures such as hand hygiene, proper injectable medication preparation, and thorough disinfection of dialysis station and, subsequently, conducting regular audits of infection control have all proven to have the most meaningful impact on reducing HCV transmission. According to the guideline, physically isolating HCV-infected hemodialysis patients and using dedicated dialysis machines are not recommended as there is weak evidence to support either practice, and, if implemented, both strategies lead to many logistical issues. The guideline states that the re-use of dialyzers from patients with HCV infection is acceptable if there is adherence to standard infection control procedures. Lastly, infrastructure changes are encouraged such as increasing

Table 3. First Line Drug Regimens Approved for Advanced CKD (eGFR < 30 mL/min) and Hemodialysis

Drug Name	Dose in Advanced CKD	Genotype	Duration of Therapy	Adverse Events	Monitoring Parameters
Grazoprevir-elbasvir (Zepatier®)	Grazoprevir 100 mg/ Elbasvir 50 mg PO once daily	1 (a, b), 4	12 weeks 16 weeks+ ribavirin for genotypes 1a and viral loads above 800,000 IU/ml and NS5A resistance at baseline	Headache, nausea and fatigue, asymptomatic ALT increase Only approved in Child-Pugh A	Efficacy: SVR after 12 weeks of treatment Safety: Hepatic laboratory testing at baseline and at least every 4 weeks while on therapy (> 10-fold increase in ALT, < 10-fold increase accompanied by symptoms or increased bilirubin or INR→ DISCONTINUE therapy); CBC and GFR assessed at 4 weeks of treatment
Glecaprevir—pibrentasvir (Mavyret®)	Glecaprevir 300 mg/Pibrentasvir 120 mg PO (3 tablet formulation) once daily WITH food	1-6 (pan-genotypic)	8 weeks in treatment naïve patients without cirrhosis 12 weeks with compensated cirrhosis or pre-treated with interferon-based regimen or sofosbuvir; 16 weeks for genotype 3	Headache, fatigue, nausea, and pruritus Only approved in Child-Pugh A	

staff-patient ratios, reinforcing staff training and education, and making physical changes to the infrastructure to create separate clean rooms (KDIGO Hepatitis C Work Group, 2018).

SUMMARY

Hepatitis C virus infection is a public health burden, especially in chronic kidney disease. Screening for HCV at

initial evaluation of CKD and routine follow-up is necessary to allow for early detection, treatment initiation, and detection of transmission. With the development of direct-acting agents, there are available treatment regimens that have shown to be efficacious and safe for patients with advanced CKD and on hemodialysis. Adherence to effective strategies to prevent HCV transmission, such as standard infection control, is critical in CKD and dialysis clinics.

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By Amanda Carroccia and Marisa Battistella

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1. _____ of acute viral Hepatitis C cases will progress to chronic disease:
 - a) 20–30%
 - b) 40–50%
 - c) 90–100%
 - d) 70–80%
2. The following are examples of percutaneous Hepatitis C viral transmission:
 - a) Illicit drug use
 - b) Needle-stick injuries
 - c) Iatrogenic transmission through dialysis
 - d) All of the above
3. A positive Anti-HCV immunoassay result and a negative Nucleic Acid Test (NAT) result means:
 - a) The patient is actively infected; acute or chronically depending on the clinical context.
 - b) The patient is not infected.
 - c) The HCV infection has resolved either by successful treatment or spontaneously cleared.
 - d) None of the above.
4. The KDIGO working group suggests that all patients should be initially screened at the following times, EXCEPT:
 - a) The time of initial evaluation of CKD
 - b) All patients upon initiation of in-center hemodialysis or upon transfer from another dialysis facility or modality
 - c) All patients every hemodialysis session
 - d) All patients at the time of evaluation for kidney transplantation
5. According to the joint guideline by the American Association for the Study of Liver Diseases and the Infectious Diseases Society of America, which group of patients may not be candidates for treatment for Hepatitis C infection:
 - a) Co-infected HIV patients
 - b) Patients with cirrhosis.
 - c) Patients with advanced Chronic Kidney Disease
 - d) Patients with a short life expectancy (<12 months) that cannot be remediated by HCV treatment, liver transplantation, or another directed therapy
6. What would be the first-line therapy for patients with chronic disease infected with Hepatitis C virus?
 - a) Direct-acting antivirals because they have proven to be efficacious, well-tolerated, and certain regimens do not require dose adjustments for reduced kidney function.
 - b) Interferon because it leads to the best Sustained Virological Response.
 - c) Ribavirin because it is very well-tolerated.
 - d) None of the above
7. What Hepatitis C Virus genotypes is Grazoprevir-elbasvir (Zepatier) used to treat?
 - a) Genotype 5 and 6
 - b) Genotype 1 and 3
 - c) All the genotypes
 - d) Genotype 1 and 4
8. All of the following parameters should be assessed during and after antiviral treatment, EXCEPT:
 - a) Sustained Virological Response
 - b) Blood pressure
 - c) ALT levels
 - d) Kidney function
9. More than _____% of all health care-associated HCV outbreaks from 2008 to 2015 reported to the Centres of Disease Control and Prevention occurred in hemodialysis settings:
 - a) 50%
 - b) 10%
 - c) 80%
 - d) 20%
10. What is the most important interventions to prevent transmission of Hepatitis C in the hemodialysis unit:
 - a) Isolating HCV-infected patients
 - b) Reuse of HCV-infected patients dialyzers
 - c) Adhering to infection control procedures (ie hand hygiene, working on clean surfaces etc) and regular audits of infection control
 - d) All of the above

CONTINUING EDUCATION STUDY
ANSWER FORMCE: 2.0 HRS CONTINUING
EDUCATION

Prevention and Treatment of Hepatitis C Virus Infection in Chronic Kidney Disease

Volume 29, Number 2

By Amanda Carroccia and Marisa Battistella

Post-test instructions:

- Select the best answer and circle the appropriate letter on the answer grid below.
- Complete the evaluation.
- Send only this answer form (or a photocopy) to:
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Kingston, ON K7K 1Z7
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- If you receive a passing score of 80% or better, a certificate for 2.0 contact hours will be awarded by CANNT.
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POST-TEST ANSWER GRID*Please circle your answer choice:*

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2. a b c d

3. a b c d

4. a b c d

5. a b c d

6. a b c d

7. a b c d

8. a b c d

9. a b c d

10. a b c d

EVALUATION

	Strongly disagree		Strongly agree		
1. The offering met the stated objectives.	1	2	3	4	5
2. The content was related to the objectives.	1	2	3	4	5
3. This study format was effective for the content.	1	2	3	4	5
4. Minutes required to read and complete:	50	75	100	125	150

Comments: _____

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☐ I have attained CNeph(C)/cdt designation

☐ I am a member of CNA

Ontario applicants only

Do you belong to RNAO?

☐ Yes ☐ No

Professional Status

☐ Registered Nurse

☐ Registered Practical Nurse/Registered Nursing Assistant/
Licensed Practical Nurse

☐ Technician

☐ Technologist

☐ Other (Specify) _____

Number of years in nephrology _____

Area of responsibility

☐ Direct Patient Care

☐ Teaching

☐ Administration

☐ Research

☐ Technical

☐ Other (Specify) _____

Work environment

☐ Acute Care

☐ Independent Health Care

☐ Self-Care Unit

☐ Private Sector

Highest level of education

Nursing

Non-Nursing

☐ Diploma

☐ Diploma

☐ Baccalaureate

☐ Baccalaureate

☐ Master's

☐ Master's

☐ Doctorate

☐ Doctorate

I am at present studying toward

Nursing

Non-Nursing

☐ Specialty Certificate

☐ Specialty Certificate

☐ Baccalaureate

☐ Baccalaureate

☐ Master's

☐ Master's

☐ Doctorate

☐ Doctorate

Primary area of practice

Choose one

☐ Adults

☐ Pediatrics

☐ Combined Adult/Pediatrics

☐ Other

Select all that apply

☐ Full-Care Hemo

☐ Clinical Educator

☐ Self-Care Hemo

☐ Academic Educator

☐ Home/Independent Hemo

☐ Corporate Education

☐ In-Patient Nephrology

☐ Vascular/Body Access

☐ In-Patient Peritoneal Dialysis

☐ Nurse Navigator

☐ In-Patient Transplantation

☐ Research

☐ Home/Independent PD

☐ Administration

☐ Out-Patient Transplantation

☐ Corporate Sales

Guidelines for Authors

The Canadian Association of Nephrology Nurses and Technologists (CANNT) Journal invites letters to the editor and original manuscripts for publication in its quarterly journal. We are pleased to accept submissions in either official language—English or French.

Which topics are appropriate for letters to the editor?

We welcome letters to the editor concerning recently published manuscripts, association activities, or other matters you think may be of interest to the CANNT membership.

What types of manuscripts are suitable for publication?

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 papers
- Relevant clinical articles
- Innovative quality improvement reports
- Narratives that describe the nursing experience
- Interdisciplinary practice questions and answers
- Reviews of current articles, books and videotapes
- Continuing education articles

How should the manuscript be prepared?

Form: The manuscript should be typed double-spaced, one-inch margins should be used throughout, and the pages should be numbered consecutively in the upper right-hand corner. More formal research or clinical articles should be between five and 15 pages. Less formal narratives, question and answer columns, or reviews should be fewer than five pages.

Style: The style of the manuscript should be based on the *Publication Manual of the American Psychological Association (APA), Sixth Edition (2009)*, available from most college bookstores.

Title page: The title page should contain the manuscript title, each author's name (including full first name), professional qualifications [e.g., RN, BScN, CNeph(C)], position, place of employment, address, telephone, fax numbers, and email address. The preferred address for correspondence should be indicated.

Abstract: On a separate page, formal research or clinical articles should have an abstract of 100 to 150 words. The abstract should summarize the main points in the manuscript.

Text/Reference List: Proper names should be spelled out the first time they are used with the abbreviation following in brackets, for example, the Canadian Association of Nephrology Nurses and Technologists (CANNT). Generic drug names should be used. Measurements are to be in Standards International (SI) units. References should be cited in the text using APA format. A reference list containing the full citation of all references used in the manuscript must follow the text.

Tables/Figures: Manuscripts should only include those tables or figures that serve to clarify details. Authors using previously published tables and figures must include written permission from the original publisher. Such permission must be attached to the submitted manuscript. Table/figure formatting should comply with APA style.

How should the manuscript be submitted?

Email your manuscript to: cannt.journal1@gmail.com. Include a covering letter with contact information for the primary author and a one-sentence biographical sketch (credentials, current job title and location) for each author.

How are manuscripts selected for the CANNT Journal?

Each manuscript will be acknowledged following receipt. Research and clinical articles are sent out to two members of the *CANNT Journal* manuscript review panel to be reviewed in a double-blind review process. All manuscripts may be returned for revision and resubmission. Those manuscripts accepted for publication are subject to copy editing; however, the author will have an opportunity to approve editorial changes to the manuscript. The editor reserves the right to accept or reject manuscripts. The criteria for acceptance for all articles include originality of ideas, timeliness of the topic, quality of the material, and appeal to the readership. Manuscripts that do not comply with APA formatting and style will be returned to the author(s).

What are the implications for copyright ownership?

Authors should note that manuscripts will be considered for publication on the condition that they are submitted solely to the *CANNT Journal*. Upon acceptance of submitted material, the author(s) transfer(s) copyright ownership to CANNT. Statements and opinions contained within the work remain the responsibility of the author(s). Authors retain the right to include their respective published work in a thesis or dissertation provided that it is not published commercially. Although no permission is required in this instance, it is expected that you reference *CANNT Journal* as the original source. All other material may not be reproduced without the written permission of CANNT.

Checklist for authors

- ✓ Cover letter
- ✓ Article
 - Title page to include the following:
 - Title of article
 - Each author's name (including full first name)
 - Professional qualifications
 - Position
 - Place of employment
 - Author to whom correspondence is to be sent, including address, phone, fax number, and email address
 - Text of article, with abstract if applicable, **double-spaced, pages numbered**
 - References (on a separate sheet)
 - Tables (one per page)
 - Illustrations (one per page)
 - Letters of permission to reproduce previously published material

Revised March 2018

Lignes directrices à l'intention des auteurs

Le Journal de l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN) vous invite à faire parvenir articles, textes et manuscrits originaux pour publication dans son journal trimestriel. Nous sommes heureux d'accepter vos documents soumis dans l'une ou l'autre des langues officielles, anglais ou français.

Quels sont les sujets d'article appropriés?

Nous acceptons les articles portant sur des manuscrits récemment publiés, des activités de l'Association ou tout sujet d'intérêt pour les membres de l'ACITN.

Quels types de manuscrits conviennent à la publication?

Nous préférons des manuscrits qui présentent de nouveaux renseignements cliniques ou qui traitent des enjeux propres aux champs d'intérêt des infirmières et infirmiers et des technologues en néphrologie. Nous recherchons plus particulièrement :

- Exposés 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 d'articles courants, de livres et films
- Articles en éducation continue.

Comment les manuscrits doivent-ils être présentés?

Forme : Le manuscrit doit être présenté à double interligne avec une marge de 1 po et une numérotation consécutive des pages dans le coin supérieur droit de la page. Les articles plus formels de recherche ou d'études cliniques doivent compter de 5 à 15 pages. Les articles moins formels, tels que textes narratifs, questions-réponses ou revues, doivent compter moins de 5 pages.

Style : Le style du manuscrit doit être conforme au manuel de publication de l'Association américaine de psychologie (AAP), 6^e édition (2009), offert dans la plupart des librairies universitaires.

Page titre : La page titre doit inclure le titre du manuscrit ainsi que les renseignements suivants : nom de chacun des auteurs (incluant prénoms au complet), titres professionnels (c.-à-d., inf., B.Sc. Inf., CNéph[C]), titre du poste occupé, nom de l'employeur, adresse, numéros de téléphone et de télécopieur et adresse courriel. L'adresse privilégiée de correspondance doit aussi être indiquée.

Résumé : Sur une page distincte, les articles formels de recherche ou d'études cliniques doivent être accompagnés d'un résumé de 100 à 150 mots, reprenant brièvement les principaux points du manuscrit.

Texte/Liste de références : Les sigles, abréviations ou acronymes doivent être écrits au long la première fois qu'ils apparaissent dans le texte, suivis de l'abréviation entre parenthèses; p. ex., Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN). Les noms génériques des médicaments doivent être employés. Les unités de mesure doivent être indiquées selon le Système international d'unités (SI). Les références doivent être citées dans le texte en utilisant le format de l'AAP. Une liste de références comprenant la bibliographie complète de toutes les références utilisées doit suivre le texte.

Tableaux/Figures : Les manuscrits ne doivent inclure que les tableaux et figures (incluant schémas, illustrations, croquis, etc.) visant à clarifier certains détails. Les auteurs qui utilisent des tableaux et des figures qui ont déjà fait l'objet d'une publication

doivent fournir l'autorisation écrite de l'éditeur d'origine et la joindre au manuscrit soumis. La mise en forme des tableaux et des figures doit être conforme au style de l'AAP.

De quelle manière doit-on soumettre les manuscrits?

Veuillez envoyer par courriel votre manuscrit à : cannt.journal1@gmail.com

Veuillez inclure une lettre de présentation en précisant les coordonnées de l'auteur principal ainsi qu'une notice biographique d'une phrase (incluant titres de compétences, titre du poste actuel et lieu de travail) pour chaque auteur.

Quel est le processus de sélection des manuscrits pour publication dans le Journal de l'ACITN?

À la réception de chaque manuscrit, un accusé de réception est envoyé. Les articles de recherche et d'études cliniques sont envoyés à deux membres du comité de révision du Journal de l'ACITN afin d'être révisés suivant un processus à double insu. Tous les articles peuvent être retournés aux auteurs pour révision et nouvelle soumission par la suite. Les manuscrits acceptés pour publication peuvent subir des changements éditoriaux; toutefois, les auteurs pourront approuver ces changements. La rédactrice en chef se réserve le droit d'accepter ou de refuser tout manuscrit. Les critères d'acceptation pour tous les manuscrits comprennent l'originalité des idées, l'actualité du sujet, la qualité du matériel et l'attrait des lecteurs. Les manuscrits qui ne sont pas conformes à la mise en forme et au style de l'AAP seront renvoyés à l'auteur ou aux auteurs.

Quelles sont les conséquences du transfert des droits d'auteur?

Les auteurs doivent prendre note que les manuscrits seront considérés pour publication à la condition qu'ils ne soient soumis qu'au *Journal de l'ACITN*. Sur acceptation du matériel soumis, les auteurs transfèrent leur droit d'auteur à l'ACITN. Les déclarations et opinions émises par les auteurs dans leurs articles, textes ou manuscrits demeurent leur responsabilité. Les auteurs conservent le droit d'insérer leurs travaux publiés respectifs dans une thèse ou un mémoire, pour autant que ces derniers ne soient pas publiés à des fins commerciales. Bien qu'aucune permission ne soit requise en pareil cas, il est attendu que les auteurs indiquent en référence le *Journal de l'ACITN* comme source originale. Tous les autres documents ne peuvent être reproduits sans l'autorisation écrite de l'ACITN.

Aide-mémoire à l'intention des auteurs

- ✓ Lettre de présentation
- ✓ Article
 - Page titre incluant les renseignements suivants :
 - Titre de l'article
 - Nom de chaque auteur (incluant prénoms au complet)
 - Titres de compétences
 - Titre du poste actuel
 - Nom et adresse de l'employeur
 - Nom de l'auteur à qui la correspondance doit être envoyée (incluant adresse, numéros de téléphone et de télécopieur et adresse courriel)
 - Texte de l'article avec résumé, s'il y a lieu à **double interligne et pages numérotées**
 - Références (sur une feuille distincte)
 - Tableaux (un par page)
 - Figures (une par page)
 - Lettre d'autorisation pour tout matériel ayant déjà fait l'objet d'une publication