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

Volume 30, Issue 1 January–March 2020

CONTENTS

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JOVINA BACHYNSKI & ROSA MARTICORENA

Letter from the Editors

In this first issue of the *CANNT Journal* 2020, our President, Janice MacKay, sends us a heartfelt message to reflect in the multiple changes related to the COVID-19 pandemic affecting humanity worldwide. The *CANNT Journal* takes pride in the dissemination of information that has significant impact on clinical practice. Our lead article by New et al. (*Perceptions of hospital safety for inpatients with chronic kidney disease: A cross-sectional quantitative study*) is an example of this. The article provides relevant information on the safety perceptions of patients with CKD and ESKD within their physical and interpersonal care environments. In addition, the continuing education article by Chiu and Battistella (*Hypoxia-inducible factor [HIF] stabilizers: An emerging treatment option for anemia in chronic kidney disease*) highlights the emergence of an oral alternative to erythropoietin-stimulating agents in the management of anemia.

To all our research 2019 grant winners: We wish that the conduction of your respective research studies is progressing well and that you can present your findings in our *CANNT Journal* in the near future.

Preparations for the 2020 CANNT Conference (*Guiding our way to the future*) that will take place in Hamilton, ON are under way! Suggestions for topics received during the successful conference in Edmonton (*Sharing our stories down by the river*) this past October have been taken into consideration. The committee is working very hard to prepare something of interest for everyone.

We encourage our members to submit manuscripts for publication. Manuscripts can be observational studies, clinical trials, case reports of interesting cases, solutions to clinical problems at the bedside, and quality improvement projects that you may have conducted. We would also like to invite you to send the experiences you have that are generated by the COVID pandemic. We recognize that preparing a manuscript is not an easy task. If you require assistance with the process of submission, do not hesitate to contact us. We are committed to guide you from the process of submission to the successful publication of your manuscript.

Stay safe and healthy.

Sincerely,

Jovina Bachynski, MN, RN(EC), CNeph(C), PhD (student)

Rosa M. Marticorena, BScN, RN, CNeph(C), CRC III, DCE, PhD

Co-editors, *CANNT Journal*

Lettre des rédactrices en chef

Dans ce premier numéro de 2020 du CANNT Journal, la revue de l'Association canadienne des infirmiers et infirmières et des technologues de néphrologie (ACITN), notre présidente, Janice MacKay, nous adresse un chaleureux message pour nous amener à réfléchir sur les nombreux changements provoqués par la pandémie de COVID19, qui a des répercussions sur toute l'humanité. Le CANNT Journal est une fierté, car il diffuse de l'information ayant une incidence importante sur la pratique clinique. Notre article principal, Perceptions of hospital safety for inpatients with chronic kidney disease: A cross-sectional quantitative study de New et ses collaborateurs en est un exemple. Il contient des renseignements pertinents sur les perceptions des patients atteints de néphropathie chronique et de néphropathie au stade terminal, en ce qui concerne la sécurité dans leurs milieux de soins physiques et interpersonnels. De plus, l'article de formation continue, Hypoxiainducible factor (HIF) stabilizers: An emerging treatment option for anemia in chronic kidney disease de Chiu et Battistella, met l'accent sur l'émergence d'un traitement par voie orale pour la prise en charge de l'anémie, une option de rechange aux agents stimulant l'érythropoïèse.

À tous nos récipiendaires de subventions de recherche de 2019 : nous espérons que la réalisation de vos recherches respectives se déroule bien et que vous serez bientôt en mesure de présenter vos conclusions dans le CANNT Journal.

Les préparatifs du symposium de 2020 de l'ACITN (Guiding our way to the future), qui aura lieu à Hamilton, en Ontario, vont bon train! Nous avons tenu compte des suggestions de sujets reçues lors du symposium fructueux d'octobre dernier, à Edmonton (Sharing our stories down by the river). Le comité met les bouchées doubles pour préparer un événement d'intérêt pour tous.

Nous invitons nos membres à soumettre leurs articles pour publication. Les articles peuvent être des études par observation, des essais cliniques, des rapports d'études de cas intéressants, des solutions aux problèmes cliniques au chevet du patient et des projets d'amélioration de la qualité que vous pourriez avoir menés. Nous aimerions également vous inviter à nous faire part de vos expériences générées par la pandémie de COVID-19. Nous reconnaissons que la préparation d'un article n'est pas une tâche facile. Si vous avez besoin d'aide dans le processus de présentation, n'hésitez pas à communiquer avec nous. Nous désirons vous orienter dans ce processus en vue d'une publication bien accueillie de votre article.

Restez en bonne santé et en sécurité.

Cordialement,

Jovina Bachynski, M. Sc. inf., inf. aut. (catégorie avancée), CNéph(C), aspirante au doctorat

Rosa M. Marticorena, B. Sc. inf., inf. aut., CNéph(C), D.E.S. Épidémiologie clinique, coordonnatrice de recherche clinique III, Ph. D.

Corédactrices en chef, CANNT Journal

Le *Journal ACITN* est la publication officielle de l'Association canadienne des infirmiers/infirmières et technologues en néphrologie, a/s 4, rue Cataraqui, bureau 310, Kingston (Ontario) K7K 1Z7.

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1-877-720-2819
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Le *Journal ACITN* accepte des articles (manuscrits) de façon continue.

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JANICE MACKAY

Message from the President

Under normal circumstances, my first greeting to you would be 'Happy Spring!'. However, the global pandemic with COVID-19 we find ourselves living in is anything but normal. When I first formulated this installment of the President's Message in February, I could not (nor anyone else, for that matter) have envisioned the extent of the social lockdown required to combat COVID. We may be living in uncharted waters currently, but for nephrology professionals, it is business as usual. Our patients continue to require renal or dialytic care—COVID does not change this. So, I write to you in the spirit of keeping things as routine and normal as can be for our patients and colleagues.

I would like to start my message to you by asking you a question. What is one thing you would change if you were President of CANNT? This is your association and you have great ideas. I want you to share them. CANNT includes all renal professionals, and your contributions towards progress are encouraged. We would love to see you volunteer for CANNT, invite a colleague to become a member, be on the Board of Directors, attend a conference, and share your knowledge nationally in a webinar, journal manuscript, or poster presentation.

National Nursing Week is May 11–17 this year. The theme is *Nurses: A Voice to Lead—Nursing the World to Health*. I look forward to seeing how our renal professionals across the country celebrate and acknowledge the dedication and care that you provide.

Now, onto my thoughts for this issue. If any of our membership follows my quarterly messages, you will see that my topics are closely related to what I am experiencing in my life at the time. For this issue, I am focused on information systems, specifically, the electronic health record. Our provincial healthcare system has been working tirelessly to implement a provincial clinical information system that will enable healthcare providers to access one comprehensive system. I am enthusiastic for this change. I am confident that most of us can think of a time when gaps in accessing health information have left us feeling less equipped in providing optimal care. I am certain that the learning curve will be steep, but the potential to improve care and outcomes is considerable. I believe that sharing information and knowledge through effective communication remains paramount in providing safe and competent care to our patients. It will be interesting to see the impact to care and outcomes once this system is fully launched.

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.

On a final note, I wish to acknowledge the efforts and measures that all of you are taking to keep our patients safe and yourselves protected. The synergy of your work is helping to keep our patients safe across the country. These are trying and uncertain times that require unity and a common purpose from everyone.

Most respectfully,
Janice MacKay

Le mot de la présidente

Normalement, je commencerais par vous souhaiter un joyeux printemps, mais la pandémie mondiale de COVID19 qui sévit actuellement n'a rien de normal. Lorsque j'ai commencé à écrire ce « Mot de la présidente » en février, je n'aurais pas pu (personne n'aurait pu) imaginer l'ampleur du confinement social requis pour lutter contre la COVID. Bien que nous soyons actuellement en terrain inconnu, les professionnels de la néphrologie, eux, poursuivent leurs activités. Nos patients ont toujours besoin de soins néphrologiques ou de dialyses, et la COVID n'y change rien. Je vous écris donc dans l'optique que la normalité soit maintenue autant que possible pour nos patients et nos collègues.

J'aimerais commencer mon message par une question. Quelle est la chose que vous changeriez si vous étiez la présidente ou le président de l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN)? C'est votre association et vous avez de très bonnes idées. Je veux que vous nous en fassiez part. L'ACITN regroupe tous les professionnels de la néphrologie, et vous êtes tous invités à participer à son évolution. Nous aimerions vous voir offrir de votre temps à l'ACITN, inviter un collègue à devenir membre, faire partie du conseil d'administration, participer à un symposium et transmettre votre savoir à l'échelle nationale au moyen d'un webinaire, d'un article de revue ou d'une présentation d'affiche.

Cette année, la Semaine nationale des soins infirmiers se déroulera du 11 au 17 mai. Le thème est « *Les infirmières, une voix faite pour diriger – Vers un monde en bonne santé* ». Je suis impatiente de voir comment les professionnels de la néphrologie de partout au pays salueront et reconnaîtront votre dévouement et les soins que vous prodiguez.

Maintenant, mes réflexions pour ce numéro. Tout membre qui lit mes messages trimestriels remarquera que mes sujets sont étroitement liés à mes expériences de vie du moment. Pour ce numéro, je m'attarde aux systèmes de renseignements, notamment aux dossiers de santé électroniques. En Alberta, notre système de santé provincial travaille sans relâche à mettre en œuvre un système provincial de renseignements cliniques qui permettra aux professionnels de la santé d'avoir accès à un système unique complet. J'entrevois ce changement avec enthousiasme. Je suis persuadée que nous avons presque tous en mémoire un événement lors duquel nous avons eu peine à offrir des soins optimaux parce que l'accès aux renseignements médicaux comportait des lacunes. Je suis certaine que la courbe d'apprentissage sera abrupte, mais le potentiel d'amélioration des soins et des résultats est considérable. Je pense qu'il est primordial de transmettre des renseignements et des connaissances par des moyens de communication efficaces pour offrir en toute sécurité des soins de qualité à nos patients. Une fois que ce système sera entièrement opérationnel, il sera intéressant d'observer son incidence sur les soins et les résultats.

La pérennité de l'ACITN est déterminée par ses membres et leur participation au symposium 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 joindre 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.

Enfin, je tiens à souligner les efforts que vous faites et les mesures que vous prenez pour assurer la sécurité de nos patients et votre protection. En travaillant en synergie, vous contribuez à assurer la sécurité de nos patients partout au pays. Nous vivons des moments difficiles empreints d'incertitude, qui exigent une solidarité motivée par un objectif commun.

Très respectueusement,
Janice MacKay

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Your Board in Action

In my "Board in Action" report for this issue, I would like to take this opportunity to thank our Board of Directors, and association management group, Events & Management Plus, who tirelessly serve CANNT and our membership all year round. Thank you to our sponsors who provide their various resources, which assist and make our events and programs possible. Most importantly, my sincere thanks go out to our general membership, who continue to believe that we can accomplish great things if we collaborate, communicate, and participate in our association.

I would like to inform our membership that Krista Smith (President-Elect/Treasurer) has assumed a management role outside of nephrology effective February 1, 2020. Please join me in congratulating Krista in her career accomplishments and wish her the very best in her future endeavors. I have truly enjoyed our partnership, Krista, and wish you everything great in life.

Under the direction of our association bylaws, we have unanimously appointed Cathy Cake (VP Atlantic) into the role of President-Elect/Treasurer effective February 11, 2020. Please join me in welcoming Cathy into her new role. CANNT has been extremely fortunate to have Cathy's dedication and expertise in nephrology to support the association. Cathy, I am so pleased that you have offered yourself to this role and I am thrilled to be working with you in this new position.

With the minimal time remaining in the current term of the position of president (February-October 2020), the Board of Directors (with my abstention) voted for me to remain in the position of president until October 2021.

I would like to introduce you to our dedicated conference planning committee for our annual conference being held in Hamilton, Ontario, on October 22–24, 2020 under the chairmanship of Ethan Holtzer (CANNT Director of Communications):

- Yolanda Berghegen – St. Joseph's Healthcare Hamilton
- Lucia Costantini – St. Joseph's Healthcare Hamilton
- Carl Haynes – St. Joseph's Healthcare Hamilton
- Nancy Hemrica – St. Joseph's Healthcare Hamilton
- Linda Mills – St. Joseph's Healthcare Hamilton
- Sarah Parfeniuk – St. Joseph's Healthcare Hamilton
- Kelly Sutherland – St. Joseph's Healthcare Hamilton
- Denis Rabbat – St. Joseph's Healthcare Hamilton
- Lisa Robertson – St. Joseph's Healthcare Hamilton
- Jovina Bachynski - Halton Health (abstract reviews)
- Rosa Marticorena – William Osler Health System (abstract reviews)

I am immensely thankful for this team. This conference is going to be outstanding!

Your Board of Directors met in two-day face-to-face meetings in October 2019 prior to the annual conference in Edmonton, Alberta. It was a productive meeting in constructing our roadmap for the coming year, reviewing our vision in evaluating what has been accomplished, and identifying our short- and long-term goals. We are pleased that revisions to the Vascular Access Guidelines have been completed, and we are just awaiting the publication of the revised KDOQI clinical practice guidelines on vascular access before we finalize our review to ensure that both sets of guidelines are aligned. In addition, the Standards of Nursing Practice are nearing completion and being prepared for peer review, and the Technologist Standards are under final review by colleagues with expertise in these areas across Canada. These reviews are a major task and the work is greatly appreciated by our content experts within our CANNT membership!

We are continuing to upgrade our website to provide current and relevant information to our membership. The quizzes for the Continuing Education Series are now available online.

MEMBERSHIP

We currently have a membership of 392 renal professionals as of February 11, 2020. The Board of Directors continually evolves to provide enduring benefits to all our members. I am seeking input from our valued membership, and I want to hear from you on ways to increase our association membership. Please share your thoughts with us by contacting your CANNT office team at**: cannt@cannt.ca**

Membership is vital to CANNT, as it is an association run by membership. There are many advantages to becoming a member of CANNT:

- Member access to the online CANNT Journal
- Access to **www.cannt.ca** "Members Only" section
- Reduced rates at the annual Nephrology Conference
- Access to *CANNT Nursing Standards of Practice* and the *CANNT Standards of Technical Practice*
- Promotion of and support for specialty certification
- Provision of continuing education opportunities—through the journal and online webinars
- Opportunities to recognize excellence in practice with yearly awards
- Access to educational bursaries and research grants
- Promotion of evidence-based practice
- Collaboration within the nephrology community

Maintaining your yearly membership in CANNT assists with the long-term viability of our association. Become a member today!

JOURNAL

Guidelines for journal article submission can be found under the "Publications" - "CANNT Journal" section of the CANNT website. We prefer manuscripts that present new clinical information or address issues of special interest to nephrology nurses and technologists.

E-mail your manuscript to Jovina Bachynski or Rosa Marticorena at **CANNT.journal1@gmail.com**. Include a cover letter with contact information for the primary author and a one-sentence biographical sketch (credentials, current job title, and location) for each author. CANNT publishes the journal four times per year in electronic versions. The *CANNT Journal* is a refereed publication and accepts only original, peer-reviewed articles. Advertising opportunities and corporate sponsored education opportunities are available.

We continue to develop new strategies for engaging our members and communicating timely and relevant information to our membership. *Your CANNT Connection* is our bi-monthly email that works to provide strategic, targeted, personalized, and properly segmented information to our members. Additionally, we try to keep the content simple, direct, to the point, and useful with a goal to engage members on a continual basis. If you have a question, idea or event to promote, please speak to our Director of Communications, Ethan Holtzer.

CANNT website (**www.CANNT.ca**)

Twitter CANNT (**@CANNT1**)

FINANCES

As a "Not for Profit" professional association, our objective is to provide value to our members that aligns with our mission and vision. We continue to explore development, collaborative, and lucrative opportunities to assist in maintaining the viability of the association. Transparency improves the coherence and cohesion of our association, and provides our association membership with the 2019 Annual Report on the CANNT website (**http://www.cannt.ca/en/about/index.html**).

Respectfully submitted,
Janice MacKay

Votre conseil en action

Dans mon rapport Board in Action (le comité en action) de ce numéro, je voudrais profiter de cette occasion pour remercier notre conseil d'administration et Events & Management Plus, le groupe responsable de la gestion de notre association, qui s'emploie inlassablement à servir l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN) et ses membres tout au long de l'année. Je remercie également nos commanditaires, qui mettent à notre disposition diverses ressources de soutien pour la réalisation de nos événements et programmes. J'adresse surtout mes sincères remerciements à l'ensemble de nos membres qui continuent de croire que nous pouvons accomplir de grandes choses si nous collaborons, communiquons et investissons dans notre association.

J'aimerais informer nos membres que Krista Smith, présidente désignée et trésorière, assume des fonctions de gestionnaire autres qu'en néphrologie depuis le 1er février 2020. Joignez-vous à moi pour féliciter Krista pour ses réalisations professionnelles et lui souhaiter un franc succès dans ses projets futurs. J'ai vraiment apprécié notre collaboration, Krista, et je te souhaite le meilleur de ce que la vie peut t'apporter.

En vertu des règlements de notre association, nous avons à l'unanimité nommé Cathy Cake, vice-présidente – Atlantique, au poste de présidente désignée et trésorière qu'elle occupe depuis le 11 février 2020. Joignez-vous à moi pour accueillir Cathy dans ses nouvelles fonctions. L'ACITN a l'immense privilège d'être appuyée par le dévouement et l'expertise de Cathy en néphrologie. Cathy, je suis très heureuse que tu aies proposé ta candidature pour ce poste et je suis emballée de travailler avec toi dans le cadre de tes nouvelles fonctions.

Compte tenu du peu de temps qu'il reste avant la fin du mandat actuel de présidente (de février à octobre 2020), le conseil d'administration a voté, avec mon abstention, pour que je reste en fonction jusqu'en octobre 2021.

J'aimerais vous présenter notre comité de planification des conférences affecté à l'organisation de notre symposium annuel qui aura lieu à Hamilton, en Ontario, du 22 au 24 octobre 2020, sous la présidence d'Ethan Holtzer, directeur des communications à l'ACITN :

- Yolanda Berghegen – St. Joseph's Healthcare Hamilton
- Lucia Costantini – St. Joseph's Healthcare Hamilton
- Carl Haynes – St. Joseph's Healthcare Hamilton
- Nancy Hemrica – St. Joseph's Healthcare Hamilton
- Linda Mills – St. Joseph's Healthcare Hamilton
- Sarah Parfeniuk – St. Joseph's Healthcare Hamilton
- Kelly Sutherland – St. Joseph's Healthcare Hamilton
- Denis Rabbat – St. Joseph's Healthcare Hamilton
- Lisa Robertson – St. Joseph's Healthcare Hamilton
- Jovina Bachynski – Halton Health (examen des résumés)
- Rosa Marticorena – William Osler Health System (examen des résumés).

Je suis très reconnaissante envers cette équipe. Cette conférence sera exceptionnelle.

En octobre 2019, votre conseil d'administration a tenu des réunions en personne pendant deux jours, avant le symposium annuel d'Edmonton, en Alberta. Ces réunions se sont révélées productives, car elles nous ont permis d'élaborer notre feuille de route pour l'année à venir, de revoir notre vision grâce à l'évaluation de nos réalisations et de déterminer nos objectifs à court et à long terme. Nous sommes heureux que les révisions des lignes directrices de l'accès vasculaire soient terminées, et nous attendons la publication des lignes directrices de pratique clinique révisées de la Kidney Disease Outcomes Quality Initiative (KDOQI) sur l'accès vasculaire avant de finaliser notre révision, afin de nous assurer que les deux documents concordent. De plus, les normes de pratique infirmière, presque terminées, sont en préparation pour examen par des pairs. Les normes de pratique technologique, quant à elles, font l'objet d'un examen final par des collègues de partout au pays ayant une expertise dans ce domaine. Ces examens représentent une tâche colossale, et nos experts en la matière au sein de l'ACITN apprécient le travail accompli!

Nous continuons d'améliorer notre site Web afin de fournir à nos membres des renseignements actuels et pertinents. Les questionnaires pour la formation continue sont maintenant disponibles en ligne.

ADHÉSION

Nous comptons actuellement 392 professionnels de la néphrologie parmi nos membres (données du 11 février 2020). Le conseil d'administration évolue continuellement pour offrir des avantages durables à tous nos membres. Je tiens nos membres en haute estime et je suis à leur écoute. J'aimerais d'ailleurs avoir votre opinion sur la manière d'augmenter le nombre de nos adhérents. Veuillez nous faire part de vos idées en communiquant avec l'équipe administrative de l'ACITN, par courriel au **cannt@cannt.ca**.

Les membres sont la force vive de l'ACITN, puisque ce sont eux qui administrent l'association. Il y a une foule d'avantages à devenir membre de l'ACITN :

- Accès à la revue électronique de l'ACITN;
- Accès à la section réservée aux membres du site www.cannt.ca;
- Tarifs réduits au symposium annuel de néphrologie;
- Accès aux normes de pratique infirmière en néphrologie et aux normes de pratique technologique en néphrologie de l'ACITN;
- Promotion et soutien en vue de l'obtention du certificat de spécialisation;
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Vous trouverez la marche à suivre pour soumettre un article à publier dans notre revue sous l'onglet « Publications », section CANNT Journal, du site Web de l'ACITN. Nous privilégions les articles qui portent sur de nouvelles données cliniques ou qui traitent de sujets présentant un intérêt particulier pour les infirmières et infirmiers et les technologues en néphrologie.

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En tant qu'association professionnelle « sans but lucratif », notre objectif est de créer de la valeur pour nos membres qui s'harmonise à notre mission et à notre vision. Nous recherchons constamment des occasions de croissance, de partenariat et de possibilités lucratives pour maintenir la viabilité de l'association. Comme la transparence améliore la cohérence et la cohésion de notre association, nos membres peuvent consulter le rapport annuel 2019 de l'association sur le site Web de l'ACITN (**http://www.cannt.ca/en/about/index.html**).

Très cordialement,
Janice MacKay

Format Update: APA 7th Edition

The *CANNT Journal* will be following the writing style format of the 7th edition of the American Psychological Association (APA) for manuscript submissions. We have put together some of the key differences between the 6th and 7th editions that should guide you when writing your manuscript.

Style Element	APA 6th Edition	APA 7th Edition
Publisher location	Element 6.30 (p. 186) Include publisher location: Bodin, S. M. (Ed.). (2017). *Contemporary nephrology nursing* (3rd ed.). Pitman, NJ: American Nephrology Nurses Association.	Element 10.2 (p. 321) Do not include publisher location: Bodin, S. M. (Ed.). (2017). *Contemporary nephrology nursing* (3rd ed.). American Nephrology Nurses Association.
Number of authors to include in in-text citations	Element 6.12 (p. 174) For a work with three to five authors: cite all authors the first time the reference occurs; include only the surname of the first author followed by "et al." in subsequent citations.	Element 8.17 (p. 266) For a work with three or more authors, include the name of only the first author plus "et al." in every citation (including the first citation).
Reference list	Element 6.27 (p. 184) Provide surnames and initials for up to and including **seven** authors.	Element 9.8 (p. 286) Provide surnames and initials for up to and including **20** authors.
Format of DOIs and URLs	Element 6.32 (p. 191) Present DOI as "doi:xxxxxxx" – when DOI is used, no further retrieval information is required.	Element 9.35 (p. 299) Present both DOIs and URLs as hyperlinks (e.g., "http://doi.org/xxxxx"). Do not include "Retrieved from" because a hyperlink leads directly to the content.
Punctuation marks	Element 4.01 (p. 88) Insert **two** spaces after punctuation marks at the end of a sentence (including periods).	Element 6.1 (p. 154) Insert **one** space after periods or other punctuation marks at the end of a sentence.
Singular "they"		Element 4.18 (p. 120) Use singular "they" to refer to person who uses "they" as their pronoun or as generic third-person singular pronoun: "they", "them", "their", their", and "themselves" or "themselves."
Preferred typeface/ font	Element 8.03 (p. 228) Serif typeface preferred for text: 12-point Times New Roman Sans serif typeface preferred for figures	Element 2.19 (p. 44) Serif font: 12-point Times New Roman, 11-point Georgia Sans serif font: 11-point Calibri, 11-point Arial, 10-point Lucida Sans Unicode
Running head	Element 2.01 (p. 23) Include running head.	Element 2.8 (p. 37) Running heads are required only for manuscripts being submitted for publication. Running heads are not required for student papers.
Headings	Element 3.03 (p. 62) 1 **Centered, Boldface, Uppercase and Lowercase** 2 **Left-aligned, Boldface, Uppercase and Lowercase** 3 **Indented, boldface, lowercase paragraph ending with a period.** 4 ***Indented, boldface, italicized, lowercase paragraph ending with a period.*** 5 *Indented, italicized, lowercase paragraph ending with a period.*	Element 2.27 (p. 48) 1 **Centered, Bold, Title Case** 2 **Left aligned, Bold, Title Case** 3 ***Left aligned, Bold, Italic, Title Case*** 4 **Indented, Bold, Title Case, Period.** Text begins on the same line. 5 ***Indented, Bold, Italic, Title Case, Period.*** Text begins on the same line.

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Perceptions of hospital safety for inpatients with chronic kidney disease: A cross-sectional quantitative study

By Lucia New, Donna Goodridge, Joanne Kappel, Joshua Lawson, Roy Dobson, Erika Penz, Gary Groot, and John Gjevre

ABSTRACT

***Background**: Due to pathophysiological, medical, and psychological factors, risks for physical and emotional harm while hospitalized are higher for individuals living with chronic kidney disease. Patient feedback regarding aspects of their physical and interpersonal care environments may provide insights into care quality and patient safety.*

***Methods**: Using the Patient Measure of Safety questionnaire, a quantitative exploratory study was undertaken to assess patients' perception of safety. Thirty participants were asked to assess organizational and local factors within their care environments known to contribute to safety incidents.*

***Results**: Positive associations were noted between individual domains of safety, as well as respect and dignity, and overall score. No statistically significant differences were observed between participant characteristics and overall safety rating.*

***Conclusions**: Patient safety is influenced by perceived levels of safety on aspects within the physical and interpersonal care environments. Obtaining patient feedback is important for patient safety initiatives and continuous improvement.*

Key words: chronic kidney disease, safety, quantitative study, hospital safety, respect, dignity, patient feedback

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Compared to patients without underlying health conditions, the risk for incurring harm while hospitalized is higher for individuals with chronic illnesses such as chronic kidney disease (CKD) and end-stage renal disease (ESRD) (Canadian Patient Safety Institute, 2018). According to the National Kidney Foundation, CKD is defined as kidney damage or glomerular filtration rate (GFR) <60 mL/min/1.73 m2 for three months or longer (Kidney Disease Improving Global Outcomes [KDIGO], 2013). Individuals are deemed to be at ESRD when the level of GFR is <15 mL/min/1.73 m^2 or the kidneys have lost all functioning and renal replacement therapy is required (KDIGO, 2013). Patients with CKD and ESRD have frequent encounters with the healthcare system including an increase in hospitalizations (Go et al., 2004; Årestedt et al., 2019). Impaired kidney functioning combined with medical and pharmacological management of comorbidities predispose individuals to higher rates of safety incidents (Wagner & Fink, 2017; Offurum et al., 2016; Harel et al., 2012). Adverse events experienced by patients with CKD may be attributable to under-recognition or under-appreciation of the extent of compromised kidney function (Bohlouli et al., 2016; Wagner et al., 2015). Patients receiving peritoneal or hemodialysis may be at risk for adverse events including: peritonitis or bacteremia associated with peritoneal catheters or vascular access devices; vascular access-related events, such as needle infiltration; falls; and line clotting associated with dialysis equipment malfunction (Kliger, 2015; Wagner & Fink, 2017). Adverse events in these patient populations may result in more significant complications due to reduced kidney functioning and associated pathophysiological diseases (Chapin et al., 2010; Seliger et al., 2008; Fink et al., 2009; Ginsberg et al., 2014), affecting lengths of stay and hospital readmissions (Bohlouli et al., 2016; Bohlouli et al., 2017; Chapin et al., 2010; Wagner & Fink, 2017).

For patients living with CKD, perceptions of safe care include the need for presence and vigilance of nursing staff, trust relationships with care providers, and the ability to control their own situation (Lovink et al., 2015). Similarly,

patients with ESRD express the importance of having information shared with them, being respected for their knowledge and knowing their plan of care (Årestedt et al., 2019). Distrust develops and patients begin to feel unsafe when these needs are unmet (Mollon, 2014). Recognition of emotional harm resulting from questionable interpersonal care has been gaining momentum in recent years (Sokol-Hessner et al., 2015; New et al., 2019). Since people with CKD and ESRD may be hospitalized more frequently, obtaining feedback regarding their care experiences may provide insights into hospital safety and quality of care.

This project was part of a mixed methods study exploring perceptions of safety for patients with CKD and ESRD while they are in the hospital. Qualitative data were obtained through face-to-face interviews, and have been published elsewhere (New et al., 2019). For quantitative data, the Patient Measure of Safety (PMOS) questionnaire (Giles et al., 2013) was utilized to determine patients' perceptions of safety within hospital settings, based on their evaluation of factors contributing to safety incidents. The PMOS questionnaire was developed through interviews with more than 30 patients from one teaching hospital in northern England. The Yorkshire Contributory Factors Framework (Lawton et al., 2012) was used to guide data analysis and the theming process. Face validity of the questionnaire was confirmed through a research advisory group composed of patients and staff (Giles et al., 2013). Eight domains of safety were initially identified through factor analysis, with confirmation of reliability and validity through a study involving 297 patients (McEachan et al., 2014). The questionnaire has been adapted for primary care settings (Hernan et al., 2016) and a long-term care facility in Australia (Taylor et al., 2016). Based on feedback from patients, the PMOS has undergone several iterations since its initial development, and is currently utilized by hospitals in the United Kingdom (UK), as part of a safety and service improvement strategy (Sheard et al., 2014; O'Hara et al., 2016).

Besides medical management, the physical and interpersonal care environments also play a role in patient safety. The extent to which patients are able to provide feedback on factors within their care environments that affect their safety has received limited research to date. The objective of this quantitative study was to examine safety perceptions of patients with CKD and ESRD through their assessment of organizational and local factors that have been known to contribute to safety incidents.

METHODS

Research Design

This research was part of a cross-sectional study using a mixed methods research design. Qualitative data were obtained using a semi-structured interview guide. Analysis and results have been reported elsewhere (New et al., 2019). Quantitative data were collected from 30 participants at one acute care hospital in an urban centre, using the Patient Measurement of Organizational Safety (PMOS) questionnaire. Data were collected between October 2017 and March 2018.

Instrument

The PMOS questionnaire was ideal for this study, as it was designed to solicit feedback, specifically from the perspective of patients, regarding factors or components associated with hospital care, that have been known to contribute to patient safety. The version of the PMOS utilized in this study comprised of 43 items, included one question specific to the concept of respect and dignity: "I was always treated with dignity and respect." Remaining questions were categorized into domains of safety: communication and teamwork (nine items); organization and care plan (five items); access to resources (four items); ward layout (11 items); information flow (three items); staff roles/responsibilities (four items); staff training (two items); and equipment design and function (four items). Positively and negatively worded items on the PMOS were scored on a five-point Likert scale from strongly disagree (1) to strongly agree (5). The statement "After a shift change staff knew important information about my care" is an example of a positively worded item. An example of a negatively worded item is: "A doctor changed my plan of care and other staff didn't know about it." If participants answered agree/strongly agree with positively worded items or disagree/strongly disagree with negatively worded items, a score of 1 was assigned. Agreement with positively worded items and disagreement with negatively worded items indicate that participants did not perceive their safety to be impacted by elements of care addressed by each item. Conversely, ratings of disagree/strongly disagree with positively worded items or agree/strongly agree with negatively worded items were assigned a score of 0. The overall PMOS score was calculated by summing up item scores, for a possible maximum total safety score of 43. Higher scores represent higher levels of overall perceived safety.

Unlike the overall score, totals for the domains were calculated by adding up the raw scores from the individual items in each domain. The maximum possible score for each domain is the number of items per domain multiplied by five, the highest value for each item: communication and teamwork (45), organization and care plan (25), access to resources (20), ward layout (55), information flow (15), staff roles/responsibilities (20), staff training (10), and equipment design and function (20). Similarly, higher scores represent higher levels of safety perceived in each domain.

Reliability of the PMOS in a hospital setting has been established through Cronbach's α (0.66 – 0.89) for individual test items within the domains (McEachan et al., 2014). Test-retest reliability, conducted within a two-week time frame, indicated acceptable internal validity on the positive PMOS index ($r = 0.75$) (McEachan et al., 2014).

Ethical Considerations

Ethics approval was obtained from the University of Saskatchewan Behavioural Ethics Board (17-300) and Saskatoon Health Region Research Ethics Board (16-309). An explanation of the purpose of the study was provided, and written informed consent was obtained prior to data

collection. Participants were informed of the option to stop or withdraw from the study at any time and that all data would be de-identified. Study participants were also reassured that their care would not be influenced by their answers.

Setting and Participants

Patients living with CKD and ESRD were recruited from one acute care hospital located within an inner-city neighbourhood in Saskatchewan. To ensure that participants represented the patient population in this study, purposive sampling was used. On a weekly basis, the researcher attended nephrology hand-over rounds to obtain names of patients with CKD or ESRD who might be approached for participation in the study. Recruitment occurred over a six-month period from October 2017 to March 2018. Inclusion criteria included: inpatients over 18 years, CKD stages 3, 4, ESRD-non-dialysis, and ESRD receiving dialysis; hospital admissions unrelated to post renal transplant or dialysis treatment; able to provide consent and complete questionnaire with or without assistance of researcher; and primary language being other than English if interpreter service was available. Patients who were deemed to be medically unstable or who had been hospitalized for less than 24 hours were excluded. Participants were from either a medical or surgical inpatient unit, with bed capacity between 35 to 45 per unit. Patient accommodations on every unit comprised a mixture of single and multi-bed rooms.

Data Collection

The PMOS questionnaire was completed at the participants' bedside during their hospital stay. All participants spoke and understood English. Participants were given the choice of having the researcher read the questions out loud and record their responses, or completing the questionnaire independently. The majority of the questionnaires were filled out with the assistance of the researcher. Time of completion for each questionnaire ranged between 10 to 15 minutes.

Data Analysis

Data analysis was performed using SPSS (version 25). Percentile values were used to separate participants into groups with low, moderate, or high perceived levels of safety to enable a more comprehensive analysis. Comparisons between participant characteristics and the overall PMOS score were analyzed using chi-squared and Mann-Whitney tests. Correlation between individual domains, the question item related to dignity and respect, and the overall PMOS score were calculated using Spearman's rho. Statistical significance level was set at $p < .05$.

RESULTS

Participant Characteristics

Thirty individuals living with CKD and ESRD participated in this study. Fifty-three percent were males. Slightly more than half were 65 years old or younger. Approximately two-thirds of the respondents had an education level between grades 10 to 12. The majority of the participants had ESRD and had two or more comorbid conditions. Three-quarters of participants were on hemo or peritoneal dialysis. Detailed demographic and clinical characteristics are available in Table 1.

Table 1. Participant characteristics (n = 30)

Characteristics	n (%)
Sex	
Male	16 (53.3)
Female	14 (46.7)
Age	
≤ 65 years	17 (56.7)
≥ 66 years	13 (43.3)
Self-declared Ethnicity	
Non-Caucasian Canadian	16 (53.3)
Caucasian Canadian	14 (46.7)
Education Level	
< Grade 9	7 (23.3)
Grades 10–12	20 (66.7)
Post-secondary	3 (10.0)
Length of CKD	
≤ 5 years	19 (63.3)
≥ 6 years	11 (36.7)
Stage of CKD	
3	3 (10.0)
4	4 (13.3)
5 (ESRD)	23 (76.7)
Type of Dialysis	
Hemodialysis	17 (56.7)
Peritoneal	6 (20.0)
Currently not on dialysis	7 (23.3)
Comorbidities	
Present (diabetes, hypertension, PVD)	25 (83.3)
Absent	5 (16.7)
Number of hospitalizations in past 5 years	
<5 times	12 (40.0)
5-10 times	6 (20.0)
>10 times	12 (40.0)
Admitting Diagnosis	
Infection of extremities	9 (30.0)
Infection to dialysis catheters	3 (10.0)
Other (i.e., cardiac, pneumonia, infection (other), amputation)	18 (60.0)
Length of Stay	
≤ 15 days	21 (70.0)
≥ 16 days	9 (30.0)

Comparisons Between Participant Characteristics and Overall PMOS Scores

Chi square analysis was conducted for a comparison of characteristics between participants with low, moderate, and high overall PMOS scores. Results are presented in Table 2. No statistically significant differences were found between participant characteristics and overall perceptions of safety. Results from chi-squared test were confirmed by the Mann-Whitney test.

Comparisons between Individual Domains and Overall PMOS Scores

Descriptive statistics for individual domains of safety are presented in Table 3. Descriptive statistics of the overall PMOS score are as follows: mean (23); SD (8.74); median (25); 25th percentile (15.5); and 75th percentile (29.25). Findings from the Spearman's correlation test indicate statistically significant positive associations between individual domains of safety, as well as the item on respect and

Table 2. Participant characteristics by category of overall PMOS scores

Characteristics	Low PMOS Score (< 15.5) *n* = 7	Mod PMOS Score (15.5-29.24) *n* = 16	High PMOS score (≥ 29.25) *n* = 7	p value*†
Sex n (%)				
Male	3 (18.8)	7 (43.8)	6 (37.5)	.15
Female	4 (28.6)	9 (64.3)	1 (7.1)	
Age n (%)				
≤ 65	5 (29.4)	10 (58.8)	2 (11.8)	.21
≥ 66	2 (15.4)	6 (46.2)	5 (38.5)	
Ethnicity n (%)				
Caucasian Canadians	4 (25.0)	9 (56.3)	3 (18.8)	.82
Non-Caucasian Canadians	3 (21.4)	7 (50.0)	4 (28.6)	
Education n (%)				
≤ Grade 9	1 (14.3)	4 (57.1)	2 (28.6)	.80
≥ Grade 10	6 (26.1)	12 (52.2)	5 (21.7)	
Previous employment n (%)				
Manual labour	6 (22.2)	14 (51.9)	7 (25.9)	.60
Licensed/professional	1 (33.3)	2 (66.7)	0 (0.0)	
Length of time living with CKD n (%)				
≤ 5 years	4 (22.2)	10 (55.6)	4 (22.2)	.96
≥ 6 years	3 (25.0)	6 (50.0)	3 (25.0)	
Stage of CKD n (%)				
≤ 3	3 (37.5)	5 (62.5)	0 (0.0)	.16
≥ 4	4 (18.2)	11 (50.0)	7 (31.8)	
Current dialysis treatment n (%)				
On dialysis	6 (26.1)	10 (43.5)	7 (30.4)	.12
Not on dialysis	1 (14.3)	6 (85.7)	0 (0.0)	
Comorbidities n (%)				
Present	5 (18.5)	16 (59.3)	6 (22.2)	.10
Absent	2 (66.7)	0 (0.0)	1 (33.3)	
Hospitalizations within last 5 years n (%)				
≤ 5	4 (33.3)	5 (41.7)	3 (25.0)	.50
> 5	3 (16.7)	11 (61.1)	4 (22.2)	
Current length of stay n (%)				
≤ 15 days	6 (28.6)	10 (47.6)	5 (23.8)	.53
> 16 days	1 (11.1)	6 (66.7)	2 (22.2)	

*chi-squared; Significance level ($p < .05$); † Assumptions of cell size not met

Table 3. Descriptive statistics of PMOS domains, and respect and dignity, and their correlation with the overall PMOS score

Domains & item (total possible score)	Mean	SD	Median	(25th percentile, 75th percentile)	Spearman's rho (rs (28))	*p* value*
Communication & teamwork (45)	30.7	5.8	32	(26.5, 35)	.85	$p < .001$
Organization & care planning (25)	17.1	2.99	17.5	(14.8, 19)	.72	$p < .001$
Access to resources (20)	13	2.6	13	(11.8, 15)	.67	$p < .001$
Ward layout (55)	32.9	7.3	33	(27.75, 37.3)	.74	.001
Information flow (15)	9.2	2.3	9.5	(8, 11)	.58	.001
Staff roles (20)	12.9	2.1	13	(11, 14)	.48	.007
Staff training (10)	6.4	1.9	6	(4.75, 8)	.47	.009
Equipment design & function (20)	12.1	2.8	12	(10, 14.3)	.75	$p < .001$
Respect & dignity (5)	3.43	1.5	4	(2, 5)	.4	.03

*Spearman's rho
Significance level ($p < .05$)

dignity and the overall PMOS score. Moderate associations were noted between respect and dignity, staff training, staff roles, and overall score. Strong associations were noted between communication and teamwork, organization and care planning, access to resources, ward layout, information flow, equipment design and functioning and the overall PMOS score.

DISCUSSION

The PMOS questionnaire was found to be a feasible and acceptable instrument to obtain feedback from inpatients with CKD and ESRD on their perceptions of safety during hospitalizations. Patient feedback can help with safety and quality improvement through identification of possible gaps between patients' perception of care received and providers' perception of care provided. Findings from this study suggest a relationship between the overall perception of safety and all domains. When participants perceive the risk for harm in all domains of safety to be low, their overall sense of safety was high. Alternatively, when perceptions of risk for harm from individual domains were high, participants rated their overall hospital safety experience to be low. Associations between perceptions of overall safety, individual domains of safety and participant characteristics were insignificant regardless of the lengths of stay, number of previous hospital visits, stage of their kidney disease, or the presence of comorbidities.

Safety is closely aligned with the quality of care for many patients, and often the separation between the two concepts is indistinct (Pronovost et al., 2005; Rathert et al., 2011). When expectations of care are not met, concern for safety may exceed feelings of dissatisfaction or frustration (Rathert et al., 2011). Regardless, whether responses indicate dissatisfaction with care or concern for safety, patient feedback is valuable for quality and safety improvement. Many participants in this study have had frequent care experiences as inpatients and willingly provided feedback on the domains of safety specified in the PMOS questionnaire.

Being an inpatient in acute care environments may mean the involvement of a team of healthcare professionals where continuity of care between providers is challenging. Communication between providers regarding patients' plans of care is necessary for continuity and consistency of care, and prevention of errors. The importance of communication and coordination of care is well researched (Irurita, 1999; Radwin, 2000; Williams, 2004; Tong et al., 2009). Lack of care coordination and communication were worrisome for patients, as they felt that no one was taking responsibility for their care, which may potentially have a negative impact on their safety (Irurita, 1999). Less anxiety was expressed about the occurrence of mistakes when care was coordinated, as patients felt that communication between providers must have taken place (Radwin, 2000). Regrettably, patients felt that it was not uncommon for errors to occur in acute care settings due to the lack of communication between specialists (Williams, 2004). Patients have also expressed the wish for the plan of care to be shared with them (Irurita, 1999), and for more informational, psychological and practical support (Tong et al., 2009). The desire for providers to respect their experience and knowledge and partnering with them in deciding on the care plan have been articulated by some patients (Radwin, 2000; Årestedt et al., 2019). Patients described feelings of disappointment when their knowledge and experience were underestimated or discounted by care providers (Roberti et

al., 2018). The significant association between communication and teamwork, organization of care and care planning and the overall perception of safety in this study is supported by findings in the literature.

Healthcare teams following the care of inpatients may consist of numerous providers, and patients may not always be aware of providers' identities or their roles. Patients with CKD and ESRD may be in hospital for reasons other than renal-specific causes and can often have multiple physicians involved in their care. Recalling the names and roles of the various providers can be challenging. Patients were able to remember the names of their nurses more often than that of physicians involved in their hospital care (O'Leary et al., 2010). In another study, only a small percentage of patients were able to identify the physicians in charge of their care (Arora et al., 2009). Introductions and presence of name tags for identification were perceived to be important and patients who knew which physicians and nurses were responsible for their care also perceived their overall safety to be high (Sofaer, 2005). Similarly, for participants in this study, a direct correlation was noted between ratings of staff roles and overall safety.

Survey responses in this study suggested that aspects of the physical environment significantly influenced participants' overall perception of safety, a finding supported by other researchers (Williams, 2004; Entwistle et al., 2005; Sofaer et al., 2005). Inadequacies of hospital accommodations and lack of cleanliness of hospital space were concerning for patients, particularly for those with comorbidities (Williams, 2004; Entwistle et al., 2005). Cleanliness of the hospital room and the bathroom was both an indicator of competence and commitment of the hospital staff, but more important, it meant that the potential for contracting hospital-acquired infections (HAI) was reduced (Sofaer et al., 2005). Susceptibility for HAIs was concerning for patients with CKD and ESRD due to both a higher risk and a lower reserve and who may be in the hospital currently for antimicrobial treatment.

Participants in this study were asked to provide an assessment of equipment and supplies required for their care, staff knowledge, and their ability and skills to use the necessary equipment. Based on the significant association between these domains and the overall safety rating, it would appear that the availability and functionality of equipment required for their care, as well as staff knowledge and ability to operate the equipment were a consideration for overall safety for study participants. These findings are supported by other safety research (Wysong & Driver, 2009; Lovink et al., 2015; Shattell et al., 2005; Koutantji et al., 2005). Patients felt reassured by their nurses' technical skills and confidence with using monitoring equipment (Wysong & Driver, 2009). At a hemodialysis unit, patients felt safe when staff displayed confidence in working with the machines, and were able to quickly resolve cycler alarms (Lovink et al., 2015). On the other hand, not all patients understood or appreciated care providers' technical competence or skill levels. Some patients noted inconsistencies in care more than efficiencies of task performance in general (Shattell et al., 2005; Koutantji et al., 2005).

All the same, nurses' technical competence and experiential knowledge are valued by patients, enabling them to feel safe from harm when these qualities were evident, particularly when combined with caring and compassion (Irurita, 1999; Radwin, 2000). Equally important are qualities such as being available and their readiness to listen, providing patients with a sense of security and safety (McCabe, 2004). On the other hand, caring and compassion without professional competence are also harmful to patients (Kvåle & Bondevik, 2010). To feel safe, both technical skills and interpersonal aspects of caring were important to patients (Attree, 2001). However, although patients were able to describe desired professional and compassionate qualities of nurses looking after them, they did not necessarily feel qualified to assess the competency of staff (Calman, 2006). Although previous research confirms findings from the current study, it may also be that staff training and competence are noted only when these skills are absent, causing patients to feel unsafe.

Although patients were not prepared to evaluate staff competence, some were willing to comment on their interactions with staff. Being treated with respect and dignity has been found to contribute to feelings of safety, as noted in this study also. The importance of establishing a connection with staff and being perceived as a person who matters contributed to patients feeling safe (Bridges et al., 2010). Violations to dignity identified by Jacobson (2009) largely consisted of patient and provider interactions with patients reporting being treated with rudeness, indifference and condescension, and being ignored. Dignity violations and disrespectful treatment may lead to emotional harm, the impact of which may be as significant as physical harms (Sokol-Hessner et al., 2015), causing secondary harms such as feeling powerless (Brown et al., 2018). For participants in the current study, a moderate correlation between respect and dignity and overall safety was found.

In this study, participant characteristics were unrelated to domain and overall safety ratings. Findings from this study contrasted with other research, where differences based on various participant characteristics were found to be significant. Age was a significant factor in some study findings. Older men felt safer than younger ones, unlike the female population where younger women felt safer than older ones (Wolosin et al., 2006). Overall perceptions of medical safety were higher for patients with shorter lengths of stay (Burroughs et al., 2007). Difference in ratings for safety related to treatment options, device use, and medications were found to be significant, based on gender, age, employment, past experience of adverse events, and clinical settings (Sahlström et al., 2014). Moreover, patients who have multiple chronic conditions, are on multiple medications, or had previously experienced harm are more likely to be vigilant about safety aspects of care (Schwappach et al., 2011; Weingart, 2005). The small sample size in this study may have contributed to the lack of association between participant characteristics and domains, as well as overall safety ratings.

Limitations

The study setting, sample size, and the purposive method of sampling preclude the generalization of results to other centres or other patient populations. Future studies should include patients who may be at high risk of experiencing harm, but lack the ability to articulate their concerns. Additionally, given that the survey was administered immediately following an interview, as a part of a larger study, some participants may have been experiencing fatigue while answering questions. This may influence the interpretation of responses and subsequently the usefulness of responses in informing safety strategies involving patients. Measurement bias may be a distinct possibility. The PMOS questionnaire was developed in the UK and the way question items were phrased may be confusing to some individuals. Although the questionnaire has been validated in the UK and Australia, its appropriateness for the context of the current study will need to be validated. Future research involving this instrument should include a pilot test to determine item clarity. Despite these limitations, the PMOS specifically looks at safety from the patient's perspective and can be useful for soliciting feedback from patients regarding factors known to contribute to safety perceptions in acute care hospital settings. Additional research involving a larger sample size, other patient populations and clinical contexts may be beneficial. Suggestions include testing the instrument in outpatient and dialysis settings with CKD and ESRD patients. Comparing the perceptions of individuals with CKD and ESRD to patients with other chronic illnesses who are hospitalized may be educational as well. Undoubtedly, using the questionnaire may give patients a voice to express concerns regarding physical and psychological safety and, in doing so, assist in efforts to keep them safe.

CONCLUSION

Utilizing the PMOS questionnaire, perceptions of overall safety are clearly influenced by participants' perceived levels of safety regarding factors within the physical and interpersonal care environments. Confidence in care providers' skills and abilities, and trusting that their care plans will be communicated amongst care providers contribute to perceptions of safe care. Cleanliness of the physical environment was important for patients with CKD and ESRD, who often have other comorbid health conditions, which may place them at higher risk for contracting HAIs. Equally important to feeling safe is the need to be treated with respect and dignity. Of note, although many aspects of hospitalization contribute to perceptions of safe care for patients, the concept of patient safety is often subsumed within the larger concept of quality of care. Associations between the PMOS domain scores and overall perception of safety may likely reflect perceptions of safety, as well as service quality. Nonetheless, obtaining patient feedback should continue as it can be an early warning of a deficient system, signalling for improvement in the care process. To enhance the usefulness of patient feedback, a suggested recommendation is to combine quantitative assessment tools with qualitative assessment where patients are encouraged to give voice to their experiences.

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CONTACT HOUR: 2.0 HRS

Hypoxia-inducible factor (HIF) stabilizers: An emerging treatment option for anemia in chronic kidney disease

Christopher Chiu and Marisa Battistella

LEARNING OBJECTIVES

1. Understand the clinical concerns surrounding erythropoietin stimulating agents
2. Describe the mechanism of action of HIF stabilizers
3. Discuss the benefits and risks of HIF stabilizers for the treatment of anemia in CKD

BACKGROUND

Anemia is defined as a reduction in red blood cell (RBC) count. It is diagnosed by hemoglobin (Hb) levels of <130 g/L in males, and Hb <120 g/L in non-pregnant females (McMurray et al, 2012). The prevalence and severity of anemia is directly linked with progression of kidney disease. By stage 5 chronic kidney disease (CKD), nearly all patients will develop anemia (Babitt & Lin, 2012). If left untreated, consequences of anemia include: decreased quality of life and reduced exercise capacity (Mancini et al, 2003), cognitive impairment (Andro et al., 2013), left ventricular hypertrophy (Levin et al., 1999), and increased mortality (Al-Ahmad et al., 2001). Therefore, the burden of anemia in patients with CKD is substantial.

The most common cause of anemia in patients with CKD is decreased production of the hormone erythropoietin (EPO) by the kidneys (Babitt & Lin, 2012). In healthy adults, 90% of EPO is produced by the kidneys, and the remaining 10% is produced by the liver. When oxygen levels are low in the tissues, a negative feedback system results in increased EPO production in the kidneys. This feedback loop is impaired in CKD. Other causes of anemia in CKD include: functional iron deficiency (Spinowitz et al., 2008), inflammation (Nicolas et al., 2002), iron losses during hemodialysis (Tsukamoto et al., 2016), reduced RBC lifespan (Vos et al., 2011), secondary hyperparathyroidism (Gallieni et al., 2000), and vitamin B12/folate deficiency (Tennankore et al., 2011).

Both iron and EPO are required for RBC production in the bone marrow. The availability of iron is also regulated by hepcidin, a hormone produced by liver. Hepcidin binds to and inhibits ferroportin, an iron transport channel, resulting in reduced intestinal iron absorption and iron trapping within macrophages and liver cells. Inflammation in CKD increases hepcidin production, which contributes to reduced iron availability (Babitt & Lin, 2012).

Erythropoietin stimulating agents (ESAs) have become the standard of care for the treatment of anemia in CKD as they improve anemia-related symptoms and reduce the need for blood transfusions (Gupta & Wish, 2017). ESAs work by binding to EPO receptors in the bone marrow and stimulating RBC production. The ESAs currently available in the Canadian market include: Epoetin alfa (Eprex®) and darbepoetin alfa (Aranesp®). There is a lack of evidence suggesting that one agent is superior to another with regards to efficacy and safety (Palmer et al., 2006). They differ in terms of their administration schedules due to differences in their half-lives: Epoetin alfa is dosed three times a week and darbepoetin alfa is dosed once weekly to every two weeks. Both are available as intravenous (IV) or subcutaneous (SC) injections. When deciding to initiate ESA therapy, the potential benefits of reducing anemia-related symptoms and blood transfusions are weighed against their potential safety concerns. Hypertension is the most common adverse event of ESAs, occurring in 24% (48/200) of patients studied in clinical trials of patients with CKD (Janssen, 2017). There have been rare but serious post-marketing reports of pure red cell aplasia, which have mostly been associated with SC administration (Janssen, 2017). Correctable causes of anemia, including iron deficiency and inflammation, must be addressed before initiating treatment with ESAs. These factors commonly lead to ESA resistance, which is defined

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as reduced responsiveness to ESAs despite maximal doses. Moreover, the results of several randomized controlled trials have demonstrated that treatment of anemia with ESAs to normal Hb levels (>130g/L) compared to a lower Hb target is associated with an increased risk of cardiovascular events, including stroke (Singh et al., 2006; Drueke et al., 2006; Pfeffer et al., 2009).

HYPOXIA-INDUCIBLE FACTOR (HIF) PATHWAY

The drawbacks of ESAs and the consequences of untreated anemia suggest the need for safer yet effective treatment options for anemia in CKD. The hypoxia-inducible factor (HIF) pathway is a recent discovery that adds to our growing knowledge of how our cells respond and adapt to different oxygen levels (Peyssonnaux et al., 2008). The HIF protein is a heterodimer consisting of alpha and beta subunits, and is expressed in a wide number of tissues. In the presence of oxygen, HIF-alpha is inactivated by the enzyme HIF-prolyl hydroxylase (PH), which causes it to be degraded by proteasomes (Figure 1). Under hypoxic (or low oxygen) conditions, HIF-PH activity is decreased, allowing HIF-alpha to accumulate and translocate to the nucleus where it dimerizes with HIF-beta. The HIF heterodimer activates the transcription of target genes including EPO, which stimulates RBC production. (Sakashita et al., 2019).

Pharmacology

HIF stabilizers work by inhibiting the HIF-PF enzyme, which reduces HIF-alpha breakdown. The accumulation of HIF-alpha stimulates endogenous EPO production. There are currently three HIF stabilizers in varying stages of development: daprodustat, roxadustat, and vadadustat. Roxadustat has a half-life of about 12 hours and is orally administered three times weekly. Daprodustat and vadadustat have half-lives of about four hours and are orally administered once-daily (Gupta & Wish, 2017). There are no clinically meaningful drug interactions yet reported (Locatelli et al., 2017). Unlike ESAs, HIF-stabilizers do not require storage in the refrigerator.

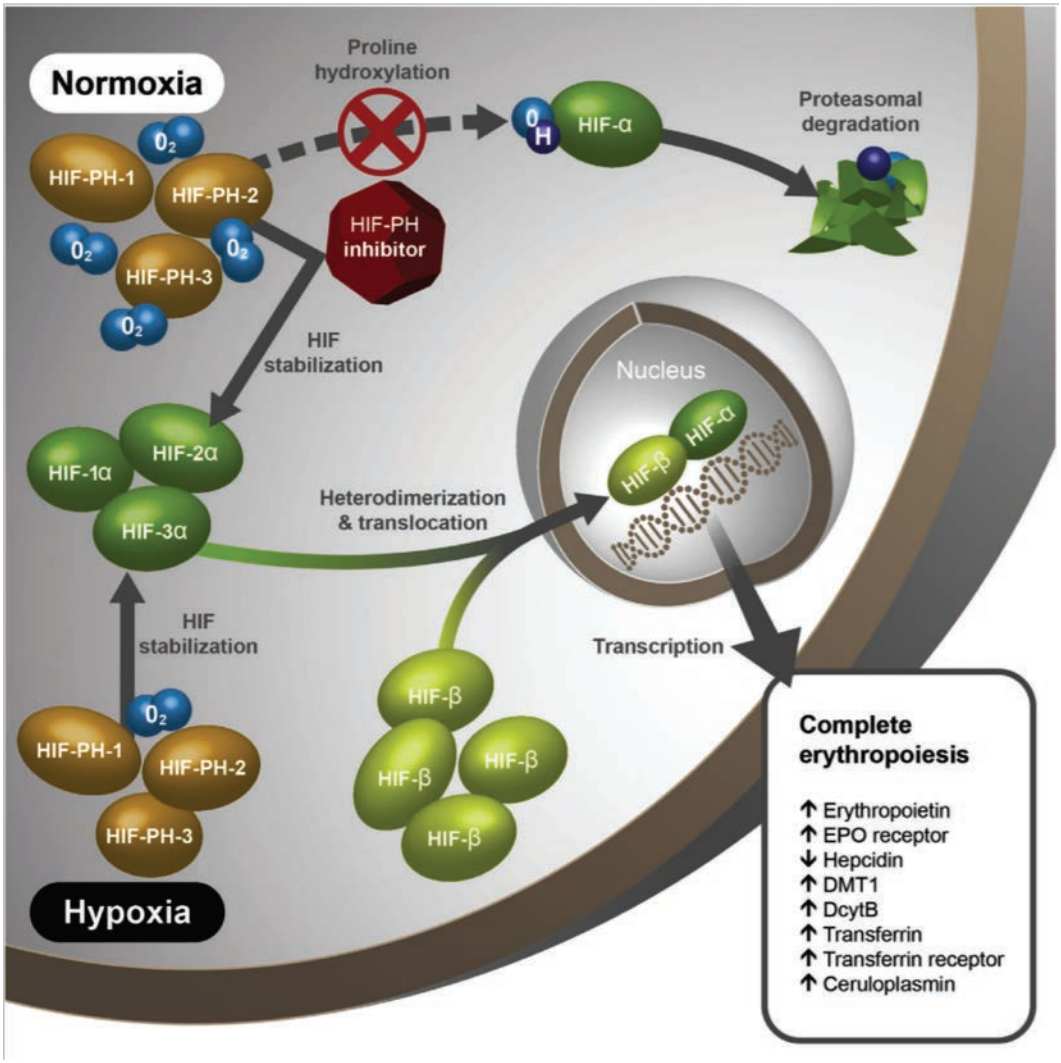

Figure 1. *HIF Pathway*
Note. Adapted from "Hypoxia-inducible factor prolyl hydroxylase inhibitors: A potential new treatment for anemia in patients with CKD," by N. Gupta and J. B. Wish, 2017, American Journal of Kidney Diseases, 69(6), p. 817. Copyright 2017 by the authors.

Efficacy

Roxadustat has recently been approved in China for dialysis- and non-dialysis-dependent patients, and in Japan for dialysis-dependent patients. Phase 3 studies with roxadustat have been completed, whereas similar studies with vadadustat and daprodustat are still underway. A phase 3 study is the final phase of clinical testing before the results are submitted to regulatory agencies. The purpose of a phase 3 study is to confirm that a drug is safe and effective for the indication being studied. One phase 3 study in China randomized dialysis-dependent patients with anemia to either oral roxadustat or IV epoetin alfa three times weekly (Chen, Hao, Liu, et al., 2019). After 26 weeks of treatment, roxadustat resulted in a greater mean increase in Hb levels (7 g/L) compared to epoetin alfa (5 g/L), and was non-inferior to epoetin alfa. Roxadustat had favourable changes to iron biomarkers, resulting in reduced hepcidin levels, increased transferrin levels, and maintained serum iron levels compared to epoetin alfa. The use of IV iron was restricted in both groups. In a subgroup analysis, patients treated with roxadustat who had inflammation at baseline (measured by elevated levels of C-reactive protein [CRP]) had a similar Hb response compared to patients with normal CRP (Chen, Hao, Liu, et al., 2019).

A second phase 3 study in China initially randomized non-dialysis CKD patients with anemia to oral roxadustat three times weekly versus placebo (Chen, Hao, Peng, et al., 2019). After eight weeks of treatment, roxadustat significantly increased mean Hb levels from baseline by 19 g/L compared to a reduction of 4 g/L with placebo. Similarly, patients receiving roxadustat had significantly lower hepcidin levels, stable serum iron levels, and increased transferrin levels compared to placebo, despite IV iron restriction in both groups. Following this initial treatment period, all patients who agreed to continue this study received roxadustat for an additional 18 weeks. Patients originally randomized to roxadustat had maintained efficacy during weeks 23 to 27, whereas patients who crossed over from placebo to roxadustat had a 20g/L increase in Hb from baseline (Chen, Hao, Liu, et al., 2019).

Three recently completed global phase 3 trials examined the efficacy and safety of roxadustat in non-dialysis dependent patients (OLYMPUS), dialysis-dependent patients (ROCKIES), and incident-dialysis patients (HIMALAYAS), respectively. The primary efficacy endpoint (mean change in Hb levels) was achieved in each individual study and in a pooled analysis of all completed phase 3 trials. In each respective study, patients treated with roxadustat required less IV iron supplementation compared with patients on placebo or epoetin alfa, while achieving similar levels of iron repletion. In subgroup analyses of each individual study, the benefit with roxadustat was attained regardless of iron repletion or inflammation at baseline (Fishbane, El-Shahawy, et al., 2019; Fishbane, Pollock, et al., 2019; Provenzano, Fishbane, et al., 2019).

Safety

In the ROCKIES study, upper respiratory tract infection occurred in 18.1% (37/204) of patients on roxadustat compared to 11.0% (11/100) of patients on epoetin alfa. Hyperkalemia occurred in 7.4% of patients on roxadustat (15/204) compared to 1% (1/100) of patients on epoetin alfa. Notably, these adverse effects are consistent with those commonly found in dialysis-dependent patients. In the OLYMPUS study, 16% (16/101) of patients on roxadustat experienced hyperkalemia compared to 4% (8/51) of patients receiving placebo. Metabolic acidosis was experienced by 12% (12/101) of patients on roxadustat compared to 2% (1 of 51) of patients receiving placebo. Both studies are limited by a short duration of follow up. Cardiovascular safety of roxadustat was determined as a pooled analysis of all global phase 3 trials and was demonstrated in both dialysis-dependent and non-dialysis dependent patients (Fishbane, El-Shahawy, et al., 2019; Fishbane, Pollock, et al., 2019; Provenzano, Evgeny, et al., 2019).

Theoretical concerns with HIF stabilizers exist, since the endogenous HIF pathway is involved in the activation of a variety of genes not affecting RBC production. HIF activation stimulates vascular endothelial growth factor (VEGF) production, which promotes angiogenesis, or the formation of new blood vessels. VEGF is associated with tumour growth and progression of diabetic retinopathy. To date, clinical studies with HIF stabilizers have not observed these effects (Sakashita et al., 2019). Further studies with longer durations of follow-up are required to determine the long-term downstream effects of HIF stabilizers.

SUMMARY

HIF stabilizers are novel agents for the treatment of anemia. Clinical concerns exist with ESAs, including their substantial cost, inconvenience of injections, ESA resistance, and association with serious cardiovascular events. Hepcidin plays an important role in this pathogenesis of ESA hyporesponsiveness, as it is induced by inflammation. HIF stabilizers appear to reduce hepcidin levels, which improves iron availability and may play a role in ESA hyporesponders. Patient preferences and convenience are important factors to consider, as an oral pill may be favoured over IV and SC injections in certain patient groups (e.g., peritoneal dialysis, and non-hemodialysis CKD patients). Finally, the cost of HIF stabilizers and funding by both payers and institutions will be the main drivers of uptake with these new agents.

In conclusion, HIF stabilizers are a promising new alternative to ESAs for the treatment of anemia in CKD. Clinical trials have demonstrated efficacy and cardiovascular safety in both dialysis- and non-dialysis-dependent patients. The long-term safety profile of these agents needs to be elucidated to further establish their role in practice.

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CONTINUING EDUCATION STUDY QUESTIONS

CONTACT HOUR: 2.0 HRS

Hypoxia-inducible factor (HIF) stabilizers: An emerging treatment option for anemia in chronic kidney disease

Christopher Chiu and Marisa Battistella

1. Which of the following is the most common cause of anemia in CKD patients?
   a) Low levels of erythropoietin
   b) Iron deficiency
   c) Folate deficiency
   d) Inflammation

2. Approximately 90% of erythropoietin in the body is produced by:
   a) Liver
   b) Kidneys
   c) Parathyroid gland
   d) Bone marrow

3. Which of the following is not a clinical concern of treatment with ESAs?
   a) Hypotension
   b) Pure red cell aplasia
   c) Stroke
   d) Cost of therapy

4. Which of the following is the most common cause of ESA hyporesponsiveness?
   a) Low levels of erythropoetin
   b) Iron deficiency
   c) Folate deficiency
   d) Inflammation

5. Which of the following is NOT a physiological response to hypoxia?
   a) HIF-alpha protein translocates to the nucleus
   b) HIF-prolyl hydroxlase activity is increased
   c) HIF increases transcription of EPO genes
   d) Hemoglobin levels increase

6. What is the function of the HIF prolyl hydroxylase enzyme?
   a) Binds directly to DNA to increase EPO transcription
   b) Binds directly to DNA to decrease EPO transcription
   c) Activates HIF, which increases its activity
   d) Inactivates HIF, which decreases its activity

7. What is the primary mechanism of action of roxadustat?
   a) Activates HIF-prolyl hydroxylase enzyme
   b) Inactivates HIF-prolyl hydroxylase enzyme
   c) Stimulates EPO receptors in bone marrow
   d) Turns off EPO receptors in bone marrow

8. Which of the following is false regarding dosage and administration?
   a) Epoetin alfa is dosed IV three times weekly
   b) Darbepoetin is dosed IV once weekly or every two weeks
   c) Roxadustat is dosed PO three times weekly
   d) Roxadustat is dosed IV three times weekly

9. Which of the following iron biomarkers is reduced by roxadustat?
   a) Hemoglobin
   b) Serum iron
   c) Transferrin
   d) Hepcidin

10. Which of the following is a theoretical concern of HIF stabilizers due to activation of VEGF production?
    a) Hypertension
    b) Dyslipidemia
    c) Tumour growth
    d) Bone marrow suppression

CONTINUING EDUCATION STUDY ANSWER FORM

CE: 2.0 HRS CONTINUING EDUCATION

Hypoxia-inducible factor (HIF) stabilizers: An emerging treatment option for anemia in chronic kidney disease

Volume 30, Number 1

Christopher Chiu and Marisa Battistella

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❏ Technician
❏ Technologist
❏ Other (Specify) _____

Number of years in nephrology _____

Area of responsibility
❏ Direct Patient Care
❏ Administration
❏ Technical
❏ Teaching
❏ Research
❏ Other (Specify)

_____

Work environment
❏ Acute Care
❏ Self-Care Unit
❏ Independent Health Care
❏ 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
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❏ Pediatrics
❏ Other

Select all that apply
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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.

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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
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- Narratives that describe the nursing experience
- Interdisciplinary practice questions and answers
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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),* Seventh Edition (2020).

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.

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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 des :

- Exposés de recherche originaux;
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Style : Le style du manuscrit doit être conforme au manuel de publication de l'Association américaine de psychologie (AAP), 7e édition (2020).

Page titre : La page titre doit inclure le titre du manuscrit ainsi que les renseignements suivants : nom de chacun des auteurs (y compris les 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 adresses 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.

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✓ Lettre de présentation
✓ Article
- Page titre incluant les renseignements suivants :
  - Titre de l'article
  - Nom de chaque auteur (incluant prénoms au complet)
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  - 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

CALL FOR ABSTRACTS

CANNT-ACITN invites you to join us in Hamilton in 2020!

Abstracts are currently being accepted for ORAL and POSTER presentations for CANNT-ACITN 2020 – "Guiding Our Way to the Future". The annual national meeting of the Canadian Association of Nephrology Nurses and Technologists will be held October 22–24, 2020 in Hamilton, Ontario.

Abstract submissions should incorporate the theme—guiding our way to the future —appropriate for the novice through to the advanced practice professional. Topics of interest may include: clinical research, quality improvement, innovation and technology, ethics, leadership in nephrology, case presentations, and clinical reviews. All abstract submissions must be evidence-based.

Consistent with our theme, all poster and oral presenters will be encouraged to consider how their presentation can help guide us into the next decade.

ABSTRACT SUBMISSION GUIDELINES:

Amended deadline: April 24, 2020

All abstracts must be submitted online (**www.cannt.ca**) through the online submission form.

Submissions must include the following:

Abstract Title
- must accurately reflect the content of the presentation

Abstract Text
- should be no longer than 250 words
- include all author names and affiliations
- should be as informative as possible
- define **all abbreviations** the first time they appear in the abstract
- use only the generic names of drugs
- **do not identify companies and/or products in the body or title of the abstract**

If research-based, must include:
- purpose of study
- methods
- results
- conclusions
- implications for nephrology care

If practice/education-based, must include:
- purpose of the project
- description
- evaluation/outcomes
- implications for nephrology practice/education

PRESENTATION INFORMATION:

- identify preferred format of presentation (ORAL or POSTER)
- full names and credentials of authors
- biography (250 words max.) and headshot of first author
- contact information for first author must include: full name, e-mail address, fax number, mailing address with postal code, home and work telephone numbers

LEADING-EDGE TOPICS IN:

- Patient empowerment
- CKD comorbidities (mental health, diabetes, & COPD)
- Future directions of CKD technology and treatment
- Pregnancy with CKD
- Transplant
- Pediatric & elderly care
- Medical assistance in dying
- The impact of social determinants of health
- Home therapies
- Data analytics

IMPORTANT NOTES:

Only COMPLETE submissions received by APRIL 24, 2020 will be considered.
- All correspondence will be with the first author only.
- Acceptance of abstract does not waive attendance fees (registration, transportation, accommodations).
- Notification regarding selection decisions will be provided by July 1, 2020.
- Should the abstract be selected for presentation, the author(s) authorize(s) the publication of the abstract submitted for publication in the CANNT-ACITN Journal.
- The presentation shall not make comparison to companies or products for any purposes of product marketing, nor will topics or materials be used to discredit companies or products.
- The abstract, and associated authors, should make full disclosure of corporate employment and/or funding sources.
- Abstracts not in the required format will be returned to the author for revision. Please review the sample abstract on the website as a guideline.

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CANNT | ACITN 2020

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