

CANNT JOURNAL JOURNAL ACITN



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Updated 1968–2008

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*By Christina Doré, Linda Duffett-Leger,
Mary McKenna, Jonathan Salsberg, and
Myriam Breau*

54 CONTINUING EDUCATION SERIES
**Restless Legs Syndrome (RLS)
in Hemodialysis Patients**

By Hugh Quinn and Marisa Battistella



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Congratulations to CANNT on 50 years of leadership in nephrology education, research and communication! We look forward to continuing to work together to advance the quality of renal care in Canada.

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The CANNT Journal is
printed on recycled paper.

Letter from the Editor

The **CANNT Journal** is the official publication of the Canadian Association of Nephrology Nurses and Technologists, 4 Cataraqui St., Suite 310, Kingston, ON K7K 1Z7, telephone: (613) 507-6053, fax: 1-866-303-0626, email: cannt@cannt.ca. Published quarterly, the journal is received by all members of CANNT. Subscriptions are: Canada \$80.00 (plus HST), US. \$90.00, Outside N. America \$115.00. Back issues, when available, are \$7.50 (+HST) per issue and are available from the editors. Opinions expressed by writers in the CANNT Journal are not necessarily those held by the editors or CANNT. Contrasting views by our readership and membership are welcome. All letters, comments and articles are to be sent to the CANNT office, 4 Cataraqui St., Suite 310, Kingston, ON K7K 1Z7.

1-877-720-2819

Website: www.cannt.ca

The CANNT Journal accepts articles (manuscripts) on an ongoing basis.

The CANNT Journal is indexed in the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the International Nursing Index (INI), MEDLINE, EBSCO, ProQuest and Thomson Gale.

ISSN 2291-644X (Online)

ISSN 1498-5136 (Print)

The CANNT Journal is produced by Pappin Communications, The Victoria Centre, 84 Isabella St., Unit 2, Pembroke, Ontario K8A 5S5

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As I pored over notes and documents in preparation for this edition honouring CANNT's 50th anniversary, I was overcome with awe at how far the association has come. Fran Boutilier was kind enough to share her musings and recollections from the early days of the precursor organizations to CANNT, as we know it today. We have, indeed, come a long way from the days of the Canadian Society of Extracorporeal Circulation Technicians (CANSECT) in 1968 when the heart-lung and dialysis disciplines were linked by the common thread of extracorporeal circulation, until both disciplines parted ways in 1975 and the dialysis branch convened under the name Canadian Society of Perfusionists (CSP) that was eventually rebranded as the Canadian Society of Dialysis Perfusionists (CSDP) in 1977 (F. Boutilier, personal communication, December 1, 2017). We are very fortunate to have Fran Boutilier in our midst—she is a reminder that many before us fought long and hard to give the association for the nephrology nursing and technological community in Canada its current professional stature and all the benefits that this entails.

I am equal parts in awe of the history of the *CANNT Journal* and the journal editors who have come before me. Ray Campeau was the editor of the inaugural edition of *Le/The Journal*, which was the publication of CANSECT from 1973-1976. From 1976-1987, the CSDP produced the *CSDP The DIALTEC* newsletter that was dedicated to nephrology only. Brian Mulhearn was one of the inaugural editors of *The DIALTEC*; Phyllis Malek took the helm in 1983-1986 through the transition of the CSDP to Canadian Association of Nephrology Nurses and Technicians (CANNT) in 1984. Jocelyne Larivière was the inaugural editor of *CANNT Journal* as we know it today. Along the way,

the torch of editorship was passed to Rita Brownrigg (1989-1992) and then to Leanne Dekker (1992-1997) who steered the journal through the final iteration of Canadian Association of Nephrology Nurses and Technologists (CANNT) in 1996. Then came the inimitable Gillian Brunier (1997-2012) with her co-editor Colleen Turpin, followed by the dynamic duo of Alison Thomas and Jan Baker (2012-2015). I was blessed to have Matt Phillips as my co-editor from 2015-2016; Matt lent a very steady and capable hand, as we navigated through the challenges and rewards of editing our renowned journal. *CANNT Journal* is a wonderful repository of information that pertains to clinical and evidence-based nephrology practice. I was again reminded of this as I researched for a presentation I gave recently at the Nurse Practitioner's Association of Ontario (NPAO) annual conference on chronic kidney disease—much of the information I needed was right at my fingertips in the *CANNT Journal*. The *CANNT Journal* is indexed in CINAHL, INI, MEDLINE, EBSCO, ProQuest, and Thomson Gale. We should all be proud of ourselves, as an association of nephrology nurses and technologists, that such high-quality work is being produced and published in our journal.

For this anniversary edition, Doré et al. deliver the conclusion of their three-part series on burn-out and empowerment. In this final offering, the authors propose an innovative web-based intervention to enhance the empowerment and well-being of hemodialysis nurses working in Quebec, as a way of mitigating the risk of burnout. In the Continuing Education series, Quinn and Battistella review both non-pharmacological and pharmacological approaches to the treatment of restless legs syndrome (RLS) in patients undergoing hemodialysis. Treatment

and management of RLS may not always lead to complete relief in this patient population; as such, it can be very challenging for clinicians to mitigate the devastating effects of RLS.

I invite you to read Clarence Graansma's article on The History of Dialysis Technology in the CANNT Era and the collective musings of Bruce Pappin and Heather Coughlin, past and current managing editors, respectively, of the *CANNT Journal*. Both pieces constitute a fascinating read, as they take us to the way things were back in time. I have also amassed reflections and recollections from past presidents and editors from the last decade—they all share the same heartfelt gratitude for the opportunity to serve and some make honest exhortations for members to become involved and support CANNT.

In the spirit of gratitude for everyone who has worked and continues to work to make CANNT and the

CANNT Journal successful, the editorial team would like to acknowledge the significant contributions that Heather Dean and Michelle Trask have made during their tenure as President and Director of Communications, respectively. Both have made an indelible impression on the CANNT tapestry.

I hope that you will immerse yourself in the CANNT conference in Quebec City as you partake of the excellent oral and poster presentations, networking opportunities, and the warmth and hospitality of this historic city. I look forward to meeting you in Quebec City!



**Jovina Bachynski,
MN, RN(EC),
CNeph(C)
Editor, CANNT
Journal**

NOTICE BOARD

- Canadian Nurses Association (CNA) Exam Timeline <https://www.nurse-one.ca/certification/renewing-your-certification#sthash.IDBqg5i7.dpuf>

FALL 2018

- **June 1–September 10, 2018:** initial exam or renewal by exam application window
- **November 1–15, 2018:** certification exam window
- **January 10–November 1, 2018:** application window to renew by continuous learning
- **October 23–28, 2018.** The American Society of Nephrology (ASN) 2018 Kidney Week, San Diego Convention Center, San Diego, CA. www.asn-online.org
- **October 25–27, 2018.** Canadian Association Nephrology Nurses and Technologists (CANNT) 50th National Symposium 2018: *Our past will guide our future/Le passé est garant de l'avenir*, Ville de Quebec City, QC. www.cannt.ca

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.

1-877-720-2819; Site web : www.cannt.ca

Le Journal ACITN accepte des articles (manuscrits) de façon continue.

Le journal ACITN est maintenant répertorié dans le « Cumulative Index to Nursing and Allied Health Literature (CINAHL) », « International Nursing Index » (INI), « MEDLINE », « EBSCO », « ProQuest » et « Thomson Gale ».

ISSN 2291-644X (En ligne)
ISSN 1498-5136 (Dans la presse)

Le journal ACITN est préparé par Pappin Communications
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JOVINA BACHYNSKI

Lettre de la rédactrice en chef

En parcourant mes notes et en faisant le tri dans mes documents en préparation de la prochaine édition du congrès annuel de l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN) qui marque le 50^e anniversaire de l'Association, je me suis sentie envahie par un sentiment d'admiration irréprouvable devant tout le chemin parcouru. Frances Boutilier a eu la gentillesse de partager avec nous ses réflexions et ses souvenirs sur les débuts des organismes précurseurs de l'ACITN, telle que nous la connaissons aujourd'hui. Nous avons en effet parcouru beaucoup de chemin en peu de temps, depuis les tout premiers débuts de la CANSECT (Canadian Society of Extracorporeal Circulation Technicians) en 1968 lorsque la perfusion cardiopulmonaire et la dialyse étaient des disciplines unies par un lien commun, celui de la circulation extracorporelle, jusqu'à ce que ces deux disciplines se séparent en 1975 et que les membres de la branche de la dialyse se regroupent et forment la Société canadienne des perfusionnistes (SCP), qui a été par la suite renommée la Société canadienne des perfusionnistes en dialyse en 1977 (F. Boutilier, communication personnelle, 1^{er} décembre 2017). Nous pouvons nous féliciter de compter Frances Boutilier dans nos rangs. Elle nous rappelle qu'avant nous, une foule de gens se sont battus bec et ongles pour donner à l'association qui représente les infirmières et infirmiers et les technologues en néphrologie la stature professionnelle dont elle jouit aujourd'hui, et tous les avantages que cela comporte.

Je suis tout aussi admirative devant l'histoire de notre revue, le journal de l'ACITN (CANNT Journal), et devant les rédacteurs en chef qui m'ont précédée. Ray Campeau a été le rédacteur en chef du numéro inaugural de Le/The Journal, la revue publiée par la CANSECT de 1973 à 1976. Entre 1976 et 1987, la Société canadienne des perfusionnistes en dialyse (SCPD) a produit The DIALTEC,

un bulletin exclusivement consacré à la néphrologie. Brian Mulhearn a été l'un des premiers rédacteurs en chef de The DIALTEC; Phyllis Malek lui a succédé de 1983 à 1986, pendant la transition de la SCPD à l'ACITN en 1984. Jocelyne Larivière a été la première rédactrice en chef du journal de l'ACITN, tel que nous le connaissons aujourd'hui. Elle a depuis lors passé le flambeau de la rédaction à Rita Brownrigg (1989–1992), relayée par Leanne Dekker (1992–1997) qui a dirigé le journal jusqu'à la dernière mouture de l'ACITN, en 1996. Sont venus ensuite l'inimitable Gillian Brunier (1997–2012) et sa corédactrice en chef, Colleen Turpin, suivis du duo dynamique formé par Alison Thomas et Jan Baker (2012–2015). J'ai eu le privilège d'avoir Matt Phillips à titre de corédacteur en chef à mes côtés, de 2015 à 2016. J'ai pu compter sur son professionnalisme et ses compétences pour relever les défis et célébrer les succès associés à la rédaction de notre revue réputée. Le journal de l'ACITN est une mine précieuse de renseignements cliniques et factuels sur la pratique dans le domaine de la néphrologie. J'ai eu l'occasion de le constater une fois de plus en faisant des recherches pour un exposé sur la néphropathie chronique que j'ai récemment présenté dans le cadre du congrès annuel de la NPAO (Nurse Practitioner's Association of Ontario); la plupart des renseignements dont j'avais besoin se trouvaient à portée de la main, dans le journal de l'ACITN. Ce dernier est référencé dans les bases de données CINAHL, INI, MEDLINE, EBSCO, ProQuest et Thomson Gale. Nous pouvons être fiers, à titre d'association représentant les infirmières et infirmiers et les technologues en néphrologie, de la grande qualité des travaux produits et publiés dans notre revue.

À l'occasion de ce numéro anniversaire, Doré et ses collaborateurs nous livrent la conclusion de leur série de trois articles sur l'épuisement professionnel et la prise en charge de soi.

Dans ce dernier article, les auteurs proposent une intervention novatrice, en ligne, pour promouvoir la prise en charge de soi et le bien-être chez le personnel infirmier québécois travaillant en hémodialyse, et pour réduire ainsi le risque d'épuisement professionnel. Dans la rubrique consacrée à la formation continue, Quinn et Battistella s'intéressent aux stratégies pharmacologiques et non pharmacologiques pour prendre en charge le syndrome des jambes sans repos (SJSR) chez les patients en hémodialyse. Le traitement et la prise en charge du SJSR ne se traduisent pas toujours par un soulagement complet dans cette population de patients, et il peut être très difficile pour les cliniciens d'atténuer les effets dévastateurs de ce syndrome.

Je vous invite à lire l'article de Clarence Graansma sur l'histoire de la dialyse en tant que technologie à l'ère de l'ACITN, ainsi que les réflexions de Bruce Pappin et Heather Coughlin, respectivement ex-rédacteur en chef et rédactrice en chef actuelle du journal de l'ACITN. Ces deux articles sont passionnants parce qu'ils nous font faire un bond dans le passé. J'ai également réuni les souvenirs et les réflexions de président(e)s et de rédacteur(-trice)s de la dernière décennie. Tous partagent le même sentiment sincère de

reconnaissance pour avoir eu l'occasion d'apporter leur pleine contribution à leur association; certains encouragent même les membres à s'investir personnellement et à soutenir l'ACITN.

Nous sommes très reconnaissants à l'égard de ceux et celles qui se sont employés et s'emploient encore aujourd'hui à faire en sorte que l'ACITN et le journal de l'ACITN sont une réussite et, dans cet esprit, l'équipe de rédaction tient à saluer l'énorme contribution de Heather Dean et Michelle Trask lorsqu'elles occupaient respectivement les postes de présidente et de directrice des communications. Toutes deux ont marqué l'ACITN de leur empreinte à jamais.

J'espère que vous tirerez le maximum de votre participation au congrès de l'ACITN à Québec, notamment en assistant aux excellents exposés et présentations d'affiches proposés, en exploitant les occasions de réseautage, mais aussi en profitant de la chaleur et de l'hospitalité de cette ville historique. Je me réjouis de vous rencontrer à Québec!



Jovina Bachynski, M. Nurs., Inf. aut. (FC), CNéph(C)
Rédactrice en chef, journal de l'ACITN

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**2018 Conference: October 25–27, 2018
Québec City, QC**
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President's Message

It has been an honour to be CANNT President—an experience that will be one of the highlights of my nursing career. I love being a nephrology nurse. CANNT has given me the opportunity to connect with dedicated renal healthcare professionals who share my passion.

I would like to share just a few highlights from my term as president. First and most importantly, I was privileged to work with a dedicated CANNT Board of Directors and office staff. This Board has worked through multiple transitions, with some planned and a few surprises. It was not always easy juggling our real jobs, family, and day-to-day responsibilities. I think we should all be proud of what we have accomplished. Our accomplishments include a beautiful new CANNT logo, the hiring of Events and Management Plus as the new CANNT office managers, and, of course, the launch of our new website.

I represented CANNT at CNA meetings. I attended the very first face-to-face meeting of the Certification Specialty Groups. The meeting took place in Ottawa at the CNA house—a beautiful building housing a wealth of nursing history. Key changes were voted on. I am happy to report a 20% discount will now be offered to CANNT members writing the certification exam or renewing with practice hours. This change will take place in 2019—please see the CNA website for details. CNA will also contact the CANNT Board for recommendations of members who are interested in becoming exam reviewers. These changes create a closer working relationship between the specialty groups and CNA.

I attended the CNA biennium in Ottawa as one of 10 voting delegates from the specialty groups. During the CNA's AGM, the members voted in favour of expanding the membership

to include Licensed Practical Nurses (known as Registered Practical Nurses in Ontario) and Registered Psychiatric Nurses. This will give the family of nursing a collective voice in Canada.

I represented CANNT at the 47th EDTNA/ERCA International Conference in Genova, Italy. The theme was Global Approach to Renal Care Innovation-Balancing Compassion and Health Technologies. I was very proud of my Canadian colleagues who presented at this year's conference. My favourite session was a round table session on plastic cannula versus metal needles. The attendees were asked a series of multiple-choice questions using the conference app. A series of presentations presented the research and the questions were asked again. The results of the questions were available in real time, and showed how many delegates changed their mind based on the research. Our own Ontario VP Rosa Marticorena did a fantastic job presenting and with the panel discussion that followed. Paulina Bleah, another fellow Canadian, presented on the Nurse Practitioner Role for Vulnerable Patient Populations Living with Renal Disease. Well done, ladies!



Round table discussion: "Plastic cannulae vs. metal needles". Left to right: Maria Teresa Parisotto (Germany): "Is metal needle the right cannulation device for every patient?"; Vicki Smith (Australia): "How do you build up a successful training process: Introducing the use of plastic cannulae"; Rosa Marticorena (Canada): "Clinical and economical considerations that drive the cost of cannulation using metal needles vs. plastic cannulae"; Marisa Pegorago (Italy): "What the future will bring".



Rosa Marticorena



Heather Dean with Jeanette Finderup (EDTNA/ERCA Brand Ambassador Denmark) Paulina Bleah

I was very impressed with the skill and confidence of all the presenters who did not have English as their first language. They not only presented in English, but they also answered questions in English! It was heart-warming to see fellow colleagues help translate a question if required. International conferences remind us we have the same challenges across the world. What an amazing experience!

What's next? Tracy Schwab and I are the co-chairs of CANNT 2019. We have put together an energetic, dynamic planning committee and look forward to welcoming you to Edmonton next year!

I would like to welcome Janice MacKay as your new CANNT President. Janice is a natural leader, an experienced nurse, a dedicated CANNT member, and the best friend a person could ever have. I wish the CANNT Board continued success as we look towards our next 50 years.

Thank you to all the CANNT members for your dedication to the care of nephrology patients.



**Yours in Nursing,
Heather Dean, RN, CNeph(C)CANNT
President 2016-2018**



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Message de la présidente

Ce fut pour moi un honneur de présider l'ACITN, une expérience qui restera l'un des points d'orgue de ma carrière dans le secteur des soins infirmiers. J'adore être une infirmière en néphrologie. L'ACITN m'a donné l'occasion de rencontrer des professionnels de la santé en néphrologie enthousiastes, mus par la même passion.

Je voudrais partager avec vous quelquesuns des moments forts de mon mandat de présidente. D'abord et avant toute chose, j'ai eu le privilège de travailler avec un comité de direction et un personnel administratif dévoués. Ce comité a traversé de multiples transitions, dont certaines planifiées et quelques autres inattendues. Il n'a pas toujours été facile de concilier travail, vie de famille et responsabilités quotidiennes. Nous pouvons tous être fiers de ce que nous avons accompli. Au nombre de nos accomplissements

figurent le nouveau logo de l'ACITN, un magnifique logo, l'embauche de Events and Management Plus en tant que nouveau gestionnaire de bureau de l'Association et bien entendu, le lancement de notre nouveau site Web.

J'ai représenté l'ACITN aux congrès de l'Association des infirmières et infirmiers du Canada (AIIC); j'ai participé à la toute première réunion en personne des groupes de spécialité sur la certification. La réunion a eu lieu à Ottawa, au siège social de l'AIIC, un magnifique édifice empreint de l'histoire des soins infirmiers. Des changements importants ont été votés. J'ai le plaisir d'annoncer qu'une remise de 20 % sera désormais consentie aux membres de l'ACITN qui passent l'examen de certification ou qui renouvellent leur certification sur la base de leurs heures de pratique. Ce changement entrera en vigueur en 2019. Veuillez consulter le site Web de

l'AIIC pour plus de détails à ce sujet. L'AIIC communiquera également avec le comité de l'ACITN pour qu'il lui recommande des membres souhaitant corriger des examens. Ces changements créent une relation de travail plus étroite entre les groupes de spécialité et l'AIIC.

J'ai participé à la réunion biennale qui s'est tenue à Ottawa, parmi les dix délégués ayant droit de vote issus des groupes de spécialité. À l'occasion de l'assemblée générale annuelle de l'AIIC, les membres se sont prononcés en faveur de l'ouverture de l'adhésion aux infirmières et infirmiers auxiliaires (ou infirmières et infirmiers auxiliaires autorisés en Ontario) et aux infirmières et infirmiers psychiatriques autorisés. Les infirmières et infirmiers, toutes disciplines confondues, pourront ainsi désormais s'exprimer d'une seule et même voix au Canada.

J'ai représenté l'ACITN à la 47^e édition du congrès international de l'EDTNA/ERCA, à Gênes, en Italie. Le thème du congrès était « une approche globale de l'innovation en matière de soins rénaux : le juste milieu entre compassion et technologies de la santé ». J'ai été très fière de



La table ronde : "Plastic cannulae vs. metal needles". Left to right: Maria Teresa Parisotto (Germany): "Is metal needle the right cannulation device for every patient?"; Vicki Smith (Australia): "How do you build up a successful training process: Introducing the use of plastic cannulae"; Rosa Marticorena (Canada): "Clinical and economical considerations that drive the cost of cannulation using metal needles vs. plastic cannulae"; Marisa Pegorago (Italy): "What the future will bring".



Rosa Marticorena



Heather Dean avec Jeanette Finderup (EDTNA/ERCA Brand Ambassador Denmark)



Paulina Bleah

mes consœurs et confrères canadiens qui ont présenté des exposés dans le cadre de ce congrès. L'activité que j'ai préférée a été une table ronde sur l'utilisation de canules en plastique contre les aiguilles métalliques. Les participants ont été invités à répondre à une série de questions à choix multiples à l'aide de l'application de la table ronde. Une série d'exposés ont porté sur la recherche, et les participants ont été de nouveau invités à répondre à des questions. Les réponses aux questions étaient accessibles en temps réel; les résultats indiquaient le nombre de délégués qui changeaient d'avis sur la base de la recherche. Notre viceprésidente pour la région de l'Ontario, Rosa Marticorena, a présenté un exposé fantastique et a fait un travail exemplaire lors de la discussion en petits groupes qui a suivi. Paulina Bleah, une autre compatriote, a présenté un exposé sur le rôle de l'infirmière

praticienne auprès des populations de patients vulnérables qui vivent avec une maladie rénale. Excellent travail, Mesdames!

J'ai été très impressionnée par la confiance et les compétences dont ont fait preuve tous les conférenciers dont l'anglais n'était pas la langue maternelle. Ils ont non seulement présenté leur exposé en anglais, mais ont également répondu aux questions dans cette langue! Cela m'a fait chaud au cœur de voir des consœurs ou confrères aider à la traduction d'une question lorsque le besoin s'en faisait sentir. Ces congrès internationaux nous rappellent que nous nous heurtons aux mêmes difficultés partout dans le monde. Quelle formidable expérience!

Quelles sont les prochaines étapes? Tracy Schwab et moi-même allons coprésider l'édition 2019 du congrès de l'ACITN. Nous avons mis sur pied un comité de planification dynamique

et débordant d'énergie et nous nous réjouissons de vous accueillir à Edmonton l'année prochaine!

Je tiens à souhaiter la bienvenue à Janice MacKay, notre nouvelle présidente. Janice est une leader née, une infirmière expérimentée, un membre dévoué de l'ACITN et la meilleure amie dont on puisse rêver. Je souhaite au comité de l'ACITN beaucoup de succès puisque nous nous apprêtons à écrire nos 50 prochaines années.

Merci à l'ensemble des membres de l'ACITN pour tout leur dévouement et leur engagement dans les soins prodigués aux patients en néphrologie.



**Cordialement,
d'une infirmière
à ses consœurs et
confrères,
Heather Dean, Inf.
aut., CNéph(C)
Présidente de l'ACITN,
2016-2018**

Your Board in Action

In my “Board in Action” report for this issue, I would like to take this opportunity to thank the many great minds and hands of our Board of Directors and association management group who tirelessly serve our CANNT membership 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. By attending our annual CANNT conference, you will learn from others, and improve your own skills and knowledge in your practice. It is also important to engage with their work, ask questions, and share your knowledge broadly. As in any other profession, networking is very important in our work. This is the way to create opportunities to participate in collaborative clinical care or research projects, work to create standardized algorithms of care across the country, connect with peers, and perhaps work towards submitting a manuscript to our peer-reviewed *CANNT Journal*.

For all these reasons, overcome your fears and doubts, and dare to attend a CANNT conference and continue to do so at least once a year. The benefits are more extensive than the costs if you know how to get the most out of every conference.

MEMBERSHIP

We currently have a membership of 469 renal professionals as of August 2018. The Board of Directors continually evolves to provide ongoing 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 or at 613-507-6053.

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

- Member access to the online publication of *CANNT Journal*
- Access to www.cannt.ca “Members Only” section
- Reduced rate at the annual nephrology symposium
- Access to the *CANNT Nephrology Nursing Standards and Practice Recommendations*, and the *Standards of Nephrology Technical Practice*, as well as the *Nursing Recommendations for the Management of Vascular Access in Adult Hemodialysis Patients (2015 Update)*
- Promotion of and support for specialty certification
- Access to continuing education opportunities through the *CANNT 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.

JOURNAL

Guidelines for journal article submission can be found under the “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 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. The CANNT Journal is

electronically published four times per year. The journal is a refereed publication and accepts only original, peer-reviewed articles. Advertising opportunities and corporate-sponsored education opportunities are available.

COMMUNICATIONS

Many of you may think of a website redesign as a daunting, time-consuming, and expensive task. Updating our website was identified as a priority for our members for many reasons. In prioritizing this venture, your Board of Directors discussed the following key indicators that supported the decision to move forward with a website re-design:

- Importance of improving the experience of members to better serve their needs
- Priority to create a more up-to-date and visually appealing platform
- Updating the display or surfacing of content—our branding has changed
- Updating to a more responsive user-friendly website so that members can switch easily between devices, which people increasingly prefer
- Providing clear, concise CANNT information to our members.

Our website redesign will better reflect our growth and it will continue to grow with us.

We continue to develop new strategies for engaging our members and communicating timely and relevant information to our membership. *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, Michelle Trask.



CANNT website (www.CANNT.ca)

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Twitter**

ANNUAL CONFERENCE

CANNT 2018 is themed “Our Past Will Guide Our Future”, and your conference committee is working hard to create an innovative and exciting

50th anniversary program to meet the needs of nephrology professionals from novice to advanced practice. I hope to meet you in Quebec City on October 25–27, 2018.

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 and 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 2018 Annual Report soon to be available on the CANNT website (<http://www.cannt.ca/en/about/index.html>).



Janice MacKay
CANNT President-Elect/Treasurer
2016–2018



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Votre conseil en action

Dans mon rapport Board in Action (le comité en action) dans ce numéro, je voudrais profiter de cette occasion pour remercier les nombreux grands esprits bénévoles au sein de notre comité de direction, et du groupe chargé de la gestion de l'ACITN qui, tout au long de l'année, s'emploie inlassablement à servir nos membres. Je remercie également nos commanditaires pour les diverses ressources qu'ils mettent à notre disposition et pour l'aide qu'ils nous apportent, sans qui nos événements et nos programmes ne seraient pas possibles. J'adresse surtout mes sincères remerciements à l'ensemble de nos membres qui continuent de penser que nous pouvons accomplir de grandes choses si nous collaborons, communiquons et nous investissons dans notre association. En participant au congrès annuel de l'ACITN, vous apprendrez au contact d'autres membres, tout en aiguisant vos compétences et vos connaissances professionnelles. Il est important de s'intéresser à leur travail, de poser des questions et de partager vos connaissances le plus largement possible. Comme dans toute profession, le réseautage est un aspect essentiel de ce que nous faisons. C'est le meilleur moyen de créer des occasions et de participer à des projets de recherche ou à des modèles de soins cliniques axés sur la collaboration, d'œuvrer à la création d'algorithmes de soins uniformisés à l'échelle du pays, de rencontrer des consœurs et confrères et peut-être de travailler à la soumission d'un article pour notre revue révisée par un comité de lecture, le journal de l'ACITN.

Pour toutes ces raisons, surmontez vos doutes et vos craintes, osez participer au congrès de l'ACITN et continuez d'y participer au moins une fois par année. Les avantages l'emportent de loin sur le coût si vous savez comment tirer le maximum de chaque congrès.

ADHÉSION

Nous comptons actuellement 469 professionnels de la néphrologie parmi nos membres (août 2018). Notre comité de direction est continuellement à la recherche de nouvelles idées qui profiteront à l'ensemble des 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 ou par téléphone au 6135076053.

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 en ligne au journal de l'ACITN
- Accès à la section réservée aux membres au www.cannt.ca
- Remise sur les droits d'inscription au symposium sur la néphrologie
- Accès aux publications Nephrology Nursing Standards and Practice Recommendations, Standards of Nephrology Technical Practice et Nursing Recommendations for the Management of Vascular Access in Adult Hemodialysis Patients (mise à jour de 2015) de l'ACITN
- Promotion et soutien en vue de l'obtention du certificat de spécialisation
- Accès à des occasions de formation continue par l'entremise du journal de l'ACITN et de webinaires
- Occasions de saluer l'excellence professionnelle par la remise de prix annuels
- Accès à des bourses d'études et à des subventions de recherche
- Promotion de la pratique axée sur les données probantes
- Collaboration au sein de la communauté de la néphrologie

Renouveler votre adhésion annuelle à l'ACITN contribue à la viabilité de notre association sur le long terme.

REVUE

Vous trouverez la marche à suivre pour soumettre un article pour publication dans notre revue sous la section réservée au journal de l'ACITN du site Web de l'ACITN. Nous privilégions les articles qui portent sur de nouvelles données cliniques ou qui traitent de sujets présentant un intérêt particulier pour les infirmières et infirmiers et les technologues en néphrologie. Envoyez votre article par courriel à Jovina Bachynski, au CANNT.journal1@gmail.com. Incluez une lettre d'accompagnement avec les coordonnées de l'auteur(e) principal(e) et une notice bibliographique d'une phrase (titres de compétence, titre et lieu du poste actuel) pour chaque auteur. Le journal de l'ACITN paraît quatre fois par année sur support électronique. La revue est une publication soumise à l'examen d'un comité de lecture. Seuls les articles originaux, révisés par les pairs, sont acceptés. La revue offre des possibilités d'annonces publicitaires et de commandites privées à visée éducative.

COMMUNICATIONS

Vous êtes nombreux à penser que le remaniement d'un site Web est une tâche coûteuse, chronophage et fastidieuse. La mise à jour de notre site Web a été perçue comme une priorité pour nos membres, et ce, pour une foule de raisons. Avant d'en faire une priorité, le comité de direction a tenu compte des indicateurs clés suivants, qui ont motivé la décision d'aller de l'avant avec le remaniement :

- Importance d'améliorer l'expérience des membres, pour mieux répondre à leurs besoins
- Priorité accordée à la création d'une plateforme plus actuelle et visuellement plus attrayante
- Remaniement du site Web pour le rendre plus réactif et plus convivial, notamment en permettant aux membres de passer facilement d'un dispositif à un autre, une fonctionnalité appréciée par de plus en plus de personnes

- Présentation de l'information sur l'ACITN d'une manière claire et concise à nos membres.

Le remaniement de notre site Web rendra mieux compte de notre évolution et notre site continuera d'évoluer avec nous.

Nous continuons d'élaborer de nouvelles stratégies pour promouvoir l'engagement de nos membres et pour leur communiquer des renseignements pertinents en temps opportun. CANNT Connection est un bulletin bimestriel envoyé par courriel pour fournir à nos membres des renseignements clés stratégiques, ciblés, personnalisés, et bien segmentés. Nous tâchons également de faire en sorte que le contenu soit simple, direct, concis et utile, de façon à fidéliser les lecteurs.

Si vous avez une question, une idée ou un événement à promouvoir, veuillez communiquer avec notre directrice des communications, Michelle Trask.



Site Web de l'ACITN :
www.CANNT.ca

Twitter : CANNT (@CANNT1) |
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CONGRÈS ANNUEL

Le thème de l'édition 2018 du congrès annuel de l'ACITN est le suivant : « notre passé guidera notre avenir ». Le comité organisateur de la conférence travaille très fort pour élaborer un programme novateur et palpitant en vue du 50e anniversaire et pour répondre aux besoins des professionnels de la néphrologie, des plus novices aux plus aguerris. J'espère avoir le plaisir de vous rencontrer à Québec, du 25 au 27 octobre 2018.

FINANCES

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 continuons d'explorer des occasions de développement, de collaboration et de financement pour maintenir la viabilité de notre association. La transparence améliore la cohérence et la cohésion de notre organisme, et nos membres auront bientôt accès au rapport annuel de 2018 de l'Association sur le site Web de l'ACITN (<http://www.cannt.ca/fr/about/index.html>).



Janice MacKay
Présidente élue de
l'ACITN 2016-2018

THANK YOU TO OUR SPONSORS!

PLATINUM



SILVER



BRONZE



The evolution of CANNT: Updated 1968–2008

By Faye Clark, RN, BN, CNeph(C)

This article was first published in the CANNT Journal (2000), 10(4), 23–37. It was reprinted in the CANNT Journal (2008), 18(3), 85–88.

ABSTRACT

In 2000, plans for a new logo for the Canadian Association of Nephrology Nurses and Technologists (CANNT) took us into the millennium, and it seemed like the opportune time to reflect on the evolution of our organization. In 2008, celebrations for the 40th anniversary of CANNT give us another opportunity to update our history. As in 2000, most of this history has been gathered from CANNT presidents' and journal editors' letters. The loyalty and dedication of these individuals has been remarkable.

CANNT has grown from an organization that focused on hemodialysis in the 1970s to one that encompasses all the areas in nephrology: pre-dialysis, hemodialysis, peritoneal dialysis, transplantation and palliative care. Educational opportunities and partnerships with other professional organizations have helped CANNT become a professional organization itself, with outstanding opportunities for its membership.

Over the years, many medical, technological, social, and economic changes have guided our practice in nephrology. CANNT, too, has grown to reflect the current nephrology climate. Nevertheless, the goal of CANNT has not changed:

To facilitate the highest quality of care to individuals with renal disease through dissemination of information to health care providers.

In this article, CANNT activities from 1968 to the present will be discussed.

I have worked in nephrology for almost 30 years and have had the opportunity to witness CANNT's evolution. I recently had the opportunity to serve on CANNT's board of directors as secretary/treasurer for two years, followed by a term as CANNT president and realized what a privilege it was to be part of such a dedicated group. When we entered the new millennium, I took the opportunity to review CANNT's past and consider some challenges for the future (Clark, 2000). In 2008, with CANNT celebrating its 40th anniversary, I would again like to update CANNT's history.

Fortunately, I'm a bit of a packrat and was able to search through many old newsletters dating as far back as 1985 to obtain a lot of the information.

In the beginning there was the Canadian Society of Extracorporeal Circulation Technicians (CANSECT). In 1968, Fran Boutilier, a hemodialysis nurse from Halifax, Nova Scotia, became the first president of CANSECT. Since extracorporeal circulation was the focus with hemodialysis, dialysis practitioners joined with heart-lung perfusionists and formed this group (Beanlands, 1990).

1970s

Hemodialysis was the treatment of choice for patients with end stage renal disease (ESRD), and had been since around 1958. Practitioners were anxious to learn all they could about this technology.

- 1975—The heart-lung perfusionists and dialysis practitioners grew in their own fields and separated. Our group took a new name, the Canadian Society of Perfusionists (CSP). (Beanlands, 1990).
- 1977—The name changed to the Canadian Society of Dialysis Perfusionists (CSDP) to reflect the membership in the organization.

The focus of this decade remained on hemodialysis. Nephrology nurses and technicians continued to learn technical and practical skills related to this specialty. Kidney transplantation and peritoneal dialysis, however, were beginning to become acceptable treatment options for patients with ESRD.

Although kidney transplants were performed as early as 1954 between identical twins, it was not until the late 1960s that transplantation was considered an acceptable treatment for patients with ESRD. Preventing rejection with anti-rejection medication was then (and still is) a major challenge (Beanlands, 1990).

Peritoneal dialysis was performed as early as 1923 as an abdominal lavage. In 1959, the first catheter was placed in the abdomen and dialysis was performed. Around 1975, continuous ambulatory peritoneal dialysis (CAPD) was used mainly as a temporary treatment for patients waiting for hemodialysis or a transplant. In 1977, CAPD became a viable, efficient and cost-effective form of treatment because of improvements in technique (Beanlands, 1990).

1980s

Treatment options for ESRD were expanding and the roles of nephrology nurses were becoming diversified as they gained experience in peritoneal dialysis and kidney transplantation as well as hemodialysis.

- 1984—The association changed its name to the Canadian Association of Nephrology Nurses and Technicians (CANNT) to be more reflective of the evolving specialties. Pre-dialysis education programs were starting (Gill, 1995).
- 1985—Liaisons with nephrology groups in the United States and Europe (the American Nephrology Nurses Association—ANNA and the European Dialysis and Transplant Nurses Association—EDTNA) were developed and representatives from CANNT were sent to their symposia (Peroff, 1985). CANNT standards for clinical practice were completed and a study guide was developed

- (Peroff, 1985). Symposium guidelines were prepared (Peroff, 1985). The Dialtec (the CANNT Journal at the time) was circulated with The Renal Family magazine (Peroff, 1985). The Fran Boutilier Bursary was introduced (Peroff, 1985) for a nurse pursuing education at the bachelor level. CANNT's Goals and Objectives were developed.
- 1986—The CANNT newsletter was now a journal and French translation was provided in the journal (Larivière, 1986).
 - 1987—Bruce Pappin became managing editor of the CANNT Journal (Larivière, 1987). A questionnaire was sent out to technicians at the time, around the changes in their scope of practice. The results indicated that the technicians preferred the name technologist to be more reflective of their practice (Calvin, 1987).
 - 1988—The Canadian Nurses Association (CNA) started certification of specialty groups and CANNT became an associate member of CNA. Meetings with members of the corporations involved with nephrology began and a corporate relationship developed. CANNT has representation on the Allied Health Council of the Kidney Foundation of Canada (Larivière, 1988). The final version of the technical standards was developed (Burns, 1989).

The focus of this decade was on CANNT's activities to evolve as a professional organization. Partnerships and liaisons with other groups with similar interests gave the membership the opportunity to collaborate with others, to

educate, update and share in common goals. CNA involvement to facilitate certification exam writing remained a high priority.

1990s

The technology of hemodialysis was expanding. High flux and high efficiency dialyzers, double blood pumps and liquid bicarbonate helped improve dialysis and urea kinetics helped determine dialysis treatment efficiency (Larivière, 1988). Patient numbers were increasing and resources were decreasing. Expensive therapies, such as erythropoetin had been developed for anemia control and improved quality of life. Practitioners were expected to do more for less (Beanlands, 1990).

- 1990—The journal was listed in the Cumulative Index to Nursing and Allied Health Literature (CINAHL) (Brownrigg, 1991).
- 1991—The first management company, Harold Taylor Enterprises, was hired to handle CANNT business, such as budget planning, negotiating rates for symposia, maintaining and encouraging memberships and providing the necessary stability for members by having the same phone number and address (Watson, 1991). A manuscript review panel was developed by the journal (MacNeil, 1991). A technical bursary was available (MacNeil, 1991). Awards were given for papers presented at national symposia for the first time (MacNeil, 1991).



The four presidents at CANNT's 30th Anniversary Symposium, London, Ontario, 1998. Valerie Price, then President of CANNT, Frances Boutilier, CANNT's first president, Patricia Weiskittel, then president-elect of ANNA, Julie Hartley-Jones, immediate past-president of EDTNA/ERCA.

- 1993—The Canadian Nurse's Association offered the first certification exam in nephrology nursing. Ninety-seven applicants wrote the exam and six received certification by exemption (Joyce, 1993). Exams in nephrology had not been offered since around 1985 when a voluntary oral and written exam was provided (MacNeil, 1991). The nephrology certification exam afforded nursing members the opportunity again to test their knowledge in their chosen field. The first international workshop was held in Halifax, Nova Scotia (Dekker, 1993). Government relations' activity by CANNT representatives was beginning in various parts of the country around health care issues (Joyce, 1993). One example was the Ontario Working Group on Renal Services.
- 1994—A representative from CANNT was involved with the World Council of Renal Care (WCRC) (Brownrigg, 1994).
- 1996—CANNT changed its name to Canadian Association of Nephrology Nurses and Technologists in keeping with the expanding roles of technicians and technologists in their scope of practice. Social workers and dietitians were encouraged to join the CANNT national conferences (Evans, 1996). Ortho Biotech agreed to devote five years to a national education program (Evans, 1996). Two journal awards were offered to encourage more members to publish manuscripts (Dekker, 1996).
- 1997—Special Interest Groups were in the early stages of development (Amos, 1997). The journal had two editors working together for the first time (Dekker, 1997). The journal was accepted by CNA to grant continuing education credits (Turpin, 1997). A CANNT strategic plan was developed (Price, 1998). Excellence in Practice awards were introduced (Price, 1998).
- 1998—WCRC encouraged CANNT involvement in international development projects (Starzomski, 1998).
- 1999—The journal was accepted by the International Nursing Index and was listed on MEDLINE (Brunier, 1999). The Nephrology Nursing Certification Exam Prep Guide, sponsored by Janssen-Ortho and developed by CNA with CANNT, was made available to assist nurses with the certification exam (Amos, 1999). Our current CANNT administrator, Debbie Maure, was hired with the national office now located in Barrie, Ontario (Clark, 1999).

The focus of the decade was on education. With certification now a reality, it has been an ongoing challenge for nurses to acquire the necessary continuing education credits to apply for re-certification. Journal continuing education articles, regional supper clubs and symposia were the most economical venues to acquire the necessary credits. National symposia are still of tremendous value to the membership.

2000s

CANNT has continued to grow and prosper in this current decade, and I am proud to be a part of a professional organization that offers so much to its membership.

The focus of the decade has been on communication.

- 2000—Amos (2000) highlighted the upcoming CANNT activities. With CANNT members working for corporations, the potential for representation on the board by these members had become a reality. Concerns around conflict of interest were researched. The CANNT website became a reality with Scott Reid as our Webmaster (MacLeod, 2003). Special Interest Groups held round table forums at the annual symposium to give members a chance to meet and discuss issues common in their practices (Amos, 2000).
- 2001—Gillian Brunier changed her role from Co-editor of the CANNT Journal to Editor with an editorial board now appointed to assist her with the journal (Brunier, 2001).
- 2002—The International Society of Peritoneal Dialysis (ISPD) donated funds to CANNT to be used for education of CANNT members. It was decided that four bursaries would be awarded to members to fund the CNA Nephrology Certification Exam. The Nursing Standards were revised (Boughen, 2002).
- 2003—Technology members wrote the first Technical Certification Examination in Vancouver (Gajaria, 2003). Leadership training workshops were held at the 2003 conference (Dunn, 2004). The impact of SARS was felt by many nephrology nurses in Ontario hospitals (Ballantine, 2003).
- 2004—Unit liaisons were starting to be recruited to help promote CANNT and encourage membership. The goal was to try and have a liaison in every unit in Canada. The website was restructured with Guided Vision as the Webmaster. Ortho Biotech provided the funding for the upgrade. The CANNT Journal is now included in the EBSCO Publications Database. Fresenius Medical Care has committed regular funding to the CANNT Bursary and Awards Programs (Dunn, 2004). Heather Reid of Innovative Conferences & Communications received a three-year contract as the conference planner for the annual symposia (Saumure, 2006).
- 2005—Synopsis of the CANNT Strategic Plan was posted on the website so membership could be aware of the business of CANNT. The CANNT Boutique provided the members the opportunity to purchase merchandise online (Saumure, 2005). Debbie Maure from the CANNT office started sending out regular e-mails to members notifying them of CANNT activities and deadlines (Maure, 2006).
- 2006—First journal supplement, the Clinical Educator Network's Recommendation for the Management of Vascular Access in Hemodialysis Patients, was included with the regular mailing of the journal (Brunier, 2006). The CANNT website advertised the launching of the first World Kidney Day in March (Pritchard, 2006). Technical Standards were updated (Clark, 2006).
- 2007—Refined Clinical Practice Groups were established. The Renal Educators Network joined forces with CANNT to enhance its membership. The Canadian Hemodialysis Access Coordinators (CHAC) is an independent group, but is affiliated with CANNT. More partnerships are anticipated (Harwood, 2008). The first Nephrology Health Care Professionals Day was celebrated on September 19 (Harwood, 2007).

- 2008—Marsha Wood is coordinating the revision of the Nursing Standards of Practice. A Strategic Planning Process is in place and the new plan should be ready in the fall. A revised CNA Study Guide should be available to members later this year. CANNT will celebrate its 40-year anniversary in Quebec in October (Harwood, 2008).

IN CLOSING

Our membership has grown from 483 members in 2000 to more than 1,000 in 2008 (personal communication, Maure, July, 2008). Since 2003, there are usually 650 to 700 delegates at each of our annual Symposia. With the increasing numbers in membership and symposium attendees,

communication is enhanced and the merits of CANNT can be shared with many more of our nephrology colleagues. As we approach the end of this decade and look forward to the next, let us continue to celebrate the success of CANNT and its members. Be part of the evolution!

ABOUT THE AUTHOR

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The Evolution of CANNT: Updated 2008–2018

Addendum written by Jovina Bachynski, MN, RN(EC), CNeph(C)

2008–2018

Upholding the historical vision of CANNT as the keystone of excellence in nephrology nursing and technological care in Canada through education, research, and communication, the CANNT Board of Directors has consistently and passionately sought to optimize the following goals:

- Increasing membership
- Sustaining the viability of the association
- Communication
- Education
- Professional practice
- Research
- Partnership
- *CANNT Journal* (Muir, 2013a; Prettie, 2015; Thomas, 2009a; Wile, 2014).

MEMBERSHIP

CANNT has borne witness to many changes and accomplishments in the past decade (2008–2018) that speak to the tenacity of the association and its members; yet, there have been challenges as well, particularly as it pertains to increasing its membership. Membership, however, has dwindled since the record membership year in 2008.

VIABILITY OF ASSOCIATION

In addition, there has been an air of sobering caution as the Board of Directors has sought to find ways to ensure the fiscal viability of the association, despite its good financial standing, as a means to keep up with the economic realities. Such measures have included:

- Decision not to send a Board representative to the ANNA and EDTNA conferences in 2009, and for Board members to share accommodations at symposia (Thomas, 2009b);
- Utilizing teleconferences versus face-to-face meetings, and holding elections online (e.g., CANNT held its first online election in 2010) (Baker, 2010);
- No French translation at a conference unless it is held at French-speaking provinces (e.g., Quebec) (Luscombe, 2011);
- Instituting a new symposium schedule in response to attendee feedback, i.e., three full days of conference activities including pre-symposium workshops from Thursday to Saturday (thus, freeing up Sunday) (Luscombe, 2011);

- Transition from print to online e-journal publication (Wile, 2013a), e.g., the January-March 2013 issue of the *CANNT Journal* was the last mass print copy of the journal (Muir, 2013b); and
- Reduction of hours at the CANNT National Office (Innovative Conferences & Communications) (Prettie, 2015).

COMMUNICATION

The CANNT Board of Directors continues to develop strategies to engage and communicate timely and relevant information to the membership. The *CANNT Connection* newsletter is the association's bi-monthly email that provides "strategic, targeted, personalized, and properly segmented information to our members" (MacKay, 2017a, p. 26). CANNT is active in different fora including Facebook, CANNT website (CANNT.ca), Twitter (@CANNT1), and plain networking. Of note, website has recently undergone an overhaul in 2018, as it did in 2008 (Baker, 2009a).

The Board of Directors has traditionally consisted of eight elected members: president-elect, president, past president, vice-president (VP) Western, VP Ontario, VP technical, and website coordinator/treasurer (MacKay, 2017). A motion proposing to change the president-elect position to the dual role of president-elect/treasurer and the website coordinator/treasurer to director of communications was tabled at the Annual General Meeting (AGM) in Vancouver in October 2015 (Prettie, 2015). These changes came into effect in 2016 with the director of communications tasked with maintaining external communications on CANNT's behalf (Dean, 2016; MacKay, 2017). The inaugural Director of Communications, Michelle Trask, has been instrumental in keeping the channels of communication

CANNT Membership

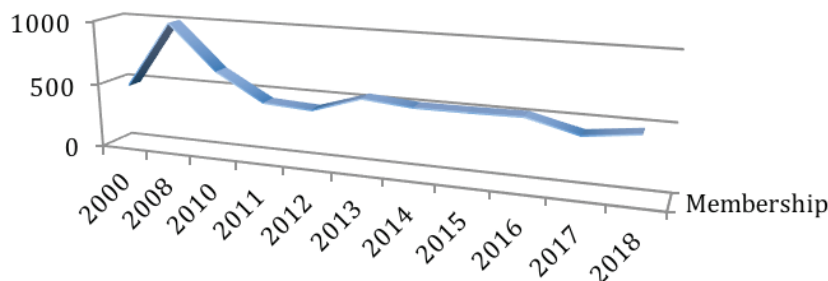


Fig. 1

(Baker, 2010a; Clarke, 2008; Dean, 2016; Luscombe, 2011b; MacKay, 2017b; MacKay, 2018; Muir, 2013c; Prettie, 2015; Quinan, 2012b; Wile, 2014)

lively and engaging in social and website media, ensuring that the association keeps up with the times.

EDUCATION

The pioneers of the associations that ultimately became known as CANNT were very interested in and concerned with professional education and standards of care (F. Boutilier, personal communication, December 1, 2017). CANNT has had the fortune of parlaying the monumental efforts of dedicated individuals into the *Nephrology Nursing Standards and Practice Recommendations* in 2006 (written by Marsha Wood and a team of nephrology experts), the *Standards of Nephrology Technical Practice* in 2006 (written by an *ad hoc* committee consisting of technologists and advisors), and the *Nursing Recommendations for the Management of Vascular Access in Adult Hemodialysis Patients (2015 Update)* (developed by the Canadian Educators Network [CEN] in 2006 and updated by CEN and the Canadian Hemodialysis Access Coordinators [CHAC] Network in 2015). The *Nursing* and *Technical* standards were updated in 2013 and 2014, respectively. The *Vascular Access* guideline is due for review by 2020.

PARTNERSHIP

The inception of CANNT was based on the premise of collaboration as it sought to establish its definitive identity as the voice of excellence in nephrology nursing and technological care. CANNT signed a collaborative agreement with the European Dialysis and Transplant Nurses Association/European Renal Care Association (EDTNA/ERCA) in 2009 (Baker, 2010b). CANNT also signed a formalized agreement with the American Nephrology Nurses Association (ANNA) in 2011 (Luscombe, 2011a). CANNT has most recently signed a reciprocal agreement with the Renal Society of Australasia (RSA). Such collaboration has allowed for the reciprocity of ideas for best practice in nephrology care, and general goodwill and ambassadorship amongst the respective representatives of each association.

At the AGM in St. Johns in October 2013, CANNT members voted to approve the requisite documents and revised by-laws for compliance with the Canadian Not-for-Profit Corporations Act with the motion to file with Industry Canada being passed. This monumental initiative was spearheaded by Marsha Wood, Linda Ballantine, and Patty Quinan (Wile, 2013c).

CANNT is a not-for-profit organization that depends on corporate sponsorship as adjunct to membership fees as a means of maintaining important initiatives (Thomas, 2009b). One such initiative is the provision of awards and bursaries. Through sponsorship from Fresenius, CANNT awards educational and research bursaries yearly. CANNT has partnered with Amgen Canada to provide new awards and bursaries through educational grants. Amgen Canada has generously extended financial support through nursing research project grants for novice and experienced researchers, nephrology preceptorship/mentorship grants (nurse practitioner, vascular access, or nursing outreach), nephrology technological practice grant, and allied health professionals grant (Baker, 2009b).

PROFESSIONAL PRACTICE, RESEARCH, AND CANNT JOURNAL

There have been changes at the helm of the *CANNT Journal*. In 2012, Gillian Brunier retired from the editorship of the journal after 14 years of service. From 2012-2015, co-editors Alison Thomas and Jan Baker steered the journal and saw through the transition of print to online publication. The editorial torch was passed to co-editors Matt Phillips and Jovina Bachynski in 2015. After Matt Phillips' departure in December 2016, Jovina Bachynski has remained the editor of *CANNT Journal*. In 2018, the CANNT Board of Directors made a calculated decision to approve limited open access to publication. Under this arrangement, a manuscript under consideration for publication in the *CANNT Journal* undergoes the usual

rigorous peer review process. However, the author may elect to pay a fee to grant online access to the published material for the general public, which will ensure that access to the author's work will not be restricted to just CANNT members.

At the CANNT conference in Ottawa in 2000, co-editors Gillian Brunier and Colleen Turpin formed the first *CANNT Journal* Editorial Board who generously donated their time and expertise to the various columns in the journal such as *Bedside Matters* and *Practice Corner* (Brunier, 2012). The Editorial Board was officially removed from service to the *CANNT Journal* in 2016, as it had not been utilized according to its purpose.

Although the *CANNT Journal* has undergone changes in editorship, it has continuously been published by Pappin Communications since its inception in 1987 with support from the CANNT National Office, which has also undergone changes in personnel. Debbie Maure held the administrative assistant role to CANNT since 1999 and resigned in 2012 (Quinan, 2012a). Heather Reid and her team from Innovative Conference & Communications took over as the new office managers for CANNT in 2013 (Muir, 2013b). Subsequent to this, Events Management Plus under Pam Lyons assumed the helm as CANNT's office managers in 2017.

CANNT Journal is a peer-reviewed publication that is acclaimed as a premier source of information related to nursing and technological professional practice and research for clinicians at both the national and international levels. The *CANNT Journal* is in an eternal quest for manuscripts that present new clinical information or address issues of special interest to the CANNT audience at large such as: original research papers, relevant clinical articles, narratives that describe nursing experience, interdisciplinary practice questions and answers, or reviews of current articles or books (Bachynski, 2017). The *CANNT Journal* continues to be published electronically four times yearly.

IN CLOSING

As of August 2018, there are 469 CANNT members. Membership is the *sine qua non* of any organization, and CANNT is no exception. CANNT is an organization that is run *by* members for its members. The CANNT Board of Directors is always painstakingly

hard at work in increasing the CANNT membership. Alongside the Board, it would behoove all CANNT members to galvanize the nephrology nursing and technological community at large across the country to join the organization, thus ensuring that CANNT thrives for the next 50 years and beyond.

ABOUT THE AUTHOR

Jovina Bachynski, MN, RN(EC), CNeph(C) is a nurse practitioner in the hemodialysis unit at Halton Healthcare, Oakville, ON. She is the current editor of the CANNT Journal.

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My Reflection on CANNT at 50 Years

By Frances Boutilier

The 21st Century—year 2018 and 50 years since the first meeting in Halifax! How far we have come since that time in the care of nephrology clients and their families! Many thoughts and images come to mind as I recall my involvement over the years.

So, a short history lesson! In 1968, the Government of Canada granted Letters Patent for the Canadian Society of Extracorporeal Technicians (CANSECT). The Society was incorporated as a bilingual association, acknowledging French and English as our national languages. In these early days, the Society encompassed both heart-lung and dialysis technology—hence “perfusionists”! Both disciplines were always interested in and concerned with professional development/education and standards of patient care.

Over the next few years, the difference between the two disciplines—heart-lung (short-term, OR-based) and dialysis (long-term, nursing/technical, multicare)—became apparent. In 1975, heart-lung members chose to align with the Canadian Cardiovascular Association. We, in dialysis, chose to retain the charter and reform the Society to reflect the

professional needs for our members and standards of care for nephrology clients and their families. It was an exciting and challenging time, as a small group of dialysis nurses and technicians came together to form a viable organization. Over the next 10-12 years, the association worked hard developing a constitution, by-laws, standards of care practice, educational bursaries and, in conjunction with the Canadian Nurses Association, the certification program, at the same time, keeping abreast of the changes and advances in nephrology care. In 1996, the association name changed to the Canadian Association of Nephrology Nurses and Technologists (CANNT) to reflect the changing and complex role of technology in dialysis and transplantation.

The journey continues! We can look with pride to our association. I believe that CANNT has responded to these advances with its continuing focus on its original vision—quality standards of patient care and opportunities for nursing/technologist professional development.

I am so proud to be a part of CANNT! I look forward to joining you in Quebec City for CANNT’s 50th Anniversary!

ABOUT THE AUTHOR



Fran Boutilier retired from health-care in 1994, and began her studies at the Atlantic School of Theology, from which she graduated with her Masters of Divinity in 1997. In 1997, Fran was ordained a deacon in the Anglican Church of Canada; in 1998, she was ordained priest. She served in a rural parish in Prince Edward Island and then in team ministry with a colleague in Pictou County, Nova Scotia, serving six churches. She retired

from full-time ministry in 2006, but continues to serve her church at the Diocesan level and as Assistant Priest, Parish of Bridgewater, Nova Scotia, with a primary focus on pastoral ministry.

Fran was involved with the Canadian Society of Extracorporeal Circulation Technicians (CANSECT), Canadian Society of Perfusionists (CSP)/Canadian Society of Dialysis Perfusionists (CSDP), and CANNT Board of Directors from 1968 to 1984: CSP President 1976-1981 and Chair, Board of Directors 1981-1984. She chaired four CANNT symposia in Halifax, and was recognized for her years of service by having a CANNT bursary established in her name in 1984 (Frances Boutilier Bursary). Fran was made a Lifetime Member of CANNT.)

Fran was also a founding member and is a Lifetime Director of the Nova Scotia Kidney Foundation.

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Ma réflexion sur l'ACITN après 50 ans

Par Frances Boutilier

Le 21^e siècle... l'année 2018... 50 ans depuis la première conférence à Halifax! Tant de chemin parcouru. Les soins dispensés aux clients en néphrologie et à leur famille ont bien changé depuis lors. De nombreuses images et pensées se bousculent dans mon esprit quand je repense à mon engagement au fil des années.

Petite leçon d'histoire : en 1968, le gouvernement du Canada émettait les lettres patentes d'incorporation de la Canadian Society of Extracorporeal Circulation Technicians (CANSECT, société canadienne des techniciens et techniciennes en circulation extracorporelle), une association bilingue qui reconnaissait le français et l'anglais comme langues nationales. À ses débuts, la Société regroupait le personnel infirmier agréé en perfusion cardiopulmonaire et en dialyse, d'où le terme « perfusionnistes »! La formation, le perfectionnement professionnel et l'excellence dans les soins prodigués aux patients ont toujours été au cœur des préoccupations des tenants de ces deux disciplines.

Dans les années qui ont suivi, la différence entre les deux disciplines, la perfusion cardiopulmonaire (essentiellement pratiquée au bloc opératoire et de courte durée) d'une part et la dialyse (multisoins de longue durée administrés par le personnel infirmier/technologues) d'autre part, a commencé à se creuser. En 1975, les membres agréés en perfusion cardiopulmonaire ont décidé de rejoindre l'Association canadienne de cardiologie. Quant à nous, œuvrant en dialyse, nous avons choisi de rester fidèles à la Charte et de remanier la Société pour rendre compte des besoins

professionnels de nos membres, tout en souscrivant au principe de l'excellence des soins pour les clients en néphrologie et leur famille. Ce fut une période à la fois exaltante et difficile. Imaginez un petit groupe d'infirmières et infirmiers et de techniciennes et techniciens en dialyse qui s'organisent pour former une association viable. Au cours des 10 à 12 années qui ont suivi, l'Association s'est employée à élaborer une constitution, des règlements administratifs, des normes de diligence dans l'exécution des soins, des bourses d'études et, en collaboration avec l'Association des infirmières et infirmiers du Canada, un programme d'agrément, tout en se tenant au fait des progrès et des changements dans le domaine des soins en néphrologie. En 1996, l'Association a changé de nom pour devenir l'Association canadienne des infirmières et infirmiers et des technologues de néphrologie (ACITN) et rendre ainsi compte du rôle complexe et changeant du technologue en dialyse et en transplantation.

L'aventure continue! Nous pouvons être fiers de notre association. L'ACITN a en effet su s'adapter aux progrès réalisés au fil du temps, tout en restant fidèle à sa vision d'origine : prodiguer des soins de qualité aux patients, tout en offrant des occasions de perfectionnement professionnel au personnel infirmier et aux technologues.

Je suis tellement fière de faire partie de l'ACITN! J'ai hâte de me joindre à vous à Québec pour célébrer le 50^e anniversaire de l'Association!



AU SUJET DE L'AUTEURE

Frances Boutilier est retraitée du secteur des soins de santé depuis 1994. Elle a entrepris des études à la faculté de théologie de l'Atlantique (Atlantic School of Theology) et obtenu une maîtrise en divinité en 1997. La même année, elle a été ordonnée diacre au sein de l'Église anglicane du Canada; en 1998, elle a été ordonnée prêtre. Elle a officié dans une paroisse rurale de l'Île-du-Prince-Édouard avant d'exercer son ministère conjointement avec un confrère dans le comté de Pictou, en Nouvelle-Écosse, où elle servait dans six églises. Elle a cessé d'exercer son ministère à temps plein en 2006, mais continue d'officier dans son église, à l'échelon diocésain, à titre de vicaire, dans la paroisse de Bridgewater en Nouvelle-Écosse, où elle exerce principalement des fonctions pastorales.

Mme Boutilier a fait partie de la Canadian Society of Extracorporeal Circulation Technicians (CANSECT), de la Société canadienne des perfusionnistes (SCP)/Société canadienne des perfusionnistes en dialyse (SCPD) et du comité de direction de l'ACITN de 1968 à 1984, à titre de présidente de la SCP de 1976 à 1981 et de présidente du comité de direction de 1981 à 1984. Elle a présidé quatre conférences de l'ACITN à Halifax et ses états de service ont été salués par la création, en 1984, d'une bourse de l'ACITN qui porte son nom, la bourse Frances Boutilier. Mme Boutilier a été nommée membre à vie de l'ACITN.

Elle est également membre fondatrice et directrice à vie de la fondation du rein de la Nouvelle Écosse (Nova Scotia Kidney Foundation).

The History of Dialysis Technology in the CANNT Era

By Clarence Graansma, CET

CANNT is turning 50. The name of our organization has changed a few times in that span, and our membership numbers and influence in the Canadian dialysis community has grown considerably, as well. Over the years, the roles of the nurses and technologists have evolved and changed with the improvements in technology. Some of us who have been working in dialysis for a long time look back fondly (perhaps through rose-coloured glasses) at the early years when things seemed simpler, but we can all agree that the changes and improvements in dialysis technology have made a great improvement to the lives of our patients.

I have been in dialysis since the late '80s. I can relate from personal experience only from then on. When I first started in dialysis, I was very interested in the technology, and spoke to a lot of nurses, technologists and home dialysis patients about the older machines and what they did before. A lot of what is in my account below comes from the collective experience of the nurses, technologists, and home dialysis patients.

We often call the people who work on dialysis equipment “techs”, a term that encompasses both technicians and technologists. In the early days of dialysis, techs came from many other fields such as engineering, electronics, biomedical, and other service disciplines. When programs were small, techs often did almost anything related to dialysis machines and water treatment such as setting up machines, repairing machines, and even running machines with patients on. Many programs now have technicians who set up supplies and machines for treatment, and may reprocess dialyzers. Technologists look after quality assurance testing, and the maintenance and repair of the water treatment systems and dialysis machines. Technologists may delegate

some defined testing and maintenance tasks to qualified technicians.

Most programs now require that technologists have a diploma in biomedical engineering technology or, at minimum, a diploma in electronics or a related field. Additional training and certification may be provided by equipment manufacturers or the hospital. Technologists may be certified by groups such as Ontario Association of Certified Engineering Technicians and Technologists (OACETT), Canadian Medical and Biological Engineering Society (CMBES) and, previously, CANNT (CANNT does not certify renal technologists at this time). Technicians generally do not require post-secondary diplomas or degrees, and may be trained by their facilities or they may obtain a certificate of training from part-time programs offered by community colleges.

THE EARLY DAYS—LATE '60s AND '70s

Although dialysis was already being performed in Toronto General Hospital for 10 years, by 1968 dialysis was just becoming established as a mainstream medical treatment. It had progressed from its infancy of being first experimental, then to a short-term stopgap and, finally, to a chronic treatment that could keep people alive for years. It was available in fewer places than it is today. If someone needed dialysis, sometimes they had to move to a place where it was available. Also, the total number of patients on dialysis was small by today's standards.

Early dialysis machines used a much simpler technology. Acetate concentrates were common. The means of supplying dialysate were either batch systems or simple proportioning systems. Batch systems required the operator to measure and add the proper amount of electrolyte constituents with a measured volume of water,

perform a mixing operation and then measure the conductivity with a separate meter to verify the proper mix. Proportioning systems had valves and pistons that could stick and quit during the treatment. Sometimes the operator had to hit the mechanism with something to get it going again.

Instrumentation and monitoring systems were more mechanical and less electronic. For example, a venous pressure monitor could be a mechanical pressure gauge with two pointers for low- and high-pressure alarms that the needle part would touch to close a switch, and activate a buzzer and a light bulb with a relay to cut out the blood pump. These mechanical systems were less reliable than current monitors, and there would always be a procedure to manually test and validate every alarm before each treatment. These early monitoring systems were rudimentary compared to today, and nurses needed to watch the treatment more closely. Early air detector systems could be more easily rendered ineffective by clots or foam in the chamber, and visual monitoring of the dialysis outflow was important to verify that there was no blood leak in the dialyzer.

Fluid management was more of an art than a science. In theory, you could calculate your fluid removal rate from the K_{UF} of the dialyzer, the venous pressure, and the dialysate pressure, but if the machine you were using did not have good positive and negative dialysate pressure control, it would be difficult to control the fluid removed. The coefficient of ultrafiltration (K_{UF}) is the amount of fluid in millilitres (mL) that crosses the dialyzer membrane each hour (Q_{UF}) for every millimetre of mercury (mmHg) of transmembrane pressure (TMP). $K_{UF} = Q_{UF} / \text{TMP}$. Although this number is published by the dialyzer manufacturers as if it were a constant value, it may vary over a range of filtration rates.

If you needed more fluid removal, you could put a partial clamp on the venous return line to raise the venous pressure, and if you wanted less fluid removal, you could turn down the blood pump rate to reduce the venous pressure or use a different dialyzer. I have even heard of stories where an extension hose on the drain line would be put to a lower drain to get the increased negative pressure on the dialysate that the siphon would create. Patients often had to have extended treatment times just to get the fluid off. In any event, it meant frequent weighing of patients during the run or the use of a chair or bed with a built-in scale if the patient could not stand for weighing.

Water treatment varied a lot from one dialysis centre to another. The design of the system depended on the source of the water. It could be as simple as filters, some carbon, and a softener. Deionization could be used as well. Reverse osmosis (RO) systems were rare at first. Looped distribution and continuous treatment were not universal. Bacteria and endotoxin levels in the water were often much higher than we see today, but because of the low flux dialyzers in use at the time it was not thought to be of great concern. There were no formal water standards at this time; programs relied on the results of studies into the effects of bacteria and endotoxins done in the 70s to guide their individual water treatment approaches.

Home dialysis was actually more common in the early days. With the very long treatment times and tedious set-up and test procedures, it made sense to train the patient to do it at home. Average patient age also tended to be younger than today. Some patients had to build up and test their own Kiil dialyzers for each treatment. Many patients became very good at repairing and adjusting their own machines.

Many types of dialyzers were used in this time. Kiil and coil dialyzers were still in use, and disposable parallel plate and hollow fibre dialyzers were common.

Vascular access types were also more varied with shunts still being used. Arteriovenous fistulas were

being introduced and used ever more widely during the '70s. Bovine and PTFE grafts were introduced. Catheters were used as well. Catheters, however, were termed as "temporary" access and did not perform as well or last as long as today's versions.

Peritoneal dialysis (PD) was just getting started during this time, mainly due to improvements in catheter design and solutions in plastic bags replacing glass. The switch from glass to plastic containers happened sooner in Canada than the United States. The PD cyclers of that time functioned quite well despite the technological limitations. All that was required for these cyclers to work was a weigh scale, a heater, some pinch valves, and a timing circuit. Canada was a world leader in advancing PD therapy and technology. Because the spots available for hemodialysis were limited, some patients were started on PD, and only switched to HD when a spot became available.

It was more difficult to assess adequacy in that time. One simple system was to just increase the frequency and length of dialysis if the patient did not feel well or their health deteriorated. But how often and how long were ideal? Since urea was an obvious and easy to measure marker, they used the time averaged concentration of BUN (TAC). Lower BUNs seemed to correspond to better survival, but it was not perfect because increased protein intake would also increase BUN, and lowering the protein intake to control BUN actually reduced survival. Other methods such as using the surface area of the dialyzer and time on dialysis to calculate adequacy were also used.

The roles of the technologists and nurses overlapped much more then than they do today. Machines had no internal diagnostics to help identify the source of problems. Alarms could be due to equipment failure or a clinical issue, and it was important to quickly and accurately identify the type of alarm. Nurses had to have a technical understanding of how the machines and alarm systems worked, and techs had to have an understanding of what was happening to the patient during the dialysis treatment.

Often, the limits of the fluid handling control and the pressures the machine could handle would be reached, and the tech and nurse would work together to make the best treatment plan for the patient.

THE '80s

In the '80s, caregivers and providers kept improving the quality of dialysis treatments. Improvements in dialysis technology to make it safer and more efficient increased the number of patients who could benefit from dialysis. This is probably the decade of the most dramatic changes in technology.

The use of electronics and integrated circuits allowed for more accurate control of the dialysis machine than older mechanical technologies. It was also much easier to monitor more functions of the machine and to give alarm limits bound not just by magnitude, but also the amount of time the level was exceeded. Towards the end of the '80s, microprocessors came into use for some machine functions. Digital microprocessor control allowed even finer control of settings and alarm limits than analog electronics. Systems were also now available that could manage vascular access with a single needle.

Machines using fixed proportioning technology also started using electronically monitored sensors to improve the reliability of the systems. Electronic servo feedback control was used on many machines to improve the accuracy of proportioning. Another benefit of this control method was that it allowed the operator to easily change the proportioning ratio so that different sodium concentrations could be obtained from one concentrate.

Fluid management improved dramatically during the '80s. Dialysate pumps producing negative pressure and pressure control valves in the dialysate path allowed for a much better range of TMP control. Early on, the most common issue was to try to get all the fluid off with the low K_{UF} dialyzers available then. Later on, when the TMP was monitored and controlled by a microprocessor-based system, the accuracy improved a lot. Once

machines were capable of this accurate fluid removal, manufacturers started making dialyzers with even greater K_{UF} . Higher K_{UF} dialyzers also tended to have better urea clearance numbers. The problem was how to maintain a fine enough control of a positive dialysate pressure that could adjust to changes of venous pressure and still maintain accurate fluid removal control.

It seemed like the development of TMP-controlled machines would soon be at a dead end. A new type of machine was now developed that was called “volumetric”. Volumetric machines accurately controlled the fluid volume going into and out of the dialyzer. If the two volumes were the same, then the patient would neither gain nor lose fluid during the treatment. If the outflow volume was slightly greater than the inflow volume, then the patient would lose a measured volume of fluid. With a volumetric machine, it did not matter what the K_{UF} of the dialyzer was, and so fluid removal accuracy was not affected even if K_{UF} changed a little during the treatment from clotting or organic material deposited on the dialyzer membrane surface. Three types of volumetric technology were available in Canada. One used a glass reservoir coil where the fluid going out of the coil was replaced by the fluid coming back from the dialyzer, and the coil was intermittently recharged with fresh dialysate. The second type used two balance chambers, each separated by a flexible diaphragm where the return dialysate pushed the fresh dialysate into the dialyzer. The third type had flow sensors on the inlet and outlet of the dialyzer, and a microprocessor would control pumps and flow valves to maintain the correct flows at all times.

The reservoir coil type machine had the advantage of having outgoing and incoming fluid occupying the same space, and as long as the valve timing was precise, the fluid inflow versus outflow balance would be very accurate. A separate pump was used to measure the removed fluid volume. If the operator was concerned about the accuracy of this pump, it could be

diverted to a graduated cylinder and monitored visually. Although these machines were classed as single pass because the dialysate only went once through the circuit, the fresh and used dialysate did occupy the same space and so good disinfection between treatments was essential. The glass components held up well to the heat and chemicals, but easily broke if the tech dropped a wrench on them. When properly maintained, these machines would be very accurate, but they were large, heavy, and required skilled techs to maintain them.

The balance chamber machines essentially had two smaller reservoirs with a flexible membrane separating inlet and outlet dialysate so that one could always be filled while the other was feeding the dialyzer. Because they were more or less continuous flow, the manufacturer could use a dialysate proportioning system very similar to what they had used in the TMP-controlled machines. Although they did not have the issue of fresh and used dialysate occupying the same space, that flexible diaphragm in the balance chamber was not as smooth as the glass and so organic material would tend to stick on the used dialysate side. Aggressive chemicals would be needed in the cleaning and disinfection cycles, and these would further degrade the membrane surface so that they would then accumulate even more organics. There was always a concern that erosion of the diaphragm surface by chemicals or failure due to the constant bending could make a hole in the diaphragm. Automated testing sequences were used to verify the diaphragm and fluid removal integrity. Eventually, improvements in the materials used would minimize this concern.

The flow control machines had a smaller and simpler flow path that could be more easily disinfected and had fewer valves and mechanical components. These machines did require more powerful microprocessor control systems, and sophisticated control and test algorithms. The flow meters still had mechanical parts that could wear a bit and cause a change to the measurement accuracy. Another issue was that

the sensors in the used dialysate path could accumulate organic material on them and change the accuracy. Small changes in the tolerance of components in the flow sensor caused by disinfection chemicals or heat could also affect the accuracy. These issues could be dealt with by periodically bypassing the dialyzer during the treatment so that it was certain that inflow equaled outflow, and then automatically recalibrating the sensors. Another concern was that a sensor might change its calibration significantly between each of these verification and calibration tests. This was dealt with by using redundant sensors that could be compared to each other continuously for verification. Eventually, improvements in the materials and designs would minimize these concerns.

Now that we had nearly perfect control of fluid removal, we could use even higher K_{UF} dialyzers. These dialyzers were termed “high flux”. As well as having good small molecule clearance and the ability to remove fluid more quickly, they also had better middle molecule clearance. Unfortunately, two other problems disrupted this paradise: acetate dialysate and endotoxins.

Two-stream acetate proportioning had replaced much of the three-stream bicarbonate proportioning in the previous decade because it could produce a safer, more stable dialysate with less chance of bacteria growing in it. However, with the new proportioning control technologies available, it was now possible to build a reliable and safe three-stream bicarbonate proportioning system. Still, there was a lot of concern that with the more porous high-flux membranes, the patient would be more susceptible to bacterial contamination. On the other hand, acetate buffers just could not work with the high-flux dialyzers. The transfer of acetate into the patient could exceed the patient's ability to metabolize back to bicarbonate resulting in intradialytic low bicarbonate levels and hypotension.

So, the newest machines for high-flux dialysis all had volumetric ultrafiltration control and bicarbonate dialysate. The issue of bacteria was to be handled by improvements

in water quality. Water quality standards were published by the Association for the Advancement of Medical Instrumentation (AAMI) and Canadian Standards Association (CSA) to address the maximum levels of certain chemicals and bacteria levels in water and prepared dialysate. Many dialysis clinics found that they had to update and improve their water treatment systems in order to comply with these new standards. The improvement in reliability of RO membranes made RO systems more efficient and easier to maintain than they had been previously. Many clinics began using RO systems originally intended for commercial or industrial use to upgrade their water treatment.

Endotoxins also were now seen as a threat to patient health. We called them “pyrogens” back then because they caused a pyrogenic reaction in our patients characterized by chills, fever, and hypotension. Endotoxin testing was usually only done on an occasional basis because of the complexity and cost of the testing available at that time. By the end of the decade, maximum allowable endotoxin levels were incorporated into the water standards. The initial allowable levels for endotoxin were much higher than they are today.

Home hemodialysis receded in use and popularity as in-centre dialysis became more popular. With the new more efficient dialyzers and dialysis machines, it was felt that treatment times could be reduced without reducing quality. The new machines were also more reliable. This allowed clinics to run several shifts of patients each day. A single hemodialysis machine that could support only one home hemodialysis patient could support up to six patients in in-centre hemodialysis.

Use of the older coil and Kiil dialyzer designs was discontinued with the shift to hollow fibre designs. Disposable plate dialyzers were still being used because that layout allowed for the use of some useful membranes that could not be easily recreated in hollow fibre form. The major change was in membrane material. Cellulose-based membranes (cuprophane) were

modified and improved (i.e., cellulose acetate) to become more biocompatible, and also became more reliable and lower in cost. New synthetic materials (polysulfone, polymethylmethacrylate, polyacrylonitrile) were used to produce dialyzer membranes that had better filtration characteristics, as well as improved biocompatibility, but these were also more expensive, and required the new volumetric machines, so they were not used as much.

Improvement in vascular access was mostly incremental. Shunts gave way to fistulas and grafts. New catheter designs allowed catheters to be used for longer periods. With the new higher clearance dialyzers available, higher blood flows were being used as well.

With more efficient clearances, urea levels could be brought down in a shorter time and treatment times tended to shorten. Measuring the percentage of urea (URR) that was removed in each treatment proved to be a better indicator of adequacy of dialysis than TAC.

In peritoneal dialysis (PD), the availability of dialysate in plastic bags became more commercially available. Bagged solutions made the process simpler and allowed for continuous ambulatory peritoneal dialysis (CAPD). The development of the y-set and twin bags reduced the rate of peritonitis in CAPD. Up to this point, PD therapy was often limited in clearance and ultrafiltration capability in many patients, and it was best if the patient had some residual renal function to make up the difference. Using some CAPD dwells during the day combined with a cyclor could extend the span of the PD modality in many patients.

The role of the renal technologist was changing. As well as knowing about the technology of dialysis and its effect on patients, technologists now had to have a good understanding of electronics in order to repair and maintain the new and more complex dialysis machines. With the new tighter standards for water, technologists now needed to have a better understanding of water treatment and water testing methods. Because the new machines were more reliable

and provided a more predictable treatment, some things did become easier for the nurses. On the other hand, with the shorter treatment times, higher blood flow rates and greater fluid removal capacity the new machines enabled, nurses needed to have a very solid understanding of the whole dialysis process in order to stay within the physical limits that the patient could tolerate.

THE '90s

By the '90s, dialysis had become a very mainstream technology that could be done in any hospital and not just in teaching centres. Patient numbers increased dramatically. Nearly every program was filled to capacity and always making plans to expand. The introduction of erythropoietin (EPO) reduced the need for blood transfusions, which had become a major source of concern due to HIV.

The new hemodialysis machines were more accurate and reliable. Bicarbonate proportioning was replacing acetate, and volumetric control was replacing TMP control. You would have expected the new machines to have quickly replaced the older designs, but because of the need for ever more treatment spaces, many centres kept their old machines when they bought new ones. This meant that most programs would have several different types of machines of differing technology levels. Patients would be prioritized by their needs. If the patient tended to need more fluid removal and clearance, they would go on one of the new machines. If they seemed to tolerate acetate well, they would go on one of the older machines.

The shift to ever more sophisticated electronic control of hemodialysis machines continued. Digital control continued to replace analog. Analog electronics were now used mostly at the sensor level. Voltages from these sensors would be converted to a digital signal using an analog to digital converter (ADC), the signal fed to a microprocessor and the microprocessor, in turn, would control motors and valves, sometimes using a digital to analog convertor (DAC). To provide a higher level of protection, a second

microprocessor would monitor everything independently from the control processor. Generally, there would be at least one pair of microprocessors for each major function of the dialysis machine (blood handling, proportioning, and ultrafiltration). There would be another set of microprocessors to handle user interaction and automated testing.

The look and feel of the new machines changed as well. The knobs and dials were replaced with keypads and pushbuttons. The old-style pointer gauges and indicator lamps were replaced with alphanumeric LED displays, plasma screens or CRT screens. When computer-based chips and displays later replaced the system control microprocessors, interactive colour displays could be used. The computer-based systems could provide online troubleshooting and help screens and could log all of the data from the treatment. Bicarbonate proportioning using cartridges was introduced. This reduced the risk of bacterial and endotoxin contamination from the growth of bacteria in the liquid bicarbonate concentrate. Automated disinfection routines and testing of all machine functions before each treatment became the norm.

Over this time period, the new high-flux synthetic membranes were used more and the older cellulose-based membranes were being used less, but the transition was slow. Many nephrologists resisted the change due to concerns about back-filtration of non-sterile water into the blood and the lack of studies showing a significant mortality benefit for high flux. Also, the new dialyzers were more expensive and not all the machines in the clinic may have been able to utilize them. The biocompatibility of modified cellulose dialyzers was continually improved as well, so that they remained a viable alternative.

Reuse of dialyzers using formaldehyde had been around for a while, but at this time, equipment became available that could automatically reprocess dialyzers using peracetic acid and hydrogen peroxide. The use of this automated equipment could improve quality control, reduce labour costs, and reduce exposure of staff to

harmful chemicals. Although reused dialyzers usually had lower performance metrics than new equivalent dialyzers, money could be saved. Some programs justified reuse by buying the more expensive, better performing synthetic membranes, and reusing them rather than buying the lower-cost cellulose-based membranes for single use. Studies had also shown that reused dialyzers had fewer biocompatibility issues than first-use dialyzers.

Higher water quality was essential when using the newer high-flux dialyzers and reuse. In general, RO systems replaced deionizer (DI) systems. Electrodeionization became popular for a while, as a lower cost treatment option, but faded away as the RO systems and membranes continued to improve in reliability and cost effectiveness. Most ROs were still based on standard commercial systems, but clinics preferred purchasing them from vendors that specialized in the hemodialysis, laboratory, and pharmaceutical sectors. These RO systems were modified to make them cleaner and easier to disinfect and obtain samples for testing. Water treatment was getting much more complex, and it helped to have service personnel who understood the specific needs of dialysis.

Endotoxin levels became a much more important quality indicator for water. It was shown that endotoxins could pass through some dialysis membranes, and even with membranes where no transfer to blood could be detected, its presence in the water could still raise the levels of c-reactive protein (CRP) in the patient. Dialysis patients who were chronically exposed to even low levels of endotoxin that did not cause an immediate febrile reaction could still have an increased risk of heart disease. Endotoxins could be released from biofilms in the water system that were very difficult to get rid of. Water could test negative for bacteria and still have elevated endotoxin levels. The new water standards decreed that the allowable level of endotoxins in dialysis water and dialysate be reduced and testing increased.

Catheters for dialysis access continued to be improved. The physical design got better, and the shift

from subclavian to the internal jugular meant that the useful life of the catheter was extended. The improved versions were considered permanent catheters (permacath). Some patients preferred the catheter to a fistula or graft because they would not be subjected to needles.

The higher flows required for the shorter, more efficient dialysis treatments meant that recirculation of blood in the access was a significant concern. The most common method of determining recirculation was a calculation using urea levels from peripheral, pre dialyzer, and post dialyzer.

In the 90s, adequacy of dialysis was primarily measured by Kt/V, and for good reason. Kt/V was developed by some very prominent and knowledgeable nephrologists, and it seemed to predict outcomes quite well in studies. Kt/V predicts adequacy based on the clearance rate of urea, time spent on dialysis, and the size of the person being dialyzed. It uses urea clearance from dialyzed blood as a marker for toxin clearance. It is based primarily on external factors that can be manipulated during the dialysis treatment to increase or decrease the urea clearance and initially does not take into account rates of transfer of urea or other toxins inside the patient's body from the cells to the interstitial fluid and to the blood. Urea clearance from blood can be increased in the following ways: higher blood flow rates, higher dialysate flow rates, longer treatment times, or a more efficient dialyzer.

The improvements in obtainable vascular access flows and dialyzer clearance in the '90s meant you could actually reduce dialysis times while still retaining what was considered an adequate Kt/V. Patients especially appreciated the shorter treatment times. In practise though, it eventually became obvious that patients who had the shortened treatment times did not do as well as the patients with longer treatment times even if the single pool Kt/V (spKt/V) was the same. The first adjustment for this was to go to a double pool model that took into account equilibrated Kt/V (eKt/V). Dialysis units in the United States shortened treatment times more than

dialysis units in Canada, and this led to a divergence in mortality rates with Canadian patients surviving longer. Over time, the treatment times lengthened again and the target Kt/V rose with this.

Other nephrologists at that time believed that the frequency of dialysis and total treatment time per week were very important factors for long-term survival. There was some existing evidence that this was true. A dialysis unit in Tassin, France, had continued to dialyze patients into the '90s three times per week for up to eight hours with low-efficiency dialyzers and had very good mortality numbers. It appeared that dialyzing for up to eight hours per day every day would result in very good outcomes. The only way to do this in a way that a patient could tolerate was to do it at night when the patient was sleeping. As in the earliest days of hemodialysis, the only economical way to do it was with home hemodialysis.

In the mid '90s, nocturnal home hemodialysis was started as a pilot project in Toronto and, later in London, Ontario. Patients dialyzed up to eight hours for six days per week. With this regimen, phosphate levels could be controlled without binders, blood pressure was much better controlled, often without use of medications, dietary and fluid intakes could be liberalized, and patients reported a better quality of life.

The y-set twin bag system became the standard for CAPD. As CAPD methods improved, peritonitis rates steadily decreased. The availability of more user-friendly cyclers increased the range of patients who could successfully do automated peritoneal dialysis at home.

As the reliability of the hemodialysis machines improved and the recommended intervals for preventive maintenance extended, renal technologists could spend less time on repairing and maintaining equipment. Machines also started to become more modular in design. Techs could now repair machines by switching out circuit boards and assemblies, thus reducing the need for extensive electronics repair abilities. The new standards for

water treatment meant that the technologists needed to do more testing, disinfection and other quality assurance for their increasingly complicated water systems.

In some ways, the more sophisticated machines with better alarm control and pre-dialysis testing made it easier for the nurses. On the other hand, the increase in the number of features now available required much more training in the operation of the machines.

THE NEW MILLENNIUM

The numbers of patients on dialysis continued to grow, and we were dialyzing more older patients. Many programs had run out of space to expand within their hospitals and were setting up satellite units in smaller hospitals or in malls.

Hemodialysis machines continued their incremental improvements in reliability and accuracy. Most machines now offered higher dialysate flow rates. There was more control of bicarbonate, sodium, and ultrafiltration rates during the dialysis treatment. Automated blood pressure monitors were now standard. Most machines could be connected to data acquisition systems. Patient care charting systems tied into these data systems were available and now worked well enough to be useful. Machines could also store some of the patient and technical data from one treatment to the next in order to allow post treatment analysis of the technical and treatment parameters if required. Alarm information and help screens were much more extensive and there were onboard diagnostic systems available to help the technologists troubleshoot the machines during the treatment or in the service shop.

More machines were now available that could use powdered bicarbonate cartridges. The most important advancement, however, was the availability of an ultrafilter on the dialysis machine that could provide an ultrapure dialysate. These ultrafilters reduced the risks to the patient from any back-filtration in the dialyzer and further increased the use of high flux dialyzers.

There continued pursuit of ever lower bacteria and endotoxin in the water systems. Studies showed the clinical benefits of lower endotoxin levels, and the standards began to reflect this. Water systems were now considered a medical device. New water systems were much easier to maintain and disinfect on a more frequent routine basis rather than waiting until there was evidence of contamination. The use of insulated PEX loops allowed for a cost-effective way of providing for heat disinfection of the loop on a routine basis.

Dialyzer development was largely incremental with modifications of existing membranes to improve clearances (especially of middle-weight molecules) and improve biocompatibility. Dialyzer reuse using heated citric acid became available, and several programs implemented it. Even with the use of automated systems, reuse was still labour intensive and required good management to ensure quality.

Many programs began to focus on optimal vascular accesses as a distinct quality initiative. Dedicated staff would monitor patient access flows and recirculation in order to maximize the effectiveness of the access and prolong its useful life. Ultrasonic equipment was now available that could measure flow rates and recirculation using a saline dilution technique. Some dialysis machines also had the ability to measure recirculation without the need of blood samples to be sent to the lab.

Kt/V was still extensively used to determine adequacy, but it was mostly as a minimum requirement. Longer treatments and four treatment sessions per week were used if patients did not do well. Some machines could now provide a Kt/V measurement during the treatment. This was useful to maintain a minimum clearance standard even when problems arose with access flow, dialyzer clotting, or frequent machine alarms.

PD equipment continued to make incremental improvements, but the biggest change was in PD dialysis solutions. Lactate had always been the standard buffer for PD, but some patients did not efficiently convert

lactate to bicarbonate. The reason that lactate was used instead of bicarbonate is because lactate is stable in the presence of calcium. This problem was overcome by the use of two chamber bags separating the acidic electrolytes from the bicarbonate until a septum was broken just prior to use. The availability of bicarbonate containing buffers allowed more potential PD patients. Solutions containing icodextrin and amino acids also became available, and there was a greater appreciation of the effects of glucose degradation products (GDPs) on the life of the peritoneal membrane.

The increasing sophistication of the dialysis machines meant that renal technologists required more extensive training on each type of machine they worked on. The increase in the number of features the new machines had available also meant the nurses needed to have more training on how to operate the machines. In the past, many programs had several different types of machines from different manufacturers, but now they were restricting themselves to using one type of machine for the life cycle of the equipment and then switching over completely to a successor or another type of machine when those were obsolete.

THE LAST FEW YEARS

The drive to using ever purer water and dialysate continues. In the past, we used to have standards that specified maximum levels of endotoxin and bacteria, and if our water did not exceed those levels, we let things continue as they were. Today, we recognize that any level of contamination can cause some harm, and we strive to improve the quality as much as we can within the technology levels available. Tighter standards for ultrapure water are now available and can generally only be achieved with the newer RO systems designed for it. Disinfection is now performed routinely so as to prevent any bacteria growth instead of as a remedial step to remove detected bacteria. The new equipment makes greater use of higher quality materials such as stainless steel and uses heat disinfection throughout the system.

Home hemodialysis has made a remarkable return in availability, and home hemodialysis patients are being encouraged to dialyze more often. Studies have shown that more frequent home hemodialysis is also cost effective. Funding agencies now promote home hemodialysis for all programs to provide to any patient who could benefit from it. Nearly every region now has a home hemodialysis program and tries to grow it as much as possible.

Dialyzer clearances and biocompatibility continue to make incremental improvements, but the biggest change for dialyzers is in relative pricing. Good quality dialyzers now can be purchased for costs low enough that reuse no longer makes economic sense for many programs, so many programs that had previously practised reuse have stopped it.

Studies have shown that there was a significant survival advantage to a patient if they had a well-functioning fistula instead of a central line access. Many programs now have dedicated staff to monitor access quality and facilitate fistula use as much as possible.

Many new hemodialysis machines available now have the ability to do online hemodiafiltration (HDF). Online HDF offers the possibility of enhanced middle molecule clearance, and has been used in Europe for a while, and when the machines became available in Canada, some programs began using it as well. HDF using bagged infusion solutions had been used in the past, but it was cost prohibitive and carried a somewhat higher risk of improper fluid removal. With the new online HDF machines, the fluid removal risk is pretty much eliminated and the incremental cost is much lower than bag solutions. Because the machine produces the infused solution directly, many programs upgraded their water systems and surveillance in order to do online HDF. It is still uncertain how much of an impact HDF will have. Some studies show significant benefits to patients particularly for cardiovascular conditions, whereas other studies show a smaller benefit.

Regardless of whether a program offers online HDF treatments, there is still a trend to more individualized monitoring of adequacy. Besides just measuring the clearance of toxins to monitor adequacy, more attention is now being paid to the negative effects of rapid electrolyte shifts, high fluid removal rates, and drops in blood pressure during the treatment. The experience of more frequent treatments and more dialysis hours per week in home hemodialysis has shown the advantages of a gentler approach. Many patients could benefit from this regimen, but may not be able to do their own treatments at home. This has resulted in more in-centre patients running longer hours and more frequently. Some programs also offer in-centre nocturnal hemodialysis. These greater demands place stress on the capacity of many programs. Some facilities now have extended hours and open on Sundays to provide these extra treatments.

The new machines now have many more features and are able to measure and modify fluid removal rates, electrolyte composition and dialysate temperature during the treatment to a fine degree of accuracy. They can also measure the rate of toxin removal and the change in hematocrit during the treatment. It is also possible now to have the machine automatically make limited changes in these parameters based on the measurements it makes in order to prevent drops in blood pressure during the treatment.

Nurses now need to know much more about the setup and operation of the machines. New features such as online HDF need to be programmed and understood. The parameter limits for automated corrections that the machine can make need to be assessed and entered. The trend to increased frequency of disinfection and longer treatment times can put a lot of stress at turnover times to get the next patient on and the treatment started as quickly as possible.

Techs are spending more time on maintaining the higher standards for water treatment. The new hemodialysis and water treatment equipment all require extensive certified training.

The self-tests that new machines are capable of performing are frequently more accurate than the manual tests that techs were able to do and so we rely more on pre-calibrated components and built-in service software to repair and troubleshoot problems. Although home hemodialysis can result in lower nursing staff requirements, it significantly increases the workload for techs. Home patient water systems must all be regularly visited, tested, and maintained. Minor machine problems that could be fixed in a few minutes on an in-centre machine could result in hours of preparation and travel time to fix in the patient's home.

WHAT'S NEXT?

Going forward, we can see that water and dialysate quality standards will become more stringent. In the past, every time that water and dialysate quality was improved, patient well-being has improved, as well. Standards are often set to what is achievable with the current technology, and as the technology improved, the standard became stricter. Online HDF will probably become more common and the automated treatment control systems on new machines will become more refined.

Many patients can benefit from home hemodialysis, but there are still many obstacles that prevent greater utilization. It is very labour intensive to support home hemodialysis equipment compared to machines in clinics. It is easy to see what advances would be welcome:

- Equipment that is easier to set up and use, and less likely to be set up incorrectly
- Information and alarm processing that makes more information available to support staff helping the patient troubleshoot a problem

- Systems that could automatically generate reliable clean water and dialysate samples for testing
- More portable home dialysis system that the patient could move around the house during dialysis.

Even after all these years and the remarkable advances that have happened in dialysis, transplantation is still the best treatment for most patients with end-stage kidney disease. Incremental improvements in transplantation will likely mean lower rejection rates, longer organ survival, and better matching and allocation. The main obstacle for many who might benefit from transplantation, however, has and likely will remain the shortage of donor organs.

In place of using donated organs, there are also groups trying to develop implantable substitutes, and there are several different approaches currently:

- Regenerating cells in order to repair kidneys
- Growing compatible organs in other animals
- Growing new kidneys from stem cells
- Using grown kidney cells in an implantable artificial kidney.
- Using biomaterials and nanotechnology to build implantable artificial kidneys.

All of these approaches are worthwhile to pursue, but they have been around for a quite a while now, and it always seems as if full implementation is just around the corner. Still, a significant breakthrough in any of these areas combined with positive clinical trials could mean a major change in the way we handle kidney failure in the future.

Probably the most attainable approach to providing more freedom for people on hemodialysis is a portable system using sorbent technology

such as the Wearable Artificial Kidney (WAK). The delay in making the WAK as mainstream technology is due to funding continuing trials and getting regulatory approvals. The cost for each treatment with the WAK might be an issue however, especially if it is not adopted widely enough to allow the cost savings due to economy of scale.

Through all these years, CANNT has been a place where both renal nurses and technologists could get together. In the early days, CANNT was very important for networking, meeting and communicating with other professionals, and sharing information. In the last few years, this has changed a bit. We can now keep in touch with such things as Facebook, Twitter, or LinkedIn. With the Internet, we now have much greater access to communication and information, but still there is nothing like going to a CANNT conference to get energized and motivated by all of the dedicated people you meet. CANNT is now much more involved in setting standards and certifications than before. A lot has changed in the last 50 years, and it is impossible to predict what things will be like 50 years ahead, but for now, we can count on our colleagues in CANNT to support us to provide the best care possible to the patients for whom we care.

ABOUT THE AUTHOR



Clarence Graansma, CET, worked as a renal technologist and charge technologist at Grand River Hospital in Kitchener for 30 years.

Clarence is currently the Senior R&D Lead at Qidni Labs in Kitchener, Ontario.

CANNT Journal Recollections

By Bruce Pappin and Heather Coughlin

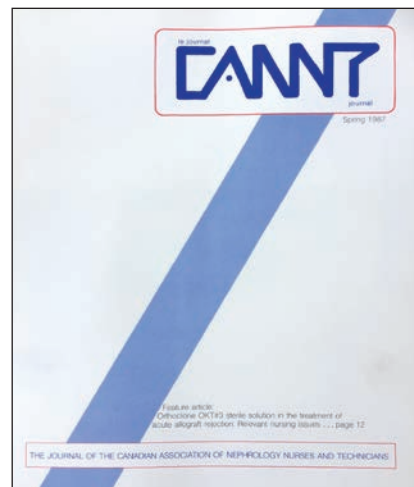
The 1980s was a period of tremendous growth and professionalization in nursing. As part of this, there was a strong demand for new publications, and within a few years I was publishing four nursing journals. As my contacts within the nursing world and associated suppliers grew, I started to receive recommendations, and in the spring of 1986, David Hayes of Terumo, a company active with both CANNT and one of my new clients, the Canadian Intravenous Nurses Association, suggested I contact Terry Rafter (CANNT Board of Directors) as CANNT was interested in upgrading their existing newsletter. Terry referred me to Phyllis Malek of London who was the editor of the newsletter. On June 9, 1986, I met with Phyllis and the *ad hoc* newsletter committee in Ottawa. The committee asked me to submit a proposal for the publication of three issues in 1987, and on December 1, I was informed that the Board had awarded me the contract for what was now being referred to as the *CANNT Journal*. As Phyllis had recently been elected President, my first editor was Jocelyne Larivière of the Ottawa General Hospital Home Dialysis Unit, and the first edition of the newly minted journal, all 16 pages of it, appeared in April 1987.

We had relocated from Toronto to my hometown of Pembroke, Ontario, in late 1983. The publishing world was drastically different at that point. Some printers were still working with metal type set in molten lead; however, for cutting edge operations like us, all of the material had to be phototypeset, pasted up by hand, and off-set printed. Computers were expensive toys and fax machines a rumour. Jocelyne assembled the typed, or more often handwritten, editorial copy and mailed it to me. I “marked it up” editing for style and grammar, and sent it off to the phototypesetter. A week later it would arrive back as narrow strips of shiny paper in a roll, about

20 feet long for a 16-page journal. This was fed through a machine that coated the back in sticky wax, cut up, and stuck down onto pre-printed layout boards on a homemade light table consisting of frosted glass over a couple of fluorescent lights. Headlines would be set in two or three different sizes to allow for some variety in layout. The finished layouts were photocopied and ready for proofing.

It was at this point in the first issue that I panicked. Jocelyne cheerfully announced that she would bring up the editorial committee to proof the journal at my office. The only problem was that my “office” consisted of the worst bedroom in our newly purchased and terribly run-down Victorian house, complete with second hand and homemade office furniture and wallpaper peeling from the ceiling. It did not look overly professional. I explained this nervously to Jocelyne, who was very understanding, and who showed up with two other committee members in quite good humour to proof the journal. They even maintained their good humour when our new collie pup decided to throw up on one of the committee member’s shoes. Following proofing, corrections were made by slicing up mistakes and rearranging letters and words like a ransom note. The completed layouts went out to DFR Printing of Pembroke, and two weeks later we received 350 copies of the new *CANNT Journal*. My mother stuffed them into envelopes, and off they went to Canada Post.

As Jocelyne was fluently bilingual, articles were accepted in either French or English, although translation was not offered. The first edition included one English article, by Beth Funnell of Oregon, based on her presentation at the past conference, and one French article, uncredited. The board had decided against selling ads in the new journal, but the issue was financially supported by Ortho Pharmaceutical whose Orthoclone OKT#3 was



featured in the lead article. A year later, things began to change dramatically with the purchase of a new computer system. The improvement to efficiency was incredible. Although the layouts took about the same time to produce, corrections went much faster.

In September 1989, Jocelyne made her last trip to Pembroke to introduce the new editor, Rita Brownrigg. Rita initiated two changes. Beginning with the Summer 1990 edition, the journal was printed on recycled paper, a big issue at the time. The other innovation was the introduction of advertising, which reduced the cost to CANNT by about 25%. Throughout this period, there was a concerted effort to improve the quality and relevance of the articles. The journal steadily increased in length, and in 1991, Rita introduced a volume and issue number in order to improve the utility of the journal as a research tool.

In 1992, Leanne Dekker of Edmonton took over as editor. Although communications and technology were improving, the guidelines for authors still asked for typed manuscripts, which then had to be entered manually. In 1996, we performed the first major redesign of the journal since we started publishing it in 1987. This was followed by a major development in the Summer 1996

issue as the journal began easing into a peer-reviewed format. Beginning with that issue, it was announced that each article would be reviewed by two members of the CANNT Board of Directors. A new and expanded author guideline announced that articles would now be accepted on “diskette” although authors were advised to provide details on the word processing package and operating system used. CANNT’s administrative office introduced e-mail that year as well, although no contacts were provided for the editor or board members. The next year, commencing with the Fall 1997 issue, the journal moved to a full peer review process, implementing a review panel using a full double-blind process. The journal also moved to a co-editor system with duties being shared between Colleen Turpin and Gillian Brunier.

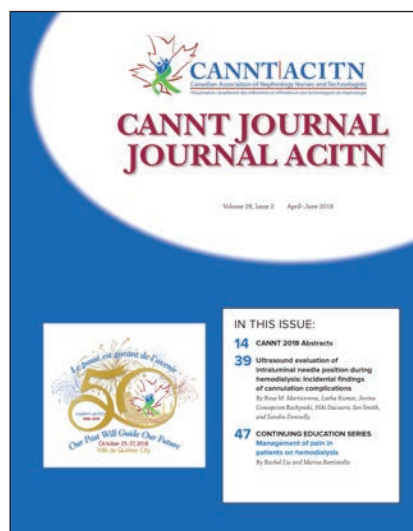
In 1998, ten years after our initial computerization, we switched to a Mac system, which allowed us to modernize and streamline production. We also introduced e-mail and developed our own website. Within a year, e-mail communication had become ubiquitous, paper manuscripts became a memory, and the introduction of Adobe Acrobat allowed us to distribute

electronic proofs instantaneously. The old fax machine began gathering dust, primarily spitting out junk mail offering discount cruises. Acrobat soon became the dominant system for receiving advertising material and for sending the journal to the printer. In 2001, the journal received its second makeover—updating to the current cover design, changing fonts and modernizing some aspects of the layout.

As we got busier, it became clear that our husband and wife operation would need some help if we were to keep on top of things. I had always been impressed with the assistant to the manager of DFR Printing, Heather Coughlin, and not long after the DFR print shop shut down, we hired Heather to take over day-to-day management and handle advertising duties. Sherri Keller, graphic designer, joined our team in 2005. In 2011, Heather purchased Pappin Communications, and my wife, C.B. and I, moved on to other interests.



**Bruce Pappin,
Managing Editor
(1987–2010)**



Since 2011, one very noteworthy change was implemented in concert with publication of the Spring 2013 issue of the *CANNT Journal*. In a bid to keep the journal relevant and continue to support members, subscribers, and libraries in the best way possible, the switch was made to electronic publication on the CANNT website in the members-only section. In the words of Alison Thomas and Jan Baker, journal co-editors at the time, “It’s a big change, but we feel it’s the right change at the right time.”

The electronic version of the *CANNT Journal* remained a major membership benefit, but with

significant cost reductions for the association in terms of printing and postage expenses. Added benefits included access to issues and articles from any desktop or mobile device, and a paperless, environmentally friendly publication.

I am confident that the journal will continue to evolve and be a valuable source of information and education for nephrology nurses and technologists for many years to come.



**Heather Coughlin,
Managing Editor
(2011 to present)**

Past CANNT Presidents & CANNT Journal Editors

PASSING THE TORCH

It was the summer of 1997 that I, along with Colleen Turpin and a certain amount of trepidation, took over from Leanne Dekker (1992–97) as the new co-editors of the *CANNT Journal*. Rita Brownrigg (1989–92) and Jocelyne Larivière (1986–89) had been the Journal Editors prior to Leanne. A few years later, Colleen stepped down to pursue other interests, while I continued on as Editor. What a journey it truly was for me. Over multiple years, I had the opportunity to connect with so many wonderful people.

Most of you will not be aware that, prior to becoming co-editor, then editor, of the *CANNT Journal*, I was on the Editorial Board of the then named *ANNA Journal*, where, through editorial board meetings under Sally McCulloch, I learned much of what I needed to know to become a novice editor. Sally, as Editor of the *ANNA Journal* for 19 years, headed a stellar group of editorial board members who all shared willingly their knowledge and skillfulness of being department editors. But it was Sally from whom I learned much about the intricacies of being an Editor.

At the same time that I became co-editor of the *CANNT Journal* with Colleen, I connected with an oncology nurse by the name of Bev Page, who was then editor of the Journal of the *Canadian Oncology Nurses Association*. Bev, by chance, worked at the same hospital as I do in Toronto, and both of our journals were managed by Pappin Communications in Pembroke, Ontario. It was Bev who helped me understand what I needed to do to obtain a listing on MEDLINE as a peer-reviewed publication for the *CANNT Journal*. It was Rita Brownrigg, former *CANNT Journal* Editor, whom I first e-mailed when I realized that searches for *CANNT Journal* articles were coming up on MEDLINE and PubMed. She was as thrilled as I was!

In the year 2000, at the CANNT conference in Ottawa, Colleen and I formed our first *CANNT Journal* Editorial Board. This small group of colleagues from across Canada included: Linda Ballantine, who wrote for several years an *On Education* column; Eleanor Ravenscroft, department editor for many years for the *Practice Corner* column; Lee Beliveau who wrote for many years the *Bedside Matters* column; Jennifer Dykeman (renal pharmacist), who started the *Pharmacy News and Reviews* column; Mukesh Gajaria (renal technologist) who started the *Technically Speaking* column; Rob Huizinga, who started his *Nephrology and the Internet* column; and Rosalie Starzomski who wrote on ethical issues. New ones have joined us, but what a contribution all these *CANNT Journal* Editorial Board members have made and continue to make year in and year out toward the success of our Journal.

Over these last 14 plus years as Editor, it has been a joy to work with so many talented Canadian authors of so many excellent manuscripts. It was always astounding to me the original thought and work that the authors put into their work. Through having the *CANNT Journal* listed on PubMed and Ovid, these manuscripts, once published, have their titles and abstracts cited on-line, giving these published works widespread recognition. It is always a source of pride for me to see articles from the *CANNT Journal* cited in other author's published works from around the world.

Above all, the *CANNT Journal* would not be what it has become without a group of dedicated manuscript reviewers. It is largely unseen work, but each feature article you read in the Journal has been reviewed by two members of the manuscript review panel. I always try to match the special focus of each article to be reviewed with the specific knowledge and expertise of different nephrology nurses and technologists from across Canada. For example,

in the January–March 2012 issue of the *CANNT Journal* (my last one as Editor), the submission for publication of the excellent article “The dangers of substance abuse in adolescents with chronic kidney disease: A review of the literature” meant I had to find two pediatric nephrology nurses to review the article, which, through contacts at CANNT 2011 held in Calgary that year, I did. It was always been a constant source of amazement to me, the willingness of these reviewers to give so much of their time and effort to ensuring the quality of each of the 187 articles received for publication over these last fourteen years!

Lastly, I would like to thank all the different CANNT Board members and Presidents with whom I have worked so closely over these many years and who have always been supportive of my work. As well Debbie Maure at the CANNT National Office, and Heather Reid, our CANNT Conference planner, were a delight to work with. With each upcoming annual CANNT Conference, I would work with Heather to be sure we were promoting the conference in the *CANNT Journal*. Heather's usual request to me was “When is the drop-dead deadline?” and my usual response would be “Now!”

Thus, it was with a certain amount of sadness in my heart, but also a sense of personal fulfilment, that in 2012 I handed over to Alison Thomas and Jan Baker as the two new co-editors of the *CANNT Journal*. I was certain they would continue to receive the support that I received from all of you and move the journal to new heights and new frontiers.



**Gillian Brunier,
MScN, RN(EC),
CNeph(C)
CANNT Journal
Editor 1997–2012**

[Originally published
in the *CANNT Journal*
(2012), 22(1), page 4.]



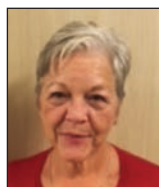
Congratulations to CANNT on this wonderful occasion of your 50th Anniversary! I had the distinct honour of being a member of the CANNT Board of Directors for a period of time as President-Elect, President, and Past President (2008–2010), and then as CANNT Journal Co-Editor alongside Janet Baker (2012–2015). CANNT has always been a leader in the specialty of nephrology. Examples include the organization's unique collaboration and partnership between nursing and technology; the annual symposium, which is always well attended and respected; the publication of the *CANNT Journal*, which is highly visible and indexed in CINAHL and Medline databases; and representation on provincial and national working groups and committees relevant to issues in nephrology nursing and/or technology. My experience on the CANNT Board was energizing and memorable, and I made many wonderful contacts and friends along the way. I am pleased to see that the organization remains vigorous and relevant over time, and I look forward to seeing CANNT continue to grow and flourish in the decades to come. Your efforts and impact are vital to the professionals who care for and support nephrology patients across the country, and for that you should be very proud. All the best to you as you celebrate together at CANNT 2018, and for many years to come!



Alison Thomas, RN(EC), MN, CNeph(C)
CANNT President 2007–2008
CANNT Journal Co-Editor 2012–2015

Happy 50th birthday, CANNT! It was an honour to be on the CANNT Board of Directors for three years starting in 2007. Promoting excellence in nephrology care has been a vision of CANNT, and I think the organization does an amazing job. Bringing nephrology staff from across the country and from outside the country together to share practice, work together to set standards, and learn from each other supports this vision. Supporting education, standards of care, celebrating awards and bursaries, helping with certifications, and publishing a peer-reviewed journal are things that make CANNT an organization to be proud of.

CANNT stands strong on items that matter, but has a remarkable ability to change with the times. Going to an online journal brings nephrology to people everywhere, and is an example of CANNT's desire to promote excellence in all things nephrology. Congratulations to the Canadian Association of Nephrology Nurses and Technologists.



Jan Baker, BN, RN, CNeph(C)
CANNT President 2008–2009
CANNT Journal Co-Editor, 2012–2015

Reflecting back on my presidency in 2010, there were a number of highlights and one ongoing challenge that every president and board has had to face that stand out for me. The ongoing challenge is membership. As an association, every Board struggles with increasing membership to CANNT. Many initiatives are suggested and trialed, but with unsustainable results. I often struggle with the

question, "How do we get nephrology nurses to become members and get involved in their profession?" I still do not have the answer. My one hypothesis is that many nurses see nephrology as just a job and do not want to go the extra mile and become involved.

This outlook is quite disheartening, and I often see it at my present working environment. Joining CANNT, being involved on the Board of Directors, and becoming president gave me the opportunity and blessing to work with outstanding, dedicated healthcare professionals—not only from within Canada, but internationally, as well. These individuals have demonstrated their commitment to their patients and to their profession by their passion and enthusiasm.

I am glad to have participated, in a small way, to the development of not only the association, but hopefully nephrology nurses, as well, by contributing to the annual symposium. I have been to many conferences over the course of my career, and I would have to say that the CANNT annual conference is consistently one of the best.

I would like to express a heartfelt thank you to the association and board members I had the extreme privilege to have worked alongside, and finally to all the amazing nurses and technologists I had the pleasure of meeting during my presidency and throughout my career journey.



Rick Luscombe, BN, RN, CNeph(C)
CANNT President 2009–2010



I had the distinct honour of serving on the Board of Directors for CANNT in the capacity of President from 2009 to 2012. This was the first time in my 35-year nephrology career that I held a national position, and I found the experience very rewarding, both personally and professionally. In my role, I worked closely with the Board, collaborated with delegates, members, and industry partners, and had the opportunity to serve the CANNT members. I am very grateful for the support that I received and the lasting friendships that I formed.

Over CANNT's 50-year history, the association and the CANNT annual symposium continue to provide excellent opportunities for nurses and technologists to network with nephrology professional, expand their knowledge, and share local research and quality improvement initiatives through oral and poster presentations. This year, CANNT celebrates its 50th anniversary in Quebec City on October 25–27. Unfortunately, I am unable to attend the annual conference. For those of you who are attending, I am sure that the conference planning committee and the CANNT Board of Directors have worked tirelessly to ensure that your experience is memorable and informative.

History in the Last Decade and Changes in Practice

I am proud of the many advancements in nephrology nursing and clinical practice that have taken place over the past decade. One example is the use of ultrasound-guided cannulation to improve patient's experience and accuracy of cannulation, which is critical to the viability of arteriovenous accesses. Through the efforts of nephrology nurses with a keen interest

and advanced expertise in vascular access, ultrasound use and incorporating best practices into clinical practice to improve patients' cannulation outcomes are considered in many dialysis units as the standard of practice.

Future of Nephrology and Vision for CANNT Beyond its 50th Birthday

As a result of CANNT's leadership and long-term professional relationships with the Canadian Nurses Association (CNA), Kidney Foundation of Canada (KFoC), American Nephrology Nurses Association (ANNA), the National Association of Nephrology Technologists/Technicians (NANT), and European Dialysis and Transplant Nurses Association/European Renal Care Association (EDTNA/ERCA), nephrology professionals continue to have an opportunity to participate in other professional associations activities, whose collective goal is to improve the patients' experience. My vision for CANNT beyond its 50th birthday is, through its members, to continue to maintain a viable association and be recognized in Canada and beyond as an association that represents excellence in nephrology care for patients with kidney disease.

It starts with you! I encourage each one of you to recognize the valuable contribution that you make to patients with kidney disease, take time to celebrate your profession, and promote and actively participate in the future of nephrology care for patients with kidney disease. Nephrology Healthcare Professionals Day was celebrated on Wednesday, September 19, 2018, and CANNT promotes and encourages the celebrations of nurses and technologists in their workplace along with members of the healthcare team.



**Patty Quinan, MN,
RN, CNeph(C)
CANNT President
2010–2011**



I just want to say how much I enjoyed the time I spent on the CANNT Board of Directors—I have developed great friendships through my time with CANNT, whether at the Board I meetings, our CANNT annual conference, or people I have met as a CANNT representative at the ANNA conference. I have met some really great friends along the way.

I started as a unit liaison to the Western Region VP in 2005. I was then elected as the Western VP from 2008–2010 before moving into the president elect/president/past president positions from 2011–2013. There were a lot of changes to the association and Board of Directors during that time. In my year as president, our office administrator changed, so we had to go through the complicated process of hiring new office staff (tenders, interviews, contracts). This was all very foreign to me (and the Board at the time), but we made it through and hired the new managers. I guess change was inevitable, and now there was not only new office staff, but new conference planners, as well. Since my time on the Board, the association positions, roles, and responsibilities have changed. I am not a fan of change, but I know we need have to change in the name of progress.

My priority was always about ensuring that our CANNT association was viable—this meant reducing costs whenever we could and maintaining fiscal viability, especially in view of changes to corporate sponsorship. We moved from an in-person spring Board of Directors meeting to teleconferences to reduce costs. We also reduced the amount of time we spent in-person at our fall conference by doing some tasks (new Board orientation) via teleconference/Skype prior to the fall meeting. This way we could fill the day we did have with our actual

meeting. We also made the tough decision to not have French translation at every conference unless we were in the French-speaking provinces (the east coast or Quebec). It was a difficult decision and one that the Board did not make without a lot of deliberation. As expected, this was met with some unhappiness from our membership.

I really just want to say that I am proud of my time on the CANNT Board of Directors. I am proud to be a nephrology nurse and very proud to be a CANNT member in good standing. I continue to encourage my colleagues to become CANNT members and continue to challenge them to become certified in nephrology nursing. I also continue my mantra of “celebrating each other as nephrology nurses and technologists” because, if we cannot celebrate and encourage each other as nephrology healthcare professionals, how can we expect anyone else to?



**Marilyn Muir,
RN, CNeph(C)
CANNT President
2011-2012**

Congratulations to the Canadian Association of Nephrology Nurses and Technologists (CANNT) on your 50th anniversary!

Our organization has undergone many changes over the past 50 years including several name changes, changes in vision and mandate, as well as growth in membership. Our focus has always been to provide leadership and share knowledge to promote the best nephrology care and practice. This has been achieved through education, research, and communication with our membership and the nephrology community at large.



During my time as president/past president (2013-2014), the association embarked on a major project to ensure that we had all the necessary documents required for compliance with the new Canadian Not-For-Profit Corporations Act. At the Annual General Meeting (AGM) in October 2013 members of CANNT voted to approve the documents and revised bylaws, and a motion was passed to enable the association to file with Industry Canada. This important work would not have been completed without the assistance and dedication of CANNT members Marsha Wood, Linda Ballantine, and Patty Quinan. Also, major revisions to the Nursing Standards were completed in 2014, thanks to the dedicated work by the CANNT Nursing Standards committee along with expert content reviewers.

It is through the dedication of volunteers like these and the membership who support our association in so many ways that CANNT can thrive today and into the future. It is so important for nephrology nurses and technologists to become involved and support CANNT. This is your association. Whether you seek out a position on the Board of Directors, volunteer to work on special projects, or present at CANNT conferences, we need your involvement to help keep the association current and relevant to those we serve and support.



**Colleen Wile, BScN,
RN, CNeph(C)
CANNT President
2012-2013**

Firstly, congratulations to CANNT on your 50th anniversary! The following is a reflection of my short time as the CANNT Journal Co-Editor (January 2015–December 2016).

I started as the co-editor just as I was completing my masters. I knew it would be completed soon, and was looking for something that would continue to challenge and engage me professionally and academically. Jovina and I started our roles as co-editors together. We learned together, and despite being several provinces apart (Ontario and Nova Scotia, respectively), quickly developed a great working relationship. Our learning was facilitated by the amazing mentorship of Jan Baker and Ali Thomas, who met with us regularly as we got started, and made themselves available to us for whatever we needed, whenever we needed it. Their passion was evident, and inspired us to hold the journal to the same standard it had been built to. It is also important to acknowledge Anne Moulton, who was President of CANNT during my time as co-editor. Anne was always a vocal, passionate advocate of the journal.

It was always inspiring to read submitted articles and to enable sharing of emerging practices through publication in the journal. There are so many great initiatives that are happening across the country in nephrology, and I firstly congratulate everyone who is working together with their multidisciplinary teams to improve care for patients with renal disease, and secondly to strongly encourage those same professionals to share their work in as many places possible including within their organization(s), as an oral and/or poster presenter at the CANNT national conference, and through the *CANNT Journal*.

In closing, I would like to formally acknowledge my Co-Editor, Jovina Bachynski, for her dedication and passion, and commitment to working collaboratively.



**Matt Phillips,
MHS, RN
CANNT Journal
Co-Editor
2015-2016**

Excerpts from Messages from Past Presidents



“...we are specialists possessing a wealth of knowledge. Through sharing at our annual conference, via the website, and the online journal, as active members of our association, we begin a domino effect that carries on throughout the nephrology community. I encourage each of you to continue to learn every day and watch your investment grow as you celebrate your successes.” [CANNT Journal, 2014, 24(3), p. 6]



Roberta Prettie, RN, CNeph(C)
CANNT President 2013-2014



“Never underestimate the power of passion to motivate you to reach your goals. As Nelson Mandela eloquently explains, ‘There is no passion to be found playing small – in settling for a life that is less than the one you are capable of living.’ Let CANNT work with you this year to achieve your professional goals. Be passionate, become involved!” [CANNT Journal 2015, 25(1), p. 6]



Anne Moulton, MN, RN, CNeph(C)
CANNT President 2014-2016

I feel very privileged to be President as CANNT is marking its 50th Anniversary as an organization. I have had many opportunities to listen to our up-and-coming generation of nephrology healthcare professionals. I am confident «we» are in excellent hands. New technology has allowed for information transfer to occur at an accelerated pace never seen before. The CANNT website provides our members a platform to keep current, and

connect with nephrology healthcare professionals in Canada and around the world. It is a very exciting time to be working in healthcare. My hope is that CANNT's rich history will always be celebrated, remembered, and shared with our members.



Heather Dean, RN, CNeph(C)
CANNT President 2016-2018



Participatory action research to empower hemodialysis nurses and reduce risk of burnout

By Christina Doré, Linda Duffett-Leger, Mary McKenna, Jonathan Salsberg, and Myriam Breau

ABSTRACT

Nursing is notorious for being a stressful profession with high rates of burnout. It is increasingly apparent that hemodialysis (HD) nurses (RNs) are not immune, and that empowerment is a promising tool to address burnout among HD RNs (Harwood, Ridley, Wilson, & Laschinger, 2010b). Recent research has revealed that HD RNs in Quebec are at considerable risk of burnout and have reported moderate levels of structural and psychological empowerment (Doré, Duffett-Leger, McKenna, Breau, & Dorais, 2018). This research used a participatory action research (PAR) approach to obtain input from HD RNs on the types of information and elements to include in a website to enhance RNs' empowerment and reduce their risk of burnout. In a series of three focus groups, a total of seven participants identified that a potential professional website could provide information updates, offer continuing education, promote healthy lifestyles, and encourage networking. Results confirmed the usefulness of a website to promote empowerment, thereby addressing RNs' practice needs and reducing their risk of burnout.

Key words: burnout, empowerment, nurses, hemodialysis, participatory action research approach, information communication technology

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Freudenberger (1974) explored burnout among people engaged in a helping profession following a prolonged exposure to stress. When burnout occurs in nursing, it can have harmful consequences on the nurses (RNs) and patients, and the functioning of the entire organization (Halbesleben, Wakefield, Wakefield, & Cooper, 2008). Extensive research has been conducted on empowerment over the last two decades, focusing on the close relationship between empowerment and burnout (Laschinger, Finegan, & Shamian, 2001).

In North America, more than one-third of hemodialysis (HD) RNs were found to be at high risk of burnout because they practised in work environments that combined high-stress situations and high work demands, and empowerment strategies would be helpful to address their risk of burnout (Doré, Duffett-Leger, McKenna, Breau, & Dorais, 2018; Harwood, Ridley, Wilson, & Laschinger, 2010b; O'Brien, 2011; Ridley, Wilson, Harwood, & Laschinger, 2009). Although there is growing evidence on the merit of empowerment, questions remain about how to enhance empowerment among RNs in the workplace (Dooher & Byrt, 2005).

An important strategy may be to develop a professional website for RNs working in HD that is focused on enhancing their empowerment to reduce their risk for burnout. Researchers have suggested that information and communication technology (ICT) can be used to positively influence the health of RNs and support their professional practice (Jackson, Fraser, & Ash, 2014). According to the Canadian Nurses Association (CNA), RNs should participate in the selection, design, and implementation of websites to ensure that the tools are user-friendly and meet RNs' needs in order to encourage website usage (CNA, 2006). To date, however, limited academic research has occurred that seeks input from RNs. This study used a participatory action research (PAR) approach to provide community-based recommendations for the development of a future professional website to enhance empowerment and well-being, and reduce the risk of burnout of HD RNs working in Quebec.

BACKGROUND

Understanding the burnout of HD RNs

Occupational stress is the major contributor to burnout (Maslach, 2003). Nursing has long been recognized as a stressful profession due to difficult working conditions contributing to the increasing incidence of burnout among Canadian RNs (Santé Canada, 2007). More recently, research has identified a high prevalence of burnout among

HD RNs practising in North America and in Quebec (Doré et al., 2018; Flynn, Thomas-Hawkins, & Clarke, 2009; Harwood et al., 2010a; O'Brien, 2011; Ridley et al., 2009). HD is well-known to be a stressful nursing specialty that requires RNs to care for patients with complex health issues, encounter life-threatening situations, make critical decisions under pressure, and face emotionally demanding interactions while mastering the skills and challenges related to HD technology (Ashker, Penprase, & Salman, 2012; Karkar, Dammang, & Bouhaha, 2015; Wright & Merriweather, 2013). Maslach and Jackson (1986) conceptualized burnout based on three specific dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment. Moreover, evidence suggests that burnout manifests as a result of a complex interplay between individual and organizational factors (Maslach, Schaufeli, & Leiter, 2001).

Burnout was found to have serious health consequences for RNs such as anxiety, depression, impaired memory, sleep disturbances, neck and back pain, and alcohol consumption (Peterson, Bergström, Samuelsson, Åsberg, & Nygren, 2008). At the organizational level, burnout was also found to affect RNs through: reduced work performance (Taris, 2006); decreased satisfaction and engagement; and increased absenteeism and intention to leave their job (Kalliath, O'Driscoll, Gillespie, & Bluedorn, 2000). Burnout hindered interprofessional relationships (Kalliath et al., 2000) and negatively impacted quality of care and patient safety (Van Bogaert et al., 2014). Thus, burnout is an important problem to address for HD RNs.

In the literature, two main approaches have been recognized for burnout management. The first focuses on providing individuals with tools and resources they need to improve their ability to cope with stress and well-being, and the second aims at creating a more positive work environment (Leiter & Maslach, 2000; Maslach et al., 2001). A literature review of 10 studies indicated that despite some positive effects with individual-directed interventions to reduce work stress of RNs, a combined approach (interventions targeting both individual and organization) was promising in that it addresses the complex nature of stress in nursing (Mimura & Griffiths, 2003). Another systematic review of 25 studies, mostly conducted with RNs, found that a combined approach had greater potential for long-term reduction of burnout (Awa, Plaumann, & Walter, 2010).

Empowerment is becoming an important strategy to reduce the risk of workplace burnout for RNs (Laschinger, Finegan, & Shamian, 2001; Laschinger, Finegan, Shamian, & Wilk, 2001). Since individual and organizational factors are central to burnout (Maslach, 2003) and since workplace empowerment considers the individuals within their workplace to identify multifaceted strategies to increase productivity while focusing on their well-being (Laschinger, Finegan, & Shamian, 2001), it might be an ideal solution. Workplace empowerment of RNs is divided into two types: structural empowerment (SE) and psychological empowerment (PE). In this study, Laschinger, Finegan, Shamian, and Wilk's (2001) conceptual framework served as a guide to

obtain recommendations from HD RNs (intended users) on the type of information and elements to include in a future professional website to enhance empowerment and well-being, and reduce their risk of burnout.

Conceptual Framework

Laschinger, Finegan, Shamian, and Wilk (2001) integrated Kanter's theory of structural empowerment (SE) with Spreitzer's theory of psychological empowerment (PE). This conceptual framework is particularly helpful in attaining a global perspective about empowerment among RNs and for developing strategies focusing on their well-being and health while ensuring their productivity in care. According to Kanter (1977, 1993), RNs' behaviours and attitudes are shaped by their perceptions of how organizations supply opportunities to grow and the tools needed to perform their work. A structurally empowered workplace includes the following six organizational structures: (a) opportunities to acquire new knowledge and skills, and professional advancement; (b) information concerning the work and organization; (c) resources—either time, material, or human—to perform the work expected; (d) support needed from peers and managers; (e) formal power referring to a job that allows some flexibility, visibility, and creativity; and (f) informal power referring to a job that cultivates positive relationships with peers and managers and encourages networking. The presence of the aforementioned dimensions facilitates the development of four PE dimensions, which represent RNs' beliefs about their work role (Laschinger, Finegan, Shamian, & Wilk, 2001, 2003). Spreitzer (1995) defined these PE dimensions as: (a) meaning refers to the congruence between the RNs' beliefs, values, and behaviours, and work expectations; (b) competence reflects the RNs' confidence in their ability to perform work activities; (c) self-determination denotes a sense of choice among RNs in the execution of the work; and (d) impact indicates a belief among RNs that their own actions influence the strategies and results of work. When RNs possess these PE dimensions they feel empowered, which is reflected by positive attitudes and behaviours, and influences their sense of control over situations. This feeling of empowerment improves their work effectiveness and productivity, enhances their trust and engagement with the organization, improves their work satisfaction, and ultimately reduces their risk of burnout (Laschinger, Finegan, Shamian, & Wilk, 2001).

Relevant Research on Burnout and Empowerment for HD RNs

Laschinger (1996) demonstrated that structural empowerment (SE) is instrumental in addressing the work demands of RNs by increasing their sense of control over their practice, improving their job effectiveness and workplace satisfaction (Laschinger & Havens, 1996), and significantly lowering their levels of burnout (Hatcher & Laschinger, 1996). Laschinger, Finegan, Shamian and Wilk (2003) established that SE within the workplace significantly increased RN's level of psychological empowerment (PE), which, in turn, greatly reduced the effects

of occupational stress and levels of burnout over time. Research showed that SE increased the RN's person-job fit and work engagement by addressing organizational risk factors predictive of burnout (Greco, Laschinger, & Wong, 2006; Laschinger & Finegan, 2005), and that staff RNs who presented high perceptions of PE (feeling empowered) at work were less likely to suffer from burnout (Boudrias, Morin, & Brodeur, 2012; Hochwalder, 2007).

RNs working in American hospitals known for their positive conditions and improved patient outcomes identified the following positive characteristics of their workplace: high standards of care settings, working with competent RNs, and having good intra- and interdisciplinary relationships. At the same time, the RNs identified many negative aspects, such as limited participation in decision-making and shared governance, insufficient opportunities for professional development and advancement, and lack of managerial recognition of their performance or answering staff concerns (Thomas-Hawkins, Flynn, & Clarke, 2008). In a similar study, Ridley et al. (2009) explored the links between workplace empowerment and traits of high performance hospitals among Canadian nephrology RNs (about 68% were HD RNs). Findings were comparable to the American study; however, Canadian RNs reported much lower ratings on items such as up-to-date nursing care plans and assignments that fostered continuity of care, highlighting concerns about the quality of nursing care. In terms of empowerment, results indicated that all structural empowerment (SE) dimension subscales were reported as deficient (Ridley et al., 2009). A secondary analysis demonstrated that SE was significantly inversely correlated with emotional exhaustion (Harwood & al., 2010b), a finding supported by further studies (Hayes, Douglas & Bonner, 2015; O'Brien, 2011).

Phase one of our study identified that 38% of HD RNs in Quebec (n=308) were experiencing high risk of burnout, and that increased structural empowerment (SE) and psychological empowerment (PE) were associated with reduced burnout (Doré et al., 2018). Furthermore, HD RNs reported moderate levels of inadequate access to all SE and PE dimensions, and indicated that such access should be strengthened. Participants also indicated that a professional website would be a useful way to achieve empowerment. In short, there is an evident need to address the burnout of HD RNs working in Quebec and to use a combined approach based on SE and PE strategies. Based on earlier findings, we posit that a professional website may offer an innovative way of empowering HD RNs, positively influencing their personal well-being and reducing their risk for burnout.

Professional Websites to Enhance Empowerment and Reduce Burnout in HD RNs

Information and communication technology (ICT) has evolved at a fast pace in healthcare and is integrated within nursing practice (CNA, 2006; Phaneuf, 2009). ICT uses various digital technologies to capture, process, and exchange information on health promotion, treatment and management of diseases, and practices (Rouleau, Gagnon,

& Côté, 2015). Recently, increased focus has been placed on the role and impact of ICT in the work life of RNs (While & Dewsbury, 2011). A literature review identified the areas of nursing practice that can be influenced by ICT: (a) patient assessment and planning, providing and evaluating patient care; (b) patient and family teaching; (c) time management; (d) quality of documentation; (e) time spent documenting and on patient care; (f) knowledge updating and utilization; (g) information quality and access; (h) RN autonomy; (i) communication and care coordination; (j) intra- and inter-professional collaboration; (k) RN competencies and skills; (l) RN-patient relationship; (m) RNs' perspectives of the quality of care provided; (n) patient comfort and quality of life related to care; (o) empowerment; (p) functional status; and (q) satisfaction or dissatisfaction of RNs and patients using ICTs (Rouleau et al., 2017).

Professional websites are part of ICT and offer many benefits for the RN users. They can create a community of practice network that promotes communication on clinical topics and diverse aspects of the practice, and provide access to clinical guidelines, continuing education, and professional advancement (Bernhardt, Chaney, Chaney, & Hall, 2013; Ventola, 2014) to enhance the quality of care delivered by RNs (Rouleau et al., 2017). Professional websites can also diffuse information about health promotion and wellness, and provide social support and networking (Lefebvre & Bornkessel, 2013; Silversides, 2012). Social support is a favoured strategy to reduce burnout and enhance the well-being of RNs (Jenkins & Elliott, 2004).

Evidence suggests that RNs have positive perceptions about using ICT for professional development (Karaman, 2011). The main reasons include: (a) access to resources is flexible (anytime and anywhere) and effective (evidence-based information to provide best care to patients especially with RNs working in specialized areas); and (b) ICT can provide affordable continuing education (Cassano, 2014; Karaman, 2011; Sweeney, Saarmann, Flagg, & Seidman, 2008). The Ordre des infirmières et infirmiers du Québec (OIIQ) recognizes that professional websites may offer a practical option to fulfill the continuing education prerequisite for the professional registration norm adopted in 2012. This norm obliges each nurse working in Quebec to complete a minimum of 24 hours of continuing education every year. In addition, the OIIQ considers that professional associations are privileged partners in providing quality training that meets the needs of RNs (OIIQ, 2011). To our knowledge, research is limited on web-based interventions in nursing; few websites were created for RNs themselves, and none to promote empowerment and reduce burnout. One literature review indicated that a major challenge with website use is the high dropout rate, which may be due to user discomfort with technology or the website not responding to the specific needs of users (Im & Chang, 2013). The Canadian Nurses Association (CNA) highlights the importance of engaging RNs in the website design to ensure they are user-friendly and meet the needs of RNs so as to encourage their usage (CNA, 2006). With this in mind, a participatory action research (PAR) approach was utilized

in this study of HD RNs working in Quebec to identify key information and elements in the design of a future professional website intended to enhance the RNs' empowerment and well-being, and reducing their risk of burnout.

PAR Approach to Address Burnout Among HD RNs

Participatory Action Research (PAR) has its origins in action research (Lewin, 1946), emancipatory and feminist research (Maguire, 1996; Rose & Glass, 2008), and empowerment research (Freire, 1970). The goal of PAR is to combine theory and practice to advance research by providing a holistic view of the problem and create or support an action to solve a problem (Roy & Prévost, 2013). Central to PAR is a reflective practice aimed at producing a social and systemic change of practice or condition of life (Higginbottom & Liamputtong, 2015). PAR leads to empowerment and emancipation of individuals, and the development of skills (Anadón, 2007; Gillis & Jackson, 2002) because it enables individuals, groups, and communities such as HD RNs to be knowledgeable about their social realities, participate and engage in research, learn, take action, and transform their own situations and realities (Higginbottom & Liamputtong, 2015). PAR differs from traditional research by the position of the researcher who adopts a researcher-guide role (Catroux, 2002) and due to the co-construction of knowledge in action (Roy & Prévost, 2013). This knowledge is the product of a collaborative process and consensual dialogue between participants who each contribute their perspective (Roy & Prévost, 2013). The key principle is that those who are affected by the problem under study are involved in making the decisions that concern them (Salsberg, Macaulay, & Parry, 2014). The focus group is regularly used as a method with a PAR approach because it allows participants to express spontaneous opinions and experiences on the subject under study (Loiselle, Polit, & Beck, 2007), and the group interactions stimulate memories, discussion, debate, and disclosure, thus producing a broader and more in-depth understanding of issues or topics (Wilkinson, 2003). Focus groups can be used as a complement to a survey by corroborating the findings or exploring in greater depth the relationships suggested (Wolff, Knodel, & Sittitrai, 1993). PAR can be seen as a cornerstone in organizations for management issues or the development of practices (Bradbury-Jones, Sambrook, & Irvine, 2011). PAR was previously found to be advantageous in addressing nursing burnout in acute care facilities (Bourbonnais, Brisson, & Vézina, 2011; Bourbonnais, Brisson, Vinet, Vézina, Abdous, & Gaudet, 2006). With PAR, an advisory team composed of practice experts and decision-makers is central to the research process in order to ensure that results are relevant and translatable in addressing the practice needs of everyone concerned (Strauss et al., 2001).

The PAR approach was chosen for our study because of the need to situate the complex problem of burnout in the unique working context of HD RNs (input from their lived experience) to find an innovative way to address it and to propose a solution.

METHODOLOGY

Aim of Study

The purpose of this study was to adopt a participatory action research (PAR) approach to generate community-based recommendations for the development of a future web-based intervention to enhance the empowerment and well-being, and reduce the risk of burnout of HD RNs working in Quebec.

Ethical approval from the University of New Brunswick's Research Ethics Board and the OIIQ were obtained.

Sample, Data Collection, and Analysis

Sample. A maximum variation purposeful sampling strategy was adopted to recruit participants to establish two focus groups and a subset group of participants available for further follow-ups. The principal investigator (PI) and an advisory team selected participants based on the reputation method (Miles & Huberman, 2003). Inclusion criteria were used to identify the best-fit RNs for the purpose of obtaining relevant information (e.g., policies and procedures) and elements (e.g., forum of discussion, online seminar) for the potential website. The inclusion criteria were: a mixture of novice RNs (seniority of less than five years), experienced RNs (seniority of more than 16 years), and nursing educational team members or RNs with educational support function (e.g., preceptorship); (b) working in different types of French and English HD facilities (university hospital, affiliated hospital, satellite unit) in the Montreal region in the province of Quebec; (c) ability to speak, read, and write in French; and (d) engaged in or would like to make positive changes in the workplace.

Data. The PI then contacted the potential participants by phone and explained the research and expectations. The data for the study were collected from February 19 to March 12, 2017 and consisted of two rounds of focus groups: the first round consisted of two focus group sessions and the second round consisted of one session. All sessions were conducted in French, lasted about 120 minutes each, and were video-recorded. The advisory team consisted of two HD RNs (one HD RN was part of the focus group), two nursing educational team members, two managers, and one physician to provide guidance and feedback on the process, and met at critical times to provide additional feedback. These nurses were either highly recommended by the Regroupement visant l'excellence de la pratique infirmière en néphrologie au Québec (REINQ) and the Société québécoise de Néphrologie (SQN) associations whose mission is to optimize nephrology nursing care and develop the nephrology practices, or they were known in their workplace for making positive changes (e.g., participation in unit-based care processes design and preceptorship program).

First Round – Focus Groups. In the first round of focus groups, the first session had four participants and the second session had three. The sessions began with a brief presentation on the background of the study, and key concepts and results from the survey of HD RNs in Quebec.

This information was followed by a series of pre-determined probing questions informed by Laschinger, Finegan, Shamian, and Wilk's (2001) conceptualization of empowerment and aimed at identifying the types of information and elements (see Table 1a) to include in a professional website aimed at enhancing empowerment, well-being and reducing the risk of burnout of HD RNs. Data saturation was achieved in the two focus groups with no new information emerging and redundancy of information.

Analysis. The treatment and analysis of data were performed manually, as they allowed intimate knowledge of the data. Transcripts were thematically analyzed using Miles and Huberman's (2003) method, which included the following steps: (a) data reduction; (b) data display; and (c) conclusion and verification. A mixed mode analysis was used; codes were categorized in predetermined categories:

structural empowerment (SE) and psychological empowerment (PE) dimensions based on Laschinger, Finegan, Shamian, and Wilk's (2001) conceptualization of empowerment (deductive) or new emerging themes (inductive). The thematic analysis was presented and discussed with the research committee and two members of the Advisory Team (one HD RN and one nursing educational team member) to strengthen the analysis, interpretation, and conclusion (member checking). The PI then presented and discussed the results obtained from the focus group sessions with the remaining advisory team members.

Second Round – Focus Group. This round consisted of one focus group with a subset of three participants from the two previous focus groups. One week prior to the session, the PI sent (through secure email) a summary of the thematic analysis from round one. The PI began the session

Table 1a. *Focus Group Guide and Questions*

First Round

Introduction

Brief presentation on the study concepts: burnout, empowerment (structural and psychological), well-being & significant results obtained from the survey.

Do you have any comments about the results?

Probe: Results that did or did not surprise you?

Empowerment, Well-being, and Burnout

Now, I would like to ask you a few questions about empowerment, well-being, and burnout:

1. Have you ever been feeling disempowered at work... and why?
2. What are you currently doing or have done in the past to help support your own well-being at work?
3. What are you currently doing or have done in the past to help you feel more empowered at work?
4. What are you currently doing or have done in the past to help you reduce your risk of burnout due to work?

Website

*If there is a mention about the use of an on-line resource, then follow-up questions: What are the resources, how and where do you use them (at work or away from work), how did you learn about them, benefits from using them, challenges to use them? ...

5. If a professional website was designed for hemodialysis nurses that provided you with resources to help with your well-being and empowerment and reduce burnout risk, what would you think of that idea?

Probe: reasons why it is a good or poor idea?

*If the answer is that a website is a poor idea, then no point in pursuing this line of questions, except to probe more on the reasons why it is a poor idea and what other strategies might help improve well-being, empowerment, and reduce burnout risk.

*If the answer is that a website is a good idea, then you can continue with the website questions.

- A. What information about well-being could be part of the website?
- B. What information about empowerment could be part of the website?
- C. What information on the website about burnout risk might be helpful to you?
- D. What types of activities on the website might support your well-being and empowerment and help reduce burnout risk, such as chat rooms, etc.?
- E. When do you think it would be appropriate to use such a website (at work or on your own time)?
- F. What do you see as potential benefits of such as website (for you and in general for the HD community)?
- G. What do you see as the main barriers or issues (to using it or other)?

Specific on structural and psychological empowerment

- A. What type of resources would you like to find on a website to support your continuing education or professional development needs?
- B. What would be the type of information (themes/subjects that you think should be covered)?
- C. What resources or activities could be available on a website to make you feel more supported?
- D. What information or resources would you like to find on a website to help you do your job?
- E. What resources could be included on a website to better respond to your patients' needs?
- F. What opportunities could a website offer to increase your visibility and creativity?
- G. What can be included in a website to increase your autonomy at work and your ability to make clinical decisions and feel competent?

with a short presentation on the thematic analysis for validation (member checking) and followed with examples of websites or web tools available to meet the specific needs of HD RNs. The session was facilitated by the PI, and the discussions were free flowing in order to further define and organize the information and elements for the proposed website (see Table 1b). Following the session, the PI compiled, presented, and discussed the results with her co-supervisors and two members of the advisory team (one HD RN and one nursing educational team member) to ensure the recommendations were representative of the HD RNs' specific needs (member checking).

RESULTS

A total of seven HD RNs participated in the two rounds of focus groups. They were aged between 22 and 56 years old, French-speaking, ranged from novice to expert HD RNs (length of time working in HD varied from less than one

year to 18 years), and worked in various types of French and English HD settings in the Montreal region. The participants were all clinical RNs and more than half had educational support duties (e.g., preceptorship). All were engaged in their respective workplace to advance nursing or were known for wanting to create positive changes (see Table 2). The themes that resulted from the discussions fit into the structural empowerment (SE) and psychological empowerment (PE) dimension categories, as conceptualized by Laschinger, Finegan, Shamian, and Wilk (2001). Opportunity, information, and support were the main themes of the discussion. Two additional themes also emerged: feelings of burnout among HD RNs, and HD RNs' personal strategies for reducing work stress/burnout and enhancing well-being. Themes were classified into two main categories: proposed changes at the organizational level and benefits of having a professional website for HD RNs, as summarized below (see Table 3a and Table 3b).

Table 1b. *Focus Group Guide and Questions*

Second Round

Introduction

Brief presentation on the thematic analysis on the first round of focus groups and examples of websites or web tools available to meet the specific needs of hemodialysis nurses. There were few formal questions, however, extensive discussion about website development occurred.

1. Who should be involved in analyzing updating the content?
2. Do you feel this website should provide a competency certificate following online self-learning activities?
3. How could this website be promoted?

Table 2. *Characteristics of Focus Group Participants*

Characteristics	1	2	3	4	5	6	7
Years of experience in hemodialysis							
< 1							✓
1-5	✓						
6-10				✓			
11-15		✓	✓		✓		
16-20						✓	
✓							
Type of renal unit							
University hospital centre							✓ (E)
Affiliated hospital		✓ (F)				✓ (F)	
Satellite	✓ (F)		✓ (F)	✓ (F)	✓ (E)		
E = English							
F = French							
Type of nursing role							
Clinical nurse	✓	✓	✓	✓	✓	✓	✓
Educational support function		✓	✓	✓		✓	

Participants were all female nurses; able to speak, read, and write in French; and known for their engagement in their workplace.

Table 3a. Presentation of Thematic Analysis Results from the Focus Group Participants

Categories SE / PE Dimensions Thematic Analysis	Proposed Changes at the Organizational Level	Benefits of Having a Professional Website for HD RNs
Opportunity	<p><i>"Regular access to continuing education at work makes it possible to regain engagement and a sense of purpose in the work. We feel re-energized."</i> (RN-3)</p> <p><i>"Bi-annual meetings for continuing education with interdisciplinary team members would be helpful to update practices."</i> (RN-6)</p>	<p><i>"An online journal club, where everyone reads the same article and logs in at a specific time to discuss the article would be great to share knowledge."</i> (RN-2)</p> <p><i>"An online journal club would encourage us to do our continuing education because we cannot always go to trainings and conferences."</i> (RN-5)</p>
Information	<p><i>"There is an overload of information on bulletin boards and we have a hard time finding the relevant and newest information. There is a need for a better internal communication system."</i> (RN-4)</p> <p><i>"It would be very convenient to have at work an intranet page dedicated for dialysis."</i> (RN-2)</p>	<p><i>"A website would facilitate the networking for nursing educational teams to standardize practice - because they all do their own literature review and the literature is limited."</i> (RN-4)</p>
Support	<p><i>"We perceive that managers know that our efforts are important but they do not talk about it, they are greedy of compliments and recognition of our actions."</i> (RN-3)</p> <p><i>"Have support meetings to talk about our good deeds and give recognition."</i> (RN-1)</p>	<p><i>"A website could provide access to information on effective communication between professionals and with patients."</i> (RN-6)</p>
Resources	<p><i>"Sometimes you start work and the care plan of a patient is disorganized with many objectives to reach and the other RN who takes over will not be able to achieve them. It's frustrating because you know you will arrive the next day and it will be the same."</i> (RN-1)</p> <p><i>"Team stability in patients plays a decisive role in the empowerment of RNs."</i> (RN-3)</p>	<p><i>A website could give tips on time management.</i> (RN-6)</p>
Formal power	<p><i>"Have a Clinical Quality of Care Committee with clear guidelines and objectives - we would like to participate to make changes to improve the care."</i> (RN-4)</p> <p><i>"A board in the HD to write proposals to develop the practices: staff RNs work on a protocol supported by a nursing counselor and the manager."</i> (RN-6)</p>	
Informal power	<p><i>"Other professionals in our team also face difficult situations - it would be nice to invite them sometimes to our meetings to share their experience."</i> (RN-1)</p>	<p><i>"A website could be used for announcements of conferences, social events, fundraising or other events."</i> (RN-7)</p>
Meaning	<p><i>"In order to increase the meaning in the work, we need qualified people in empowerment to support managers and nursing counselors in identifying empowering strategies for employees."</i> (RN-3)</p>	
Competence	<p><i>"I like the idea of team meetings and talking about a complex case and do a debriefing - where each RN gives her opinion on how she would have proceeded."</i> (RN-2)</p>	<p><i>"Contributing to the website would improve our sense of competence."</i> (RN-2)</p>
Self-determination	<p><i>"Having training to help patients become autonomous in their care and empowered with their illness - will necessarily help us with our professional autonomy and empowerment as a RN."</i> (RN-3)</p>	<p><i>"With the website, we would have easier access to collective prescriptions, rules of care, policies and procedures that will make us more autonomous in our practice."</i> (RN-2)</p>
Impact	<p><i>"It is surprising how much RNs are interested in participating when they are asked - if there is no attempt to solicit them, then they disengage from work."</i> (RN-3)</p>	<p><i>"With a website, we would think about proposing innovations for the practice."</i> (RN-3)</p>

SE: structural empowerment; PE: psychological empowerment

Table 3b. Presentation of Thematic Analysis Results from the Focus Groups Participants

Emerging Themes	Feeling Burnout Among HD RNs	HD RNs Personal Strategies for Reducing Work Stress/ Risk of Burnout and Enhancing Well-Being
Thematic Coding	<p><i>"Last time I was obliged to work overtime, I was more tired, I felt less patient with my colleagues and the patients. I said things I regretted and felt guilty." (RN-2)</i></p> <p><i>"We feel like just letting ourselves be carried by the wave, we do not take initiatives or make any more efforts. We focus only on our work tasks, we are reluctant to change." (RN-1)</i></p> <p>Proposed changes at the organizational level</p> <p><i>"We do not have workplace wellness conception - RNs are not asked how they are doing - it should be considered." (RN-3)</i></p>	<p><i>"Talk about work situations with colleagues, see friends and do sports." (RN-3, RN-5)</i></p> <p><i>"Talk about work situations with colleagues, see friends and do sports." (RN-3, RN-5)</i></p> <p>Proposed changes at the organizational level</p> <p><i>"Outings to do group activities with colleagues would be good to reduce stress and solidify the RNs team." (RN-7)</i></p> <p>Benefits of having a professional website for HD RNs</p> <p><i>"A website would be a good idea to have self-assessment and resources to promote healthy lifestyle, exercises to self-reflect." (RN-6)</i></p>

Feeling Burnout Among HD RNs

HD RNs described their work as very technical. The care is complex, demanding, and intensifying especially with the increasing complexity of patient needs. RNs commented about feeling a constant pressure to perform, requiring fast thinking and actions, and creating high levels of stress. They reported that HD care is physically demanding and, for some RNs, too tiring. Interactions with patients and colleagues, and lack of support from peers and managers were recognized as significant sources of stress leading to burnout. They mentioned that a workplace wellness approach should be considered.

HD RNs Personal Strategies for Reducing Work Stress/Risk of Burnout and Enhancing Well-Being

HD RNs discussed the importance of having a good work-life balance and healthy lifestyles. They reported using some strategies both at work and outside work to reduce their stress and enhance their well-being. The most important strategy was social support, which was provided firstly by colleagues, then family and friends. Physical activities, relaxation techniques, yoga, self-reflection, and social activities were also identified. They indicated that social activities with the nursing team would solidify team spirits and provide support, and that a website would be beneficial in providing useful information to promote a healthy lifestyle and could provide self-assessment tools and resources.

Opportunity

HD RNs divulged being very conscientious about delivering high-quality care. They further discussed the pressing need for opportunities in their workplace to update their knowledge and skills that are tailored to their specific needs, and the importance of including the interdisciplinary team. They explained that the website could give access to live or recorded conferences, symposia or seminar training, web simulations and exercises, tutorials, learning modules (with learning objectives and continuing education certification potentially), slide presentations, scientific articles/theses with a focus in nephrology, and an online journal club for

HD RNs. They stated that all web resources must target RNs' needs, but that a renal interdisciplinary approach would be welcomed (i.e., contributions from nephrologists, renal pharmacists, nutritionists, and social workers).

Information

HD RNs explained that information is essential in the workplace to perform work activities and that oftentimes, they are not knowledgeable about key information and new procedures. They reported feeling that this situation impacts on the quality and safety of care as well as on their feelings of empowerment. They recommended having a better communication system (visible bulletin boards on the units that are regularly updated or a dedicated intranet homepage for HD). They mentioned that team meetings are frequently cancelled and become sporadic; thus, they recommended having regular team meetings to share information, discuss issues, and promote shared governance or a more participative process in decision-making. They commented that a website for HD RNs would be valuable because all HD settings in Quebec could share: policies and procedures, collective prescriptions, practice guidelines, tools and information for patients and new RNs, and useful web links. They indicated that a directory with an online bulletin board to create a community of practice would be useful.

Support

HD RNs reported that support is indispensable at work in addressing current challenges in HD. HD RNs are known to be a close circle of professionals who are usually very supportive. However, the participants revealed that some of their RN colleagues are more rigid and not as supportive especially with new RNs who are not performing according to standards. They stated that managers should meet with these RNs and encourage them to self-reflect. They highlighted the need for a better preceptorship program to retain new RNs in HD and to improve skills of preceptors. They commented on the need for team meetings to discuss difficult care situations or ethical issues to de-dramatize situations. They indicated that these situations might require

a facilitator to address issues to ensure a constructive outlook on situations and outcomes. HD RNs also stressed the importance of having a manager who is encouraging and gives recognition. They indicated that a professional website could provide useful tools for conflict management, problem solving, and/or to provide support for colleagues. They mentioned that an online discussion forum would be favorable for HD RNs to share their lived experiences.

The PI presented and discussed the results with the Advisory Team who suggested some useful links to websites and training activities such as reflexive workshops. We originally anticipated presenting the recommendations for the creation of a future website for HD RNs to the Société québécoise de Néphrologie (SQN). Upon further discussion, the Advisory Team proposed the recommendations to the Regroupement visant l'excellence de la pratique infirmière

Table 4. *Final Recommendations for the Development of a Future Website for HD RNs*

Recommendation #1 To develop a professional website targeting the professional needs of the hemodialysis nursing community in Quebec.

Rationale and benefits (perceived by the participants):

- Provide easy access to resources relevant to nurses and be available at any time
- Promote standardization of care across Quebec
- Promote sharing of expertise
- Provide opportunities for professional development and continuing education (perform these activities at convenient times)
- Promote clinical innovation
- Provide peer support and information to optimize wellness and reduce job stress and burnout
- Facilitate communication between RNs who work varied schedules
- Overall provide a general sense of empowerment at work

Recommendation #2 To create an executive committee to overview and update the content of the Website. This committee should be composed of: two hemodialysis nurses, one nursing practice consultant, one nurse practitioner, one nursing counsellor, two nursing managers, one member of the executive of the REINQ, one physician (member of the SQN), one dietitian, one pharmacist. The members should meet at least once every two months and the membership should be renewed yearly. The committee should designate two members as site managers.

Rationale and benefit (perceived by participants):

- Ensure the content is evidenced-based and updated

Recommendation #3 Develop written ground rules for online discussions and have a moderator (for any forums that are created). The committee should designate a member or someone external.

Rationale and benefit (perceived by participants):

- Ensure that discussions are professional and courteous

Recommendation #4 The potential professional website should be user-friendly and easy to navigate to all nurses and comprise the following five main tabs:

- Continuing education: documentation (e.g., vascular access, nutrition for patients, comorbidity in hemodialysis, diabetes and heart failure) and online continuing education (e.g., video, case studies, live or past web conferences, seminars, symposia and web tools for patients, online reading club, research and publications, bulletin board event to announce learning activities)
- Information for practice (e.g., news and clinical innovation, glossary, best practice including policies and procedures, guidelines, collective prescriptions, nursing rules, health and safety, infection control, vaccination and resources for nurses and patients) with a forum for discussion
- Healthy lifestyle habits (e.g., information on improving nutrition, exercise, relaxation and sleep, reducing stress and strategies to adapt, promoting a better work-life balance as well as self-assessment tools and links to employee and family assistance programs and other resources)
- Networking (e.g., social activities, training activities, general announcement board and fundraising activities)
- Contact information (e.g., emails, phone numbers of managers and clinical support teams)

Each tab would have its own subtabs and specific information and element

*All focus group participants agreed to the above recommendations.

**REINQ : Regroupement visant l'excellence de la pratique infirmière en néphrologie au Québec; SQN : Société québécoise de Néphrologie

en néphrologie au Québec (REINQ) and collaborated with the SQN in order to gain community buy-in (HD RNs). The PI contacted the REINQ and SQN for the purpose of presenting the project. Lastly, the PI met again with the Advisory Team to discuss the final report, which included four recommendations for the website: target the needs of HD RNs; form an executive committee; develop ground rules for the website; and ensure easy website navigation (see Table 4). In early August 2017, the report was presented by the PI to the REINQ, which supported the recommendations and agreed to assist with the future development of a professional website.

DISCUSSION

To our knowledge, this study is the first to propose the development of a professional website to address burnout among HD RNs. Focus group results support the findings from the online cross-sectional survey conducted in phase 1 of this research, indicating that a significant amount of burnout exists among HD RNs working in Quebec and that empowerment is key in addressing the issue (Doré et al., 2018). For the current phase, our research team initially expected that in using a participatory action research (PAR) approach, the focus groups would illuminate nursing practice and engage RNs to discuss actions for their practice and health. More precisely, this action would come in the form of providing community-based recommendations (by checking in with HD RNs) for the development of a future professional website to enhance empowerment and well-being, and reduce the risk of burnout of HD RNs working in Quebec. The researcher met with the one affected by the problem under study to understand the actual problem and later on communicate with participants to confirm what they have said to ensure accuracy of study). We held this assumption on the basis that focus groups usually provide a more comprehensive understanding of the problem under study and determine sustainable solutions (Ivankova, 2015; Mills, 2011). However, the focus changed somewhat when the RNs also identified priorities to be addressed at the organizational level by suggesting structural and psychological strategies. The RNs were enthusiastic and clear about the many positive outcomes that a future website could have on their practice and well-being.

With a PAR approach, the researcher and facilitator must be knowledgeable about the community and sensitive to participants' issues (Gillis & Jackson, 2002). Argyris and Schön (1999) and Schwarz (2002) added that the facilitator must have deep reflective skills and be able to create a supportive environment for mutual learning. The PI, who was also the facilitator in this study, has extensive experience as a HD RN in Montreal and as a Nursing Practice Consultant reviewing work processes and practices and implementing organizational changes using participatory principles. Although the PI had no power of authority on the staff or conflict of interest, she did self-reflect on her mobilizing potential before undertaking the study. The goal of the PI was to give a voice to these HD RNs, share their stories and move forward to create strategies to enhance empowerment and well-being, and reduce the risk of burnout within their nursing community. This goal

was achieved; positive group synergy existed at each session, and the RNs were able to articulate their thoughts and engage in proposing changes. It is important to note, however, that although these participants contributed fully, there was resistance from some managers when the PI was recruiting participants, minimizing the burnout problem.

At the end of the first round of focus group sessions, the PI asked participants about their experience. They described their experience as positive and that their participation provided an occasion to self-reflect on their work situation and well-being, as well as providing them with new insights into their practice. They felt empowered to participate in proposing recommendations for the development of a future website that represents an innovation to support their professional practice and promote their well-being. They stated that this research project was important to them and to the HD nursing community. Most of them volunteered to continue contributing to the development of the website if created. Following the focus group sessions, the PI sent an email to participants asking them to share their experience about the process. Three RNs reported:

I appreciated my experience in participating in the focus groups. This allowed me to find out about the nursing realities in other HD facilities and it made me realize that we live the same work situations despite our different types of facilities - this shared experience taught me a lot. (RN-1).

It was empowering to discuss with other RNs in our specialty without judgment or pressure – to share our positive and negative experiences, to recognize the challenges and difficulties that are common to all – small focus groups facilitate communication and everyone could confide, propose solutions – we really felt the researcher's interest in helping us, we felt confident and well guided to allow us to self-reflect and express our opinion to create a clinical innovation. (RN-2).

I thoroughly enjoyed my experience – the small focus groups allowed us to feel the trust among each other to discuss difficult topics related to our work-life – I felt energized to be able to express my thoughts and opinions for the benefit of creating positive changes for the practice. (RN-4).

LIMITATIONS

The primary limitation of this study is the small sample size. HD RNs have a very busy work schedule making it impossible to integrate the PAR activities within their work schedule. The focus groups were conducted during their days off (consensual decision among the potential participants), which may explain a lower attendance rate than expected. Despite the small sample size, the strength of this study was the group synergy that generated rich data during the focus group sessions providing a clear and comprehensive perspective of HD RNs' needs, and corroborated the findings of the earlier survey. Another limitation of this study is that the results were meant to recommend systemic changes and provide sustainable solutions for the HD RNs community in Quebec, which may be difficult to generalize

beyond our population. However, our research further supports the usefulness of a PAR approach to address burnout of RNs and the benefits of using ICT to address the personal and professional needs of RNs.

IMPLICATIONS AND RECOMMENDATIONS

The results of this study demonstrate the usefulness of Laschinger, Finegan, Shamian, and Wilk's (2001) conceptual framework to develop strategies to empower HD RNs to be efficient at work, and address burnout and well-being. With this study, the most valuable lesson we learned about using a PAR approach that may guide future research is that to achieve empowerment of RNs in order to create a social change, we must have RNs and managers who are concerned about the problem and engaged at improving nursing practice, and creating a supportive work environment. When RNs engage in examining their practice and work life, there is occasion to enhance awareness and learning, see new possibilities, and contribute their efforts to solve a problem. At the micro level, managers must engage RNs to be more active in the decision-making that affects their work, the delivery of patients' care, and their well-being. RN participants felt they had a voice that should be heard to make local structural changes and to establish wellness initiatives, and that an institutional quality committee could be beneficial. At the macro level, HD nursing managers would benefit from having a formal provincial committee that would promote the sharing of workplace concerns, resources, and solution-making, as well as obtaining support and transformative leadership training to empower staff. This was discussed and agreed upon among focus groups participants and presented to the advisory team who thought it was an excellent idea. Furthermore, for RN researchers/practitioners who are contemplating using a PAR approach, three main principles must be observed: (a) shared ownership of the project; (a) community-based analysis (collaborators examine the problem arising within the community); and (c) orientation towards a community action (participants willing to act upon findings) (Kemmis & McTaggart, 2000). The engagement of participants and group synergy must be promoted during the focus groups through open communication (focused on honesty and transparency principles), respect, trust, engagement, balance in power relations (ensuring everyone has the chance to speak equally), positive conflict resolution (speaking frankly about disagreements and conflicts), and promotion of abilities and competencies that are stimulating and conducive to share lived experiences, situate the problem and find solutions (Lasker, Weiss, & Miller, 2001). Furthermore, since a PAR approach is conducted with those who are affected by the problem under study and oriented toward a

meaningful action, it requires a high degree of reflexivity and flexibility (Bergold & Thomas, 2012).

CONCLUSION

Phase I of this study confirmed that burnout was a significant problem for HD RNs working in Quebec and that empowerment would be key to address it, and highlighted that a professional website would be an innovative way to achieve it (Doré et al., 2018). This current phase of the study developed recommendations for the creation of a future professional website to enhance HD RNs' empowerment and well-being, and reduce their risk of burnout, and highlighted important workplace changes that could be further developed with HD nursing care teams and with a provincial group of managers. Based on the results, the recommendations were well received, and plans are to develop an actual website.

Having used a PAR approach, we are confident that this web-based intervention is promising for responding to the practice and health needs of HD RNs and ensuring its sustainability. PAR was a valuable approach to explore issues in the workplace of RNs and complex problems such as burnout, and to develop systemic changes of practice and condition of work life.

FUNDING

The authors confirm that no financial aid was received to conduct this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper or the conduct of this study.

INTELLECTUAL PROPERTY AND CONTRIBUTIONS

CD was responsible for study conceptualization and design, conducted the focus groups and wrote the final report for the REINQ. CD performed the data analysis and discussed results with the PhD co-supervisors (L.D-L, MM) and advisory team members for this study and co-authors who specialize in empowerment (JS, MB) and participatory approach (JS). CD drafted the article and revisions were made in collaboration with the co-authors (L.D-L, MM, JS, MB). All authors agreed with the final version that was sent for publication.

ACKNOWLEDGEMENTS

The authors wish to acknowledge and thank the HD RNs working in Quebec who participated in the focus groups for sharing their unique perspective and generous contribution. We would like to thank the advisory team members for their engagement and collaboration throughout this research, and the OIIQ, REINQ and SQN for their support.

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Restless Legs Syndrome (RLS) in hemodialysis patients

By Hugh Quinn and Marisa Battistella

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LEARNING OBJECTIVES

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

1. Describe the prevalence of RLS in hemodialysis patients.
2. Discuss the impact of RLS on patients' quality of life in hemodialysis patients.
3. Define the diagnostic criteria for RLS.
4. Evaluate possible treatments for RLS in the hemodialysis population.

RESTLESS LEGS SYNDROME

More than one in 10 Canadians suffer from chronic kidney disease (CKD) and greater than 21,000 are receiving dialysis treatment for their end-stage kidney disease (ESKD) (CORR, 2017). Sleep disorders, in general, have been shown to be associated with increased fatigue, poor healthcare-related quality of life, and depression (de Menezes et al., 2018). Hemodialysis treatment may be associated with many complications experienced by patients, with a variety of sleep disorders being among the most prevalent. One of the more common sleep disorders experienced by patients receiving hemodialysis treatment is restless legs syndrome (RLS) (Davison et al., 2015). RLS is often described by patients as an urge to move accompanied by uncomfortable sensations and pain, which begins or worsens during periods of inactivity (Gopaluni, Sherif, & Ahmadouk, 2016). Most estimates place the prevalence of

RLS among long-term hemodialysis patients in the range of 10–20% (Davison et al., 2015). In addition to the effects of impaired sleep, RLS has also been linked to premature withdrawal of dialysis and increased cardiovascular morbidity and mortality (Davison et al., 2015).

PATHOPHYSIOLOGY

The underlying pathophysiology associated with RLS is currently not well understood and warrants further investigation. Symptom improvement has been noted in patients receiving dopamine agonists such as levodopa (Akpinar, 1982), which, along with the worsening of symptoms in patients receiving dopamine antagonists, such as prochlorperazine (Winkelmann et al., 2001), suggest that decreased activity of the neural dopamine signaling pathways may play a role in the pathogenesis of the condition. Dopamine is a molecule that plays a critical role in cell communication. It is involved in multiple pathways in the brain that regulate pleasure, reward, mood, motivation, and movement (Perry, 2015). Disruptions in dopamine signaling can have various effects depending on which areas of the brain are affected. Therefore, a decrease in activity of dopamine may result in the symptoms observed in patients presenting with RLS (Connor et al., 2009). Iron deficiencies have also been linked to RLS symptoms as iron is a key component in the metabolic pathway that produces dopamine (Gopaluni et al., 2016). Another possible contributing factor in dialysis patients is uremia. Because patients with end-stage kidney disease (ESKD) are unable to clear urea on their own as a result of reduced kidney function, urea can build up in the blood and cause metabolic, hormonal, fluid, and electrolyte imbalances. (Meyer & Hostetter, 2007) Data have shown that there may be uremic factors contributing to RLS in patients on dialysis as symptoms have been shown to greatly improve upon kidney transplantation, and can improve with increased dialysis (e.g. receiving eight hours of dialysis every night versus four hours three times weekly) (Kahvecioglu et al., 2016). Other possible etiologies have been investigated, and RLS is now generally considered to be a central nervous system related disorder (Miyamoto, Miyamoto, Iwanawi, Suzuki, & Hirata, 2009).

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DIAGNOSIS

An important part of diagnosing RLS is the ability to rule out other possible conditions that present with similar signs and symptoms, and may mimic RLS. Conditions that should be considered as differential diagnoses for RLS include: akathisia, peripheral neuropathy, leg cramps, radiculopathy, arthritic pain, positional discomfort, and periodic limb movements in sleep (PLMS) (Gopaluni et al., 2016). It may be difficult to differentiate RLS from these conditions as they often fulfill the most recent diagnosis criteria for RLS, which were revised in 2002 to include the following:

1. Urge to move the legs with unpleasant sensations in the legs. Arms and other body parts occasionally involved
2. Symptoms begin or worsen during periods of rest or inactivity
3. Symptoms partially or totally relieved by movement and as long as the activity continues
4. Symptoms are worse during the evening or night than during the day (Allen et al., 2003).

DRUG-INDUCED RESTLESS LEGS SYNDROME

Although the pathophysiology of RLS is not fully understood, it has been linked to neural signaling; thus, drugs that affect neural signaling have the potential to induce RLS. There have been several case reports published regarding drug-induced restless legs syndrome (DI-RLS) in which a variety of medications have been linked to either worsening or new onset of symptoms of RLS (Patatanian & Claborn, 2018) (see Table 1). Antipsychotics, antidepressants, and antiepileptics are among the worst offenders when it comes to DI-RLS (Patatanian & Claborn, 2018). These medications work in various ways to alter neural signaling, and have the potential to affect dopamine signal transmission. If medications are a suspected cause of a patient's RLS symptoms, removal of the offending agent should be considered if medically safe (Patatanian & Claborn, 2018).

Table 1: Medications Associated with Drug-Induced Restless Legs Syndrome

Drug Class	Examples of Medications
Antipsychotics	Olanzapine, clozapine, quetiapine, aripiprazole, risperidone, lurasidone, haloperidol
Antidepressants	Sertraline, paroxetine, fluoxetine, duloxetine, citalopram, escitalopram, mirtazapine, nefazodone, lithium
Anti-epileptics	Topiramate

List of examples includes some medications with published case reports regarding drug induced restless legs syndrome and does not include all possible causative medications.

TREATMENT OF RLS

Non-Pharmacologic Treatment Options

Any non-pharmacologic measure that can be taken to improve sleep quality in patients suffering from RLS should be utilized first. The removal of stimulants such as caffeine should be suggested to patients. Sleep hygiene should be assessed in patients, and methods of improving it on an individual basis can be discussed and recommended (Winkelmann et al., 2018). For those patients with good sleep hygiene who still experience symptoms of RLS, iron and phosphate levels should be assessed and corrected before considering any pharmacologic treatments (Davison et al., 2015). Exercise and the use of pneumatic compression devices (e.g., stockings or boots that are placed around the legs and intermittently filled with air to improve circulation) have also been found to be likely efficacious for the treatment of RLS, and are low-risk options that do not require any additional monitoring (Winkelmann et al., 2018). Patients who conduct aerobic exercises such as pedaling on a stationary bike often receive more efficient dialysis, which may be the factor contributing to the improvement of RLS symptoms (Gopaluni et al., 2016).

Pharmacologic Treatment Options

A variety of pharmacologic options have been studied for the treatment of RLS in the general population including: levodopa, dopamine agonists, and anticonvulsants (see Table 2). Data for these options in the dialysis-specific population is less robust, but their safety, efficacy, and possible roles in treatment will be further discussed. Other agents including opioids and tramadol have also been studied for the treatment of RLS. However, the evidence for their efficacy is still limited, and they possess safety concerns that make them less favourable treatment options (Winkelmann et al., 2018).

Levodopa. The most studied pharmacologic treatment for RLS has been levodopa. Its efficacy has been shown in numerous trials, and it has been shown to be safe for use in patients receiving hemodialysis (Winkelmann et al., 2018). Levodopa works by crossing the blood brain barrier where it is then converted into dopamine by decarboxylases. In order to prevent side effects associated with increase in systemic dopamine, levodopa is administered with a decarboxylase inhibitor (e.g. carbidopa [Sinemet®]), which prevents the conversion of levodopa to dopamine until it has crossed the blood brain barrier (Erwin & Turco, 1986). Dosing adjustments for levodopa are likely not required in dialysis patients, as only a small fraction of the drug is excreted unchanged in the urine (Bennett et al., 1983). Unfortunately, levodopa treatment is associated with a high prevalence of augmentation (Gopaluni et al., 2016). Augmentation is the worsening of symptoms due to prolonged treatment and can manifest as symptom onset earlier in the day, increased severity of symptoms, or shorter duration of relief from symptoms following medication use (Winkelmann et al., 2001). Due to its short duration of action, and the high prevalence of augmentation, levodopa may be reserved for individuals who cannot tolerate or have failed other treatment options.

Table 2: Treatment Options for Restless Legs Syndrome in Hemodialysis Patients

Agent	Recommended Dose in Hemodialysis*	Special Monitoring	Common Side Effects
Levodopa/ Carbidopa	100 mg/25 mg	Signs of augmentation	Agitation, anxiety
Ropinirole	Initial: 0.25 mg/day (MAX 3 mg/day)	Blood pressure	Dizziness, nausea
Pramipexole	Initial: 0.125 mg once daily (MAX 0.75 mg/day) [#]	Blood pressure	Nausea, somnolence
Cabergoline	Initial: 0.5 mg/day (MAX 3 mg/day)	ECG every 6-12 months	Constipation, nausea, headache
Gabapentin	100 mg once daily (MAX 300 mg) [†]	Unusual behaviour or mood changes	Dizziness, drowsiness
Pregabalin	25 mg once daily (MAX 75 mg once daily) [†]	Peripheral edema	Dizziness, drowsiness

*Dose recommendations based on data obtained from product package inserts.

[#]Evidence for dosing recommendations in patients receiving hemodialysis is not well established.

[†]Dose to be given post hemodialysis.

Dopamine agonists. Another acceptable treatment option utilizing dopaminergic pathways are the dopamine agonists. These include ergot-derived agonists (e.g. cabergoline [Dostinex[®]]) and non-ergot-derived agonists (e.g. ropinirole [Requip[®]], pramipexole [Mirapex[®]]). These drugs activate dopamine receptors within the nervous system and have been shown to reduce symptoms associated with RLS (Winkelmann et al., 2018). Dopamine agonists have longer half-lives and lower incidence of augmentation compared to levodopa (Gopaluni et al., 2016). Doses of dopamine agonists when used to treat RLS are much lower than doses used to treat Parkinson's disease. Common side effects noted in patients receiving ergot-derived dopamine agonists include: constipation, nausea, and headache (Dostinex, 2011). Common side effects that may occur in patients receiving non-ergot-derived dopamine agonists include: nausea, vomiting, dizziness, and orthostatic hypotension (Mirapex, 2018; Requip, 2007). One study into the use of ropinirole in RLS patients found that 37% and 10% of those patients experienced nausea and vomiting, respectively (Kurin, Bielefeldt, & Levinthal, 2018). Special attention should be paid to monitoring for these adverse effects, as well as signs of augmentation.

Gabapentinoids. Many anticonvulsant agents have been used to treat RLS. The agents with the strongest evidence that are regarded as safe for use in hemodialysis patients are the gabapentinoids. (Winkelmann et al., 2018). Gabapentinoids have been shown to activate the gamma-aminobutyric acid (GABA) receptors, which may reduce impulse transmission in the spinal cord (Patel & Dickenson, 2016). In addition, GABA may affect the release of dopamine and serotonin, which may also provide some explanation for RLS symptom control seen in patients taking these medications. Significantly less augmentation is seen with these medications compared to dopamine agonists, and relatively few adverse effects are noted compared to other

anticonvulsants (Winkelmann et al., 2018). Both gabapentin (Neurontin[®]) and pregabalin (Lyrica[®]) are highly dialyzable, so supplemental doses after each dialysis session may be required. Common side effects that may occur in patients receiving these medications include: somnolence, unsteadiness, dizziness, and dry mouth (Lyrica, 2018; Neurontin, 2017). Because many hemodialysis patients often suffer from multiple comorbidities or are taking medications that put them at greater risks for falls, special consideration to falls risk should be given before initiating these medications.

SUMMARY

Restless legs syndrome (RLS) is a common issue among the hemodialysis population. The pathophysiology behind the cause of symptoms is not well understood, but likely involves some disruption in the dopamine signaling pathway. Non-pharmacologic measures that can be used to help resolve symptoms include proper sleep hygiene and exercise while receiving dialysis. A variety of drug classes including antipsychotics, antidepressants, and antiepileptics may induce RLS, and removal of offending agents should be considered, if medically safe. If a patient is found to be iron deficient, supplementation should be given, and symptoms should be reassessed prior to initiating any other medical treatments. In patients who do not have iron deficiency, drugs that are considered to be efficacious include: levodopa (Sinemet[®]), cabergoline (Dostinex[®]), ropinirole (Requip[®]), pramipexole (Mirapex[®]), gabapentin (Neurontin[®]), and pregabalin (Lyrica[®]). Augmentation, or the worsening of symptoms with treatment, is a common phenomenon found with the use of dopaminergic drugs (levodopa, cabergoline, ropinirole), thus special monitoring for this effect in patients is required. As with all medications, it is important to ensure proper dose reductions are made for patients on hemodialysis.

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Restless Legs Syndrome (RLS) in hemodialysis patients

By Hugh Quinn and Marisa Battistella

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- Which of the following conditions are associated with sleep disorders in hemodialysis patients?
 - Fatigue
 - Depression
 - Cardiovascular mortality
 - All of the above
- Which of the following may contribute to the development of Restless Legs Syndrome?
 - Electrolyte imbalances
 - Iron overload
 - Decreased dopamine signaling
 - Muscle breakdown
- Which of the following is NOT a part of the diagnostic criteria for RLS?
 - Symptoms relieved by movement
 - Strong urge to move the legs
 - Symptoms are worse at night
 - Symptoms are associated exclusively with the legs
- True or False: The only options found to reduce symptoms of Restless Legs Syndrome are pharmacologic?
 - True
 - False
- Which of the following conditions should be ruled out before an RLS diagnosis is made?
 - Heart failure
 - Peripheral neuropathy
 - Periodic limb movements in sleep (PLMS)
 - Both b and c
- Which of these medications may worsen the symptoms of RLS?
 - Methadone
 - Prochlorperazine
 - Carbidopa
 - Iron Dextran
- Which of the following best describes the mechanism of action of levodopa?
 - Activates dopamine receptors at the neuromuscular junction
 - Is converted to dopamine in the liver by decarboxylase
 - Inhibits dopamine receptors in the brain
 - Crosses the blood brain barrier and is then converted into dopamine
- Which medication is associated with the highest prevalence of augmentation?
 - Pregabalin
 - Levodopa
 - Cabergoline
 - Gabapentin
- True or False: A dose reduction is required for Levodopa/Carbidopa for patients with creatinine clearance less than 30 mL/min.
 - True
 - False
- Drug classes most associated with Drug-Induced Restless Legs Syndrome include the following, EXCEPT:
 - Antipsychotics
 - Antiepileptics
 - Antiarrhythmics
 - Antidepressants

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Restless Legs Syndrome (RLS) in hemodialysis patients

Volume 28, Number 3

By Hugh Quinn and Marisa Battistella

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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:

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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

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- Des exposants nous présenteront leurs produits et nouveautés
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