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JOURNAL ACITN

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Letter from the Editor: Gillian Brunier

More than 1,000 nephrology nurses with certification in Canada

We can be proud that there are now more than 1,000 nephrology nurses with Canadian Nurses Association (CNA) certification—such a program of which to be proud. Through attendance at local supper clubs with guest speakers or attendance at CANNT regional and national symposia, the CNA certification program has prompted us to make certain we have the requisite number of continuing education (CE) hours to renew our certification every five years.

In this issue of the **CANNT Journal**, we bring you another excellent CE article. This article will not only help you learn, but at the same time help you obtain more continuing education hours towards certification. The article is entitled "Are Canadian Society of Nephrology (CSN) and National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) mineral metabolism guidelines for hemodialysis patients achievable? Results from a provincial renal program," by Lori Wazny and her colleagues, pharmacists at the Manitoba Renal Program. We hope you will be challenged with the CE questions.

Also in this issue, we have a research study entitled "Predictors of hemodialysis central venous catheter exit-site infections," by Lori Harwood and her colleagues at the London Health Sciences Centre, London, Ontario. Their important study was assisted by financial support from a CANNT 2005 Research Grant. This is certainly an area worthy of nephrology nursing research, given that so many of our patients on dialysis in Canada do have hemodialysis catheters as their primary access.

In the Pharmacy News and Reviews section, a doctor of pharmacy student, Jodi Symes, has written an excellent review entitled "Low molecular weight heparins in patients with renal insufficiency." Take time out of your busy day to update yourself on the latest research on the use of low molecular weight heparins for prophylaxis and treatment of clotting disorders in patients with impaired kidney function.

To conclude this issue of the **CANNT Journal**, we are delighted to be able to showcase two exemplary Canadians, nephrologist Dr. Dasgupta from Edmonton and advanced practice nurse Betty Kelman from Toronto. These two were both awarded Lifetime Achievement Awards for their many years of contributions to peritoneal dialysis at the most recent Annual Dialysis Conference, in Orlando, Florida. Enjoy reading about their achievements!

Lettre de la rédactrice en chef : Gillian Brunier

Plus de 1 000 infirmières et infirmiers certifiés en néphrologie au Canada

C'est avec fierté que je vous annonce que nous avons franchi le cap des 1 000 infirmières et infirmiers à avoir obtenu la certification en néphrologie [CNéph(C)] de l'Association des infirmières et infirmiers du Canada (AIIC)—un programme dont il y a de quoi être fier ! Ce programme de certification nous force à nous assurer que nous avons le nombre requis d'heures en éducation continue (ÉC), que nous accumulons par notre participation aux dîners-causeries locaux ou aux symposiums régionaux ou nationaux de l'ACITN, afin de renouveler notre certification tous les cinq ans.

Dans ce numéro du Journal, nous vous présentons un autre excellent article d'ÉC. Cet article vous permettra non seulement de parfaire vos connaissances, mais aussi d'accumuler des heures d'ÉC pour la certification. L'article, intitulé « Les lignes directrices de la SCN et de la NKF K/DOQI sur le métabolisme minéral chez les patients hémodialysés sont-elles atteignables ? Résultats d'un programme provincial des maladies rénales », a été rédigé par Mme Lori Wazny et ses collaborateurs du Programme manitobain des maladies rénales. Nous espérons que vous relèverez le défi de répondre aux questions d'ÉC.

De plus, dans ce numéro, nous vous présentons un rapport d'étude intitulé « Predictors of hemodialysis central venous catheter exit-site infections » (Facteurs prédisposants d'infection au site d'insertion du cathéter veineux central en hémodialyse), par Mme Lori Harwood et ses collaborateurs du London Health Sciences Centre, à London, en Ontario. Cette importante étude a été appuyée financièrement grâce à une subvention à la recherche octroyée en 2005 par le Fonds de recherche de l'ACITN. Il s'agit assurément d'un domaine de recherche pour les soins infirmiers en néphrologie qui mérite toute notre attention, puisque beaucoup de nos patients en hémodialyse au Canada possèdent un cathéter veineux central comme accès principal.

À la rubrique Revue et nouvelles en pharmacie, Mme Jodi Symes, étudiante au doctorat en pharmacie, a compilé une excellente revue de la documentation intitulée « Low molecular weight heparins in patients with renal insufficiency » (Utilisation d'héparines de faible poids moléculaire chez les patients atteints d'insuffisance rénale). Nous vous invitons à prendre quelques minutes de votre précieux temps pour mettre à jour vos connaissances à propos de la plus récente recherche sur l'utilisation d'héparine de faible poids moléculaire dans la prévention et le traitement des troubles de coagulation chez les patients atteints d'insuffisance rénale.

Pour conclure ce numéro du Journal, nous avons le plaisir de vous présenter deux personnalités canadiennes, le Dr Dasgupta, néphrologue à Edmonton, et Mme Betty Kelman, infirmière en pratique avancée (PIA) à Toronto, qui ont reçu un Prix d'excellence pour l'ensemble de leurs réalisations en reconnaissance de leurs nombreuses années de contribution dans le domaine de la dialyse péritonéale lors du Congrès annuel de dialyse, qui s'est déroulé à Orlando, en Floride. Nous espérons que vous prendrez plaisir à lire leurs réalisations !

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est la publication officielle de l'Association canadienne des infirmiers/infirmières et technologues en néphrologie, a/s 336 Yonge St., Ste. 322, Barrie, ON, L4N 4C8, téléphone : (705) 720-2819, télécopieur : (705) 720-1451, 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, 50 $ (+TPS), E.-U., 60 $, hors du Canada et E.-U., 85 $. Les publications antérieures, lorsque disponibles, coûtent 7,50 $ (+TPS) chacune. Les opinions émises par les auteurs dans ce journal ne sont pas nécessairement partagées par l'Association ni par le rédacteur en chef. Nous invitons les lecteurs à nous faire part de leurs opinions. Toute correspondance devra être envoyée à l'ACITN, 336 Yonge St., Ste. 322, Barrie, ON L4N 4C8.
Site web : www.cannt.ca

• **Voici les échéanciers à rencontrer pour soumettre des articles/nouvelles au journal :**
Janvier–mars – le 15 janvier, pour publication le 15 mars
Avril–juin – le 15 avril, pour publication le 15 juin
Juillet–septembre – le 15 juillet, pour publication le 15 septembre
Octobre–décembre – le 15 octobre, pour publication le 15 décembre
Le journal CANNT est maintenant répertorié dans le "Cumulative Index to Nursing and Allied Health Literature (CINAHL)", "International Nursing Index" (INI), "MEDLINE", "EBSCO", "ProQuest", et "Thomson Gale".
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Message from the President

No matter how long the winter, spring is sure to follow.
~Proverb

It was, indeed, a long, hard winter and we are all finally enjoying the beautiful spring and (soon-to-be) summer weather. With spring came the CANNT spring board of directors' meeting in Toronto. At that meeting we finalized our strategic plan for the organization for 2008 to 2013, and made some necessary updates to the bylaws. For the most part, the updates involved bringing the bylaws forward to reflect more current practice, as the organization evolves. As members of CANNT, you will be provided with the opportunity to review the revised bylaws and to vote on the changes through a mailing that will come your way in the near future. Please take the time to review this mailing and to respond to the changes made on behalf of your membership by the board.

Another sure sign of spring was the Canadian Nurses Association (CNA) Certification in Nephrology Nursing examination. Congratulations to all RNs who committed your time and energy to preparing for and writing the CNeph(C) examination April 5 of this year. We wish you the best of luck, and may a large envelope arrive in your mailbox by way of a reward for your efforts. For those of you who are thinking of writing in subsequent years, the CANNT board hopes to launch a workshop at this year's symposium that will provide you with tools and tips for preparing to write the CNA examination. CNA representatives will be participating in this workshop that will provide supportive information related to exam writing tips, how to study, approach to multiple choice questions, and more. Look for the workshop details in the CANNT 2008 information when it arrives to your unit.

The CANNT 2008 symposium is only months away! Your CANNT 2008 planning committee is busy at work planning for this annual symposium and our 40th anniversary as an organization in Quebec City, October 23–26 at the Quebec Convention Centre. A record number of abstracts were submitted by the deadline of April 1, and the program is shaping up to be an informative and educational one under the strong leadership of Heather Reid from Innovative Conferences & Communications and the team of CANNT members on the planning committee. Please consider joining us if you can for this excellent opportunity to learn and network with other nephrology professionals from across Canada. It promises to be a wonderful symposium. For those of you who have had abstracts accepted, I would encourage you to give some thought to writing a manuscript for the journal so those who are not able to attend the symposium can still benefit from your knowledge. There are supports available to those of you who are interested in the experience of manuscript development and publication. For more information, contact the journal editor, Gillian Brunier, at gillianbrunier@sympatico.ca.

On behalf of the board, I would like to wish all of you a safe and enjoyable summer season. Here's hoping you all have some opportunity to take time away from work to reflect, recharge, and renew with friends and family.

Alison Thomas, RN, MN, CNeph(C),
CANNT President

Message de la présidente

L'hiver le plus rigoureux craint le printemps.
~ proverbe

Après un long et pénible hiver, il est temps de profiter pleinement de la douceur du printemps et surtout de l'été qui s'en vient à grands pas. À l'ACITN, le printemps est annonciateur de la réunion du Conseil d'administration à Toronto. À l'occasion de cette réunion, nous avons finalisé notre plan quinquennal stratégique de 2008 à 2013 et suggéré certains changements à nos règlements administratifs. Dans la plupart des cas, ces changements visent à actualiser les règlements afin de mieux refléter la pratique l'évolution de l'association. À titre de membre, vous aurez l'occasion de réviser les règlements modifiés et de voter pour entériner ces changements par un publipostage qui vous sera expédié sous peu. Veuillez prendre le temps de lire ces documents et de commenter, s'il y a lieu, les changements proposés par les membres de votre CA.

L'examen de certification en néphrologie, CNéph(C), de l'AIIC est un autre signe annonciateur du printemps. Félicitations à toutes les infirmières et à tous les infirmiers qui ont investi temps et énergie dans la préparation et la rédaction de l'examen le 5 avril dernier. Nous leur souhaitons la meilleure des chances ainsi que la réception d'une grande enveloppe dans leur boîte aux lettres les récompensant de leurs efforts. Pour ceux et celles qui se prépare à la séance d'examen en 2009, nous souhaitons présenter un atelier dans le cadre du Congrès annuel de 2008 afin d'offrir des outils et des conseils sur la préparation et la rédaction de cet examen. Des représentants de l'AIIC participeront à cet atelier pour donner de l'information utile, à savoir des trucs pour la rédaction, l'étude et l'approche des questions à choix multiple, etc. Surveillez les détails portant sur cet atelier dans la documentation du CANNT/ACITN de 2008 qui sera expédiée à votre unité de soins.

Il ne reste plus que quelques mois avant la tenue du Congrès annuel national! Votre comité de planification des activités est à pied d'œuvre pour organiser ce Congrès et souligner le 40e anniversaire de fondation de notre Association dans la vieille capitale, la ville de Québec, du 23 au 26 octobre au Centre des congrès de Québec. Un nombre record de résumés de présentation a été soumis au comité organisateur. Le programme du Congrès promet d'être informatif et éducatif sous la direction de Heather Reid d'Innovative Conferences & Communications et du comité organisateur. Veuillez vous joindre à nous pour saisir cette excellente occasion d'acquérir de nouvelles connaissances et de tisser des liens avec d'autres professionnels en néphrologie œuvrant d'un bout à l'autre du pays. Ce congrès sera exceptionnel. J'inviterais ceux et celles dont le résumé de présentation a été accepté à songer à la possibilité de rédiger un article pour le Journal. Ainsi, les personnes qui ne peuvent assister au Congrès pourront tout de même bénéficier de vos connaissances. Si l'expérience vous intéresse, nous vous offrirons le soutien nécessaire pour l'édition et la publication de votre article. Pour plus de renseignements, veuillez communiquer avec l'éditrice du Journal, Mme Gillian Brunier, à gillianbrunier@sympatico.ca.

Tous les membres du Conseil se joignent à moi pour vous souhaiter un été doux et agréable. En espérant que vous aurez tous et toutes la chance de prendre des vacances, de refaire le plein d'énergie et de renouer avec vos amis et les membres de votre famille, je vous prie d'accepter mes plus chaleureuses salutations.

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Regional reports
Rapports régionaux

Western Region (Rick Luscombe)

British Columbia

Northern Health Authority

- New self-care unit to open April 21, 2008, with six to eight stations, two home hemodialysis training rooms and a consultation room.

Vancouver Coastal Health Authority

Transplantation

- The pre-transplant team has been discussing and planning ways to meet our patients' educational needs. We have many patients referred each month who, unfortunately, may wait many months (or years) before being seen in the pre-transplant clinic.
- We are pleased to announce the first group education sessions to be held at St. Paul's Hospital (SPH). We have invited patients who have been recently referred, but not yet seen in clinic, and live in the lower mainland. The session will be given by one of our nephrologists, the pre-transplant donor and recipient nurses and social workers. Family and friends of candidates are encouraged to attend.
- Later, we hope to be able to go to other communities around B.C. with this presentation.
- The donor team is looking at out-of-country donors. It is hoping to develop clearer policies and standards.
- The two leading transplant centres, St. Paul's Hospital (SPH) and Vancouver Hospital (VH) report:
  159 kidney transplants (94 live donors + 65 deceased donors) for the 2007–2008 fiscal year. These numbers do not include kidney/pancreas transplants.

Hemodialysis

- The number of post-op cardiac patients requiring hemodialysis is on the rise, including intra-operative hemodialysis.
- Longer-term pre-op patients awaiting cardiac surgery or cardiac transplant requiring once or twice weekly hemofiltration for fluid management is rising.
- Over the past year, a regional community unit patient assessment team has been set up in the Vancouver Coastal Health Region to assess and prioritize patients in the in-centre units who want dialysis in their communities.
- There are six community units in the region: Vancouver Community Dialysis Unit (VCDU), Richmond Community Dialysis Unit (RCDU), North Shore Community dialysis Unit (NSCDU), Squamish, Sechelt and Powell River.
- The assessment team includes three nephrologists from the two in-centre units, six nurse leaders from the in-centre and community dialysis units, a nurse coordinator, social workers and the operation leader and patient care managers from SPH and VH Hospital.
- Patients who are referred to and by the team are assessed first. A community dialysis unit wait list spread sheet is circulated to the team prior to discussion. Ranking of patients is done via teleconference twice monthly.
- The team ensures that patients are suitable for transfer and that information is current. Patients are ranked based on seniority, time on dialysis and readiness for transfer. Closer to home, work, school and child care issues are major considerations for transfer. The team meets face to face to discuss operational issues every two months.

Vancouver Island Health Authority

- Striving to find liaisons in the community units. I have sent a letter to all the units.
- Letters have been sent out to Victoria, Duncan, Nanaimo, Port Alberni and Cumberland looking for interested volunteers.

Fraser Health Authority

- Surrey Memorial Hospital is expanding from 18 stations to 30 stations. Date planned for completion is early 2009. Dialysis unit is celebrating tenth year in the fall of 2008. Poster of 10-year celebration has been submitted to CANNT.
- New Abbotsford Hospital plans to open in August 2008. Clinical Resource Nurse and some nursing positions have already been filled.
- Two new nephrologists joined our team.
- Royal Columbian Hospital PD program is preparing to launch education for the new Abbotsford Hospital.

Interior Health Authority

- Kelowna Education Days with a Vascular Access Breakout Day held May 2–3, 2008.
- British Columbia Renal Educators Group (BC REG) has developed Clinical Decision Support Tools (CDST) to standardize practice throughout the province. The procedures being developed are: 1. Putting a circuit into a circle; 2. Heparin administration on dialysis; 3. Catheter exit-site care; 4. Treating hypotension on dialysis.
- Provincial Vascular Access Service Team (PVAST) has developed provincial incidence, prevalence and infection rate reports.

Alberta

Southern Alberta

Renal Program (SARP)

- The program has been very busy this spring focusing on education for staff within the renal program, as well as those throughout the Calgary Health Region.
- Hosted the Nephrology Education Conference "The Realities of Renal Research: Initiating the Innovations" in Febraury. This was an informative conference for nurses within our program.
- Hosted the information day for the region "Back to Basics," presented by our multidisciplinary teams in March. This was an opportunity for anyone thoughout the region to learn about dialysis modalities and care issues for patients while admitted. Our goal will be to continue offering this information day and to build on the new learning.

- Hosted "2008 Cardiovascular Complications in CKD" in April.
- Peritoneal dialysis is preparing to launch its "Home Cycler Assist Program" to support recruitment of candidates to peritoneal dialysis and also to provide further support for retention within the program. Look for a poster presentation at CANNT 2008.

NOTICE BOARD

- Ottawa Supper Clubs—Contact Janet Graham, Nephrology Unit, Ottawa Hospital, jgraham@ottawahospital.on.ca

- June 15, 2008. CANNT Awards, Bursaries and Grant Application Deadline. For more information, contact Debbie Maure at the CANNT National Office (705) 720-2819, e-mail cannt@cannt.ca, or visit our website at www.cannt.ca

- September 2–October 17, 2008. Registration time for the Nephrology Certification Exam. Contact Canadian Nurses Association Certification Program, e-mail: certification@cna-aiic.ca. Website: www.cna-aiic.ca Toll-free phone number: 1-800-450-5206
- September 6–9, 2008. European Dialysis and Transplant Nurses Association/European Renal Care Association (EDTNA/ERCA) 37th International Conference, Prague, Czech Republic. Website: http://www.edtnaerca.org
- September 17, 2008. Nephrology Health Care Professionals Day
- October 15, 2008. Kidney Foundation of Canada. Deadline for Allied Health Research Grants. Contact: Coordinator, Research Grants and Awards, e-mail: research@kidney.ca. Website: www.kidney.ca

- October 23–26, 2008. CANNT 40th National Symposium. Quebec Convention Centre—Quebec Hilton Hotel, Quebec City, Quebec. Conference Planner: Heather Reid: e-mail: hreid@innovcc.ca. Website: www.cannt.ca

- March 8–10, 2009. The Annual Dialysis Conference. Houston, Texas. Website: www.som.missouri.edu/Dialysis/
- March 12, 2009. World Kidney Day. International Federation of Kidney Foundations. Website: http://www.ifkf.net/worldkidneyday.php
- March 15, 2009. Kidney Foundation of Canada. Deadline for Allied Health Fellowships and Scholarships. Contact: Coordinator, Research Grants and Awards, (800) 361-7494, ext. 232, E-mail: research@kidney.ca. Website: www.kidney.ca
- April 4, 2009. Exam date for CNeph(C) certification exam. Contact Canadian Nurses Association Certification Program, e-mail: certification@cna-aiic.ca. Website: www.cna-aiic.ca Toll-free phone number: 1-800-450-5206
- April 26–29, 2009. The American Nephrology Nurses Association (ANNA) 40th National Symposium, Hilton San Diego and the San Diego Convention Center in San Diego, CA. Website: www.annanurse.org
- August 28–30, 2009. The 3rd North American Chapter Meeting of the International Society for Peritoneal Dialysis (ISPD), The Westin Bayshore, Vancouver, BC. Website: www.ispd.org

Northern Alberta Renal Program (NARP)

- Dialysis bus is continuing to offer dialysis to our patients in the Hinton and Whitecourt area (Hinton on Mondays, Wednesdays and Fridays, Whitecourt on Tuesdays, Thursdays, and Saturdays).
- Nephrology Information System project recently won a national award at the Canadian Information Productivity Awards in Toronto.
- New software tool for staff education "TRACCESS" is being implemented.
- Plan for Rural Nephrology Clinics to be functional in the next few months.
- Alberta Nephrology Days were held April 11–13, 2008, in Jasper Park Lodge, AB, and a session in Edmonton for GPs and allied health staff May 3, 2008. Spring education day for staff was held April 20, 2008.

Saskatchewan

- Saskatoon Health Region recently celebrated the official opening of the new Dr. Marc Baltzan Histocompatibility (HLA or tissue typing) Lab, part of the regional Laboratory Medicine program managed by St. Paul's Hospital.
- Prior to the opening of the HLA Lab in Saskatoon, specimens were sent outside the province, resulting in delays and increased costs.

Manitoba

- Seven Oaks General Hospital in Winnipeg is in the process of hiring a renal nurse for its growing clinic. The hemodialysis unit is bursting at the seams with 32 stations for more than 190 patients, and looking for more space.
- The number of PD patients has grown to 50 (up from 23 when we opened in 2005) and continues to grow.
- Gillian Toth has been hired as the new manager of patient care for the Health Sciences Centre (HSC) program. Gillian has worked with the renal program as an educator, clinical resource nurse and head nurse. She has returned after eight years of working in adolescent diabetic education.
- HSC is expanding by 10 more stations. Hopefully, renovation will start by summer.

- Manitoba Renal Program's annual conference will be held September 26–28, in combination with the annual Western PD days.

Many thanks to Gisele Robichaud, Julie Nahn, Katie Nikl, Lori Paille, Audrey Miller, Angel McKay, Irmy Friesen, Gayle Kroetsch, Ruth McCarrell, Marilyn Muir, Maureen Donnelly and Janice James for their contributions to this report.

Région de l'Ouest (Rick Luscombe)

Columbie-Britannique

Northern Health Authority

- Notre nouvelle unité de soins autonomes a ouvert le 21 avril dernier et compte six à huit postes de traitements, deux salles de formation pour l'hémodialyse à domicile et une salle de consultation.

Vancouver Coastal Health Authority

Greffe

- Les membres de l'équipe prégreffe ont discuté et planifié des façons de répondre aux besoins éducationnels des patients. On nous envoie de nombreux patients qui malheureusement peuvent attendre des mois, voire des années, avant d'être reçu en clinique prégreffe.
- Nous avons le plaisir de vous annoncer que les premières séances d'éducation ont eu lieu au St. Paul's Hospital. Nous avons invité les patients qui avaient été aiguillés vers notre clinique sans avoir été vus, et qui vivent dans les basses terres du Fraser (Lower Mainland). La séance est donnée par l'un de nos néphrologues, en compagnie d'infirmières des équipes du donneur et du receveur et de travailleurs sociaux. Les membres de la famille et les amis des patients candidats à la greffe ont également été invités à assister à cette séance.
- Nous espérons pouvoir présenter cette séance d'éducation à d'autres collectivités près de la C.-B.
- Les membres de l'équipe du donneur sont à la recherche de donneurs à l'extérieur du pays et souhaitent l'établissement de politiques et de normes plus claires.
- Les deux principaux centres de greffe, St. Paul's Hospital et Vancouver Hospital ont rapporté :
  159 greffes de reins (94 donneurs vivants + 65 donneurs cadavériques) en 2007–2008. Ces nombres n'incluent pas les greffes rein-pancréas.

Hémodialyse

- On note un augmentation du nombre de patients cardiaques nécessitant un traitement d'hémodialyse après une intervention, incluant l'hémodialyse intra-opératoire.
- Le nombre de patients en attente depuis longtemps de chirurgie cardiaque ou de greffe qui a besoin d'hémofiltration une ou deux fois par semaine pour la prise en charge des fluides est également en hausse.
- Au cours de la dernière année, nous avons formé une équipe régionale pour les unités communautaires de la région côtière de Vancouver, dont le mandat est d'évaluer les patients et de donner la priorité à ceux qui sont en centres de dialyse et qui désirent effectuer leur dialyse dans leur collectivité.
- Il y a six centres de santé communautaire dans la région : Vancouver Community Dialysis Unit (VCDU), Richmond Community Dialysis Unit (RCDU), North Shore Community dialysis Unit (NSCDU), Squamish, Sechelt et Powell River.
- L'équipe d'évaluation comprend trois néphrologues provenant de deux centres, six infirmières gestionnaire, une coordonnatrice en soins infirmiers, des travailleurs sociaux, le chef de projet et le directeur de soins aux patients de SPH et VH.
- Les patients qui sont envoyés à l'équipe et ceux dirigés par l'équipe d'évaluation sont évalués en premier. Une liste d'attente circule parmi les membres de l'équipe avant la discussion. Le classement des patients est fait par téléconférence deux fois par mois.
- L'équipe s'assure que les patients rencontrent les critères d'éligibilité et de la mise à jour des informations. Les patients sont classés selon leur ancienneté, la durée de la dialyse et leur disponibilité au transfert. Lors du transfert, il est important de prendre en considération la distance entre la maison, le travail, l'école ou le service de garde. Les membres de l'équipe se rencontrent tous les deux mois pour discuter de problèmes opérationnels.

Vancouver Island Health Authority

- Nous nous efforçons de trouver des agents de liaison pour l'ACITN dans les centres communautaires. Une lettre a été envoyée à ce sujet dans tous les centres.
- Des lettres ont également été envoyées aux centres de Victoria, de Duncan, de Nanaimo, de Port Alberni et de Cumberland pour solliciter la participation de bénévoles intéressés.

Fraser Health Authority

- Surrey Memorial Hospital (SMH) passe de 18 postes de traitements à 30. L'expansion devrait prendre fin au début de 2009. L'unité de dialyse célèbrera son 10e anniversaire à l'automne 2008. Nous avons soumis au CANNT/ACITN pour approbation une affiche soulignant la célébration de ce 10e anniversaire.
- Le nouvel hôpital d'Abbotsford prévoit ouvrir en août 2008. Une infirmière ressource en soins cliniques et des infirmières on été recrutées pour pourvoir les postes vacants.
- Deux nouveaux néphrologues se joignent à l'équipe.
- Le Programme de DP du Royal Columbian Hospital se prépare à donner de la formation au nouvel hôpital d'Abbotsford.

Interior Health Authority

- Les Journées de formation du Kelowna comprenant un atelier sur les accès vasculaires auront lieu les 2 et 3 mai 2008.
- Le groupe d'éducateurs en néphrologie de la Colombie-Britannique a mis au point des outils pour assurer le soutien des décisions cliniques afin de normaliser la pratique dans toute la province. Voici les procédures qui ont été élaborées : 1. Installer du circuit de dialyse; 2. Administration d'héparine en hémodialyse; 3. Soins du cathéter; 4. Traitement de l'hypotension.
- Une équipe de suivi des accès vasculaires à l'échelle de la province a com-

pilé des rapports d'incidence, de prévalence et de taux d'infection.

Alberta

Southern Alberta Renal Program (SARP)

- Nos efforts ont été concentré sur la formation du personnel au sein du programme de celui du Calgary Health Region.
- En février, nous avons été l'hôte d'une Conférence intitulée : « The Realities of Renal Research: Initiating the Innovations » (Les réalités de la recherche en néphrologie : déclencher les innovations.). Cette conférence a été très instructive pour les infirmières de notre Programme.
- En mars, nos équipes multidisciplinaires en néphrologie ont préparé une Journée d'information « Back to Basics » (Retour aux sources) pour la région. Ce fut une occasion d'échanger et d'apprendre les différentes modalités de dialyse et les problèmes associés aux soins pour les patients lors de leur admission. Notre objectif est de continuer de présenter cette Journée d'information et de mettre à profit les nouveaux apprentissages.
- En avril, nous avons tenu une Conférence sur les complications cardiovasculaires associé d'une maladie chronique du rein.
- L'unité de dialyse péritonéale s'apprête à lancer son Programme d'assistance pour cycleur à domicile afin d'appuyer de nouveaux candidats DPAC en plus de favoriser l'adhésion à cette modalité. Nous souhaitons présenter une affiche scientifique au Congrès annuel de 2008.

Gillian Brunier, CANNT Journal Editor, drawing a name from among all the Ontario Liaisons for the free CANNT 2008 registration.

Northern Alberta Renal Program (NARP)

- L'autobus de dialyse continue d'offrir des soins de dialyse à nos patients des régions de Hinton (les lundis, mercredis et vendredis) et de Whitecourt (les mardis, jeudis et samedis).
- Notre projet sur le Système d'information en néphrologie a remporté un prix national aux Canadian Information Productivity Awards (CIPA), à Toronto.
- Un nouveau logiciel conçu pour l'éducation du personnel a été mis en place, le *TRACCESS*.
- Nous planifions l'ouverture de cliniques en néphrologie en milieu rural au cours des prochains mois.
- Des Journées néphrologiques de l'Alberta ont eu lieu du 11 au 13 avril 2008 au Jasper Park Lodge, en Alberta. Il y aura une autre séance d'éducation le 3 mai prochain à Edmonton pour les omnipraticiens et les membres des professions paramédicales. Une Journée éducative pour les membres du personnel s'est déroulée le 20 avril 2008.

Saskatchewan

- Saskatoon Health Region a célébré récemment l'ouverture officielle du Laboratoire d'histocompatibilité (HLA ou typage tissulaire) du Dr Marc Baltzan, dans le cadre du Programme régional de médecine de laboratoire dirigé par St. Paul's Hospital.
- Avant l'ouverture de ce laboratoire d'histocompatibilité à Saskatoon, nous devions envoyer les échantillons à l'extérieur de la province pour analyse, ce qui entraînait des délais et des coûts élevés.

Manitoba

- Seven Oaks est en plein processus pour l'embauche d'une infirmière en néphrologie pour sa clinique qui est en croissance constante. L'unité d'hémodialyse est pleine à craquer avec 32 postes de traitements pour plus de 190 patients. Nous sommes à la recherche de plus d'espace.
- Le nombre de patients en DP a augmenté à 50 (ils étaient 23 patients à l'ouverture de l'unité en 2005) et continue de croître.
- Gillian Toth a été embauchée comme nouvelle directrice des soins aux patients pour le programme du Health Sciences Centre (HSC). Gillian a travaillé au sein du programme de néphrologie comme éducatrice, infirmière-ressource et infirmière gestionnaire. Elle est de retour après avoir travaillé pendant 8 ans en éducation auprès des adolescents atteints de diabète.
- HSC ajoutera 10 nouveaux postes de traitements. Avec un peu de chance, les travaux de rénovation vont commencer cet été.
- La Conférence annuelle du Programme de néphrologie du Manitoba aura lieu du 26 au 27 septembre 2008, en association avec les Journées de l'Ouest sur la DP.

Je tiens à remercier sincèrement Gisele Robichaud, Julie Nahn, Katie Nikl, Lori Paille, Audrey Miller, Angel McKay, Irmy Friesen, Gayle Kroetsch, Ruth McCarrell, Marilyn Muir, Maureen Donnelly et Janice James pour leur précieuse collaboration à la rédaction de ce rapport.

Ontario (Jane Alfarero)

As an acknowledgement for all active liaisons who have volunteered their time disseminating CANNT initiatives, CANNT Ontario Regional had a raffle to sponsor registration for this upcoming CANNT conference in Quebec City (Oct. 23–26, 2008). Gillian Brunier (CANNT Journal Editor-in-Chief) did the honours of drawing a name. The lucky liaison is Dianne Silverson. Congratulations Dianne!

Currently, we are revising our list of liaisons as there have been lots of changes. Several liaisons have relinquished their duties and moved on to other areas and we are looking for nurses who are enthusiastic to come aboard

as a CANNT liaison in their units.

If you are interested in becoming a unit liaison, contact the Ontario VP.

Central East and Toronto Region

Peterborough Regional Health Centre Hemodialysis Program

- Working toward moving into a new hospital and will consolidate two hospital sites into a beautiful new building. The hemodialysis program will have 30 stations. Extensive orientation to the new building, new process and to the new unit is underway.
- PD program now has more than 60 patients. It is the fastest growing PD.
- Vascular access nurse Deb Mathew is collaborating with the Lakeridge vascular access program in vascular access rounds teleconferencing.
- The program held a memorial service at a local church. The service was attended by patients' families, staff, physicians and friends. More than 100 people attended the service.

Humber River Regional Hospital

- Seven staff attended ANNA in Florida. They came back sharing their knowledge with their colleagues.
- Humber Green armband initiative progresses with a significant improvement. It keeps access arms safe and intact.
- Patty Quinan (Vascular Access Coordinator) and Rizalina Visitacion have been reviewing urea reduction ration (URR) indications, recirculation, and collection techniques. It is a great little slide show they have taken on the road and have inserviced just about half the staff and are now putting the show on the unit computers.

Sick Children's Hospital

- Held a staff retreat. It is looking for a unit vision and mission statement.
- The unit has participated in auditing the tight and regular heparin policy, redeveloping the doctors' order sheets to meet new standards, best practice and DOQI guidelines. There is a continuous updating of the policy and procedures for the unit.
- The unit is restarting the exercise program for patients. A new reverse osmosis and two dialysis machines are arriving.
- There's a new Nephrology Database for the chronic hemodialysis patients.

Toronto East General Hospital

- Has a new practice leader (Kerry Overholt). He has been busy training and certifying hemodialysis staff to perform TB testing, and the unit is busy putting together a foot assessment protocol.
- The new graduate program has been an asset in finding new hemodialysis nurses.
- The unit has recently trained an RN from outside Canada. She was hired under the Ontario New Graduate initiative.
- Dietitians had a "Kidney Climb Program" to assist patients in reaching their goals for phosphorous control. Patients climbed the CN tower depending upon their phosphorous control (based on their monthly blood works). Prizes were given for the first to reach the top depending on how long their numbers stay within guidelines. About 95% of patients participated.

Orillia Soldiers Memorial Hospital

- Nurses starting up new and renewing old projects in their hemodialysis unit such as foot care, anemia management and bone metabolism.
- Annual Nephrology Education Day was held April 5. CANNT membership was encouraged. CANNT T-shirts, mouse pads and pens were given as prizes.
- Two RPNs in the unit and an RN submitted a poster to the Registered Nurses Association of Ontario (RNAO) Leadership conference to outline the role of RPN in hemodialysis.

Sunnybrook Health Sciences Centre

- On March 27, team members from the Sunnybrook Dialysis Program celebrated Kidney Health Month in an effort to raise public awareness of kidney diseases. Social work, pharmacy and nursing collaborated to create a display, distribute educational materials and check blood pressures. There was a simple quiz about chronic kidney disease (CKD). Forty people took the quiz. It was gratifying to see such a good response to the team's efforts. The team is looking forward to doing this again next year.
- Shirley Drayton has been acting Patient Care Manager for the Renal Program off and on for the past several years. Since 2005, she and the renal staff have worked diligently towards creating a positive work environment that contributed greatly to many quality improvement initiatives.
- The Renal Unit welcomes its new Patient Care Manager, Eleanor Ravenscroft. Eleanor previously worked with dialysis patients in Vancouver. She is a member of the CANNT Journal Editorial Board as department editor for the "Practice Corner" column. Eleanor has just completed her PhD through the University of British Columbia.

Eastern Ontario

Ottawa Hospital

- Presented an Advanced Nephrology Day on March 27 that was well-attended by many staff from all divisions of nephrology.
- They have again been invited to participate in continuing education in April sponsored by Amgen in Brockville. This is an exciting time to network with staff in nephrology who often do not get to see each other, involving centres from Kingston, Brockville and Cornwall.
- The Ottawa Hospital Civic Campus has reached capacity, as have most units of the Ottawa Hospital, running close to 110% capacity on daily basis.
- The New Start Unit has been a great success for the entire Ottawa Hospital's nephrology program including the Civic Campus.
- The project for Diabetic Foot Assessment for Hemodialysis Patients using the Registered Nurses Association of Ontario (RNAO's) Best Practice Guidelines will be piloted at The Ottawa Hospital's Riverside Campus and Civic Campuses.
- Currently, the Ottawa Hospital is looking at a Tuesday, Thursday and Saturday schedule.
- Four RNs successfully completed

Georgian College course Modalities Treatment 1.

Hawkesbury General Hospital
Satellite Hemodialysis Unit

- Two staff members wrote their Nephrology Certification Examinations in April. Two staff members were sent to attend an education day presented by The Ottawa Hospital on March 27, "Nephrology Day 2, A Week in the Life of an Urgent Start Dialysis Patient."
- One patient is currently receiving home hemodialysis training. This is the first patient to be in home training.
- This spring-summer the unit plans to work on a program of information/education to help inform and educate seniors' residences and homes on the important facts of caring for a dialysis patient. The goal is to help improve the quality of life for all patients with increased understanding about kidney diseases.

Cornwall Dialysis Clinic

- Continues to hold Journal Clubs utilizing articles from CANNT Journal and ANNA Journal.
- One of the staff (Monique Moore) wrote her CNeph(C) exam.
- Donna Schofield, RN, attended a conference at Renal Research in Cancun Institute and presented "Foot Care on Dialysis Patients."

South West and Central South Region

London Renal Program

- Representing Ambulatory Care Program for Canadian Council on Health Services Accreditation (CCHSA), which will take place in November 2008.
- The unit had converted to Fresenius K dialysis machines. The unit had also participated in a short trial (of JMS buttonhole needle) for the purpose of Food and Drug Administration (FDA) approval.
- Several staff are preparing projects for CANNT 2008.

London Health Sciences
Centre Victoria Hospital

- Adam Linton Unit is in the process of organizing the Vascular Access Evening for May 15 and the Vascular Access Day for June.
- Welcome to the new Vascular Access Case managers Kari Matos and Sue Seiler.

Grand River Hospital

- Second CANNT board was hung so the seventh floor staff can also be kept informed of the CANNT news. Seventh floor is a hemodialysis care and PD clinic area.
- The Access Committee is well under way. Its purpose is to discuss access-related problems in the unit and also review the NKF/DOQI guidelines related to access to ensure staff is providing the best access-related care.
- The Freeport site is scheduled to open on April 9. Three of the unit's full-time staff and six part-time staff will be staffing the satellite. The Freeport site is to open at capacity.
- The Palmerston unit will also be opening in April. Selection of staff for this site is underway.

Hanover and District
Hospital Dialysis Unit

- Training new RN for permanent part-time.
- Two RNs renewed their CNeph(C).

Northern Ontario

North Bay General Hospital

- On February 21, some Renal Unit staff members attended an introductory session presented by Janice Scharfe on use of a Sonosite ultrasound device to observe the position, depth and flow in fistula vessels and grafts.
- The unit welcomes the new Program Manager, Debbie Thomas. She has been a member of North Bay General Hospital staff for 20 years with a background in nursing and human resources.
- Sue Lebeau has become a member of the Transition Team, which is preparing for the move into the new hospital building scheduled to open in late fall 2010.

On Thursday, March 27, in an effort to raise public awareness of kidney disease, team members from the dialysis program at Sunnybrook Health Sciences Centre, Toronto, celebrated Kidney Health Month. On the right, Diane Zianis, dietitian nephrology, talks to staff from Sunnybrook.

Région de l'Ontario (Jane Alfarero)

Afin de reconnaître et de récompenser le travail des agents de liaison qui donnent généreusement de leur temps pour organiser les activités de l'ACITN, nous avons décidé d'organiser un tirage au sort parmi nos agents de liaison en offrant une inscription gratuite au Congrès annuel qui aura lieu à Québec du 23 au 26 octobre 2008. Gillian Brunier, éditrice en chef du Journal nous a fait l'honneur de procéder au tirage. Et la gagnante est... Dianne Silverson. Félicitations Dianne!

Nous travaillons actuellement à mettre à jour notre liste d'agents de liaison, étant donné qu'il y a eu de nombreux changements. En effet, plusieurs agents ont quitté leur poste et se sont réorientés vers d'autres secteurs. Nous sommes donc à la recherche de membres qui aimeraient tenter l'aventure comme agents de liaison

auprès de leur unité de dialyse. Si vous désirez devenir relever le défi, n'hésitez pas à communiquer avec moi.

Centre-Est de l'Ontario et Toronto

Programme d'hémodialyse du Peterborough Regional Health Centre

- Notre Programme de dialyse s'apprête à emménager dans un nouvel hôpital. Deux centres hospitaliers seront ainsi consolidés dans un bel et nouvel édifice. Le Programme d'hémodialyse comprendra 30 postes de traitement. Un programme complet d'orientation sur le nouvel édifice, le nouveau processus et la nouvelle unité est en préparation.
- Le Programme de DP compte maintenant plus de 60 patients. Il s'agit d'un programme qui connaît une croissance rapide.
- Deb Mathew, infirmière spécialisée en accès vasculaire, travaille en étroite collaboration avec le Programme d'accès vasculaire de Lakeridge sur téléconférence sur les accès vasculaire.
- Le Programme de dialyse a tenu une cérémonie commémorative dans une église du quartier. Patients, membres des familles, amis, personnel infirmier et médecins ont assisté à cette messe. Plus de 100 personnes étaient présentes.

Humber River Regional Hospital

- Sept membres du personnel ont assisté au Congrès de l'American Nephrology Nurses' Association (ANNA) en Floride et ont partagé, à leur retour, l'information recueillie avec leurs collègues.
- L'initiative de préservation du bras non dominant à Humber va bon train et présente des progrès importants. Ce brassard permet de conserver l'intégrité du bras.
- Patty Quinan, coordonnatrice des accès vasculaire, et Rizalina Visitacion ont passé en revue les indications sur le ratio de réduction d'urée (URR), sur la recirculation et les techniques de prélèvement. Elles ont préparé un excellent diaporama qu'elles ont présenté à près de la moitié du personnel. Celui-ci est maintenant disponible sur tous les ordinateurs de l'unité de dialyse.

Sick Children Hospital

- Un groupe de travail s'est penché sur la rédaction d'unevision et de rédiger l'énoncé de la mission de l'unité.
- Le personnel de l'unité a participé à la vérification de la mise en application de la politique standard et rigoureuse sur l'utilisation de l'héparine, à la mise à jour des ordonnances médicales afin de répondre aux nouvelles normes, aux meilleures pratiques démontrées et aux lignes directrices de la K/DOQI.
- Nous relançons le programme d'exercice physique à l'intention des patients.
- Nous attendons sous peu la réception et l'installation d'un nouveau système de traitement d'eau par osmose inverse et de deux nouveaux générateurs.
- Nous disposons d'une nouvelle base de données servant à la gestion des patients en IRT.

Toronto East General Hospital

- Kerry Overholt est le nouveau leader clinique des services professionnels. Il a été très occupé à former le personnel en hémodialyse sur le protocole de dépistage de la tuberculose. De plus, l'unité travaille à la préparation d'un protocole sur l'évaluation des soins de pieds.
- Le Programme d'encadrement des infirmières diplômées est un atout pour recruter de nouvelles infirmières en hémodialyse.
- L'unité a récemment entraînée une infirmière formée à l'étranger qui a été embauchée en vertu de l'initiative recrutement de l'Ontario.
- La diététiste a conçu un programme de motivation pour aider les patients à gérer leur taux de phosphore. Les patients montaient dans la tour du CN suivant leur capacité à maîtriser leur taux de phosphore (en fonction de leurs analyses sanguines mensuelles). Le premier patient qui a atteint le sommet de la Tour grâce au maintien des valeurs cibles des lignes directrices a reçu un prix. Près de 95 % des patients ont participé à ce projet.

Orillia Soldiers Memorial Hospital

- Les infirmières en hémodialyse ont instauré de nouveaux projets et en ont adapté d'anciens tels que soins des pieds, la prise en charge de l'anémie et le suivi du métabolisme osseux.
- Une Journée annuelle de formation en néphrologie a eu lieu le 5 avril dernier. Nous avons encouragé les infirmières à devenir membres de l'ACITN. Des prix de présence à l'effigie de l'ACITN tel que des T-shirts, des tapis à souris et des stylos ont été remis.
- Deux infirmières auxiliaires autorisées et une infirmière autorisée ont présenté une affiche scientifique sur le rôle de l'infirmière auxiliaire autorisée en hémodialyse à la Conférence sur le leadership de l'Association des infirmières et infirmiers autorisés de l'Ontario.

Sunnybrook Health Sciences Centre

- Le 27 mars dernier, les membres de l'équipe du Programme de dialyse du Sunnybrook ont souligné le mois de la santé rénale en sensibilisant la population aux maladies du rein. Travailleurs sociaux, pharmaciens et infirmières ont collaboré pour créer un présentoir, distribuer des documents éducatifs et vérifier la tension artérielle. Un questionnaire a été créé sur la maladie chronique du rein et 40 personnes ont pris le temps d'y répondre. Ce fut très gratifiant de constater une telle réponse positive aux efforts déployés. L'équipe attend donc avec impatience l'occasion de répéter cette activité l'an prochain.
- Shirley Drayton a assumé le rôle de gestionnaire du programme de néphrologie par intérim au cours des sept dernières années. Depuis 2005, Shirley et les membres du personnel de la néphrologie ont travaillé avec ardeur à la création d'un environnement de travail dynamique qui a contribué grandement à l'instauration de nombreuses initiatives

d'amélioration de la qualité.

- L'unité de néphrologie souhaite la bienvenue à sa nouvelle directrice des soins aux patients, Eleanor Ravenscroft, qui œuvrait auparavant auprès de patients en dialyse à Vancouver. Eleanor est membre du comité de rédaction du Journal et elle est l'auteure de la chronique sur la pratique professionnelle. Eleanor vient de terminer son Ph. D. à la University of British Columbia (UBC).

Est de l'Ontario

L'Hôpital d'Ottawa

- Nous avons organisé le 27 mars dernier une Journée de formation clinique en pratique avancée en néphrologie. De nombreuses infirmières provenant de tous les secteurs de la néphrologie y ont assisté.
- Les infirmières ont reçu une invitation à participer à une Journée de formation continue en avril dernier, commanditée par Amgen à Brockville. Ce fut une belle occasion pour les infirmières des centres de Kingston, de Brockville et de Cornwall qui n'ont pas souvent la chance de se rencontrer de pouvoir réseauter.
- Le Campus Civic de L'Hôpital d'Ottawa a atteint sa pleine capacité comme la plupart des unités de L'Hôpital d'Ottawa, fonctionnant maintenant à près de 110 % de sa capacité sur une base quotidienne.
- La nouvelle Clinique d'instauration du traitement a connu un franc succès dans tout le programme de néphrologie de L'Hôpital d'Ottawa, incluant le Campus Civic.
- Le projet pilote portant sur l'évaluation des pieds chez les patients diabétiques en hémodialyse et suivant les lignes directrices des meilleures pratiques de l'A.I.I.O. sera mis en oeuvre aux Campus Riverside et Civic de L'Hôpital d'Ottawa.
- L'Hôpital d'Ottawa désire envisager un horaire réparti comme suit : mardis, jeudis et samedis.
- Quatre infirmières ont terminé avec succès le cours Modalité de traitement 1 au collège Georgian.

Centre satellite d'hémodialyse de l'Hôpital général de Hawkesbury

- Deux membres du personnel ont rédigé leur examen de certification en néphrologie en avril.
- Deux membres du personnel ont assisté à la Journée de formation présentée par L'Hôpital d'Ottawa le 27 mars dernier (Une semaine dans la vie d'un patient en dialyse d'urgence).
- Un des patients reçoit présentement sa formation en hémodialyse à domicile. Il s'agit du premier patient à recevoir cette formation.
- Ce printemps et cet été, l'unité prévoit travailler sur un programme d'information/éducation visant à informer et éduquer le personnel des centres d'hébergements pour personnes âgées et des maisons de soins infirmiers sur l'importance des soins à prodiguer à un patient en dialyse. L'objectif consiste à aider à améliorer la qualité de vie de tous les patients et d'offrir une meilleure compréhension des maladies rénales.

Centre de dialyse de Cornwall

- Notre Club de lecture poursuit ses activités en utilisant principalement les articles parus dans le Journal l'ACITN et dans le Journal ANNA.
- Monique Moore, infirmière, a rédigé son examen de certification en néphrologie, CNéph(C).
- Donna Schofield, a fait une présentation sur les soins de pieds chez les patients en dialyse à la Conférence sur la recherche en néphrologie à l'Institut de Cancun.

Sud-Ouest et Centre-Sud de l'Ontario

Programme de néphrologie de London

- Représentation du Programme des soins ambulatoires pour le Conseil canadien d'agrément des services de santé (CCASS) qui aura lieu en novembre 2008.
- La conversion aux appareils d'hémodialyse 2008K™ de Fresenius est maintenant terminée. Nous avons également participé à une étude de courte durée (sur l'aiguille JMS utilisée dans la technique du trou de bouton) en vue d'une approbation par l'agence américaine Food and Drug Administration (FDA).
- Plusieurs membres de notre équipe préparent en ce moment des projets pour le Congrès annuel de 2008.

London Health Sciences Centre du Victoria Hospital

- L'unité Adam Linton prépare une Soirée d'information sur l'accès vasculaire le 15 mai prochain et aussi une Journée d'information, en juin.
- Joignez-vous à nous pour accueillir Kari Matos et Sue Seiler, nouvelles coordonnatrices responsables de la gestion des accès vasculaire.

Grand River Hospital

- L'unité d'hémodialyse et la clinique de DP, au 7ième étage a maintenant sont tableau d'annonce de l'ACITN.
- Le comité de gestion des accès vasculaire est maintenant en place. Son mandat est de discuter des problèmes associés aux accès et de procéder à la revue des lignes directrices de la KNF/DOQI afin d'améliorer la prestation de soins.
- Le Centre Freeport est en opération depuis le 9 avril dernier. L'équipe comprend trois infirmières à temps plein et six infirmières à temps partiel. Ce centre fonctionne à pleine capacité, depuis son ouverture.
- L'unité Palmerston est aussi en opération depuis avril et a procédé au recrutement de son personnel.

Unité de dialyse du Hanover and District Hospital

- De nouvelles infirmières permanentes à temps partiel ont reçues la formation spécialisée.
- Deux infirmières ont renouvelé leur certification en néphrologie, CNéph(C).

Nord de l'Ontario

North Bay General Hospital

- Le 21 février dernier, quelques membres du personnel de l'unité ont participé à un atelier sur l'utilisation d'un appareil à ultrasons Sonosite pour observer la position, la profondeur et le débit des fistules et des greffons. Cet atelier a été présenté par Janice Scharfe.
- Joignez-vous à nous pour souhaiter la bienvenue à Debbie Thomas,

notre nouvelle directrice de Programme. Debbie fait partie du personnel du North Bay General Hospital depuis 20 ans, période pendant laquelle elle a occupé divers postes en soins infirmiers et en ressources humaines.

- Sue Lebeau vient de se joindre à l'équipe de transition pour préparer notre déménagement dans le nouvel édifice de l'hôpital, dont l'ouverture est prévue vers la fin de l'automne 2010.

Quebec Region (Lisette Lafrenière)

As many of you know, April 1 was the deadline to present an abstract for a presentation at the next CANNT annual conference, which will be held in October 2008. Members of the association and I were astonished and especially excited to record that more than 103 abstracts have been submitted for approval. The CANNT annual conference looks to be promising and very interesting. I would like to personally thank all the people who took part in this process. Before this special event, I would like to wish you all a wonderful springtime and I'm looking forward to seeing you in "Old Québec City".

—Lisette Lafrenière, Pierre-Le Gardeur Hospital

Centre de santé et des services sociaux (CSSS) of South Lanaudière–Pierre-Le Gardeur Hospital

The population of our hospital and predialysis clinic is growing. Therefore, several new staff members have joined our team. All efforts are made and energy is used to stabilize the workforce in the expectations of our business expansion and the summertime, which is coming soon. We are proud to announce that Mrs. Ivone Coelho, RN, received an award from the "Ordre des infirmières et des infirmiers du Québec (OIIQ)", as well as financial support from the Department of Health and Social Services for Québec, i.e., a scholarship award from the "Programme ministériel d'intéressement au rôle d'infirmière praticienne spécialisée", in order to complete her education as a nurse practitioner in nephrology. Congratulations Ivone!

As you already know, we will have a visit from the Canadian Council on Health Services Accreditation (CCHSA), and our renal unit is part of its agenda. We are well prepared and we're looking forward to their review June 9–11.

—Lisette Lafrenière

McGill University Health Centre (MUHC)

Montreal General Hospital

We have experienced a great deal of staff movement due to sick leaves, leaves without pay and resignations from nurses who wanted to pursue personal dreams. Moreover, our Nocturnal Home Dialysis Program is growing. As of today, six patients benefit from this modality and we even have a small waiting list. We also expect to increase our remote dialysis service.

Royal Victoria Hospital

The number of patients who are performing HDF (hemodiafiltration) treatments is also increasing.

Montreal General Hospital and Royal Victoria Hospital

Our CLSC project for our patients in PD (approximately 12 patients in CLSC) was updated January 1.

On April 20, all nurses attended an Education Day during which the following topics were introduced:

- Professional Model of Nursing
- The 15-minute interview: Moving from a social to a therapeutic conversation
- Case scenarios and discussion
- Quality of life and hemoglobin target: Benefits for the patients
- Solution-focused communication.

—Marie-Josée Stonely

Centre de santé et des services sociaux (CSSS) of Chicoutimi

We are currently very busy, as everybody is, I presume. We have been open since last December on Mondays, Wednesdays and Fridays until midnight, as we have reached our maximum patient threshold. Since January 2008, we also made some changes to our schedule by opening on Sundays. Please take note that I will be moving to a new position as Intensive Care Nursing Manager. Mrs. Martine Gravel will be replacing me in HD, but she will start at a later and undefined date for the moment.

—Esther Girard

Centre de santé et des services sociaux (CSSS) of Gatineau–Hull Hospital

Since December 2007, Mr. Jean Bouchard has been working for the Outaouais Agency, as a temporary assignment. His position is senior consultant for the opening of two satellite units. The opening of the first satellite unit in Maniwaki (200 km far from our hospital) is expected at the beginning of 2009 and the second one in Buckingham (45 km from our hospital) is anticipated for the beginning of 2010. On April 3, during the Vascular Access Education Day sponsored by the "Regroupement visant l'excellence de la pratique infirmière en néphrologie au Québec (REINQ)", our clinical trainer, Mrs. Rachelle Brisson, acted as a speaker. Bravo Rachelle!

Four of our nurses will attend the annual conference of the "Société québécoise de néphrologie (SQN)", from May 1–3.

Since last December, we have implemented the buttonhole technique with some patients who are performing self-care hemodialysis. We are pleased with the results achieved so far. At the moment, five patients are benefiting from this new technique.

—Serge Gauvreau

Notre-Dame Hospital

Officially, the renovations started on February 12 at the L.C.-Simard Pavilion of Notre-Dame Hospital (self-care dialysis unit). We also notice an increase in hemodialysis patients.

We are experiencing a success rate of 80% with the buttonhole technique in self-care dialysis.

—Marie-Rose Charles

Trois-Rivières Regional Hospital Centre, St. Marie Pavilion

Home Nocturnal Hemodialysis:

Two new patients are starting their home therapy of which one is the first patient to perform hemodialysis through a catheter. She claims to be very happy withh the experience. Also, we have initiated the buttonhole technique and the results are very positive.

—Sylvie Lehouillier

St. Jérôme Hôtel-Dieu Hospital

Since the fall of 2006, a pre- and post-transplantation clinic was created. Connie Blake, a dialysis nurse clinician, was appointed. Her challenge was to set up a pre-transplantation follow-up process to ensure proper management of eligibility of potential patients to the transplant list. We have three nephrologists who are working in collaboration within this clinic.

First, we meet with pre-dialysis clinic patients who have a glomerular filtration rate below 20 ml/min and who are in relatively good health to ask if they are interested in kidney transplant and, thus, able to initiate the evaluation process in order to register their names on the transplantation list. Concerning our PD and HD patients, we are asking them the same question in order to know their interest in a kidney transplant and to initiate rapidly the process.

When patients confirm their interest, Connie schedules an appointment to further discuss and educate on the transplant process. Next, an appointment with one of the three nephrologists is scheduled where a medical examination is performed to confirm eligibility for a transplantation.

Since the implementation of a dedicated nurse in the pre-transplantation clinic, the follow-up is faster. An average of four months is now required to complete the process versus one year before the change. In 2007, seven patients received kidney transplants – of those, five were on PD. Since January 2008, four were given kidney transplants. We expect that within one year, we will also do post-transplantation follow-up. A great improvement for our hospital!

—Lyne Beauregard, Nephrology Program Manager

Haut-Richelieu Hospital

In our hospital, the implantation of the NephroCare™ software is doing well. First, a working paper was required by our CSSS management team in order to evaluate the need for such an acquisition: presentation of a Project Organization Manual (known in French as MOP or "Manuel d'organisation de projet"). The project was approved with the cooperation of the IT, Purchasing and Finance Services of the hospital. The current success of this operation is partially due to the availability of one dedicated nurse who is working full-time on this project. Before getting involved in this journey, it was mandatory to persuade our managers to allocate a special budget to purchase the application pilot, to customize the software and to train our team of nurses, nephrologists and other health care professionals. The whole team is very excited and focused to learn to use this software very quickly.

Four nurses of our dialysis unit chose to invest their time and energy to complete their certification in nephrology with the Canadian Nurses Association (CNA). We wish them all the best to obtain this certificate!

Two nurses from France, who have been working at the dialysis unit since their arrival, will pass the exam of the "Ordre des infirmières et infirmiers du Québec (OIIQ)" in September. We wish them the best of luck!

This year, the struggle is especially fierce between hospitals to hire newly graduated nurses ("candidate to the profession"). We have observed a decrease in college registrations ("CÉGEPs"). Therefore, after "shopping for a position," the best offer is chosen. Summer won't be easy.

Several nurses will attend the CANNT annual meeting in Québec City, and we're hoping for great weather.

—Hélène Perron

Québec (Lisette Lafrenière)

Dernièrement comme plusieurs d'entre vous le savez, le premier avril était la date butoir pour soumettre un abstract en vue de faire une présentation lors de la tenue prochaine du congrès CANNT/ACINT en octobre prochain. Les membres de l'association ainsi que moi-même ont été renversé et surtout très excité de constater que plus de 103 abstracts ont été soumis. Le congrès s'annonce prometteur et fort intéressant. Je remercie personnellement tous ceux et celles qui se sont impliqués dans la démarche. En attendant ce merveilleux moment, je souhaite un beau printemps à tous et au plaisir de vous voir dans le "Vieux Québec".

—Lisette Lafrenière

CSSS du Sud de Lanaudière—Hôpital Pierre-Le Gardeur

Notre centre continu de croître ainsi que la clinique de prévention de l'insuffisance rénale. Par le fait même, plusieurs nouveaux membres du personnel se sont ajoutés à l'équipe. Tous les efforts et les énergies sont déployés afin de stabiliser les effectifs en vue de l'expansion de la clientèle et de l'été qui s'en vient à grand pas. Nous sommes fiers d'annoncer qu'une de nos infirmières, Mme Ivone Coelho a obtenu une bourse de OIIQ ainsi qu'un support financier du ministère de la Santé et des Services sociaux soit une bourse d'études du Programme ministériel d'intéressement au rôle d'infirmière praticienne spécialisée afin de compléter sa formation d'infirmière praticienne en néphrologie. Toute nos félicitations.

Comme vous le savez déjà nous aurons la visite du CCASS, Canadien d'agrément des services de santé et le service de suppléance rénale sera sur le parcours et nous sommes prêts. La visite du conseil est prévue du 9 au 11 juin prochain.

—Lisette Lafrenière

CUSM

Hôpital Général Montréal

Beaucoup de changement de personne relie aux congés de maladie, congés sans solde et démission pour poursuivre des rêves personnel.

De plus, notre programme de Dialyse Nocturne à domicile prend de l'expansion. Actuellement 6 patients profitent de cette option et nous avons une petite liste d'attente.

Nous prévoyons aussi l'expansion de

notre service de télénéphrologie.

Hôpital Royal Victoria

Le nombre de patient qui reçoit un traitement "HDF" (hémodiafiltration) est aussi en croissance.

Hôpital Général Montréal et Hôpital Royal Victoria

Notre projet de CLSC pour notre clientèle de PD (environ 12 CLSC participants) est actualisé depuis le premier janvier.

Le 20 avril prochain, une Journée de formation aura lieu pour toute les infirmières portant sur:

Professionnal model of nursing

- The 15-minutes interview: Moving from a social to a therapeutic conversation
- Case scenarios and discussion
- Quality of life and hemoglobin target: Benefits for the patients
- Solution focused communication.

—Marie-Josée Stonely

CSSS de Chicoutimi

Actuellement, beaucoup de travail comme partout. Nous sommes maintenant ouvert depuis décembre dernier les lundis, mercredis et vendredis jusqu'à minuit puisque le seuil de patients maximum ayant été atteint. Nous avons aussi modifié l'horaire en ouvrant le dimanche et cela, depuis janvier 2008. Juste un petit mot pour dire que je quitterai mon poste au cours de la prochaine année. Je suis maintenant gestionnaire des soins intensifs. Mme Martine Gravel est nommée sur le poste en hémodialyse cependant elle entrera en fonction à une date ultérieure qui pour l'instant est indéterminée.

—Esther Girard

CSSS de Gatineau—Hôpital de Hull

Depuis décembre 2007, M Jean Bouchard est en prêt de service à l'Agence de l'Outaouais à titre de conseiller cadre pour l'ouverture de 2 unités satellites. L'ouverture de la première unité satellite à Maniwaki (200 Km de notre centre) est prévue en début de l'année 2009 et une deuxième à Buckingham (45 km de notre centre) est prévue en début de l'année 2010.

Le 3 avril, lors de la journée de formation des accès vasculaires parrainée par le REINQ, notre monitrice clinique Rachelle Brisson a agit à titre de conférencière. Bravo Rachelle!

Lors de la tenue du Congrès de la SQN en mai prochain, 4 infirmières de notre centre y assisteront.

Depuis décembre dernier, nous avons développé la technique du trou de bouton chez certains candidats de l'hémodialyse semi-autonome. Nous sommes heureux des résultats obtenus jusqu'à maintenant. Actuellement cinq usagers bénéficient de cette nouvelle technique.

—Serge Gauvreau

Hôpital Notre-Dame

Officiellement les rénovations ont débutées le 12 février au pavillon L.C. Simard à L' H.N.D. (dialyse semi-autonome).

Il y a une croissance du nombre de patients en hémodialyse (L'H.N.D.).

Un grand succès sur la technique du TROU DE BOUTON en auto dialyse. 80% des patients utilisent cette technique.

—Marie-Rose Charles

C.H. Régional de Trois-Rivières Pavillon Ste-Marie

Hémodialyse nocturne à domicile:

Deux nouvelles patientes débutent leur traitement à la maison dont première patiente avec cathéter qui se dit très heureuse de pouvoir l'expérimenter.

Aussi ponction en trou de bouton créée par infirmière et enseignement au patient par la suite pour auto ponction avec résultats très positifs.

—Sylvie Lehouillier

Hôpital Hôtel-Dieu de St-Jérôme

Depuis l'automne 2006, nous avons mis en place un poste de suivi pré greffe. Connie Blake, une infirmière clinicienne en dialyse, a obtenu le poste. Son défi était de mettre en place un processus de suivi pré greffe afin de pouvoir inscrire sur une liste les usagers potentiels à une greffe rénale le plus rapidement possible. Nous avons 3 néphrologues qui s'occupent plus particulièrement de ce suivi pré greffe.

Dans un premier temps, les usagers de la clinique de pré-dialyse avec un taux de filtration glomérulaire de moins de 20ml/min qui sont relativement en bon état de santé sont rencontrés afin de leur demander leur intérêt face à une greffe rénale et ainsi pouvoir entamer le processus d'examen pour les faire inscrire sur la liste de greffe. Pour ce qui est des usagers en dialyse péritonéale ainsi que nos usagers hémodialysés, la même demande est faite afin de voir leur intérêt et débuter le même processus rapidement.

Lorsque l'usager se dit intéressé, un rendez-vous est fixé avec Connie afin de lui donner l'enseignement concernant la greffe soit les examens nécessaires à passer, l'attente et le après greffe. Par la suite, une rencontre avec l'un des 3 néphrologues est fixée. Ce dernier effectue l'examen physique de l'usager et prescrit la série d'examen demandée par le centre greffeur en vue de l'inscrire sur la liste de greffe.

Par la suite tout est mis en branle et c'est là que le rôle de l'infirmière prend tout son sens.

Depuis l'instauration du système de suivi d'examens pré greffe par une infirmière réellement dédiée à cette clientèle, le suivi se fait plus rapidement, l'usager dont tous les critères sont présents pour être greffé est mis sur la liste beaucoup plus rapidement dans un délai de ± 4 mois au lieu d'environ 1 an comme par le passé. En 2007, sept usagers ont reçu une greffe rénale dont 5 en dialyse péritonéale et depuis janvier 2008, quatre ont été greffés. Nous envisageons que d'ici environ 1 an, nous effectuerons aussi le suivi post greffe. Une belle amélioration pour notre centre.

—Lyne Beauregard

Hôpital du Haut Richelieu

Dans notre centre l'implantation du logiciel Néphrocare se déroule très bien. Au préalable, un document de travail avait été exigé par les directeurs de notre CSSS afin de faire valoir la nécessité de cette acquisition : dépôt sous forme de Manuel d'Organisation de Projet (MOP pour les familier de cette présentation) Le projet a été accepté grâce à la collaboration du service informationnel, du service des approvisionnements et du service financier de l'Organisation.

Le succès présent est en partie relié à

la libération d'une infirmière dédiée depuis plusieurs semaines à cette mission à temps complet. Il est impératif avant de débuter cette aventure de trouver les arguments pour convaincre nos directeurs d'allouer un budget spécifique pour obtenir la présence d'un pilote applicatif pour la personnalisation du logiciel, pour la formation des équipes d'infirmières, néphrologues et autres professionnels. Toute l'équipe manifeste un enthousiasme et une détermination à s'approprier rapidement ce logiciel.

Trois infirmières et un infirmier de notre centre de dialyse ont choisi d'investir temps et énergie pour réussir l'examen de certification en néphrologie de l'Association des infirmières et infirmiers du Canada. Nous leur souhaitons la meilleure des chances pour l'obtention de ce certificat.

Une infirmière et infirmier en provenance de la France et qui travaillent en dialyse depuis leur arrivée se préparent à passer l'examen de l'O.I.I.Q. en septembre. Le mot de ''cambrone" vous accompagne.

Particulièrement cette année, la lutte est féroce entre les centres hospitaliers afin de recruter des infirmières finissantes (CEPI). On note une réduction des inscriptions dans les CEGEP, donc après le ''magasinage" la meilleure offre est choisie. On s'attend à un été difficile.

Plusieurs infirmières assisteront au CANNT à Québec, en espérant que le beau temps de l'automne sera au rendez-vous.

—Hélène Perron

Atlantic Region (Colleen Wile)

Greetings from the Atlantic Region. The following outlines the Atlantic Region in terms of membership and activities:

Saint John's, Newfoundland

- No new initiatives—had a long hard winter.

Corner Brook, Newfoundland

- Two staff wrote the certification exam and we wish them good luck.
- Four staff attended "Provincial Dialysis Days" in Gander, NL, April 19.
- Seven staff attended Atlantic CANNT in St. John, New Brunswick, in June.
- Four new staff members were recently trained for the region.
- Manager for the program, Suzanne Joseph, retired March 28. Suzanne started the renal program at Western in 1974. We will miss her. We welcome our new manager Linda Sparkes.

Charlottetown, Prince Edward Island

Completed Phoenix training in West and East Prince sites in February and these units were partially converted to the Gambro Phoenix machines at that time.

- We had inservices on new blood lines and on the e-beam dialyzers.
- Seven dialysis staff attended a nephrology education day in Halifax in April.
- The Provincial Dialysis Program partnered with the Kidney Foundation of Canada to host a Kidney Health Education Day in March.
- Planning has begun for next year's CANNT Atlantic Conference (2009). Anyone interested in volunteering for the organizing committee should contact Jennifer Seeley.
- We will be training staff soon at Kings County Memorial Hospital (KCMH) on PD for the provision of respite care service.
- The Provincial Dialysis Program has been working with Dr. Jones, who will be coming to PEI next year, in the planning of future nephrology services for PEI.

Cape Breton, Nova Scotia

- Four staff members attended CANNT Atlantic in New Brunswick in June.
- We were successful in obtaining an Integrated Quality Improvement Grant for our unit. Our goal was to provide education and enhance clinical excellence with a focus on vascular access.
- We held a vascular access camp over four hours and repeated it a second day so all staff could attend. The camp included lectures, interactive booths, open discussions and feedback. A multi-disciplinary team took part with positive feedback from the staff. Overall, the camp enabled us to share evidence-based practice, with every-

Celebrating World Kidney Day, March 16, 2008, in Moncton, New Brunswick, are Faith Leger (LPN), Chantal Saumure, Nurse Manager Hemodialysis, Jackie Victor (Genzyme), Denise Gaudet, Program Director, and Nola Langis, Nurse Manager Clinics and In-patient Nephrology.

one receiving the same information. We hope to present this at CANNT in Quebec, if accepted.
- We started using 4% sodium citrate to lock our hemodialysis catheters as of April 1, 2008.
- Lunch and learns were held discussing estimated glomerular filtration rates (eGFR) reporting by our lab for our chronic kidney disease (CKD) patients. Other topics included albumin-creatinine ratio and calcium phosphorus product.
- Successful patient education days were held in the CKD clinic.

Halifax/Dartmouth, Nova Scotia

LPNs have maximized their scope of practice and are now caring for the tunneled hemodialysis catheters in our stable predictable hemodialysis patients.

- "Changing the Way We Work" initiative, looking at scopes of practice and scopes of employment to ensure the right person is doing the right job to best meet the needs of our current patient population, continues to see progress.
- A successful Nephrology Education Day was held March 28 and April 1, and the plan is to repeat the day in the fall for other staff members to attend.
- Liverpool satellite site has expanded.
- Port Hawkesbury satellite site has begun renovations for a new unit within the same complex.

Moncton, New Brunswick

- Nephrology New Brunswick (NNB) was a success with more than 100 delegates.
- Celebration of International Kidney Day in collaboration with Jackie Victor of Genzyme.
- Four staff members received additional training and education on wound management in Quebec City by the Canadian Association of Wound Care.
- Continued efforts in recruitment and retention for all nursing staff in our program.
- Expansion of the satellite unit in Miramichi is on target.
- Planning for a memorial celebration in collaboration with the local chapter of the Kidney Foundation.

Bathurst, New Brunswick

- Trained a nursing home for PD with the cycler.
- Five nurses attended Nephrology NB.
- Four nurses attended CANNT Atlantic.
- Starting E-charting as a pilot project in our unit and in our satellite unit in Tracadie.

Saint John, New Brunswick

- Hosted CANNT Atlantic titled, "Ethics: What's the Problem".
- Supper clubs continue, as do monthly lunch and learns—continue development of nocturnal option for home dialysis.
- Working within region to develop new clinical information management.
- New hemodialysis quality working group has been formed.
- Initiation of nephrology nurse practitioner (NP) in a primary health care role in this population as NB does not recognize specialty NP roles.
- Great commitment to CANNT Atlantic by many staff members.

Many thanks to Paula Menard, Christine Chadderton, Lanea Harris, Mary Larade, Chantal Saumure, Nicole Fournier, and Sherry MacPhee for their contributions to this report.

Région de l'Atlantique (Colleen Wile)

Salutations de la région de l'Atlantique. La section suivante souligne les activités qui se sont déroulées dans notre région :

Saint John's, Terre-Neuve-Labrador

- Aucune nouvelle initiative—l'hiver a été long et pénible.

Corner Brook, Terre-Neuve-Labrador

- Deux membres du personnel ont passé leur examen de certification en néphrologie. Nous leur souhaitons la meilleure des chances!
- Quatre membres du personnel ont participé à la Journée provinciale sur la dialyse à Gander, à T.-N-L., le 19 avril dernier.
- Sept membres du personnel ont assisté à la réunion de l'ACITN de la région de l'Atlantique à St. John, N.B. en juin dernier.
- Quatre membres du personnel ont été formés récemment pour la région.
- Suzanne Joseph, directrice du Programme, a pris sa retraite le 28 mars dernier. Nous lui devons la mise ne œuvre du Programme de néphrologie en 1974. Elle nous manquera. Veuillez vous joindre à moi pour souhaiter la bienvenue à Linda Sparkes, notre nouvelle directrice.

Charlottetown, Île-du-Prince-Édouard

Nous avons terminé en février la formation sur les appareils Phoenix™ de Gambro dans les secteurs Ouest et Est de l'Î.-P.-É. et une partie du transfert est complétée pour le moment.

- Nous avons reçu une formation sur place sur de nouvelles tubulures à sang et sur de nouveaux dialyseurs stérilisés au faisceau d'électrons (*e-beam*).
- Sept membres du personnel ont participé à la Journée de formation en néphrologie à Halifax en avril.
- Le Programme provincial, en partenariat avec la Fondation canadienne du rein, a tenu une Journée de formation sur la santé du rein en mars dernier.
- Nous avons commencé la planification du Congrès annuel de l'ACITN région de l'Atlantique 2009. Si vous désirez vous joindre au comité organisateur, veuillez communiquer avec Jennifer Seeley.
- Nous donnerons sous peu de la formation sur la DP au personnel du Kings County Memorial Hospital (KCMH) pour la prestation de services de relève.
- Le Programme provincial travaille en étroite collaboration avec le Dr Jones, qui viendra à l'Î.-P.-É. l'an prochain pour planifier les services de néphrologie de la province.

Cap Breton, Nouvelle-Écosse

- Quatre membres du personnel ont assisté à la réunion de l'Atlantique de l'ACITN qui s'est déroulée au Nouveau-Brunswick, en juin dernier.
- Notre unité de dialyse a obtenu une bourse pour notre processus intégré d'amélioration de la qualité. Notre objectif consistait à donner de la for-

mation et à améliorer l'excellence clinique en valorisant l'importance des soins à apporter à l'accès vasculaire.

- Nous avons tenu un atelier de formation sur l'accès vasculaire pendant plus de quatre heures et nous avons répété l'expérience une seconde fois afin que tout le personnel puisse y assister. Cet atelier incluait des présentations, des stands interactifs, des tribunes libres et des séances de rétroaction. Une équipe multidisciplinaire y a pris part et a reçu de bons commentaires de la part du personnel. Dans l'ensemble, l'atelier nous a permis de partager notre pratique fondée sur l'expérience clinique, en fournissant à toute la même information. Nous espérons pouvoir présenter cette expérience au Congrès annuel du l'ACITN à Québec, en espérant que notre résumé de présentation sera retenu.
- Depuis le 1er avril 2008, nous utilisons du citrate de sodium à 4 % pour fermer les cathéters d'hémodialyse.
- Nous avons tenu un déjeuner-causerie pour discuter des taux estimatifs de filtration glomérulaire (eGFR) rapportés par notre labo chez les patients atteints de maladie rénale chronique (MRC). Les autres sujets abordés ont porté sur le rapport albumine-créatinine et sur le produit du phosphate de calcium.
- Nous avons également organisé avec succès des journées de formation à l'intention des patients à la clinique de MRC.

Halifax/Dartmouth, Nouvelle-Écosse

Les infirmières auxiliaires autorisées (I.A.A.) peuvent maintenant administrer, grâce à la nouvelle portée de leur pratique, des soins aux cathéters tunnelisés chez nos patients dont l'état est stable en hémodialyse et la réponse au traitement est prévisible.

- Nous continuons de faire des progrès avec l'initiative *Changing the Way We Work* (« Adoptons une nouvelle façon de travailler »), qui permet d'évaluer la portée de la pratique et de l'emploi afin d'assurer que la bonne personne occupe le bon poste, et ce, pour mieux répondre aux besoins de notre population de patients actuelle.
- Nous avons organisé avec succès des Journées de formation en néphrologie les 28 mars et 1er avril derniers et nous prévoyons répéter cette expérience une journée à l'automne 2008 afin de permettre aux autres membres du personnel d'y assister.
- Le centre satellite de Liverpool a connu une expansion.
- Le centre satellite de Port Hawkesbury a entamé des travaux de rénovation pour la construction d'une nouvelle unité dans le même complexe.

Moncton, Nouveau-Brunswick

- La Journée de formation en néphrologie (Néphrologie Nouveau-Brunswick) a été couronnée de succès avec plus d'une centaine de participants.
- Nous avons célébré la Journée internationale du rein en collaboration avec Jackie Victor de Genzyme.
- Quatre membres du personnel ont reçu à Québec une formation complémentaire sur le traitement des plaies donnée par l'Association canadienne du soin des plaies.
- Nous déployons des efforts continus dans le recrutement et la rétention du personnel infirmier pour notre programme.
- La construction de l'unité satellite à Miramichi se poursuit conformément aux objectifs.
- Nous planifions une Journée commémorative en collaboration avec le Chapitre de Moncton de la Fondation canadienne du rein.

Bathurst, Nouveau-Brunswick

- Le personnel d'un foyer de soins a reçu une formation sur la DP avec cycleur.
- Cinq infirmières ont participé à la Journée de néphrologie Nouveau-Brunswick.
- Quatre infirmières ont assisté à la réunion de la région de l'Atlantique de l'ACITN.
- Nous entamons un projet pilote de consignation électronique des notes au dossier à la fois dans notre unité de dialyse et notre centre satellite à Tracadie.

Saint John, Nouveau-Brunswick

- Nous avons accueilli la réunion de la région de l'Atlantique de l'ACITN intitulée « Éthique : C'est quoi le problème ? » ("*Ethics: What's the Problem?*").
- Le Club des soupers continue d'organiser des conférences visant favoriser le développement de la dialyse nocturne à domicile.
- Nous travaillons en région afin de développer la gestion de l'information clinique.
- Nous avons créé un nouveau groupe de travail qui se penche sur l'amélioration continue de la qualité en hémodialyse.
- Nous avons décrit le rôle de l'infirmière praticienne dans les soins de santé primaires auprès de la population en dialyse.
- Notons que le gouvernement du N.-B. ne reconnaît pas le rôle de spécialité des infirmières praticiennes.
- La région de l'Atlantique de l'ACITN connaît un excellent taux de participation dans ses activités grâce à l'engagement d'un grand nombre d'infirmières.

Je tiens à remercier Paula Menard, Christine Chadderton, Lanea Harris, Mary Larade, Chantal Saumure, Nicole Fournier et Sherry MacPhee pour leur précieuse collaboration à la rédaction de ce rapport.

Technical VP (Marc Héroux)

- Two large endeavours for the technologists are in full swing.
- The CANNT home dialysis committee represented by nephrology technologists is actively involved in many aspects, playing an integral role in the care of patients with chronic kidney disease (CKD) who choose the home dialysis modality. On that venue, we are creating a CANNT technical practice for home dialysis to capture the items that are beyond the scope of the standards of technical practice. Both sets of standards will be merged to create one document. The standards will be released as a whole and the new home dialysis section will be emphasized.
- A letter has been sent to the Canadian Standards Association (CSA) by the VP of technologists with the endorsement of the board of directors of

CANNT requesting the investigation and feasibility of a home dialysis standard. The CSA has the power to create standards that have quantities, values and the guidance it should, could or must have. When this CSA endeavour goes forward, we shall be looking for technologists from across Canada. The CSA must have cross-country representation to be accepted by the Standards Council of Canada (SCC), which is the body that oversees the CSA at an international level.

Southern Alberta Regional Program (SARP), Calgary Health Region

- Michael Laing, long-serving technical manager of SARP of Calgary Health Region, has retired. Martin Dyke from Peterborough is the new technical manager of SARP.
- SARP has recently changed the default sodium setting to 137 mmol/L from 142 mmol/L, as most patients were presenting with lower sodium, as demonstrated as a feature of our dialysis machine. SARP has also changed the default temperature setting from 37ºC to 36ºC, due to the fact that body temperature generally increases on dialysis and it is, therefore, better to maintain a neutral temperature of 36ºC or less.
- SARP has now decided to disinfect hemodialysis machines once a day instead of between every patient treatment (except infectious patients) due to the fact that it does not necessarily provide better results.

British Columbia
Royal Jubilee Hospital

- It's been a very busy time at the Vancouver Island Health Authority. Planning for the mid-island acute dialysis facility in Nanaimo is nearing completion and the workload seems to always be on the increase, as our patient numbers continue to grow.
- After an exercise in logistics (our hospital doesn't handle maternity cases, and the maternity hospital doesn't offer hemodialysis), we recently celebrated with our patient the successful birth of a baby girl.
- In addition, we have been actively involved with the Renal Technologist Recognition Poster program with our counterparts across Canada, hoping to increase the stature and profile of the renal technologists across Canada.

Many thanks to Shripal Parikh and R. Allan Whysker for this report.

Rapport technique (Marc Héroux)

- Deux projets d'importance battent leur plein pour les technologues.
- Le Comité de dialyse à domicile de l'ACITN, formé par des technologues, participe activement sur de nombreux aspects, en jouant un rôle intégral dans les soins prodigués aux patients atteints de maladie chronique du rein qui ont choisi la modalité de la dialyse à domicile. Nous avons conçu un guide de pratique technique pour la dialyse à domicile afin de bien saisir les éléments qui sont en dehors de la portée des normes de la pratique technique. Nous amalgamerons ces deux normes pour créer un seul document. Les nouvelles normes seront publiées comme un tout et la nouvelle section portant sur la dialyse à domicile sera mise en valeur.
- Une demande d'évaluation ainsi qu'un étude de faisabilité avec l'approbation du C.A. a été transmise à l'Association canadienne de normalisation (CSA) avec l'approbation du C.A. sur la création d'une norme sur la dialyse à domicile. La CSA doit se conformer « à un processus d'élaboration de normes clairement défini qui fait l'objet d'une documentation officielle et qui est soumis à un contrôle strict ». Si la CSA accepte de mettre de l'avant ce projet, nous aurons besoin du soutien et de la collaboration de la part des technologues d'un bout à l'autre du pays. En effet, la CSA doit assurer la représentation des groupes d'intérêts à l'échelle nationale pour obtenir la reconnaissance officielle d'une nouvelle norme par le Conseil canadien des normes (CCN) qui est l'organisme qui approuve les normes du CSA sur le plan international.

Southern Alberta Renal Program (SARP), Calgary Health Region

- Michael Laing, directeur technique du SARP du Calgary Health Region vient de prendre sa retraite. Martin Dyke de Peterborough prend le relai à titre de nouveau directeur technique du SARP.
- Le SARP a changé récemment ses réglages de sodium par défaut, passant de 137 mmol/L à 142 mmol/L, étant donné que la plupart des patients présentent un taux de sodium plus bas. Le SARP a aussi modifié la température par défaut, passant 37ºC à 36ºC, puisque la température corporelle augmente généralement durant le traitement. Par conséquent, il est plus approprié de maintenir une température neutre de 36ºC ou moins.
- Le SARP a pris la décision de désinfecter les appareils d'hémodialyse une fois par jour au lieu de le faire entre chaque traitement (sauf pour les patients présentant une infection), étant donné que l'ancienne procédure n'entraînait pas nécessairement de meilleurs résultats.

British Columbia
Royal Jubilee Hospital

- Nous avons été très occupés au Health Authority de l'île de Vancouver. La planification des activités du centre de dialyse aiguë à Nanaimo, qui dessert une partie du territoire de l'île, est presque terminée. Toutefois, la charge de travail semble de plus en plus grande, étant donné que le nombre de patients en dialyse ne cesse d'augmenter.
- C'est une fille! Une de nos patientes a donné naissance récemment à une petite fille. L'accouchement s'est bien déroulé. Ce fut un véritable exercice de logistique pour nous, car habituellement nous ne traitons pas les parturientes (et la maternité n'offre pas de traitements d'hémodialyse).
- Enfin, nous avons joué un rôle actif dans la préparation de l'affiche sur la reconnaissance du rôle des technologues en néphrologie avec nos collègues dans tout le Canada. Nous espérons ainsi accroître la reconnaissance et la notoriété des technologues.

CANNT ACITN
CANADIAN ASSOCIATION OF NEPHROLOGY NURSES AND TECHNOLOGISTS
L'ASSOCIATION CANADIENNE DES INFIRMIÈRES ET TECHNICIENS DE NÉPHROLOGIE

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KEYNOTE SPEAKERS

GISELLE KOVARY & ADWOA K. BUAHENE

N-GEN PEOPLE PERFORMANCE: Generational Experts and Organizational Performance Experts

Giselle Kovary M.A. and Adwoa K. Buahene M.A. are the managing partners of n-gen People Performance Inc., a leading performance consulting company focusing on human resources from a generational perspective. They are the authors of *Loyalty Unplugged: How to Get, Keep & Grow All Four Generations*, which definitively answers the question, "Is loyalty dead?"

The four generations in the workplace Traditionalist, Baby Boomer, Gen X and Gen Y demonstrate different workplace behaviours because of their unique identities. Giselle and Adwoa help professionals maximize those behaviours while managing the differences to create an engaged workforce. They clarify how to get, keep, and grow your human capital by responding to the generational identities. Giselle and Adwoa tackle the why, what, and how to, within recruitment, orientation, career-pathing, learning and development, mentoring, performance management, succession planning and people management practices.

Their highly customized keynote presentations will help delegates understand generational motivations from both a research and anecdotal perspective, and provide strategic solutions that can be applied easily and quickly to improve organizational and people performance.

DR. GILLES LAPOINTE

Host of the popular daily television show Allô Docteur on Canal Vie, Dr. Lapointe gives hilarious presentations on healthy living and coping with stress. He is fluently bilingual, an accomplished musician and extremely entertaining. His keynotes bring audiences to their feet and tears of laughter to their eyes. Dr. Lapointe is the author of the best-selling book Docteur, Aidez-Moi! (Doctor, I Need Help) and has produced two videocassette series on health, Savoir Produire sans se Détruire (Being Productive Not Destructive) and Le Succès par la Santé (Success Through Health).

Dr. Lapointe has lectured across Canada, in both French and English, to various groups including judges and attorneys, sales representatives, civil servants, medical practitioners, and many more. He focuses on the importance of attitude in life. He helps individuals cope with stress by introducing the seven laws of success, and important information about how to handle tough days. Self-image, simplicity in your life, dignity and human pride are addressed in his humorous, yet insightful presentations.

DANIÈLE SAUVAGEAU

Former Head Coach of the first Canadian Olympic hockey team to win gold in 50 Years, Danièle Sauvageau has extensive experience in human resource management, coaching, leadership, evaluation, communication and the making of a winning team. Her speeches are designed to teach, inspire and support people in being their best. She brings to the speaking arena a mix of practical and academic experiences in the public, private and sport sector organizations. Fluently bilingual in French and English, her clients include the RCMP, Hockey Canada, Sport Canada, Water Polo Canada, Bombardier, Federal and provincial government, and numerous private, public and not-for-profit organizations.

Beyond coaching and working as a police officer, she is also spokesperson for the Coaching Association of Canada, a member of the Canadian Professional Coaches Association, and was a member of the successful bid committee for the Vancouver 2010 Olympics bid. Her drive to win and her commitment to numerous not-for-profit and community organizations round out her already impressive repertoire of accomplishments.

Sauvageau and her work have appeared on CBC, TSN and NBC, and been featured in a variety of Canadian and U.S. publications. She co-authored the book *A Golden Tear*, an account of her journey to the Olympics.

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GISELLE KOVARY et ADWOA K BUAHENE

N-GEN PEOPLE PERFORMANCE: Experts générationnels et en performance organisationnelle

Giselle Kovary MA et Adwoa K Buahene MA sont les gestionnaires partenaires de n-gen People Performance Inc., une éminente compagnie de consultation ayant une expertise en ressources humaines concentrée vers une perspective générationnelle. Elles sont les auteurs de *Loyalty Unplugged: How to Get, Keep and Grow All Four Generations (Loyauté débranchée: Comment trouver, garder et développer les quatre générations), qui répond sans aucun doute à la question,* "Is loyalty dead?" (La loyauté est-elle morte?).

Les quatre générations dans le milieu du travail: traditionaliste, baby boomer, génération X et Y démontrent différents comportements au travail en raison de leur identité unique. Giselle et Adwoa aident les professionnels à maximiser ces comportements tout en gérant les différences afin de créer une main d'oeuvre engagée. Elles clarifient comment trouver, garder et développer le capital humain tout en répondant aux identités générationnelles. Giselle et Adwoa abordent le pourquoi, le quoi, et le comment, dans le recrutement, l'orientation, le plan de carrière, l'apprentissage et le développement, le mentorat, la gestion de la performance, la planification de la relève et les pratiques de la gestion du personnel.

Leurs présentations personnalisées aideront les congressistes à comprendre les motivations générationnelles d'un point vue de recherche et anecdotique, et apporteront des solutions stratégiques qui peuvent être appliquées facilement et rapidement pour améliorer la performance organisationnelle et humaine.

DR. GILLES LAPOINTE

Animateur de la populaire émission télévisée quotidienne *Allô Docteur* sur les ondes de Canal Vie, Dr. Lapointe fait des présentations humoristiques sur comment vivre en santé et gérer le stress. Il est bilingue, musicien accompli et extrêment divertissant. Ses présentations animent et réjouissent le public. Dr. Lapointe est l'auteur du livre à succès *Docteur, Aidez-Moi!* et a produit deux vidéocassettes sur la santé, *Savoir produire sans se détruire* et *Le succès par la santé.*

Dr. Lapointe a présenté des conférences à travers le Canada, en français et en anglais, à des groupes variés dont des juges et avocats, des vendeurs, des fonctionnaires, des médecins et plusieurs autres. Il se concentre sur l'importance de l'attitude dans la vie. Il aide les personnes à faire face au stress en présentant les sept lois du succès, une information importante pour savoir supporter les jours difficiles. L'image de soi, la simplicité de la vie, la dignité et la fierté humaine sont abordées dans ses présentations drôles et perspicaces.

DANIÈLE SAUVAGEAU

Ex-entraîneure-chef de la première équipe olympique canadienne de hockey à gagner une médaille d'or en 50 ans, Danièle Sauvageau possède une expérience considérable dans la gestion des ressources humaines, du coaching, du leadership, de l'évaluation, de la communication et la création d'une équipe gagnante. Ses discours sont conçus pour enseigner, inspirer et encourager les gens à faire de leur mieux. Dans le domaine des conférences, elle apporte une combinaison d'expériences au sein d'organisations publiques, privées et sportives. Maîtrisant le français et l'anglais, ses clients sont la GRC, Hockey Canada, Sport Canada, Water Polo Canada, Bombardier, les gouvernements fédéral et provincial et plusieurs organismes privés, publics et à but non lucratif.

En plus de son travail d'entraîneure et de policière, elle est également porte-parole pour l'Association canadienne des entraîneurs, membre de l'Association canadienne des entraîneurs professionnels et a été membre du comité qui a obtenu avec succès la tenue des Olympiques à Vancouver en 2010. Sa volonté de réussir et son engagement dans plusieurs organisations communautaires et à but non lucratif viennent compléter son impressionnante liste de réalisations.

On a pu voir le travail de Madame Sauvageau sur les réseaux CBC, TSN, NBC et il a aussi été présenté dans une grande variété de publications canadiennes et américaines. Elle est co-auteure du livre *Une Larme d'or*, le récit de son parcours vers les Olympiques.

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Découvrez le talent, l'originalité et l'humour des quatre frères et soeur de la famille Painchaud. En spectacle, vous les verrez jouant tous à la fois sur le même piano à qui mieux mieux, giguer avec ferveur, maîtriser plus de quinze instruments avec virtuosité et accomplissant des acrobaties musicales inédites. Vous y verrez notamment un violoneux dont l'archet prend littéralement en feu alors qu'il joue sur son violon. Avec un répertoire de plus de 900 pièces, ils feront également toutes les demandes spéciales en direct aux tables.

Predictors of hemodialysis central venous catheter exit-site infections

By Lori Harwood, RN, MSc, CNeph(C), Barbara Wilson, RN, MScN, CNeph(C), Bonita Thompson, RN, BA, Elizabeth Brown, RN, and Danae Young, RN

Abstract

Central venous catheter (CVC) exit-site infections contribute to bacteremia and patient morbidity and mortality among patients on hemodialysis. This structured observational study examined predictors of positive CVC exit-site infections. Hemodialysis nurses documented the physical appearance of the CVC exit site for sites they believed to be infected and required a swab culture. Additional information that pertained to the catheter, exit-site care and demographic data were also collected. No patient characteristics were associated with an exit-site infection. However, the type of dressing (p=0.007) and cleansing solution (p=0.007) used were positively associated with an exit-site infection. Negative exit-site culture reports were more likely to have dressings changed weekly (p=0.03). The size of peri-wound erythema (p=0.008) was also associated with a higher incidence of exit-site infections. Patients with dry crust present at the exit site were more likely to have negative culture results (p=0.03). A large number of negative swab culture results (71%) were obtained suggesting that further nursing education is needed. The results of this study contribute to our understanding of the physical characteristics of an infected CVC exit site. Given the morbidity and mortality associated with CVC infections, more nursing research is needed in this area.

Key words: central venous catheters, exit-site infections, hemodialysis, nursing assessment

Introduction

Central venous catheter (CVC) use in hemodialysis is common and is associated with a number of negative sequelae. Infection is one of the most problematic, potentially life-threatening CVC complications and the most common cause leading to CVC removal. Hemodialysis CVCs have a higher infection rate when compared to fistulas and grafts (Balwit & Rezabeck, 2002). Hemodialysis nurses are the first and often the only health care professional to assess, evaluate and manage hemodialysis central venous catheter exit sites. When surveyed, hemodialysis nurses identified nursing interventions to prevent vascular access infections as one of five nursing research priorities (Lewis et al., 1999).

Previous clinical practice guidelines outlined by the National Kidney Foundation Dialysis Outcome Quality Initiative (NKF-DOQI, 2006) and the Canadian Society of Nephrology (CSN) (Jindal et al., 2006) both recommend that the preferred type of access for patients requiring chronic hemodialysis is the native arterio-venous (AV) fistula. It is concerning that despite these recommendations, the use of temporary and permanent CVCs in Canada is high at 33% (Mendelssohn et al., 2006). This is higher than usage in both Europe (25%) and the U.S. (18%) (Mendelssohn et al.). Yeates et al. (2007) have recommended that decreasing the prevalence of CVCs is key to improving survival of individuals on hemodialysis in Canada.

Appropriate clinical assessment and management of the CVC exit site is vital, as it is a source of microbial colonization leading to exit-site infection and the potential for subsequent bacteremia and sepsis (Jones, 1998). Catheter-related bacteremia is a significant cause of morbidity and mortality for hemodialysis patients and the increased cost associated with bacteremia is significant (Allon, 2004; NKF-K/DOQI, 2006). It is estimated that the costs associated with one treatment for hemodialysis catheter-related bacteremia in the United States can be as high as $45,000 (Reed et al., 2005) with an average of approximately $22,000 per episode (Engemann et al., 2005).

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There is a paucity of research on predictors of hemodialysis CVC exit-site infections. Specifically, what objective clinical findings and patient characteristics are associated with hemodialysis CVC exit-site infections? Answers to these important questions may improve patient outcomes, reduce the number of unnecessary and costly investigations, and lead to a reduction in the frequency of antibiotics prescribed.

Review of related literature

Hemodialysis CVCs, in comparison to other CVCs, have a higher infection rate and these exit-site infections are predictive of systemic infections (Gosbell et al., 1995). The most common organism for CVC-related infections are those found on skin flora such as *Staphylococcus epidermidis*, *Staphylococcus aureus* and *Streptococcus species* (Jones, 1998). These species can migrate from the CVC entry site along the external surface of the catheter or from the hub, directly contaminating the surface of the internal lumen and into the bloodstream (Jones).

CVC exit-site classification

Generally, the universally accepted clinical signs of infection are redness, heat, swelling and pain. Despite these universally accepted signs, there remains much subjectivity and variability in definitions, depending on the source. For example, how much erythema is present with an exit-site infection? Is there evidence to suggest that crusting is associated with a CVC exit-site infection? Is a wet exit site associated with a CVC exit-site infection, whereas a dry exit site is not? Are hemodialysis patients with certain comorbid conditions more prone to exit-site infections?

In terms of definitions from the literature, the most detailed description of local infection is provided by Health Canada (1997) in the infection control guidelines for intravascular access devices in which they categorize and define local infections into three areas. A local infection is *definite* when there is either purulent discharge at the site or erythema, tenderness, induration with a positive culture of serous discharge. A *probable* local infection includes erythema, tenderness, and induration at the exit site without a positive culture. A *possible* local infection includes erythema, tenderness, induration at the exit site and when an alternate cause cannot be ruled out. From a nephrology perspective, the CSN guidelines do not provide a definition, but state that exit-site infections are typically associated with erythema, crusting and exudate without systemic symptoms or positive blood cultures (Jindal et al., 2006). The NKF-K/DOQI (2006) guidelines define a CVC exit-site infection as one in which inflammation is limited to the surrounding area, not extending superiorly beyond the cuff and a positive exudate culture.

Twardowski and Prowant (1996) developed and validated a classification system for identifying categories of healthy and unhealthy peritoneal dialysis (PD) exit sites. It is the belief of the authors of this paper that although PD catheter exit sites are different than that of a CVC, exit-site principles used in this study and evaluation of the physical appearance of PD exit sites and their classification may be applicable for use in hemodialysis.

Dressing care and cleansing agent

The use of gauze versus a semi-permeable transparent dressing for CVC hemodialysis exit sites has been well studied. The CSN guidelines recommend that a dry gauze type be used (Jindal et al., 2006). However, this evidence is based on studies using dry gauze and antimicrobial ointment (Hoen, Paul-Dauphin, Hestin & Kessler, 1998; Levin, Mason, Jindal, Fong & Goldstein, 1991). The NKF-K/DOQI (2006) guidelines recommend either a transparent or dry gauze dressing. Health Canada (1997) also does not support the use of transparent semi-permeable dressings. The Centers for Disease Control (CDC) recommends either gauze or semi-permeable transparent dressings (O'Grady et al., 2002). This evidence is based on a meta-analysis of central and peripheral venous catheters comparing gauze to transparent dressings. The risk of catheter-related blood stream infections did not differ between the groups (Hoffman, Weber, Samsa, & Rutala, 1992).

The NKF-K/DOQI and CSN guidelines do not include statements regarding the preferred cleansing agent for CVC exit sites. The CDC recommends a 2% chlorhexidine-based preparation, 70% alcohol, tincture of iodine or iodophor (O'Grady et al., 2002). Health Canada (1997) recommends cleansing arterial and central venous sites with aqueous 2% chlorhexidine gluconate. This evidence is based on one study demonstrating lower infection rates with chlorhexidine compared to 10% povidone-iodine or 70% alcohol (Maki & Ringer, 1991). In this study, the majority (64%) of exit sites were covered with a semi-permeable transparent dressing while 36% used a type of dry gauze. Sixty-eight per cent (68%) of the patients had their exit sites cleansed with a 2% chlorhexidine gluconate solution.

Health Canada (1997), the CSN (Jindal et al., 2006), and CDC (O'Grady et al., 2002) recommend the use of antimicrobial ointments with hemodialysis CVCs as a preventative measure. Antimicrobial/antiseptic ointments such as mupirocin (Bactroban) (Johnson et al., 2002), povidone-iodine (Levin et al., 1991), Polysporin Triple (Lok et al., 2003) and antibacterial honey (Johnson et al., 2005) applied to the exit site have all been shown to be effective in reducing the incidence of staphylococcal infections.

In terms of the frequency of assessing CVC exit sites, the NKF-K/DOQI guidelines (2006) and the CSN Clinical Practice Guidelines (Jindal et al., 2006) for care of access recommend that hemodialysis exit sites should be examined each treatment for signs and symptoms of infection. Similarly, the CDC recommends that visual inspection of the catheter site through the intact dressing be done on a regular basis and if tenderness, fever without obvious source or other manifestations suggesting local infection appear, the dressing should be removed to allow for a more thorough examination of the site (O'Grady et al., 2002).

Factors associated with CVC exit-site infections

An Italian study (Viale et al., 2004) was done to assess variables associated with CVC exit sites, tunnel infections, bacteremia and sepsis. However, this study did not include the clinical appearance of exit sites and the results have not yet been published. Therefore, studies examining factors associated with CVC exit-site infections are limited to those involving temporary, uncuffed catheters.

Exit-site infections with temporary CVCs are associated with an increased risk of bacteremia and catheter removal (Hung, Tsai, Yen & Yen, 1995; Oliver, Callery, Thorpe, Schwab & Churchill, 2000; Piraino, 2000). A recent study reported the incidence of exit-site infections with hemodialysis temporary uncuffed, non-tunneled CVCs to be 2.1% and associated with the total number

of uses and catheter placement with the jugular site the most prevalent (Young, Contreras, Robert, Vogt & Courtney, 2005). Having diabetes was not found to be an influencing factor with exit-site infections with temporary CVCs (Young et al., 2005).

In a prospective evaluation of possible complications for temporary non-tunneled double-lumen catheters, local and systemic complications ranged from 0 to 36 (8.8 SD 8.2) (de Andrade & Ferreira, 2007). They defined local complications as insertion pain, secretion, bleeding, pruritis and hyperemia. Systemic complications included fever, pyrogenic reaction and bacteremia. In this nursing study, de Andrade and Ferreira (2007) followed 64 patients with new CVC insertions for complications over a period of six months. Data were obtained through interviews, assessments and review of health records. Local complications, on average, were experienced in the first few days following insertion: pain (two days), secretion (two days), bleeding (one day), hyperemia (two days), and pruritis (one day). Exit-site infections were not reported. Local complications were not reported in their data beyond nine days (secretion) of insertion suggesting that data collection was limited beyond the first few weeks of CVC insertion.

In summary, despite the enormous clinical importance of hemodialysis CVC infections on morbidity and mortality, there has been no study to date that examines predictors of hemodialysis tunneled cuffed CVC exit-site infections. The importance of proper exit-site care in the prevention of catheter-related bacteremia is well documented in the literature. There is very little consensus and even less evidence about which clinical findings are associated with hemodialysis CVC exit-site infections. It is important to investigate the predictors of exit-site infections, as they could be precursors to catheter-related bacteremia and the subsequent risk of morbidity and mortality for the hemodialysis patient. The purpose of this observational study was to identify predictors associated with positive CVC exit-site infections.

Methodology

Sample

After ethical approval from the local research ethics board, the investigators approached patients for participation in the study and to obtain informed consent. A convenience sample was used and included all adult individuals, 18 years of age or

Figure One.

Central Venous Catheter Exit-Site Assessment Form

Exit-site swab for central venous catheter date sent _____

For the following indications: (check if present)

- ❑ Patient c/o pain at exit site
- ❑ Patient c/o pruritis at site
- ❑ Patient c/o tenderness at exit site
- ❑ Febrile, if yes, temp
- ❑ Dressing fell off at home
- ❑ Cuff visible
- ❑ Trauma to line (pulled)

- ❑ Redness at exit site

If present please estimate the size of the peri-exit site erythema border:

❑ < 5mm ❑ > 5mm ❑ 1cm ❑ 1.5cm ❑ 2cm, or ❑ > 3cm

- ❑ Redness along catheter tunnel
- ❑ Swelling at exit site
- ❑ Swelling along catheter tunnel
- ❑ Dry crust* at exit site,
- ❑ Dry scab** at exit site,
- ❑ Obvious abscess (enlargement/induration above tunnel)
- ❑ Purulent exudate at exit site (wet)
- ❑ Serous exudate (wet)
- ❑ Purulent exudate expressed with manipulation of catheter (wet),
- ❑ Excoriation of peri-exit site skin
- ❑ Exuberance/granulation or 'proud flesh' at exit site
- ❑ Other, specify_____

Does the patient have poor hygiene? ❑ Yes ❑ No

*Crust: defined as pale or dark yellow hardened drainage
**Scab: defined as hardened serum and blood

older, receiving chronic hemodialysis in a large academic teaching hospital in Canada who had a tunneled CVC requiring an exit-site culture.

Data collection

The proposed study was advertised by the primary investigators (LH & BW) to the hemodialysis nurses via email, educational sessions and staff meetings requesting nurses to volunteer to assist with the study. A group of interested hemodialysis nurses (EB & DY) and one vascular access case manager (BT) volunteered to assist with the study. Their role was to verbally promote the study amongst their peers, answer questions regarding the study, refer to the primary investigators when necessary and assist with data collection from the health records. Their participation also provided exposure to nursing research and current literature regarding CVC management. They were each provided with an orientation to the study, which was conducted by the primary investigators (LH & BW).

Following completion of the educational component, data collection occurred over a period of 18 months. Data collection consisted of nurses' assessment of the CVC exit site with each hemodialysis treatment and completion of an assessment form (see Figure One) if his/her clinical judgment determined the need for a culture swab (i.e., the exit site looked infected).

Definitions and hemodialysis unit protocols

For the purposes of this study, a positive CVC exit culture was defined as the presence of white blood cells with a colony forming unit of > 10 (reported as ++ for our hospital laboratory) and an organism identified as present. The hospital laboratory where the study took place was used for the culture and sensitivity testing of all swabs. Nursing standards exist within the teaching hospital for obtaining an exit-site swab prior to cleansing all types of CVC sites. Hemodialysis tunneled CVC exit-site swabs for culture and sensitivity were obtained by rolling a culture swab that had been pre-moistened in the transport gel, once forwards and backwards at the exit site as per the nursing protocol of the hemodialysis unit. With respect to the physical appearance of the exit site, crust was defined as pale or dark yellow hardened drainage and a scab was defined as hardened serum and/or blood. These definitions have been documented in the literature for classification of PD exit sites (Twardowski & Prowant, 1996) and were determined by the primary investigators (LH & BW) to be applicable for hemodialysis exit sites.

Current practices in the hemodialysis unit were not affected, nor were existing protocols related to CVC exit-site care and dressing changes altered during the study. At the time of the study, current protocol in our unit included use of 2% chlorhexidine gluconate to cleanse the exit site with application of a semi-permeable transparent dressing. If the patient was unable to tolerate either the dressing or cleansing solution, a dry gauze-type dressing would be applied and/or the exit site cleansed with a 10% povidone-iodine solution. Unit protocol was for dressing changes to be done on a weekly basis if a semi-permeable transparent dressing was used and more frequently at the nurse's discretion if there was clinical indication to do so (i.e., infection, lack of adherence of the dressing, patient request). For patients using a dry gauze-type dressing, our unit protocol outlined dressing changes to be routinely done with each dialysis to allow visualization of the exit site. It is practice in our unit for nurses to obtain a swab if there are indications that infection may be present based on his/her assessment of the exit site and clinical judgment. No unit policy exists indicating when nurses should or should not swab an exit site. The nurses were provided with a Wound Measuring Guide produced by HealthPoint® specifically designed to measure wounds to increase the accuracy of measurement of size of the erythema borders. Wound measurement devices are commonly used in the clinical setting to accurately measure the size of wounds.

Instrumentation

An assessment form (see Figure One) was developed by the investigators based on a review of the literature for risk factors associated with CVC-related blood stream infections and criteria previously developed for PD exit-site infections. The assessment form is a checklist based upon a category system of phenomena documented in the literature, which may be present with a CVC exit-site infection. Content validity is empirically supported, as the instrument was developed based on the literature and the clinical experience of two advanced practice nurses.

Prior to initiation of the study, 11 hemodialysis unit nurses independently assessed 10 different exit sites using the CVC assessment form as a means to pre-test the form. One of the nurses (EB) consistently assessed all 10 of the exit sites. The correlation coefficient using Spearman's rank order analysis was .80 for all items on the instrument. Pre-testing of the tool determined that clarification and re-education on measuring the peri-erythemic borders was required. In attempting to capture all possible exit-site swabs collected on patients who consented to be part of the study during the data collection period, all hemodialysis RNs were asked to complete the assessment form. For pragmatic concerns, only 11 RNs were involved in the inter-rater reliability testing.

Education sessions provided by the primary investigators (LH & BW) were conducted in the hemodialysis unit for all of the nursing staff regarding the use of the assessment form and the study procedures prior to data collection. The existing protocol for the method of how to obtain an exit-site swab was reviewed and the policy was made readily available to staff. Additional information was provided to the staff on the method for measuring the peri-wound erythema border. It was documented on the chart by the investigator obtaining informed consent, if the patient consented to be part of the study. The orientation session included where to find this information documented on the health record. If the nurses determined the need for a swab, they were asked to verify that the patient had consented to the study and then complete the assessment form. If the patient had not consented, the swab was still done as per usual care, but was not included as part of the study.

In addition to the assessment form completed with each culture swab, information was gathered about each patient including basic demographic information (gender, age, length of time on hemodialysis, length of time the CVC was in place, and etiology of end stage renal disease), the type and location

of the CVC, the cleansing agent and dressing type used, the frequency of dressing changes, and immunosuppressive medications, if any, being taken.

The Charlson Comorbidity Index adapted for end stage renal disease (ESRD) was used to assess comorbid risk (Hemmelgarn, Manns, Quan & Ghali, 2003). This Index is a valid tool that assesses comorbidity and predicts survival with ESRD patients (Hemmelgarn et al., 2003). Comorbid conditions are assigned weighted units and the total score is then categorized into five levels of risk.

Table One. Patient characteristics associated with exit-site cultures

Patient Characteristics	n=52	Exit-Site Culture Results		p-value
		Negative (n=37)	Positive (n=15)	
Female, n (%)	20 (38)	14 (38)	6 (40)	1.00
Age years, mean (SD)	62 (14)	62 (14)	63 (16)	0.93
Length of dialysis years, mean (SD)	3 (4)	3.1 (4.7)	3.5 (3.0)	0.76
Length of time catheter in situ months, mean (SD)	15 (16)	14.8 (16.0)	15.4 (17.5)	0.90
Renal Etiology, n (%)				
Autoimmune diseases	2 (4)	2 (5)	0 (0)	0.51
Diabetes	16 (31)	10 (27)	6 (40)	
Glomerulonephritis	8 (15)	6 (16)	2 (13)	
Interstitial Nephritis	5 (10)	5 (14)	0 (0)	
Multiple Myeloma	4 (8)	2 (5)	2 (13)	
Polycystic Kidney Disease	2 (4)	2 (5)	0 (0)	
Reflux nephropathy	2 (4)	2 (5)	0 (0)	
Renal cell carcinoma	1 (2)	0 (0)	1 (7)	
Renal vascular disease	8 (15)	6 (16)	2 (13)	
Unknown	4 (8)	2 (5)	2 (13)	
Comorbidity Index, mean (SD)	3.8 (3.6)	3.5 (3.4)	4.4 (4.3)	0.43
Systolic BP pre-dialysis < 120, n (%)	9 (17)	6 (16)	3 (20)	0.71
Taking immunosuppressive medications, n (%)	7 (13)	5 (14)	2 (13)	0.89
Most recent nasal swab				
MSSA positive, n (%)	12 (23)	8 (22)	4 (27)	0.73
MRSA positive, n (%)	2 (4)	1 (3)	1 (7)	0.20
Most recent serum				
Albumin, mean (SD)	31.9 (4.5)	32.5 (4.6)	30.5 (4.0)	0.13
nPNA, mean (SD)	1.03 (0.4)	1.01 (0.3)	1.07 (0.7)	0.67
Hgb, mean (SD)	114.0 (19.8)	112.9 (21.9)	116.8 (13.7)	0.52
Wbc, mean (SD)	8.0 (4.0)	7.7 (3.3)	8.9 (5.4)	0.30
Low, n (%)	6 (12)	3 (8)	3 (20)	0.26
Normal, n (%)	36 (69)	28 (76)	8 (53)	
High, n (%)	10 (19)	6 (16)	4 (27)	

Note: MSSA = Methicillin-sensitive *Staphylococcus aureus*
MRSA = Methicillin-resistant *Staphylococcus aureus*
nPNA = Normalized protein equivalent of total nitrogen appearance
Hgb = Hemoglobin
Wbc = White blood cell

Data analysis

Baseline characteristics were summarized with standard descriptive statistics. For determination of the association of patient characteristics and positive exit-site swab results, Fisher's exact test was used for dichotomous characteristics and a two-sample t-test was used for continuous characteristics. All analyses were completed using SAS v9.1 (SAS Institute, Cary, NJ, USA) and statistical significance was set at p=0.05.

Results

Over the course of data collection, 52 culture swabs were completed and results demonstrated 13 (25%) with positive exit-site cultures, 2 (4%) had marginal results and 37 (71%) had negative exit-site cultures. Since only two patients had marginal results, these patients were combined with the positive exit-site patients giving overall results of 15 (29%) positive and 37 (71%) negative results.

Patient characteristics are summarized in Table One. Of the sample, 38% were female and 62% were male. The mean age was 62 years. Multiple comorbidities were present as evidenced by a comorbidity index mean score of 3.8 (out of five). Patients had been receiving chronic hemodialysis an average of three years, while the CVC catheter had been in situ an average of 15 months. Diabetes (31%), glomerulonephritis (15%), and renovascular disease (15%) were the three most common causes of ESRD in this sample. Seven (13%) patients were taking immunosuppressive medications on a routine basis at the time the exit-site swab was taken. In terms of nasal swab results (which are routinely done monthly in our unit), 23% were documented as methicillin-sensitive *Staphylococcus aureus* (MSSA) positive and 4% were known to be methicillin-resistant *Staphylococcus aureus* (MRSA) positive prior to the catheter swab being done. Laboratory serum parameters (albumin, nPNA, hemoglobin) demonstrated results consistent with dialysis unit targets. White blood cell counts (as per the hospital laboratory) were categorized as low in 12% of patients, within normal limits in 69%, and higher than normal in 19% of cases.

Catheter and exit-site care characteristics of the sample of 52 patients are summarized in Table Two. All of the catheters requiring a culture swab were tunneled and cuffed with 25% located on the left side and 75% on the right side. In terms of the dressings used to cover the exit site, a semi-permeable transparent dressing was used in 64% of cases, while a dry gauze-type dressing was used 36% of the time. The most common cleansing agent used was 2% chlorhexidine gluconate (68%), while 24% of patients used 10% povidone-iodine, and 4% used a citric acid-based solution. In terms of the frequency of dressing changes, this varied depending on the patient including daily at home performed by the patient (2%), performed by the nurses with every dialysis (32%), or weekly (60%).

Clinical characteristics at the exit sites as assessed by the hemodialysis nurses are summarized in Table Three. While a number of factors were included on the incident form, the

Table Two. Catheter and exit-site care characteristics associated with exit-site cultures

Catheter and Exit-Site Care Characteristics	n=52	Exit-Site Culture Results		p-value
		Negative (n=37)	Positive (n=15)	
Left, n (%)	13 (25)	8 (22)	5 (33)	0.5
Right, n (%)	39 (75)	29 (78)	10 (67)	
Vessel				
IJ vessel, n (%)	45 (87)	30 (81)	15 (100)	0.09
Not reported, n (%)	7 (13)	7 (19)	0 (0)	
Sutures present, n (%)	1 (2)	1 (3)	0(0)	1.00
Type of Dressing				
Semi-permeable n (%)	32 (64)	28 (76)	4 (31)	0.007
Gauze type, n (%)	18 (36)	9 (24)	9 (69)	
Cleansing				
Chlorhexidine Gluconate 2%	34 (68)	29 (78)	5 (38)	0.007
Povidone-Iodine 10%	14 (24)	8 (22)	6 (46)	
Citric Acid 4%	2 (4)	0 (0	2 (15)	
Frequency of dressing changes				
Daily (by pt)	1 (2)	0 (0)	1 (8)	0.03
q dialysis	16 (32)	9 (24)	7 (54)	
q weekly	30 (60)	26 (70)	4 (31)	
Unknown	3 (6)	2 (5)	1 (8)	

most commonly reported features at the exit sites included the presence of dry crust (58%), redness (56%), purulent exudates (33%), patient complaints of pruritis (31%), serous exudates (17%), and poor hygiene by the patient (15%). Redness ranged in diameter from < 5 mm to > 3 cm.

Tables One and Two summarize correlations between patient and catheter and exit-site care characteristics and their associations with exit-site cultures. None of the patient characteristics significantly differed by exit-site culture results (see Table One). In terms of catheter and exit-site care characteristics (see Table Two), patients with positive exit-site culture results were more likely to have used the dry gauze-type dressing instead of the semi-permeable transparent dressing (p=0.007). Patients with negative exit-site culture reports were more likely to use 2% chlorhexidine gluconate for cleansing than the 10% povidone-iodine solution (p=0.007). Similarly, patients with negative exit-site cultures were more likely to have dressings changed weekly instead of daily or with each hemodialysis treatment (p=0.03). No other clinical characteristics were significantly associated with exit-site culture results.

Table Four highlights clinical characteristics at the exit site and their associations with exit site cultures. Hemodialysis patients with a dry crust present at the exit site were more likely to have negative culture results (p=0.03). Although the proportion of patients with redness at the exit site was not significantly different between positive and negative culture results, if redness existed, the size of the peri exit-site erythema border was significantly different (p=0.008). Most patients with positive culture results had a peri exit-site erythema border ranging from 1 cm to 1.5 cm.

Discussion

The purpose of this study was to identify and describe characteristics associated with an infected, tunneled hemodialysis CVC exit site. In summary, no patient characteristics were found to be associated with an exit-site infection. However, the type of dressing (p=0.007) and cleansing solution (p=0.007) used were positively associated with an exit-site infection. Negative exit-site culture reports were more likely to have dressings changed weekly (p=0.03). The size of peri-wound erythema (p=0.008) was also associated with a higher incidence of exit-site infections. Patients with dry crust present at the exit site were more likely to have negative culture results (p=0.03).

In contrast to previous definitions of infection, study results demonstrated the presence of purulent drainage in 33% of all swabs, yet it was not associated with a positive culture. Redness, another common sign of infection, was documented to be present in 56% of the cases where a swab was taken. Although the proportion of patients with redness at the exit site was not significantly different between positive and negative culture results, if redness existed, the size of the peri-wound erythema was associated with the presence of infection. The only other notable factor of significance in the statistical analysis was the finding that the presence of dry crust at the exit site was most likely to result in a negative exit-site culture (p=0.03).

It is common practice in our hemodialysis unit for the nurse to assess all CVC exit sites at every hemodialysis treatment and have a culture swab done in each instance where he/she believes that infection is present. In this study, 52 swabs were taken, but only 15 (29%) were positive. The other 37 (71%) were negative results. The high percentage of swabs with negative results is concerning given the nursing time and laboratory costs associated with sending the samples for analysis. This may be explained by the fact that the nurses were vigilant in assessing for infection and, when in doubt, were cautious and performed a swab. Secondly, the result raises the question as to what is contributing to the nurses' clinical decision-making regarding when to swab or not. Further clarity and education regarding what constitutes an 'inflamed' versus an 'infected' exit site is most likely required. A third explanation for the findings may be the level of experience of the nurse assessing the exit site. While not part of this study, it would be interesting to know whether novice versus experi-

Table Three. Clinical characteristics at the exit site

Clinical Characteristics at the Exit Site	n=52
Dry crust at exit site, n (%)	30 (58)
Redness at exit site, n (%)	29 (56)
< 5 mm	8 (28)
> 5 mm	9 (31)
1 cm	3 (10)
1.5 cm	4 (14)
2 cm	2 (7)
> 3 cm	3 (10)
Purulent exudates at exist site, n (%)	17 (33)
Patient c/o pruritis at site, n (%)	16 (31)
Serous exudates, n (%)	9 (17)
Patient has poor hygiene, n (%)	8 (15)
Patient c/o pain at exit site, n (%)	6 (12)
Purulent exudates expressed with manipulation of catheter, n (%)	6 (12)
Excoriation of peri-exit site skin, n (%)	6 (12)
Patient c/o tenderness at exit site, n (%)	5 (10)
Febrile, n (%)	5 (10)
Redness along catheter tunnel, n (%)	5 (10)
Swelling at exit site, n (%)	4 (8)
Dry scab at exit site, n (%)	4 (8)
Cuff visible, n (%)	4 (8)
Trauma to line (pulled), n (%)	4 (8)
Dressing fell off at home, n (%)	3 (6)
Swelling along catheter tunnel, n (%)	2 (4)
Obvious abscess, n (%)	2 (4)
Exuberance/granulation or 'proud flesh' at exit site, n (%)	2 (4)

enced nurses swabbed the exit sites more or less frequently and perhaps level of experience of the nurses participating in the study may have played a role.

The results of this study lend support for weekly dressing changes, as those with dressing changes more frequently than that were more likely to have had a positive culture result (p=0.03). In terms of a cleansing solution, our results favoured the use of 2% chlorhexidine gluconate at the exit site (p=0.007). It is reassuring to note that our current unit protocols are consistent with these results. It is also important to consider that while a chlorhexidine-based solution may be preferred, there will be those patients who continue to use an alternate cleansing solution (i.e., povidone-iodine) for varying reasons. Perhaps there is an opportunity in our unit to review all patients not using 2% chlorhexidine gluconate and consider if the reason(s) for not using it are appropriate or in the best interest of the patient.

Patients in our study using the gauze-type dressing were more likely to have positive exit-site culture results (p=0.007) than those using a semi-permeable transparent dressing, which is in contrast to previous studies done with hemodialysis patients and gauze dressings (Hoen et al., 1998; Levin et al.,

Table Four. Clinical characteristics at the exit site and associations with exit-site cultures

Clinical Characteristics	Exit Site Culture Results		p-value
	Negative (n=37)	Positive (n=15)	
Patient c/o pain at exit site, n (%)	4 (11)	2 (13)	1.00
Patient c/o pruritis at site, n (%)	13 (35)	3 (20)	0.34
Patient c/o tenderness at exit site, n (%)	4 (11)	1 (7)	1.00
Febrile, n (%)	4 (11)	1 (7)	1.00
Dressing fell off at home, n (%)	1 (3)	2 (13)	0.20
Cuff visible, n (%)	3 (8)	1 (7)	1.00
Trauma to line (pulled), n (%)	1 (3)	3 (20)	0.07
Redness at exit site, n (%)	23 (62)	6 (40)	0.22
< 5 mm	7 (30)	1 (17)	0.008
> 5 mm	9 (39)	0 (0)	
1 cm	1 (4)	2 (33)	
1.5 cm	1 (4)	3 (50)	
2 cm	2 (9)	0 (0)	
> 3 cm	3 (13)	0 (0)	
Redness along catheter tunnel, n (%)	4 (11)	1 (7)	1.00
Swelling at exit site, n (%)	3 (8)	1 (7)	1.00
Swelling along catheter tunnel, n (%)	0 (0)	2 (13)	0.08
Dry crust at exit site, n (%)	25 (68)	5 (33)	0.03
Dry scab at exit site, n (%)	2 (5)	2 (13)	0.57
Obvious abscess, n (%)	1 (3)	1 (7)	0.50
Purulent exudates at exit site, n (%)	9 (24)	8 (53)	0.06
Serous exudates, n (%)	6 (16)	3 (20)	0.71
Purulent exudates expressed with manipulation of catheter, n (%)	3 (8)	3 (20)	0.34
Excoriation of peri-exit site skin, n (%)	4 (11)	2 (13)	1.00
Exuberance/granulation or 'proud flesh' at exit site, n (%)	1 (3)	1 (7)	0.50
Patient has poor hygiene, n (%)	6 (16)	2 (13)	0.53
Patient c/o pain at exit site or Patient c/o tenderness at exit site or Purulent exudates at exit site (wet) or Purulent exudates expressed with manipulation of catheter (wet), n (%)	14(38)	10(67)	0.06

1991). It is important to acknowledge that these earlier studies used dry gauze and antimicrobial ointment at the exit site. Our unit protocol does not include the use of antimicrobial ointment at the exit site with a dry gauze dressing and, therefore, may provide some explanation as to why our results were not consistent with those from previous studies.

Results of this study did not provide evidence for specific patient characteristics that were associated with positive culture results despite the fact that the sample included patients who empirically would be a higher risk for infection. Thirteen per cent (13%) of the sample were taking immunosuppressive medications at the time of the study, 12% had a low white blood cell count, 19% had a high white blood cell count, and 33% (n=17) were determined using the Charlson ESRD modified Comorbidity Index to be at high risk (score > 5) for poor survival. Despite these findings, the authors suggest that nurses should continue to be vigilant in monitoring for CVC exit-site infections for all patients, whether immune compromised or not.

Implications for nursing practice and research

Given the increasing numbers of patients receiving chronic hemodialysis using a CVC and the significant morbidity and mortality associated with their use, the results of this study have implications for nursing practice and future research. The results suggest the need for hemodialysis units to examine current practices associated with the type of dressing used (i.e., dry gauze versus semi-permeable transparent), the cleansing agent, and the frequency of dressing changes. In this study, results would favour a semi-permeable transparent dressing cleansed with 2% chlorhexidine gluconate on a weekly basis. While no patient characteristics were significant, nurses need to consider the size of peri-wound erythema as being associated with a higher probability of exit-site infections. Dry crust was present in 58% of the swabs taken and was not associated with positive culture results. Unless other clinical signs or patient symptoms are present, performing a swab on the basis of dry crust alone may not to be warranted.

From an education standpoint, the results of this study would suggest that nurses may benefit from continuing education around wound assessment and the signs and symptoms of an infected CVC exit site. The outcome of this may be fewer culture swabs being done, leading to a reduction in nursing work and hospital laboratory costs. Implementation of a nursing protocol, based on the results of this study, guiding when to swab a hemodialysis exit site with thorough evaluation on patient outcomes may be appropriate in this setting.

Further studies with a qualitative design may add to our knowledge in helping us to understand the nurses' clinical decision-making in regards to exit site assessment. Future studies similar to Twardoswki & Prowant (1996) with the goal of a gold standard classification system for CVC exit sites would have important clinical application for nursing practice regarding assessment of exit sites.

The primary investigators (LH & BW) at the time of this study were nurse practitioner/clinical nurse specialists in the hemodialysis unit where the study took place. It was our clinical observation that we reviewed a large amount of negative hemodialysis exit-site swabs. This study confirms this observation. It is unknown if this common practice is unique to only our hemodialysis unit, or if other units also experience the same phenomenon. The publication of these results may encourage further nursing discussions and clinical examination on the topic.

Limitations of the study

Several limitations must be considered when interpreting the findings of this study. First, this study was limited to patients in one hemodialysis program in an urban academic centre in Canada. Thus, the demographics of our population may not reflect those of other dialysis centres. Second, generalizability of these results should be done with caution given the small sample size (n=52) and lack of randomization of the sample. In addition to the small sample size, a very small proportion of the sample (n=15) had positive exit site cultures, further limiting the detection of relationships between variables. Third, this study relied on the hemodialysis nurse to identify potential subjects, swab the exit site and remember to complete the assessment form. On a number of occasions, potential subjects may not have been captured as part of the study due to the nurse's workload and time available to complete the form. Fourth, the design of this study required that every hemodialysis nurse potentially contributed to the data collection by recording his/her observations. Our hemodialysis unit employed approximately 70 RNs and orientation to the study was voluntary. Observational studies are more vulnerable to perceptual errors. Training on the data collection methods maximizes accuracy and reduces biases (Polit & Hungler, 1991). However, the data were obtained prospectively as opposed to other designs, which may have attempted to obtain the data retrospectively from review of documentation of the assessment in the health record. Finally, the information requested in the assessment form would be considered standard of core knowledge in our hemodialysis unit when assessing an exit site. Replication of this study with a larger randomized sample and a more rigorous design would contribute to clarification of characteristics associated with positive exit-site infections.

Conclusion

In conclusion, this structured observational study examined the clinical findings and patient characteristics associated with hemodialysis CVC exit-site infections. Overall, none of the patient characteristics significantly differed by exit-site culture results. In terms of clinical characteristics, patients with positive exit-site culture results were more likely to have used the dry gauze-type dressing instead of the semi-permeable transparent dressing, and those with negative exit-site culture reports were more likely to use 2% chlorhexidine gluconate as a cleansing agent. The frequency of dressing changes appeared to make a difference, such that those with negative exit-site cultures were more likely to have dressings cleaned weekly instead of daily or with each hemodialysis treatment. Hemodialysis nurses at the bedside are the key individuals to routinely assess CVC exit sites and determine whether the exit site requires further interventions.

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Are CSN and NKF-K/DOQI mineral metabolism guidelines for hemodialysis patients achievable? Results from a provincial renal program

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Learning objectives

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

1. Understand the differences in recommendations between the Canadian Society of Nephrology (CSN) and National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) mineral metabolism guidelines.
2. Recognize the most common mineral metabolism disturbances observed in dialysis patients.
3. Review the prevalence of prescribed medications for disorders of mineral metabolism.
4. Discuss the limitations of a cross-sectional study design.

Abstract

Background: *The calcium, phosphorus, and parathyroid hormone targets recommended by the Canadian Society of Nephrology (CSN) encompass a wider range of values as compared to the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) guidelines. We sought to compare mineral metabolism parameters within the Manitoba Renal Program (MRP) to the CSN and NKF-K/DOQI guidelines. Medication use was also examined.*

Methods: *All hemodialysis patients in Manitoba were evaluated. Values for serum albumin, phosphorus, calcium, intact parathyroid hormone (PTH) and pertinent medications were collected.*

Results: *Five hundred and forty-six patients were included in the analysis. Fifty-three per cent to 81% of MRP patients met individual CSN targets. However, only 26% of patients achieved all targets, despite high usage of phosphate (85.5% calcium carbonate, 16.1% sevelamer, 1.3% aluminum) and PTH-lowering drug therapies (30.2% calcitriol, 2.7% cinacalcet).*

Conclusion: *Only a small proportion of patients were able to achieve all three CSN mineral metabolism targets simultaneously. The majority of outliers presented with hyperphosphatemia or hypoparathyroidism.*

Key words: renal dialysis, calcium, phosphorus, hyperparathyroidism, secondary, practice guidelines

Introduction

Disturbances in mineral metabolism have been associated with morbidity, decreased quality of life, and cardiovascular mortality in patients receiving hemodialysis (Block, Hulbert-Shearon, Levin, & Port, 1998; Block et al., 2004; Ganesh, Stack, Levin, Hulbert-Shearon, & Port, 2001; Noordzij et al., 2005; Slinin, Foley, & Collins, 2005; Stevens, Djurdjev, Cardew, Cameron, & Levin, 2004; Young et al., 2005). The Canadian Society of Nephrology (CSN) recently published a guideline on mineral metabolism for patients receiving hemodialysis (Jindal et al., 2006). The calcium, phosphorus, and parathyroid hormone targets recommended by the CSN encompass a wider range of values as compared to the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) guidelines (see Table One) (National Kidney Foundation, 2003). Previous studies have found that a large proportion of patients on hemodialysis have mineral metabolism parameters that do not fall within the NKF-K/DOQI targets (Wald, Tentori, Tighiouart, Zager, & Miskulin, 2007; Wei et al., 2006; Young et al., 2004). However, to date, no published data are available on the ability to meet the less stringent CSN targets. In addition, little published information is available regarding the medications used in an attempt to achieve either the CSN or NKF-K/DOQI mineral metabolism targets.

The Manitoba Renal Program (MRP) is responsible for all adult patients requiring chronic kidney disease care for the entire province. The MRP consists of hemodialysis, peritoneal dialysis and renal health clinics at three centres in Winnipeg,

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one in Brandon, and 13 satellite hemodialysis units throughout the province. There are approximately 800 hemodialysis, 180 peritoneal dialysis, and 3,600 renal health clinic patients in the program currently.

The present evaluation examined the levels of albumin-corrected serum calcium (CCa), serum phosphorus (PO4), and intact parathyroid hormone (PTH) in all hemodialysis patients in our provincial renal program in June 2005 to determine what proportion of these patients had laboratory values within the range of the CSN and NKF-K/DOQI guidelines. We also collected data on the use of phosphate binders, vitamin D, and cinacalcet.

Methods

All patients receiving chronic maintenance hemodialysis for at least three months in the MRP in June 2005 were included in the evaluation. Patients were excluded if they did not have all four laboratory values (serum calcium, albumin, PO4, and PTH) available. Values of serum calcium, albumin, PO4, and PTH were collected from the routine mid-month blood work in all patients. Albumin-corrected calcium was calculated using the Payne formula (adjusted calcium = total serum calcium + [0.02 (40 - albumin)] where calcium is in mmol/L and albumin in g/L) (Payne, Little, Williams, & Milner, 1973, p.645). As the CSN guidelines specify that serum calcium levels should be maintained within the normal range (Jindal et al., 2006), the normal range for our centre (2.1 mmol/L to 2.6 mmol/L) was chosen as the target serum calcium. The standard dialysate calcium concentration in our program was 1.5 mmol/L, but data on individual patient's calcium baths were not captured. Serum samples were analyzed at the local hospitals' laboratories. Serum calcium, albumin, and PO4 were determined using standard assays. Serum PTH concentrations were determined using the intact PTH assay, Roche Diagnostics Canada, Laval, Quebec. The clinicians taking care of the patients managed the parameters of bone and mineral metabolism according to standard practice that was consistent with the NKF-K/DOQI guidelines (data were collected prior to the release of the CSN guidelines) without the use of program-specific algorithms or collaborative prescribing agreements among health professions. Patients requiring vitamin D compounds received oral or intravenous calcitriol and those requiring phosphate binders received calcium carbonate, sevelamer, aluminum hydroxide, or a combination of these agents. Cinacalcet was available for use in up to 20 patients through a compassionate release program that required patients to meet the following criteria: PTH > 53 pmol/L and/or total calcium > 2.60 mmol/L; and/or PO4 > 1.78 mmol/L; and/or refractory to or with contraindications to vitamin D. All data were obtained from the hemodialysis charts, and were entered into a database (Microsoft Access®) by a nurse, a pharmacy technician, and a dietitian depending on the program site.

Table One. National Kidney Foundation Kidney Disease Outcomes Quality Initiative versus Canadian Society of Nephrology targets for bone and mineral metabolism

Measurement	CSN	NKF-K/DOQI
Ca (mmol/L)	2.1–2.6	2.1–2.37 (specifies CCa)
PO4 (mmol/L)	0.8–1.78	1.13–1.78
PTH (pmol/L	10.6–53.0	16.5–33.0

Notes: CSN=Canadian Society of Nephrology
NKF-K/DOQI=National Kidney Foundation Kidney Disease Outcomes Quality Initiative
Ca=serum calcium
CCa=corrected serum calcium
PO4=serum phosphate
PTH=serum intact parathyroid hormone

Results

Of 748 patients receiving chronic maintenance hemodialysis in the MRP that were evaluated, 138 did not have a PTH value and 64 did not have an albumin value available in June 2005 and were not included in the evaluation. The remaining 546 patients who had all four laboratory values available were included in the analysis. The demographic characteristics of the population are detailed in Table Two. Table Three illustrates the results by NKF-K/DOQI and CSN target ranges. The most glaring mineral metabolism abnormalities observed were high phosphorus (45% of patients) and low parathyroid hormone (31% to 45% depending on target used) concentrations.

Table Two. Demographic characteristics

Parameter	Mean ± SD values
Hemodialysis patients, number	546
Age, years (mean±SD)	60±15
Male sex	268 (49%)
Ethnic Origins	
Caucasian	264 (48.4%)
Aboriginal[a]	226 (41.4%)
Asian[b]	50 (9.2%)
Black	5 (0.9%)
Other	1 (0.2%)
Duration of dialysis, years (mean±SD)	6.82±5.24
Reasons for dialysis (%)	
Diabetes mellitus	274 (50.2%)
Glomerulonephritis	101 (18.5%)
Other	106 (19.5%)
Unknown	28 (5.1%)
Reno vascular disease	16 (2.9%)
Hypertension	21 (3.8%)

a Includes Inuit, Metis, North American Indian
b Includes Filipino, Oriental, and East Indian

Medication use by the CSN CCa, PO4, and PTH targets is outlined in Tables Four A, Four B, and Four C respectively. Overall, 85.5% of patients were prescribed calcium carbonate, 16.1% were prescribed sevelamer, and 1.3% were prescribed aluminum as a phosphate binder. This is consistent with Canadian DOPPS II (2002–2004) data, which indicate that 81.5% of Canadian patients were prescribed a calcium-based binder and 14.2% were prescribed sevelamer (personal communication, Dr. David Mendelssohn, Oct. 17, 2007). A total of 30.2% of MRP patients were prescribed calcitriol (17.4% oral, 12.8% intravenous) and 2.7% were prescribed cinacalcet. Almost one-quarter of hyperphosphatemic patients were taking sevelamer at an average dose of eight tablets (6400 mg) daily in combination with calcium containing binders at an average dose of 2.5 grams elemental calcium per day and were still not able to lower their phosphorus below the CSN and NKF-K/DOQI target of 1.78 mmol/L (see Table Four B). In addition, despite using high doses of calcium containing phosphate binders (range 1.9–2.9 grams elemental calcium per day, Table Four A), only 10% of our patient population was found to be hypercalcemic according to CSN targets. The CSN Mineral Metabolism Guideline, unlike NKF-K/DOQI, does not limit the daily oral calcium intake and instead recommends that serum calcium levels be maintained within the normal range (Jindal et al., 2006), which our results appear to support.

Discussion

In a cross-sectional evaluation of hemodialysis patients in a provincial renal program, we observed that only 81%, 53% and 57% of patients met CSN targets for calcium, phosphate and PTH respectively. A greater proportion of patients was able to achieve all three of the more lenient CSN mineral metabolism targets (26%) versus NKF-K/DOQI (6%). However, the vast majority of hemodialysis patients are still not meeting either the CSN or NKF-K/DOQI targets. Our low proportion of patients meeting all three of the NKF-K/DOQI targets simultaneously (see Table Three, 6%) is very similar to what others have reported using data from longer periods of time (three months to two years) with ranges of 5.3% (Wei et al., 2006) to 5.5% (Young et al., 2004). The outlook becomes even more dismal when mineral metabolism parameters are examined over longer time periods. One group of investigators has shown that only 2.4% of patients were able to maintain consistent control of all NKF-K/DOQI mineral metabolism targets over a 12-month period (Wald et al., 2007). To our knowledge, there are not any previous publications that have examined achievement of the CSN targets.

The CSN Mineral Metabolism Guidelines recommend to "give priority to phosphate and calcium targets over the management of PTH" (Jindal et al., 2006, p. S12). In our provincial data, more than 80% of patients were able to achieve the CSN calcium target range while only 53% were able to achieve the CSN phosphate target range. The vast majority of patients outside the CSN phosphate target were due to hyperphosphatemia (see Table Three). DOPPS II (2002–2004 data) mentions that 85% of patients within the NKF-K/DOQI target range were prescribed any type of phosphate binder (Young et al., 2005). In contrast, 99% of our provincial renal program patients who were within the NKF-K/DOQI PO4 targets and 91% who were within the CSN PO4 targets were prescribed a phosphate binder. Even more revealing is that 88% of patients in DOPPS II (Young et al., 2005) and 96% of patients in our provincial program who were hyperphosphatemic were prescribed phosphate binders. This very high usage of phosphate binders in patients who are still not able to achieve the phosphorus targets may indicate that the phosphate binding agents available at that time were inadequate treatments (Wald et al.,

Table Three. Proportion of patients below, within, and above the guideline ranges

Measurement	CSN	MRP (n=546)	K/DOQI	MRP (n=546)
CCa (mmol/L)	< 2.1 2.1–2.6 > 2.6	49 (9%) 440 (81%) 57 (10%)	< 2.1 2.1–2.37 > 2.37	49 (9%) 217 (40%) 280 (51%)
PO4 (mmol/L)	< 0.8 0.8–1.78 > 1.78	15 (3%) 288 (53%) 243 (45%)	< 1.13 1.13–1.78 > 1.78	73 (13%) 230 (42%) 243 (45%)
PTH (pmol/L)	< 10.6 10.6–53 > 53	168 (31%) 310 (57%) 68 (12%)	< 16.5 16.5–33 > 33	245 (45%) 153 (28%) 148 (27%)
Meeting all three targets	CSN Targets	142 (26%)	K/DOQI Targets	33 (6%)

Notes: CSN=Canadian Society of Nephrology
NKF-K/DOQI=National Kidney Foundation Kidney Disease Outcomes Quality Initiative
CCa=corrected serum calcium
PO4=serum phosphate
PTH=serum intact parathyroid hormone

2007; Wei et al., 2006; Young et al., 2005). However, caution should be used in interpreting these data, as this may also represent medication non-adherence.

DOPPS II data reported that 48% of patients (Young et al., 2004) had an intact PTH concentration below 16.5 pmol/L; similarly, we observed 45%. This suggests that hypoparathyroidism and subsequent development of adynamic bone disease, and not hyperparathyroidism, should be the predominant concern in this era of mineral metabolism. Low PTH concentrations have been associated with increased morbidity and mortality (Avram, Mittman, Myint, & Fein, 2001; Guh et al., 2002). The main cause of hypoparathyroidism in one study of hemodialysis patients was parathyroidectomy (77% of patients). However, patients with a parathyroidectomy had better survival despite their low PTH values (Dussol et al., 2007). Another recent study reported that parathyroidectomy is associated with a lower risk of fractures (Rudser, de Boer, Dooley, Young, & Kestenbaum, 2007). These data may indicate that the benefits of surgical amelioration of secondary hyperparathyroidism outweigh the risk of hypoparathyroidism and development of adynamic bone disease. Another factor that may have influenced our low PTH results is the large numbers of patients with diabetes. Patients with diabetes as the cause of their kidney disease represented more than 50% of our hemodialysis population (see Table Two) and it has been shown that hyperglycemia and insulin deficiency inhibit PTH secretion (Haris et al., 2006). However, examining our use of PTH-lowering agents (see Table Four C), one disconcerting value is that approximately 15% of patients with a PTH < 10.6 pmol/L were still receiving calcitriol. The CSN guidelines specifically state that vitamin D sterols should be discontinued when PTH levels decrease below target levels. Simply discontinuing the vitamin D sterol in these patients would certainly be the simplest "treatment" to help to increase their PTH.

Table Four A. Use of phosphate binders by CSN corrected calcium targets

CCa (mmol/L)	n	Calcium n; % patients; grams elemental Ca/day	Sevelamer n; % patients, no. 800 mg tablets/day	Al. hydroxide n; % patients; grams/day
< 2.1	49	46, 94%, 2.9	1, 2%, 9	2, 4%, 1.5
2.1–2.6	440	377, 86%, 2.1	70, 16%, 8	5, 1%, 3.7
> 2.6	57	44, 77%, 1.9	16, 28%, 7	0

Notes: Some patients were receiving more than one phosphate binder.
CSN=Canadian Society of Nephrology
CCa=corrected serum calcium

Table Four B. Use of phosphate binders by CSN PO4 targets

PO4 (mmol/L)	n	Calcium n; % patients; grams elemental Ca/day	Sevelamer n; % patients, no. 800 mg tablets/day	Al hydroxide n; % patients; grams/day
< 0.8	15	11, 73%, 1.9	0	0
0.80º1.78	288	250, 87%, 1.9	29, 10%, 7.3	2, 0.7%, 2.9
> 1.78	243	214, 88%, 2.5	59, 24%, 8.2	5, 2%, 3.4

Notes: Some patients were receiving more than one phosphate binder.
CSN=Canadian Society of Nephrology
PO4=serum phosphate

Table Four C. Use of calcitriol and cinacalcet by CSN PTH targets

PTH (pmol/L)	n	Oral calcitriol n, %, mcg/week	IV calcitriol n, %, mcg/week	Cinacalcet n, %, mg/day
< 10.6	168	21, 12.5%, 2.79	4, 2.4%, 3.25	0
10.6-53	310	64, 20.6%, 4.92	30, 9.7%, 3.08	1, 0.3%, 30
> 53	68	11, 16.2%, 1.41	39, 57.3%, 3.73	14, 20.6%, 40.7

Notes: Some patients were on both calcitriol and cinacalcet.
CSN=Canadian Society of Nephrology
PTH=serum intact parathyroid hormone

Limitations

This evaluation has several limitations. First, due to the cross-sectional design, all four laboratory values were not available for all patients receiving hemodialysis in Manitoba in June 2005. Although calcium and phosphate are part of routine monthly blood work at all MRP hemodialysis sites, PTH is normally measured every three months and albumin is not always ordered.

Second, the dialysis dose and frequency, which may have had a bearing on the phosphate concentrations, were not collected as part of this evaluation. The majority of MRP patients received conventional hemodialysis three times per week. However, some patients are dialyzed twice weekly. The MRP did not have any daily or nocturnal hemodialysis patients.

Third, we did not examine the effect of a patient missing or shortening hemodialysis sessions on mineral metabolism targets. A recent study has demonstrated that each 1% increase in the frequency of missed hemodialysis sessions was associated with a decrease in consistent control of calcium, phosphate, and Ca x P product of 2%, 4%, and 1% respectively (Wald et al., 2007). It also is known that 19% of the total phosphate removal occurs in the last hour of a four-hour treatment (Gutzwiller et al., 2002), so patients missing even one hour of dialysis time may need to ingest significantly more phosphate binders to achieve the same phosphate removal (Sherman, 2005).

Fourth, control of phosphorus through diet and phosphate binders requires a great deal of patient education and adherence to the prescribed medications. Non-adherence with phosphate binders has been self-reported by 38% of dialysis patients (Tomasello, Dhupar & Sherman, 2004). One study demonstrated that a one-to-one teaching session by a renal dietitian on PO4 management produced a statistically significant reduction in serum PO4 values that persisted for at least three months (Ashurst & Dobbie, 2003). However, another study reported that the patient to dietitian ratio had no discernible association with mineral metabolism control (Wald et al., 2007). We did not examine the data for variations in patient-dietitian or patient-pharmacist ratios to determine if this would influence the proportion of patients achieving control. However, our provincial renal program does employ both renal dietitians and renal pharmacists in all the hemodialysis units. We also did not examine medication adherence in this evaluation.

Fifth, at the time of our evaluation, we did have access to cinacalcet through a compassionate release program. However, the data in this evaluation were collected in the first few months of patient enrolment and, hence, we were not able to demonstrate a significant impact of cinacalcet on PTH (see Table Four C). However, other investigators have reported that use of cinacalcet does aid in the achievement of NKF-K/DOQI targets (Moe et al., 2005).

Finally, we did not record the calcium concentration of individual patients' dialysis bath. However, the standard dialysate calcium concentration in our program in June 2005 was 1.5 mmol/L. Studies have shown that using a low-calcium dialysate (1.25 mmol/L) in hemodialysis patients with PTH below 16.5 pmol/L leads to significant and sustained increases in PTH and alkaline phosphatase (Lezaic et al., 2007; Spasovski et al., 2007). It is important to note that these studies were performed in patients who were also receiving calcium-containing phosphate binders. Another recent study indicated that switching from calcium carbonate to sevelamer in patients with PTH < 6.4 pmol/L significantly decreased the serum levels of calcium, resulting in the elevation of PTH concentrations from 3.3 pmol/L to 10.0 pmol/L at 48 weeks (Iwata et al., 2007). The dialysate calcium concentration employed in this study was 1.5 mmol/L. A limitation of the aforementioned studies is that they did not examine the effects of the treatment on bone histomorphometry using bone biopsies. One study that did examine patients with biopsy-proven adynamic bone disease, found that successful renal transplantation led to either partial or complete recovery of bone turnover (Abdallah et al., 2006).

Implications for practice

These results were disseminated to all MRP nephrologists, pharmacists, charge nurses, and dietitians at a symposium held in October 2005. The purpose of the symposium was to develop a consistent approach in the MRP in the management of disorders of mineral metabolism. Some of the recommendations that were approved included: 1. Standard dialysate calcium will be 1.2 mmol/L; 2. Serum calcium will be reported by all labs as total and albumin-corrected calcium; 3. Ionized calcium will no longer be measured routinely; 4. Target albumin-corrected calcium will be < 2.6 mmol/L; 5. Target serum phosphorus level will be ≤ 1.8 and initial treatment of high phosphorus must include dietary instruction and review, and optimal dialysis (if on dialysis) before binder therapy.

We are also in the process of developing a mineral metabolism database in which laboratory values and medications will be entered on a quarterly basis for all patients in the MRP. Ongoing evaluation using this database will focus on improving the number of patients achieving calcium, phosphate and PTH targets over time, particularly those with hyperphosphatemia and hypoparathyroidism.

Recommendations for future research

The impact of the use of agents such as lanthanum carbonate, calcium acetate, sevelamer, or cinacalcet on bone metabolism parameters outside the setting of a randomized controlled trial should be evaluated in a prospective manner. In addition, prospective randomized trials are needed to demonstrate that achievement of the CSN or NKF-K/DOQI guidelines do, in fact, decrease mortality in patients receiving hemodialysis.

Conclusion

Only a small proportion of patients was able to achieve all three CSN or NKF-K/DOQI mineral metabolism targets simultaneously. The majority of our patients falling outside of the target ranges presented with either hyperphosphatemia or hypoparathyroidism. These findings highlight the difficulties we still face in the management of mineral metabolism in hemodialysis patients.

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Continuing Education Study Questions

Contact hour: 2.0 hrs

Are CSN and NKF-K/DOQI mineral metabolism guidelines for hemodialysis patients achievable? Results from a provincial renal program

By Lori D. Wazny, PharmD, Colette B. Raymond, PharmD, MSc, Esther M. Lesperance, RT, and Keevin N. Bernstein, MD, FRCPC

Case One

Ms. A.L. is a 60-year-old female on chronic hemodialysis three times weekly for the past six months. Her mid-month blood work comes back with the following: Ca 2.1 mmol/L; PO4 2.2 mmol/L; and PTH 8.3 pmol/L.

Questions 1 to 4 refer to this case.

1. Which of the Canadian Society of Nephrology (CSN) 2006 mineral metabolism targets is Ms. A.L. out of range for?

(a) Ca
(b) PO4
(c) PTH
(d) both PO4 and PTH

2. Ms. A.L.'s medications consist of calcium carbonate 625 mg (250 mg elemental Ca/tab) one tablet PO TID with meals and calcitriol 0.25 mcg PO on Mondays, Wednesdays, and Fridays. Based on her mid-month blood work, which of the following is the most appropriate adjustment to her medications?

(a) increase calcium carbonate and continue same dose of calcitriol
(b) decrease calcium carbonate and increase calcitriol
(c) increase calcium carbonate and discontinue calcitriol
(d) discontinue calcium carbonate and calcitriol and change to sevelamer

3. Ms. A.L.'s phosphate concentration may also have resulted from which of the following?

(a) taking her calcium carbonate as instructed
(b) shortening her dialysis sessions
(c) following a low phosphate diet
(d) attending all her scheduled hemodialysis sessions

4. Ms. A.L. asks you, "What number should my phosphate be?" What is the highest target PO4 concentration according to the Canadian Society of Nephrology (CSN) 2006 and National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) 2003 guidelines?

(a) 1.45
(b) 1.78
(c) 2
(d) 2.2

End of case one

5. The most common mineral metabolism abnormalities observed in the hemodialysis population in the Manitoba Renal Program study were:

(a) hyperphosphatemia and hyperparathyroidism
(b) hypophosphatemia and hypoparathyroidism
(c) hyperphosphatemia and hypoparathyroidism
(d) hyperphosphatemia and hypocalcemia

6. The per cent of hemodialysis patients in the Manitoba Renal Program who met all three CSN (2006) mineral metabolism targets was:

(a) 6%
(b) 12%
(c) 26%
(d) 45%

7. In this study, what percentage of hemodialysis patients who were within the CSN (2006) phosphate target (0.80–1.78 mmol/L) were prescribed calcium containing phosphate binders?

(a) 7.3%
(b) 8.2%
(c) 73%
(d) 87%

8. The majority of Canadian dialysis patients (according to the Dialysis Outcomes and Practice Patterns Study - DOPPS II data) are prescribed which of the following phosphate binders?

(a) calcium-based
(b) sevelamer
(c) lanthanum
(d) aluminum-based

9. Which of the following targets should be given priority according to the Canadian Society of Nephrology (2006) mineral metabolism guidelines?

(a) calcium
(b) phosphate
(c) calcium and phosphate
(d) phosphate and parathyroid hormone

10. Which of the following medications has been shown to increase parathyroid hormone (PTH) levels in patients with hypoparathyroidism?

(a) calcium carbonate
(b) sevelamer
(c) calcitriol
(d) cinacalcet

Continuing Education Study Answer Form

CE: 2.0 hrs continuing education

Are CSN and NKF-K/DOQI mineral metabolism guidelines for hemodialysis patients achievable? Results from a provincial renal program

Volume 18, Number 2

By Lori D. Wazny, PharmD, Colette B. Raymond, PharmD, MSc, Esther M. Lesperance, RT, and Keevin N. Bernstein, MD, FRCPC

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6.	a	b	c	d
7.	a	b	c	d
8.	a	b	c	d
9.	a	b	c	d
10.	a	b	c	d

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Les lignes directrices de la SCN et de la NKF K/DOQI sur le métabolisme minéral chez les patients hémodialysés sont-elles atteignables ? Résultats d'un programme provincial des maladies rénales

Par Lori D. Wazny, Pharm.D., Colette B. Raymond, Pharm.D., M.Sc., Esther M. Lesperance, T.M., et Dr Keevin N. Bernstein, FRCPC

Objectifs d'apprentissage

Après lecture de l'article, le lecteur sera en mesure de :

1. comprendre les différences entre les recommandations de la Société canadienne de néphrologie (SCN) et celles de la National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF K/DOQI) sur le métabolisme minéral ;
2. reconnaître les perturbations du métabolisme minéral observées le plus couramment chez les patients dialysés ;
3. passer en revue la prévalence des médicaments prescrits dans le traitement des anomalies du métabolisme minéral ;
4. discuter des limites d'une étude transversale.

Résumé

Plan de l'étude : *Les valeurs cibles de calcium, de phosphore et de parathormone préconisées par la Société canadienne de néphrologie (SCN) englobent une plus grande plage de valeurs comparativement à celle des lignes directrices recommandées par la National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF K/DOQI). Nous avons cherché à comparer les paramètres du métabolisme minéral dans le cadre du Programme manitobain des maladies rénales (PMMR) par rapport aux lignes directrices de la SCN et de la NKF K/DOQI. Nous avons également examiné l'utilisation des médicaments prescrits.*

Méthodologie : *L'ensemble des patients hémodialysés au Manitoba a été évalué. Les taux sériques d'albumine, de phosphore, de calcium, de parathormone intacte (PTHi) et de médicaments pertinents ont été relevés.*

Résultats : *Cinq cent quarante-six (546) patients ont pris part à l'analyse. De 53 à 81 % des patients du PMMR ont atteint les valeurs cibles individuelles préconisées par la SCN. Toutefois, seulement 26 % des patients ont atteint toutes les valeurs cibles, malgré une grande utilisation de chélateurs de phosphates (85,5 % de carbonate de calcium, 16,1 % de sevelamer et 1,3 % d'hydroxyde d'aluminium) et de pharmacothérapies entraînant une diminution de la sécrétion de PTH (30,2 % de calcitriol et 2,7 % de cinacalcet).*

Conclusion : *Seul un faible pourcentage de patients a été apte à atteindre les trois valeurs cibles de la SCN sur le métabolisme minéral simultanément. La majorité des patients ayant obtenu des résultats se situant en dehors des valeurs cibles présentaient soit une hyperphosphatémie, soit une hypoparathyroïdie.*

Mots clés : dialyse, calcémie, phosphatémie, hyperparathyroïdie secondaire, lignes directrices

Introduction

Des perturbations du métabolisme minéral ont été associées à une morbidité, à une diminution de la qualité de vie et à une mortalité cardiovasculaire dans la population en hémodialyse (Block, Hulbert-Shearon, Levin et Port, 1998 ; Block et al., 2004 ; Ganesh, Stack, Levin, Hulbert-Shearon et Port, 2001 ; Noordzij et al., 2005 ; Slinin, Foley et Collins, 2005 ; Stevens, Djurdjev, Cardew, Cameron et Levin, 2004 ; Young et al., 2005). La Société canadienne de néphrologie (SCN) a récemment publié des lignes directrices sur le métabolisme minéral chez les patients en hémodialyse (Jindal et al., 2006). Les taux sériques cibles de calcium, de phosphore et de parathormone (PTH) préconisés par la SCN englobent une plus grande plage de valeurs que celle des lignes directrices de la National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF K /DOQI) (voir Tableau 1) (National Kidney Foundation, 2003). Des études antérieures ont permis de constater qu'une grande proportion de patients hémodialysés présentent des paramètres biochimiques de métabolisme

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minéral se situant en dehors des valeurs cibles de la NKF K/DOQI (Wald, Tentori, Tighiouart, Zager et Miskulin, 2007 ; Wei et al., 2006 ; Young et al., 2004). Quoi qu'il en soit, à ce jour, aucune donnée publiée n'est accessible sur la capacité d'atteindre les valeurs cibles moins rigoureuses de la SCN. De plus, très peu d'information publiée est accessible à l'égard des médicaments utilisés dans une tentative d'atteindre les valeurs cibles recommandées par la SCN ou la NKF K/DOQI sur le métabolisme minéral.

Le Programme manitobain des maladies rénales (PMMR) prend en charge, à l'échelle de la province, tous les patients adultes atteints de maladie rénale chronique (MRC) qui nécessitent des soins. Le PMMR comprend des cliniques d'hémodialyse, de dialyse péritonéale et de soins de santé en néphrologie réparties dans trois centres à Winnipeg, dans un centre à Brandon et dans 13 unités satellites d'hémodialyse sur l'ensemble de la province. À l'heure actuelle, on recense approximativement 800 patients en hémodialyse, 180 patients en dialyse péritonéale et 3 600 patients recevant des soins de néphrologie dans ce programme.

Dans la présente évaluation, nous avons examiné les taux sériques du calcium corrigé en fonction de l'albumine (CaC), du phosphore (PO4) et de la parathormone intacte (PTHi) chez tous les patients hémodialysés de notre PMMR en juin 2005 afin de déterminer la proportion de patients qui présentaient des résultats de laboratoire s'inscrivant dans la plage des valeurs cibles recommandées par les lignes directrices de la CSN et de la NKF K/DOQI. Nous avons également recueilli des données sur l'utilisation de chélateurs de phosphates, d'analogues de la vitamine D et de cinacalcet.

Méthodologie

Tous les patients atteints de MRC recevant des traitements d'hémodialyse d'entretien depuis au moins trois mois dans le cadre du PMMR en juin 2005 ont été inclus dans l'évaluation. Les patients ont été exclus s'ils ne présentaient pas les quatre résultats de laboratoire, à savoir la calcémie, l'albuminémie, la phosphatémie et le taux sérique de PTH.

Tableau 1. Comparaison entre les valeurs cibles de la NKF K/DOQI et celles de la SCN sur le métabolisme minéral et osseux

Mesures	SCN	NKF K/DOQI
Ca (mmol/L)	2,1–2,6	2,1–2,37 (CaC)
PO4 (mmol/L)	0,8–1,78	1,13–1,78
PTH (pmol/L	10,6–53,0	16,5–33,0

Nota : SCN = Société canadienne de néphrologie
NKF K/DOQI= National Kidney Foundation's Kidney Disease Outcomes Quality Initiative
Ca = calcium sérique
CaC = calcium sérique corrigé
PO4 = phosphore sérique
PTH = parathormone sérique intacte

Ces valeurs ont été obtenues par les examens sanguins semi-mensuels menés de routine chez tous les patients. Le calcium corrigé en fonction de l'albumine (CaC) a été calculé au moyen de la formule de Payne (calcium corrigé = calcium sérique total + [0,02 (40 - albumine)] où le calcium est exprimé en mmol/L et l'albumine en g/L) (Payne, Little, Williams et Milner, 1973, p. 645). À l'instar de la SCN qui préconise le maintien de la calcémie dans la plage des valeurs normales (Jindal et al., 2006), nous avons opté pour la plage des valeurs normales de notre centre (de 2,2 à 2,6 mmol/L) comme valeurs cibles de la calcémie. Dans notre programme, la concentration normale de calcium dans le dialysat était de 1,5 mmol/L, mais les données sur les bains de dialyse avec calcium pour chaque patient n'ont pas été prélevées. Les échantillons sanguins ont été analysés dans les laboratoires des centres hospitaliers locaux. Les taux sériques du calcium, de l'albumine et du PO4 ont été déterminés en utilisant des épreuves standard. Les concentrations de PTH dans le sang ont été déterminées au moyen de l'épreuve de dosage de la PTHi de Roche Diagnostics Canada, à Laval, au Québec. Les cliniciens traitants ont pris en charge les paramètres du métabolisme minéral et osseux d'après la norme de pratique clinique qui était conforme aux lignes directrices de la NKF K/DOQI (les données ont été recueillies avant la publication des lignes directrices de la SCN) sans l'utilisation d'algorithmes propres au programme ou d'ententes collabora-

Tableau 2. Données démographiques

Paramètres	Valeurs moyennes (écart type ±ÉT)
Nbre de patients hémodialysés	546
Âge, en années (moyenne ± ÉT*)	60 ± 15
Nbre d'hommes	268 (49 %)
Origines ethniques	
Caucasienne	264 (48,4 %)
Autochtone[a]	226 (41,4 %)
Asiatique[b]	50 (9,2 %)
Noire	5 (0,9 %)
Autres	1 (0,2 %)
En dialyse depuis, nbre d'années (moyenne ± ÉT)	6,82 ± 5,24
Causes de la dialyse (%)	
Diabète sucré	274 (50,2 %)
Glomérulonéphrite	101 (18,5 %)
Autres	106 (19,5 %)
Étiologie inconnue	28 (5,1 %)
Maladie rénovasculaire	16 (2,9 %)
Hypertension	21 (3,8 %)

Nota : *ÉT = écart type
a Inclut : Inuits, Métis, Amérindiens
b Inclut : Filippins, Chinois et Indiens d'Asie

tives sur les pratiques de prescription parmi les professions de la santé. Les patients nécessitant une supplémentation en vitamine D ont reçu du calcitriol par voie orale ou intraveineuse et ceux requérant des chélateurs de phosphates ont reçu du carbonate de calcium, du sevelamer, de l'hydroxyde d'aluminium ou une combinaison de ces agents. Du cinacalcet était accessible grâce au programme d'accès à un médicament pour raisons humanitaires chez près de 20 patients ayant atteint les critères suivants : PTH > 53 pmol/L et (ou) calcium total > 2,60 mmol/L ; et (ou) PO4 > 1,78 mmol/L ; et (ou) présentant des contre-indications ou tolérant mal la prise de vitamine D. Toutes les données ont été obtenues à partir de représentations graphiques des traitements d'hémodialyse, puis ont été saisies dans une base de données (Microsoft Access®) par une infirmière, un technicien en pharmacie et (ou) une diététiste selon le site du programme.

Résultats

Parmi les 748 patients du PMMR en hémodialyse d'entretien ayant pris part à l'évaluation en juin 2005, 138 ne présentaient aucune valeur de PTH et 64 n'avaient aucune valeur d'albumine. Ces patients ont donc été exclus de l'étude. Les 546 patients restants qui cumulaient les quatre résultats de laboratoire ont été inclus dans l'analyse. Le Tableau 2 montre les données démographiques de notre population. Le Tableau 3 illustre les résultats obtenus d'après les plages cibles recommandées par la SCN et la NKF K/DOQI. Les anomalies les plus manifestes du métabolisme minéral qui ont été observées étaient une hyperphosphatémie (45 % des patients) et une hypoparathyroïdie (de 31 à 45 % en fonction des plages cibles utilisées).

Les médicaments utilisés pour maîtriser les taux sériques de CaC, de PO4 et de PTH conformément aux valeurs cibles préconisées par la SCN sont indiqués dans les Tableaux 4a, 4b et 4c respectivement. Dans l'ensemble, on a prescrit à 85,5 % des patients du carbonate de calcium, à 16,1 % du sevelamer et à 1,3 % de l'hydroxyde d'aluminium comme chélateur de phosphates. Ces pourcentages correspondent aux données de l'étude canadienne DOPPS II (2002–2004) qui indiquent qu'on a prescrit à 81,5 % des patients canadiens un chélateur de phosphates à base de calcium et à 14,2 %, du sevelamer (renseignements obtenus par le Dr David Mendelssohn, le 17 octobre 2007). On a prescrit à un total de 30,2 % des patients du PMMR du calcitriol (17,4 % par voie orale ; 12,8 % par voie intraveineuse) et à 2,7 % du cinacalcet. Près d'un quart des patients atteints d'hyperphosphatémie prenaient du sevelamer à raison de huit comprimés (6 400 mg) en moyenne par jour en association avec des chélateurs de phosphates à base de calcium, dont la dose moyenne de calcium élémentaire par jour était de 2,5 g ; ces patients étaient toujours incapables d'abaisser leur phosphatémie sous la valeur cible supérieure de 1,78 mmol/L recommandée par la SCN et la NKF K/DOQI (voir Tableau 4b). En outre, malgré l'utilisation de fortes doses d'agents de chélation des phosphates à base de calcium (de 1,9 à 2,9 g de calcium élémentaire par jour, voir Tableau 4a), seulement 10 % de notre population en hémodialyse présentait une hypercalcémie d'après les valeurs cibles de la SCN. Les lignes directrices préconisées par la SCN sur le métabolisme minéral, contrairement à celles recommandées par la NKF K/DOQI, ne limitent pas la dose orale quotidienne de calcium, mais

Tableau 3. Proportion de patients dont les taux sériques sont inférieurs, conformes ou supérieurs aux valeurs cibles des lignes directrices

Mesures	SCN	PMMR (n = 546)	K/DOQI	PMMR (n = 546)
CaC (mmol/L)	< 2,1 2,1–2,6 > 2,6	49 (9 %) 440 (81 %) 57 (10 %)	< 2,1 2,1–2,37 > 2,37	49 (9 %) 217 (40 %) 280 (51 %)
PO4 (mmol/L)	< 0,8 0,8–1,78 > 1,78	15 (3 %) 288 (53 %) 243 (45 %)	< 1,13 1,13–1,78 > 1,78	73 (13 %) 230 (42 %) 243 (45 %)
PTH (pmol/L)	< 10,6 10,6–53 > 53	168 (31 %) 310 (57 %) 68 (12 %)	< 16,5 16,5–33 > 33	245 (45 %) 153 (28 %) 148 (27 %)
Conformes aux trois valeurs cibles	Valeurs cibles de la SCN	142 (26 %)	Valeurs cibles de la K/DOQI	33 (6 %)

Nota : SCN = Société canadienne de néphrologie
NKF K/DOQI= National Kidney Foundation's Kidney Disease Outcomes Quality Initiative
Ca = calcium sérique
CaC = calcium sérique corrigé
PO4 = phosphore sérique
PTH = parathormone sérique intacte

recommandent plutôt que la calcémie soit maintenue dans la plage des valeurs normales (Jindal et al., 2006), ce que nos résultats semblent également corroborer.

Discussion

Dans une analyse transversale menée auprès de patients hémodialysés dans le cadre d'un programme provincial de maladies rénales, nous avons observé que seulement 81 %, 53 % et 57 % des patients avaient atteint les valeurs cibles de la SCN relativement à la calcémie, à la phosphatémie et au taux sérique de PTH respectivement. Une plus grande proportion de patients (26 %) a pu atteindre les trois valeurs cibles plus indulgentes de la SCN sur le métabolisme minéral comparativement aux valeurs cibles de la NKF K/DOQI (6 %). Cependant, la vaste majorité des patients en hémodialyse n'atteint toujours pas les valeurs cibles préconisées par la SCN ou recommandées par la NKF K/DOQI. Notre faible pourcentage de patients ayant atteint les trois valeurs cibles de la NKF K/DOQI simultanément (6 %, voir Tableau 3) est très semblable à ce que d'autres chercheurs ont rapporté avec des données recueillies sur de plus longues périodes (de trois mois à deux ans) avec des taux de 5,3 et de 5,5 % (Wei et al., 2006 ; Young et al., 2004). Le tableau des résultats s'assombrit lorsque les paramètres biochimiques de métabolisme minéral font l'objet d'études menées à plus long terme. Un groupe de chercheurs a montré que seulement 2,4 % des patients sont parvenus à maîtriser de façon constante l'ensemble des valeurs cibles de la NKF K/DOQI sur

Tableau 4a. Utilisation des chélateurs de phosphates selon les valeurs cibles préconisées par la SCN pour le calcium corrigé

CaC (mmol/L)	n	Nbre de pts prenant du Ca ; % de pts ; Ca élémentaire/jr (en g)	Nbre de pts prenant du sevelamer ; % de pts ; nbre de comprimés à 800 mg/jr	Nbre de pts prenant de l'hydroxyde d'Al ; % de pts ; g/jr
< 2,1	49	46 ; 94 % ; 2,9	1 ; 2 % ; 9	2 ; 4 % ; 1,5
2,1–2,6	440	377 ; 86 % ; 2,1	70 ; 16 % ; 8	5 ; 1 % ; 3,7
> 2,6	57	44 ; 77 % ; 1,9	16 ; 28 % ; 7	0

Nota : Certains patients ont reçu plus d'un chélateur de phosphates.
SCN = Société canadienne de néphrologie
CaC = calcium sérique corrigé

Tableau 4b. Utilisation des chélateurs de phosphates selon les valeurs cibles préconisées par la SCN pour le PO4

PO4 (mmol/L)	n	Nbre de pts prenant du Ca ; % de pts ; Ca élémentaire/jr (en g)	Nbre de pts prenant du sevelamer ; % de pts ; nbre de comprimés à 800 mg/jr	Nbre de pts prenant de l'hydroxyde d'Al ; % de pts ; g/jr
< 0,8	15	11 ; 73 % ; 1,9	0	0
0,80–1,78	288	250 ; 87 % ; 1,9	29 ; 10 % ; 7,3	2 ; 0,7 % ; 2,9
> 1,78	243	214 ; 88 % ; 2,5	59 ; 24 % ; 8,2	5 ; 2 % ; 3,4

Nota : Certains patients ont reçu plus d'un chélateur de phosphates.
SCN = Société canadienne de néphrologie
PO4 = phosphore sérique

Tableau 4c. Utilisation de calcitriol et de cinacalcet selon les valeurs cibles préconisées par la SCN pour la PTH

PTH (pmol/L)	n	Nbre de pts prenant du calcitriol par voie orale ; % de pts ; mcg/sem	Nbre de pts prenant du calcitriol par voie i.v. ; % de pts ; mcg/sem	Nbre de pts prenant du cinacalcet ; % de pts ; mg/jr
< 10,6	168	21 ; 12,5 % ; 2,79	4 ; 2,4 % ; 3,25	0
10,6–53	310	64 ; 20,6 % ; 4,92	30 ; 9,7 % ; 3,08	1 ; 0,3 % ; 30
> 53	68	11 ; 16,2 % ; 1,41	39 ; 57,3 % ; 3,73	14 ; 20,6 % ; 40,7

Nota : Certains patients ont reçu plus d'un chélateur de phosphates.
SCN = Société canadienne de néphrologie
PTH = parathormone sérique intacte

le métabolisme minéral sur une période de 12 mois (Wald et al., 2007). À notre connaissance, aucun autre rapport d'étude portant sur l'atteinte des valeurs cibles de la SCN, hormis celui-ci, n'a encore été publié.

Selon les lignes directrices de la SCN sur le métabolisme minéral, « il importe de normaliser en priorité la calcémie et la phosphatémie dans la prise en charge de la PTH » (Jindal et al., 2006, p. S12). D'après les données de notre programme provincial, plus de 80 % des patients ont atteint la plage des valeurs cibles de la SCN pour ce qui est de la calcémie, alors que seulement 53 % ont pu atteindre la plage des valeurs cibles de la SCN quant à la phosphatémie. La vaste majorité des patients, dont le taux sérique de PO4 se situait en dehors des valeurs cibles de la SCN, présentait une hyperphosphatémie (voir Tableau 3). L'étude DOPPS II (données de 2002 à 2004) indique que 85 % des patients, dont les taux sériques de PO4 se situent dans la plage des valeurs cibles de la NKF K/DOQI, ont reçu un chélateur de phosphates (Young et al., 2005). En revanche, 99 % des patients de notre PMMR qui ont atteint les valeurs cibles de PO4 de la NKF K/DOQI et 91 %, celles de la SCN se sont vu prescrire un chélateur de phosphates. De façon encore plus révélatrice, 88 % des patients ayant pris part à l'étude DOPPS II (Young et al., 2005) et 96 % des patients de notre programme provincial qui étaient atteints d'hyperphosphatémie ont reçu des chélateurs de phosphates. Cette très grande utilisation des chélateurs de phosphates chez les patients n'atteignant toujours pas les valeurs cibles de phosphatémie laisse indiquer que les agents de chélation des phosphates offerts à ce moment étaient des traitements inadéquats (Wald et al., 2007 ; Wei et al., 2006 ; Young et al., 2005). Toutefois, il faut faire preuve de prudence dans l'interprétation de ces données, car elles peuvent également supposer une non-observance thérapeutique.

Les données de l'étude DOPPS II ont rapporté que 48 % des patients (Young et al., 2004) présentaient une concentration de PTHi < 16,5 pmol/L ; de façon similaire, nous avons observé que 45 % des patients de notre PMMR présentaient une telle concentration. Ceci suggère que l'hypoparathyroïdie et la survenue consécutive d'une ostéopathie adynamique, et non l'hyperparathyroïdie, devraient être les principales préoccupations au chapitre du métabolisme minéral. De faibles concentrations sanguines de PTH ont été associées à une augmentation de la morbidité et de la mortalité (Avram, Mittman, Myint et Fein, 2001 ; Guh et al., 2002). Dans une étude menée auprès de patients hémodialysés, on a observé que la principale cause d'hypoparathyroïdie était la parathyroïdectomie (77 % des patients) ; cependant, les patients parathyroïdectomisés avaient de meilleures chances de survie malgré de faibles concentrations de PTH dans le sang (Dussol et al., 2007). Dans une étude récente, les chercheurs ont constaté que la parathyroïdectomie est associée à un plus faible risque de fractures (Rudser, de Boer, Dooley, Young et Kestenbaum, 2007). Ces données laissent croire que les avantages du traitement chirurgical de l'hyperparathyroïdie secondaire compensent les risques associés à une hypoparathyroïdie et à la survenue d'une ostéopathie adynamique. On a également relevé un autre facteur qui a pu influer sur nos faibles résultats de PTH, soit le grand nombre de patients diabétiques. Ces patients chez qui l'insuffisance rénale est secondaire au diabète comptent pour plus de 50 % de notre population en hémodialyse (voir Tableau 2). Il a été montré que l'hyperglycémie et la carence insulinique inhibent la sécrétion de PTH (Haris et al., 2006). Cependant, en examinant notre utilisation des agents visant à diminuer la PTH (voir Tableau 4c), nous avons découvert une donnée déconcertante, à savoir qu'approximativement 15 % des patients présentant une PTH < 10,6 pmol/L continuaient à prendre du calcitriol. Dans ses lignes directrices, la SCN énonce formellement que le traitement aux analogues de la vitamine D doit être abandonné lorsque le taux sérique de PTH diminue sous la valeur cible inférieure. L'abandon des analogues de la vitamine D chez ces patients représenterait certainement la « solution » la plus simple afin d'aider à élever le taux de PTH.

Limites

Cette évaluation comporte plusieurs limites. Premièrement, à cause de la méthode transversale utilisée, les résultats des quatre valeurs de laboratoire n'étaient pas accessibles pour tous les patients hémodialysés au Manitoba en juin 2005. Bien que le dosage systématique de la calcémie et de la phosphatémie fasse partie des examens sanguins mensuels de routine dans tous les centres d'hémodialyse du PMMR, la PTH est normalement mesurée tous les trois mois et le dosage de l'albumine n'est pas toujours demandé.

Deuxièmement, les données relatives à la dose et à la fréquence de dialyse, ayant pu influer sur les taux sériques de phosphore, n'ont pas été recueillies dans le cadre de cette évaluation. La majorité des patients du PMMR recevait des traitements d'hémodialyse traditionnelle trois fois par semaine ; par contre, certains patients ont été dialysés deux fois par semaine. Le PMMR ne comptait aucun patient en hémodialyse nocturne ou quotidienne.

Troisièmement, nous n'avons pas examiné les effets sur les valeurs cibles du métabolisme minéral lorsqu'un patient omettait d'effectuer des traitements d'hémodialyse ou raccourcissait la durée de ses séances. Une récente étude a montré que chaque augmentation de 1 % dans la fréquence d'omission des séances d'hémodialyse était associée à une diminution dans la maîtrise constante des taux sériques de calcium, de phosphore et du produit Ca X P de 2, de 4 et de 1 % respectivement (Wald et al., 2007). Chaque augmentation de 1 % dans la fréquence d'abrègement des séances d'hémodialyse était associée à une diminution de 2 % dans la maîtrise constante des taux sériques de phosphore et du produit Ca X P. On sait également que 19 % de l'élimination du phosphore total se produit durant la dernière heure d'un traitement de quatre heures (Gutzwiller et al., 2002). Par conséquent, les patients, dont la durée de dialyse de chaque séance est amputée d'une heure, devront prendre beaucoup plus de chélateurs de phosphates afin d'atteindre le même taux d'élimination des phosphates (Sherman, 2005).

Quatrièmement, la maîtrise des taux de phosphore par le suivi d'une diète et la prise de chélateurs de phosphates requiert beaucoup d'éducation auprès du patient et une grande observance de la part de ce dernier à l'égard des médicaments qui lui sont prescrits. Trente-huit pour cent (38 %) des patients hémodialysés ont signalé qu'ils ne respectaient pas la prise de leurs chélateurs de phosphates (Tomasello, Dhupar et Sherman, 2004). Une étude a montré qu'une séance de formation en face à face avec une diététiste en néphrologie sur la prise en charge du PO4 a entraîné une réduction statistiquement significative des taux sériques de PO4 qui se sont maintenus pendant au moins trois mois (Ashurst et Dobbie, 2003). Dans une autre étude, les chercheurs ont signalé que le rapport patient-diététiste n'a aucun effet discernable sur la maîtrise du métabolisme minéral (Wald et al., 2007). Nous n'avons pas examiné les données sur les variations des rapports patient-diététiste ou patient-pharmacien pour déterminer si cela pourrait influencer la proportion de patients atteignant un état d'équilibre. Soulignons toutefois que notre PMMR emploie à la fois des diététistes et des pharmaciens spécialisés en néphrologie dans toutes ses unités d'hémodialyse. Nous n'avons pas examiné l'observance thérapeutique de la part des patients dans cette évaluation.

Cinquièmement, au moment de notre évaluation, mentionnons que les médecins de notre PMMR avaient accès à cinacalcet grâce au programme d'accès à un médicament pour raisons humanitaires. Néanmoins, les données de cette évaluation ont été recueillies au cours des premiers mois suivant le recrutement des patients et, par conséquent, nous n'avons pas été en mesure d'établir les répercussions importantes de cinacalcet sur la PTH (voir Tableau 4c). D'autres chercheurs ont signalé que l'utilisation de cinacalcet avait contribué à atteindre les valeurs cibles de la NKF K/DOQI (Moe et al., 2005).

Finalement, nous n'avons pas tenu compte de la concentration calcique du dialysat de chaque patient. Toutefois, la concentration standard en calcium du dialysat utilisée par notre programme en juin 2005 était de 1,5 mmol/L. Des études ont montré que l'utilisation d'un dialysat à faible teneur en calcium (1,25 mmol/L) chez les patients hémodialysés ayant un taux de PTH < 16,5 pmol/L entraînait une augmentation significative et soutenue des taux sériques de PTH et de phosphatase alcaline (PhoA) (Lezaic et al., 2007 ; Spasovski et al., 2007). Il est important de noter que ces études ont été menées auprès de patients qui prenaient également des chélateurs de phosphates à base de calcium. Une autre étude souligne que le passage du carbonate de calcium au sevelamer chez les patients présentant un taux de PTH < 6,4 pmol/L diminuait de façon significative la calcémie, causant ainsi l'élévation des concentrations de PTH de 3,3 à 10,0 pmol/L après 48 semaines (Iwata et al., 2007). La concentration en calcium du dialysat employée dans cette étude était de 1,5 mmol/L. Une des limites des études mentionnées précédemment est liée au fait que les chercheurs n'ont pas examiné les effets du traitement sur l'histomorphométrie des os au moyen de biopsies osseuses. Une étude, dans laquelle les chercheurs ont examiné des patients présentant un diagnostic avéré d'ostéopathie adynamique éprouvé par biopsie, a permis de constater qu'une greffe rénale réussie entraîne un rétablissement partiel ou complet du renouvellement des cellules osseuses (Abdallah et al., 2006).

Répercussions dans la pratique clinique

Ces résultats ont été diffusés à l'ensemble des néphrologues, des pharmaciens, des infirmières responsables et des diététistes du PMMR lors d'un symposium en octobre 2005. L'objectif de ce symposium consistait à développer une approche cohérente de prise en charge des désordres du métabolisme minéral dans le cadre du PMMR. Certaines des recommandations qui ont été approuvées incluent : 1. une concentration standard en calcium du dialysat de 1,2 mmol/L ; 2. une calcémie exprimée par tous les laboratoires sous forme de calcium total et de calcium corrigé en fonction de l'albumine ; 3. l'abandon du dosage systématique du calcium ionisé ; 4. une valeur cible du calcium corrigé en fonction de l'albumine < 2,6 mmol/L ; 5. une phosphatémie (1,8 mmol/L dont le traitement initial doit inclure une revue de la diète et des conseils alimentaires ainsi qu'une dialyse optimale (si le patient est en dialyse) avant l'instauration d'une pharmacothérapie par les chélateurs de phosphates.

Nous travaillons actuellement à la création d'une base de données sur le métabolisme minéral dans laquelle les valeurs de laboratoire et les médicaments prescrits seront saisis tous les trimestres pour l'ensemble des patients du PMMR. Une évaluation continue au moyen de cette base de données visera à augmenter le nombre de patients qui atteindront les valeurs cibles des taux sériques de calcium, de phosphore et de PTH au fil du temps, en particulier chez les patients atteints d'hyperphosphatémie et d'hypoparathyroïdie.

Recommandations de recherche future

Les répercussions de l'utilisation des agents, tels que : carbonate de lantane, acétate de calcium, sevelamer ou cinacalcet, sur les paramètres du métabolisme osseux en dehors du cadre d'une étude contrôlée à répartition aléatoire devraient être évaluées de façon prospective. De plus, il est nécessaire de procéder à d'autres études prospectives à répartition aléatoire afin de montrer que l'atteinte des valeurs cibles des lignes directrices de la SCN ou de la NKF K/DOQI permet effectivement de réduire le risque de mortalité chez les patients hémodialysés.

Conclusion

Seul un faible pourcentage de patients a pu atteindre les trois valeurs cibles de la SCN ou de la NKF K/DOQI sur le métabolisme minéral simultanément. La majorité de nos patients, dont les résultats s'inscrivaient en dehors des plages de valeurs cibles, présentaient soit une hyperphosphatémie, soit une hypoparathyroïdie. Ces constatations soulignent les difficultés auxquelles nous nous heurtons constamment dans la prise en charge du métabolisme minéral chez les patients en hémodialyse.

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SÉRIE SUR LA FORMATION CONTINUE
QUÉSTIONNAIRE D'ÉVALUATION

Durée de la séance : 2 h

Les lignes directrices de la SCN et de la NKF K/DOQI sur le métabolisme minéral chez les patients hémodialysés sont-elles atteignables ? Résultats d'un programme provincial des maladies rénales

Par Lori D. Wazny, Pharm.D., Colette B. Raymond, Pharm.D., M.Sc., Esther M. Lesperance, T.M., et Dr Keevin N. Bernstein, FRCPC

Cas no 1

Mme A.L., âgée de 60 ans, reçoit des traitements d'hémodialyse trois fois par semaine depuis les six derniers mois. Voici les résultats de ses examens sanguins semi-mensuels : Ca à 2,1 mmol/L ; PO4 à 2,2 mmol/L et PTH à 8,3 pmol/L.

Les questions 1 à 4 portent sur ce cas.

1. Pour quel(s) paramètre(s), Mme A.L. présente-t-elle des résultats se situant en dehors des valeurs cibles des lignes directrices de 2006 de la Société canadienne de néphrologie (SCN) sur le métabolisme minéral ?

(a) Ca
(b) PO4
(c) PTH
(d) PO4 et PTH

2. Mme A.L. prend les médicaments suivants : un comprimé de carbonate de calcium à 625 mg (250 mg de Ca élémentaire/comprimé) par voie orale trois fois par jour avec les repas et du calcitriol à 0,25 mcg par voie orale les lundis, mercredis et vendredis. Selon les résultats de ses examens sanguins semi-mensuels, laquelle des modifications suivantes du traitement médical est la plus appropriée ?

(a) augmentation de la dose de carbonate de calcium et maintien de la même dose de calcitriol
(b) diminution de la dose de carbonate de calcium et augmentation de la dose de calcitriol
(c) augmentation de la dose de carbonate de calcium et arrêt du calcitriol
(d) arrêt du carbonate de calcium et du calcitriol et passage au sevelamer

3. Mme A.L. présente une hyperphosphatémie secondaire à l'un des énoncés suivants. Lequel ?

(a) Prise du carbonate de calcium selon les instructions
(b) Séances de dialyse plus courtes
(c) Suivi d'une diète faible en phosphore
(d) Assiduité à toutes ses séances d'hémodialyse

4. Mme A.L. vous pose la question suivante : « Quel devrait être mon taux sérique de PO4 ? » Quelle est la concentration sanguine maximale cible de PO4 selon les lignes directrices de la SCN (2006) et de la NKF K/DOQI (2003) ?

(a) 1,45
(b) 1,78
(c) 2
(d) 2,2

Fin du cas no 1

5. Les anomalies les plus courantes du métabolisme minéral observées chez la population en hémodialyse de l'étude menée sur le Programme manitobain des maladies rénales (PMMR) étaient :

(a) l'hyperphosphatémie et l'hyperparathyroïdie
(b) l'hypophosphatémie et l'hypoparathyroïdie
(c) l'hyperphosphatémie et l'hypoparathyroïdie
(d) l'hyperphosphatémie et l'hypocalcémie

6. Quel était le pourcentage de patients en hémodialyse dans le PMMR qui a atteint les trois valeurs cibles des lignes directrices de la SCN (2006) sur le métabolisme minéral ?

(a) 6 %
(b) 12 %
(c) 26 %
(d) 45 %

7. Dans l'étude sur le PMMR, quel était le pourcentage de patients hémodialysés, dont les résultats d'analyses se situaient dans la plage des valeurs cibles du PO4 (0,80-1,78 mmol/L) des lignes directrices de la SCN (2006), chez qui l'on avait prescrit des chélateurs de phosphates à base de calcium ?

(a) 7,3 %
(b) 8,2 %
(c) 73 %
(d) 87 %

8. Quel type de chélateurs de phosphates prescrit-on à la majorité des patients dialysés au Canada (selon les données issues de la deuxième étude Dialysis Outcomes and Practice Patterns Study—DOPPS II) ?

(a) à base de calcium
(b) sevelamer
(c) lanthane
(d) à base d'aluminium

9. Quelles valeurs cibles devrait-on normaliser en priorité selon les lignes directrices de la SCN (2006) sur le métabolisme minéral ?

(a) calcémie
(b) phosphatémie
(c) calcémie et phosphatémie
(d) phosphatémie et taux sérique de parathormone

10. Parmi les médicaments suivants, lequel a montré une augmentation du taux sérique de parathormone (PTH) chez les patients atteints d'hypoparathyroïdie ?

(a) carbonate de calcium
(b) sevelamer
(c) calcitriol
(d) cinacalcet

FORMULAIRE DE RÉPONSE À LA SÉRIE SUR LA FORMATION CONTINUE

É.C. : 2 h éducation continue

Les lignes directrices de la SCN et de la NKF K/DOQI sur le métabolisme minéral chez les patients hémodialysés sont-elles atteignables ? Résultats d'un programme provincial des maladies rénales

Volume 18, Numéro 2

Par Lori D. Wazny, Pharm.D., Colette B. Raymond, Pharm.D., M.Sc., Esther M. Lesperance, T.M., et Dr Keevin N. Bernstein, FRCPC

Directives pour compléter le questionnaire :

- Choisir la meilleure réponse et encercler la lettre correspondante sur la grille de réponses ci-après
- Terminer l'évaluation
- Retourner ce formulaire seulement (ou une photocopie) à
  l'ACITN,
  336 Yonge St., Ste. 322,
  Barrie, ON L4N 4C8
- Joindre un chèque ou un mandat poste payable à l'ACITN
- Les tests doivent être envoyés avant le 30 juin 2009, l'oblitération postale en fait foi.
- Si vous recevez une note de 80 % et plus, un certificat équivalent à 2 heures de formation sera émis par l'ACITN
- Veuillez prévoir de six à huit semaines pour le traitement. Vous pouvez soumettre plus d'un formulaire par enveloppe, mais vous ne recevrez pas nécessairement tous les certificats en même temps.

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Grille de réponse

Veuillez encercler votre choix :

1.	a	b	c	d
2.	a	b	c	d
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5.	a	b	c	d
6.	a	b	c	d
7.	a	b	c	d
8.	a	b	c	d
9.	a	b	c	d
10.	a	b	c	d

Évaluation

	Pas du tout d'accord				Entièrement d'accord
1. La présentation recontrait les objectifs visés.	1	2	3	4	5
2. Le contenu correspondait aux objectifs.	1	2	3	4	5
3. La présentation de l'étude convenait au contenu.	1	2	3	4	5

4. Temps requis en minutes pour lire et remplir le questionnaire :
   50 75 100 125 150

Commentaires: _____

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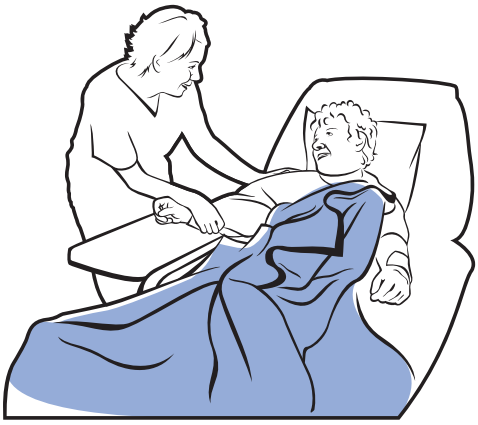
Bedside Matters…

From a volunteer's heart



This is a story submitted by one of our renal technicians, Elaine May, who also devotes her time and soul to volunteer work. This is her story, published first in the Surrey Hospice Newsletter, Surrey BC, Spring 2008 edition, page 3.

In the past, my one-to-one volunteer assignments in the community have only required that I spend an hour visiting with my clients.

With my last palliative client, this was not to be. Alice and I developed a special bond right from the beginning. My first visit lasted two-and-a-half hours and that's how it continued. We would sit and talk about her life and what the future might hold. She would often invite me to share reflections of my own life as well. We would laugh and laugh and laugh.

Elaine May

Through these conversations I got to know how she felt about her prognosis and how she was going to live her life, but, more importantly, how she was going to die. She was very definite on what she wanted and did not want.

About four weeks into my role as volunteer companion, I received a telephone call saying Alice was admitted to the hospice residence and she wanted me to know.

For the next several weeks I continued to visit, bringing coffee and blueberry fritters and enjoying our remaining time together.

On Christmas Eve, I went to visit. I told her I was going away after Christmas and that this could be the last time we would see each other. I also told her how much I enjoyed getting to know her and was glad she had allowed me into her life at this time.

She died two weeks into the New Year.

In the short time I knew Alice, she taught me many things about life. She taught me many more things about dying.

When I heard that she had died, I went out and had a blueberry fritter and a coffee and said goodbye in that way to someone who had come to mean a great deal to me in a very short time.

Elaine is a dedicated renal tech in our busy hemo unit. She is the kind of person who listens to patients and puts herself out to help with things that really matter to them.

She feeds people who need help, joins in their personal celebrations and is generous with her hugs. Elaine has worked as a nursing aide in extended care and is active as a union steward and takes leadership courses. Our unit benefits from all the heart and soul Elaine shares.

by Elaine May, Renal Tech, hemodialysis unit, at Surrey Hospital, Surrey, British Columbia

Department Editor: Lee Beliveau, RN, CNeph(C), staff nurse, hemodialysis unit, at Surrey Hospital, Surrey, British Columbia

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Two perspectives on nursing student exposure to nephrology nursing

A mentor's perspective

Last summer, our organization, London Health Sciences Centre (LHSC), offered a summer employment initiative for nursing students. As part of that program, I had the opportunity to mentor Lindsay, a third-year nursing student. The purpose of the program was to provide nursing students with the opportunity to work with a clinical program, gain first-hand experience as a member of an interdisciplinary team, and learn more about the variety of educational and career opportunities that are available to them once they graduate.

Lindsay spent a total of 12 weeks with our renal program. During that time, she assisted us to complete a number of ongoing projects. Examples of projects she was involved in included: 1) assisting with data collection for a number of research studies, 2) organizing education materials for nursing staff under the guidance of the renal educator, and 3) updating a community resource binder.

Overall, the summer employment initiative was a positive experience and, as a program, we gained tremendous benefit from having Lindsay. Conversely, I feel that Lindsay benefitted from the program as it allowed her the opportunity to learn about renal disease and dialysis. She became familiar with the roles of renal team members through job shadowing and was exposed to the various areas of our program (i.e., chronic kidney disease, hemodialysis, and peritoneal dialysis).

Exposure to nephrology in basic nursing studies remains limited. Through programs such as this at our organization, future nurses like Lindsay may develop an interest in working in nephrology post-graduation. Any effort to improve recruitment in an era of nursing shortages is warranted.

A student perspective

As a nursing student who was hired to work as a research assistant in a dialysis unit this summer, I was petrified. I realized that I knew nothing of dialysis, except that the process cleaned your blood. However, leaving the unit this was not the case. I had learned a great deal and had become quite interested in the nursing process behind dialysis and nephrology, so much so that I am consolidating on a medical nephrology floor, and doing a four-week term in hemo and peritoneal dialysis.

I feel that the important question is: Why was a nursing student going into her final year of school uncertain and uneducated in this area of nursing? During my employment at LHSC I conducted an educational session for my fellow nursing students on chronic kidney disease and dialysis. This group consisted of third- and fourth-year nursing students from various universities and colleges throughout Ontario. During that time, we also discussed how much background knowledge we had acquired in our education on renal failure. The consensus was that there was a lack of awareness and education about dialysis and nephrology. The students who did have some education felt, thought, or believed they were inadequately introduced to this area of nursing.

There is a great deal of potential for nursing students in nephrology. I was lucky to have employment that encouraged my learning to understand hemodialysis and peritoneal dialysis in both home and hospital settings. I would like to see nephrology taking a larger role in the nursing student's education, as the renal system is vital in optimal health. I, for one, am glad that I was included in this area of nursing and plan to continue my own education to further my practice.

Acknowledgements

The authors would like to acknowledge London Health Sciences Centre for its sponsorship of the Summer Student Nursing Program.

The Practice Column editor welcomes any questions, ideas, suggestions, or contributions for the Practice Column. Please contact: Eleanor Ravenscroft, RN, CNeph(C), PhD, Patient Care Manager, Sunnybrook Health Sciences Centre, 2075 Bayview Avenue, Toronto, ON M4N 3M5, Telephone: (416) 480-6100 ext. 7252, E-mail: ***eleanor.ravenscroft@sunnybrook.ca***

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Pharmacy news and reviews

Low molecular weight heparins in patients with renal insufficiency

Abstract

Low molecular weight heparins (LMWHs) have been evaluated in a large number of randomized clinical trials and have been shown to be safe and effective for the prophylaxis and treatment of thromboembolic disorders, myocardial infarction and unstable angina in patients with normal renal function. Unfortunately, most studies evaluating LMWH have excluded patients with renal insufficiency, or those that included these patients were exceedingly small. There are limited clinical data to make assumptions about how to offer the same benefits of LMWH in patients with renal insufficiency. Several small pharmacokinetic studies of the LMWH enoxaparin have demonstrated that there is a delay in elimination in patients with renal insufficiency. There are limited data to make the same assumption concerning other LMWH. This accumulation effect could place these patients at an increased risk of bleeding. Monitoring of LMWH by measuring antifactor Xa levels may be an option. However, the ideal therapeutic range for LMWH for which there is proven efficacy and low risk of bleeding has not been clearly defined. Empirically adjusted doses or lower doses intended for prophylaxis or for hemodialysis extra-corporeal anticoagulation may not demonstrate the same level of accumulation, however, studies are limited and of short duration. The use of measuring antifactor Xa levels remains warranted in patients with CrCl < 30 mL/min treated with empirically adjusted doses and prophylactic doses used for duration of > 4 days. Until there are better data to suggest otherwise, adjusted doses of enoxaparin are not first choice in patients with renal insufficiency when other options exist. Heparin remains the gold standard of treatment in patients with renal insufficiency.

Key words: low molecular weight heparin, anticoagulation, renal insufficiency

Introduction

Low molecular weight heparin (LMWH) and unfractionated heparin (UFH) have been evaluated in a large number of randomized clinical trials and have been shown to be safe and effective for the prophylaxis and treatment of thromboembolic disorders, myocardial infarction and unstable angina (Antman et al., 1999; Gould, Dembitzer, Doyle, Hastie, & Garber, 1999). However, a universally accepted standard dose of LMWH for patients with severe renal insufficiency has not been established. Most studies evaluating LMWH have excluded patients with renal insufficiency or have been exceedingly small. There are a few pharmacokinetic studies and limited clinical data to make assumptions about how to dose LMWH in renal insufficiency.

This article will review the current literature regarding the use of LMWH in patients with renal insufficiency with regards to treatment dosages, prophylactic dosages, and dosages used during hemodialysis to prevent thrombosis of the extracorporeal dialysis circuit.

Background

UFH has been the gold standard of anticoagulant care for more than 50 years (Arbit, Goldberg, Gomez-Orellana, & Majuru, 2006). Despite its extensive use in clinical practice, UFH use has several limitations. It has well-known bleeding complications, the ability to induce immune-mediated platelet activation leading to heparin-induced thrombocytopenia (HIT), and a negative effect on bone metabolism leading to heparin-induced osteoporosis (Hirsh & Raschke, 2004). The anticoagulant effect of heparin is monitored by activated partial-thromboplastin time (aPPT), and activated clotting time (ACT). There is wide inter- and intra-patient variability in ACT and aPPT. Therefore, frequent and careful monitoring is required due to an unpredictable dose-response relationship.

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One benefit that UFH has over LMWH is the antagonistic effects of IV protamine on heparin-induced bleeding. UFH is still considered the anticoagulant of choice during pregnancy, obesity and renal failure due to limited data from clinical trials evaluating the safety and efficacy of the drugs in these special populations (Duplaga, Rivers, & Nutescu, 2001).

Both UFH and LMWH exert their anticoagulant activity predominantly by binding to and exerting a conformational change in antithrombin (antifactor IIa), which accelerates inactivation of factor Xa and thrombin. LMWHs have lower antifactor IIa activity than antifactor Xa activity (Zakarija & Bennett, 2005). LMWHs are derived from UFH by depolymerization to one-third the molecular weight of heparin. Virtually all heparin molecules contain at least 18 saccharide units yielding an antifactor Xa/anti-IIa ratio of 1:1. LMWHs have approximately 15 saccharide units, which decreases its ability to bind to thrombin, giving it an antifactor Xa/anti-IIa ratio of 2:1 to 4:1, depending on the molecular size distribution (Hirsh & Raschke, 2004). This reduction in molecular size reduces the ability of LMWH to bind to protein (Hirsh & Raschke, 2004). Reduced binding to plasma proteins is responsible for the more predictable dose-response relationships, lower incidence of HIT, lower incidence of bone loss, and decreased frequency of major bleeding events (Hirsh & Levine, 1992). LMWHs have improved bioavailability and a longer half-life, which allow for once-twice daily subcutaneous administration based on weight without the need for laboratory monitoring (Hirsh & Raschke, 2004). Laboratory monitoring of LMWH is generally not necessary due to more predictable pharmacokinetic and pharmcodynamic properties. The exception is in special populations such as renal insufficiency, obesity, and pregnancy, where monitoring should be considered (Hirsh & Raschke, 2004). Unlike UFH, the effects of LMWH are not reversible.

There are currently three LMWHs available in Canada: enoxaparin, dalteparin, and tinzaparin (see Table One). Each of these agents is prepared with a different method of depolymerization resulting in different molecular weights, different specific activities (anti-Xa: anti-IIa activities), different rates of plasma clearance and different recommended dosage regimens. They may share some common properties, however, LMWHs are unique and not interchangeable (Hirsh & Levine, 1992). There is a hypothesis that the lower the molecular weight (such as enoxaparin), the more a LMWH depends on renal elimination and may account for the various findings discussed in this article (Mahe, 2007a).

Monitoring and anti-Xa levels in special populations

It is not possible to measure LMWH levels directly, therefore, most studies use surrogate biologic markers such as antifactor Xa activity. Appropriate timing, frequency and desired therapeutic target range of antifactor Xa activity are not clearly defined and remain controversial (Duplaga et al., 2001). Despite these limitations, antifactor Xa levels have been shown to be inversely related to thrombus propagation and the development of thrombosis (Alhenc-Gelas et al., 1994; Levie et al., 1989). Measurements of antifactor Xa levels near their peak (four hours) appear to have a stronger correlation with safety and efficacy than through levels obtained just prior to administration (Harenberg, 2004). For suggested peak anti-Xa levels (taken four hours after subcutaneous injection) for all LMWHs see Table Two. Evidence suggests an increased risk of bleeding with levels above 0.8–1.0/mL (Nieuwenhuis, Albada, Banga, & Sixma, 1991).

Several small pharmacokinetic studies of the LMWH enoxaparin have demonstrated there is a delay in drug elimination in patients with renal insufficiency resulting in accumulation of drug and effect. This accumulation could place these patients at an increased risk of bleeding. However, there are conflicting data regarding the pharmacokinetics of enoxaparin in renal insufficiency with regards to half-life and accumulation kinetics.

Review of literature

Treatment dosages

Lim, Dentali, Eikelboom, and Crowther (2006) conducted a meta-analysis to compare risk of major bleed-

Table One. The three low molecular weight heparins (LMWH) available in Canada

Agent	Average Molecular Weight (Da)	Intravenous half-life (Minutes)	Anti-Xa to Anti-IIa
Enoxaparin	4500	129–180	2.7:1
Dalteparin	5000	119–139	2.0:1
Tinzaparin	4900	111	1.9:1

Table Two. Suggested peak anti-Xa levels (taken four hours after subcutaneous injection) for all low molecular weight heparins (LMWHs)

Use	Suggested peak anti-Xa levels	Reference
Prevention of venous thromboembolism	0.1–0.2 U/mL	Aguilar & Goldhaber, 1999
Treatment of venous thromboembolism	a. Twice daily dosing: 0.5–1.1 U/mL b. Once daily dosing: 0.8–1.6 U/mL	Harenberg, 2004 Harenberg, 2004

ing and levels of antifactor Xa levels in patients with creatinine clearance (CrCl) < 30 mL/min versus patients with CrCl > 30 mL/min. In the primary analysis of 4,971 patients, of which 416 had a CrCl < 30 mL/min, enoxaparin was associated with an increased risk of bleeding (5.0% versus 2.4%; odds ratio [OR] 2.3; 95% CI, 1.2 to 4.3; p=0.01). However, there was clear evidence of statistical heterogeneity (I^2 = 50.4%; p=0.03) between studies. Eighteen studies of various LMWHs and various dosages were included in the systemic review: eight evaluated treatment doses of enoxaparin, four used a prophylactic dose of enoxaparin, five evaluated adjusted treatment doses of enoxaparin for renal insufficiency, two used tinzaparin, and one used dalteparin. When the data were analyzed according to LMWH agent, major bleeding was found to be increased when full treatment doses of enoxaparin were used (8.3% versus 2.4%; OR, 3.88 [CI, 1.78 to 8.45]). However, when adjusted doses of enoxaparin were used, major bleeding may not of been increased (0.9% versus 1.9%; OR, 0.58 [CI, 0.09 to 3.78]). Data were not analyzed on risk of major bleeding for tinzaparin, dalteparin, and prophylactic doses of enoxaparin due to insufficient studies.

Another analysis of the data for antifactor Xa levels and renal function in four of the studies used therapeutic doses of enoxaparin 1 mg/kg every 12 hours (Bazinet et al., 2005; Becker et al., 2002; Chow, Zammit, West, Dannenhoffer, & Lopez-Candales, 2003; Peng, Eikelboom, Tenni, McQuillan, & Thom, 2004). All four studies found higher peak anti-Xa levels in patients with renal insufficiency (CrCl < 30 mL/min). Mean antifactor Xa levels after a minimum of three doses ranged from 1.27 to 1.58 IU/mL for patients with a CrCl < 30 mL/min compared to the mean antifactor Xa level of 0.91 to 1.06 IU/mL in patients with CrCl > 30 mL/min. This was found to be statistically significant in three of the four studies (Becker et al., 2002; Chow et al., 2003; Peng et al., 2004). These three studies also recommended dose adjustments in renal insufficiency.

Three studies used empirically adjusted-dose enoxaparin (Collet et al., 2003; Collet, Montalescot, Choussat, Lison, & Ankri, 2001; Kruse & Lee, 2004). Two studies treated patients with a CrCl < 30 mL/min with 65% of the 1 mg/kg dose every 12 hours for three doses, then adjusted doses based the antifactor Xa levels (Collet et al., 2003; Collet et al., 2001). The other study treated all patients with 1mg/kg for the initial dose. However, the subsequent doses were based on CrCl (< 30 mL/min were given 0.5 mg/kg every 12 hours and CrCl 30–60 mL/min were given 0.75 mg/kg every 12 hours) (Kruse & Lee, 2004). Mean antifactor Xa levels were 0.65 IU/mL for patients with a CrCl of < 30 mL/min and 0.82 IU/mL for patients with a CrCl of 30–60 ml/min (p < 0.001). All three studies concluded that adjusted doses produce safe therapeutic levels of anti-Xa with no increase in bleeding.

Two studies evaluated therapeutic tinzaparin in elderly patients with renal insufficiency (Pautas, Gouin, Bellot, Andreus, & Siguret, 2002; Siguret et al., 2000). No correlation was found between the peak level of anti-Xa and CrCl. Only one study evaluated therapeutic doses of daltaparin (Shprecher et al., 2005). This study also found no correlation between CrCl and anti-Xa levels.

Lim et al. (2006) concluded that enoxaparin given at therapeutic doses to patients with CrCl < 30 mL/min is associated with a two- to three-fold increased risk of bleeding. Empirical dose adjustments may decrease this risk, however, more studies are needed to draw a definite conclusion and define what this adjustment should be. These conclusions are based on enoxaparin alone due to limited data found with other LMWHs. The few studies that did evaluate other LMWHs did not find the accumulation in renal failure, however, these were relatively small studies conducted over a short period of time. The known differences in the pharmacokinetics of LMWHs may help validate this assumption. This meta-analysis is suggestive of an increased risk of bleeding with the use of enoxaparin, however, it contained many het-

Teaching sidebar

Definitions

Unfractionated heparin
Unfractionated heparin is a large, naturally occurring anticoagulant injectable medication. It inhibits the activation of thrombin, factor Xa and other clotting factors within the body's clotting pathway.

Low molecular weight heparins
Low molecular weight heparins are a more refined form of heparin and are much newer to the market. These medications are 1/3 the size of unfractionated heparin. These agents primarily inhibit the clotting factor Xa and, therefore, have a more specific activity within the body.

Anti-factor Xa levels
Anti-factor Xa levels: measure of the blood's ability to clot. Specifically, it is a measure of the body's inhibition of factor Xa. It is used to monitor the effect of LMWH.

aPPT: Activated partial thromboplastin time
aPPT: Activated partial thromboplastin time or the time needed for plasma to form a fibrin clot. Used to monitor the effect of unfractionated heparin.

ACT: Activated clotting time
ACT: Activated clotting time: These are usually done at the bedside. It is used to monitor the effect of high-dose unfractionated heparin before, during, and shortly after surgeries that require intense anticoagulation measures.

Heparin-induced thrombocytopenia
Heparin induced thrombocytopenia: A condition where platelet levels are depleted in response to antibodies formed against heparin. This results in increased thrombosis and risk of bleeding and is a contraindication to further heparin or LMWH use.

erogeneous types of studies, different patient populations, different LMWH preparations, and varying assays to measure antifactor Xa levels, and different dosages, thus making the analysis questionable. It did not take into account any other antiplatelet or antithrombin used that could have contributed to the increased bleeding, nor did it consider the fact that uremic patients may have a higher baseline risk of bleeding regardless of therapy. It is hard to form any true conclusions. However, it is likely that unadjusted treatment doses of enoxaparin can cause an increase in bleeding in renal insufficiency.

After the publication of the meta-analysis by Lim et al. (2006), Lachish, Rudensky, Slotki, and Zevin (2007) conducted a prospective study of 19 patients with CrCl < 30 mL/min who had an indication for full anticoagulation. Nineteen patients received an adjusted dose of enoxaparin 1mg/kg subcutaneously every 24 hours (based on renal function) for two or more days. Peak and trough antifactor Xa levels were measured during the enoxaparin treatment. Fourteen of the 19 (74%) patients had peak factor antifactor Xa levels within 0.5–1.0 IU/mL after the first dose. Mean levels after the first dose were not significantly different from the second or third. No bleeding events occurred in this trial. However, five of the 19 patients did have levels lower than the set therapeutic range of the study. The treatment duration of this study was a maximum of three doses. No accumulation was found, however, this might not be apparent in the short term. It seems a reasonable option to adjust the dosage of enoxaparin for renal insufficiency, but more studies of longer timeframes are needed to assess the best way to do this safely and effectively.

Fox et al. (2007) retrospectively analyzed data from the ExTRACT-TIMI 25 Trial to evaluate the impact of renal dysfunction on outcomes in 18,548 patients with ST-segment elevation myocardial infarctions (STEMIs) treated with enoxaparin or UFH. ExTRACT-TIMI was a randomized double-blind trial in which patients were randomized to UFH or enoxaparin. A reduced dose of enoxaparin was given to patients greater than 75 years (0.75 mg/kg) or CrCl < 30 mL/min (N=106). The primary endpoint was death from any cause or nonfatal recurrent myocardial infarction within the first 30 days of randomization, and secondary outcomes included major bleeding, clinically significant minor bleeding, and stroke. In this study, major bleeding was similar in the enoxaparin and UFH groups in patients with CrCl > 90 mL/min. However, as renal function declined, a progressive increase in bleeding was observed with enoxaparin. The authors also recommend that dosage adjustment with CrCl 30–90 mL/min may be required to achieve benefits of administration of enoxaparin while minimizing the risk of bleeding, however, specific recommendations on how to do this were not provided. Despite the increased risk of bleeds, net clinical benefit (death, stroke, and bleeding) in STEMI patients receiving fibrinolytic therapy did not differ between patients treated with enoxaparin or UFH. This was a large study, however, only 106 patients had CrCL < 30 mL/min. These were high-risk patients who received adjunctive antithrombotic therapy that may have increased the risk of bleeding in these patients. This was a retrospective analysis. Therefore, antifactor Xa were not measured and not correlated with outcomes. From the available data, it appears there is accumulation with treatment doses of enoxaparin in renal insufficiency. This accumulation appears to put patients at an increased risk of bleeding. It seems logical to adjust the dosages of enoxaparin for renal failure; however, the precise dose adjustment is not defined. The therapeutic range of enoxaparin is unknown. Therefore, empirically adjusting may put the patient at risk of sub-therapeutic levels (increasing the risk of clot formation) or supratherapeutic levels (increasing the risk of bleeding).

Prophylactic dosages

In the meta-analysis by Lim et al. (2006), the incidences of bleeding in the prophylactic dose studies were not evaluated due to insufficient numbers to make an analysis. Three studies were evaluated using prophylactic doses (enoxaparin 40 mg once daily or 30 mg twice daily). One study found no correlation between peak levels of antifactor Xa and creatine clearance (Mahe et al., 2002). Two studies found that elimination was decreased causing higher antifactor Xa levels (Sanderink et al., 2002). No target antifactor Xa levels have been established for prophylactic doses, however, all studies found that peak levels of antifactor Xa remained below the lower limit of the treatment target therapeutic range for LMWH.

Accumulations of LMWH at prophylactic doses have shown conflicting data and depend on the agent used. Tincani et al. (2006) conducted a prospective cohort study to determine the incidence of daltaparin (5000 IU daily) accumulation and bleeding during prophylaxis treatment in 115 elderly patients with renal failure. Antifactor Xa levels were measured on day one and day six. All patients were treated for a minimum of six days and there were no major bleeding events and no thromboembolic events during the study period. This study did not find relationship between the degree of renal impairment and the peak antifactor Xa levels on day six.

Mahe et al. (2007b) conducted another prospective study to analyze the influence of renal function on antifactor Xa levels on 125 consecutive hospitalized acutely ill elderly patients treated with enoxaparin 40 mg/day for venous thromboembolic events with a mean CrCl of 40 mL/min. Antifactor Xa levels were measured on days one to three and again at days four to 10. They found that mean antifactor Xa levels taken on days four to 10 were significantly higher then the levels taken days one to three (p=0.012) suggesting accumulation.

Mahe et al. (2007a) conducted a prospective randomized parallel study comparing prophylactic dose of enoxaparin (40 mg/day) or tinzaparin (4500 IU/day) in 55 elderly patients. Antifactor Xa levels were measured on day one and day eight of treatment. This

pharmacokinetic study also suggests that accumulation does not occur with tinzaparin (p=0.29) and does occur with enoxaparin (p=0.001).

It appears from the above trials that the conflicting data concerning the accumulation of LMWH studied may be due to the type of LMWH and that the accumulation is not a class effect.

This may be due to the different molecular weights, and differences in renal excretion or hepatic metabolism of the agents (Mahe et al., 2007a). More trials are needed for a longer duration to form a better conclusion regarding accumulation. The above studies had a maximum of only 10 days follow-up.

Preventing thrombosis of the extracorporeal dialysis circuit

Lim, Cook, and Crowther (2004) conducted an earlier meta-analysis of the safety and efficacy of LMWH for hemodialysis in patients with end stage kidney disease. Randomized controlled trials that compared an LMWH with another anticoagulant during hemodialysis were evaluated. Eleven studies were included in the meta-analysis and clinical outcomes measured included bleeding symptoms or access compression times, extracorporeal thrombosis, antifactor Xa levels and risk of accumulation for a duration of two weeks to 36 months.

When LMWH was compared to UFH, six studies were included in the analysis for bleeding events. Minor and major bleeding events were combined due to the low event rates of bleeding. They found the RR for bleeding with LMWH compared with UFH was not significant (Relative risk [RR] 0.96, CI 0.27 to 3.43, p=0.95).

When LMWH was compared to UFH, five studies were included in the analysis of the extracorporeal thrombosis within the dialysis circuit (two studies used dalteparin, two studies used tinzaparin, and one study used enoxaparin). They found the RR for bleeding with LMWH compared with UFH was not significant (RR 1.15, CI 0.70 to 1.91). There was no significant evidence of accumulation from monitoring antifactor Xa levels. The meta-analysis concluded that all LMWHs appeared as safe and effective as UFH when comparing bleeding and clotting events during chronic hemodialysis.

After the publication of the meta-analysis by Lim et al. (2004), Joannidis et al. (2007) conducted a randomized, prospective, controlled, crossover study in 40 critically ill patients requiring hemodialysis. Patients received a 30 IU bolus of UFH and a maintenance infusion at 7 units/kg/hour or a 0.15 mg/kg bolus of enoxaparin and a 0.05 mg/kg/hour infusion for 72 hours. Then, a washout period of 12 hours was given before the switch. UFH dose was adjusted to maintain an aPPT of 40 to 45 seconds and enoxaparin dose was adjusted to maintain antifactor Xa level of 0.25–0.30 IU/mL. This study also concluded that LMWH enoxaparin is as safe and as effective as UFH. Anticoagulation with enoxaparin resulted in longer filter survival times (31.8 hours for enoxaparin versus 23.5 hours for UFH [p=0.019], without increasing bleeding complications). However, this study had a small sample of patients and a short duration (72 hours). Therefore, accumulation could not be accurately assessed. Enoxaparin has been shown in previous studies of longer durations (8 to 10 days) to show accumulation (Mahe et al., 2007a; Mahe et al., 2007b).

Perry, O'Shea, Byrne, Szczech, and Ortel (2006) conducted a multi-dose pharmacokinetic study of dalteparin in 14 hemodialysis patients. Prophylactic doses of dalteparin (5000 IU) were administered daily for four days. Accumulation did not occur in this study. However, some increases in antifactor Xa levels did show an apparent increase on day four. This study gave all patients the same dosage of dalteparin, regardless of patient weight, it had a very small sample size and had a short duration (four days).

Current data suggest that LMWH can be used safely at prophylactic dosages in renal insufficiency. However, the safety of long-term prophylaxis has not been addressed.

Summary

In general, there were many limitations of the meta-analysis by Lim et al. (2006). The more similar the trials included in a meta-analysis, the more likely the meta-analysis will result in valid conclusions. The addition of study protocols that are significantly different from one another makes a meta-analysis less reliable. In this case, there were many differences in the studies with regards to age, concomitant antiplatelet given, number of doses of LMWH administered, and different types of LMWH administered (Lim et al., 2006). There were varying types of assays used to measure antifactor Xa levels, therefore, results may have differed from lab to lab, and different standards were used to measure the incidence of bleeding. Most studies did not enroll consecutive patients, therefore confounding by treatment indication cannot be eliminated. Patients at high risk of bleeding may have been excluded in many of the trials and there were very few patients with severe renal insufficiency included in the analysis. There was a non-uniform patient population in all the studies evaluated. Thus, the conclusions found in this meta-analysis are less reliable and may not be generalizable (Lim et al., 2006).

There are limited data for the LMWHs tinzaparin and daltaparin. Individual LMWHs may behave differently, therefore conclusions about all LMWHs cannot be assumed because most of the data were studied with the use of enoxaparin.

Renal function does affect antifactor Xa levels in patients receiving enoxaparin. Renal insufficiency can cause supratherapeutic levels through accumulation. This may put patients with renal insufficiency receiving this agent at a greater risk of bleeding. No general consensus exists regarding the minimum CrCl that causes a significant risk of accumulation. Antifactor Xa levels are widely used to monitor LMWH in special populations. However, it has not been validated in studies large enough to confirm an effective therapeutic range. There is insufficient evidence to define which levels are

associated with an increased risk of thrombosis or increased risk of bleeding (Crowther & Lim, 2007).

Conclusion

Based on the review of literature, it is clear this issue requires further investigation. The data indicate that renal insufficiency does cause accumulation with therapeutic doses of enoxaparin. There are limited data to make the same assumption concerning other LMWHs. The amount of accumulation, as indicated by antifactor Xa levels, does not seem to occur as greatly when the doses of enoxaparin are adjusted empirically for renal insufficiency (CrCl < 60 mL/min), using prophylactic doses and doses required to prevent thrombosis in the hemodialysis extracorporeal circuit. However, data beyond 10 days do not exist, and accumulation over a long period of time may be significant. The use of measuring antifactor Xa levels remains warranted in patients with CrCl < 30 mL/min treated with empirically adjusted doses and prophylactic doses for more than four days. There are no data correlating empirically adjusted doses of enoxaparin with efficacy and, therefore, these doses may put the patient at risk of being subtherapeutic. Until there are better data to suggest otherwise, adjusted doses of enoxaparin are not first choice in patients with renal insufficiency when other options exist. Heparin remains the gold standard of treatment in patients with renal insufficiency.

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Profiling...

Lifetime Achievement Awards

Elizabeth Kelman, Advanced Practice Nurse Nephrology, University Health Network, Toronto General Hospital, recipient of the University of Missouri Annual Dialysis Conference Lifetime Achievement Award for PD Nursing, 2008

By Diane Watson, RN, MScN, CNeph(C), Advanced Practice Nurse Nephrology, University Health Network, Toronto General Hospital, Toronto, ON

Still waters run deep

Elizabeth (Betty) Kelman is one of those precious gems you meet rarely in life, and are thankful for—particularly if you are one of her patients, students, colleagues or friends. From humble beginnings in Timmins, Ontario, our Betty chose a career in nursing and has never looked back. As with many of us, fate and happenstance brought her to nephrology and, with it, she has embraced a lifelong passion in peritoneal dialysis. She worked with the team at Toronto Western Hospital in the 1970s and 1980s as they put CAPD on the map, under the leadership of Dr. Dimitrios Oreopoulos and Nurse Manager, Sharron Izatt. Her path has taken many twists and turns as she has worked in a variety of capacities including research (have her tell you some PD bunny stories sometime!), bedside nursing, education and, for the past 14 years, as an Advanced Practice Nurse in PD and in-patient nephrology.

Betty has authored numerous articles, and has done countless presentations nationally and internationally, always representing her hospital, CANNT and Canada with grace, intelligence and humour. She has written two chapters in one of the seminal textbooks of nephrology nursing, **Contemporary Nephrology Nursing: Principles and Practice**, 2nd Edition, 2007, A. Molzahn, Ed. Containing 387 references, these chapters were a labour of love and consumed Betty's "spare time" for almost two years. She has also distinguished herself as an amazing teacher, both for nurses and patients. She developed and taught the first nephrology nursing certificate curriculum in Toronto, through Humber College. As an educator, Betty has had a tremendous influence on all of her students through her knowledge and experience, and she is one of the few people who can make learning the likes of *Streptococcus bovis* and *Lactobacillus* actually fun.

Betty Kelman, on the right, receiving the Lifetime Achievement Award for PD Nursing from Barbara Prowant, Nursing Chair for the 2008 Annual Dialysis Conference.

Betty has consistently challenged herself to higher levels, and has always met the challenge. Her driving force, however, are her patients, for whom she has quite literally dedicated her life. She compassionately deals with patients and their families as they try to cope with the impact of renal failure, dialysis, illness, and not infrequently, end-of-life decisions. With her unassuming and gentle nature, she guides them through the maze of our medical system, with its high-tech overtones, and reminds us all that it is the human touch that makes the difference.

She stays grounded with the help of her wonderful family—her mum in Timmins, her sister Mary and brother-in-law Joe in England, and their beautiful granddaughters, Annie and Georgie, who also consider Betty their honourary grandmother and, of course, her feline "owner", Contessa Merrydancer, aka Tessie—Betty always reminds me that we don't own cats, they own their bipeds!

The selection committee of the University of Missouri Annual Dialysis Conference made a brilliant choice when they selected Betty Kelman to be the recipient of the 2008 Lifetime Achievement Award for PD Nursing, at the 28th annual conference in Orlando, Florida, on March 1, 2008.

Dr. Mrinal Dasgupta, MD, MSc, FRCPC, Professor Emeritus, University of Alberta, Edmonton, Alberta, recipient of the University of Missouri Annual Dialysis Conference Lifetime Achievement Award for PD, 2008

By Julie Nhan, RN, MN, CNeph(C), Nurse Practitioner, Northern Alberta Renal Program, Edmonton, AB

Behind that gentle smile…

Dr. Mrinal Dasgupta, recipient of the Lifetime Achievement Award for PD.

Behind that gentle smile… is a physician who is dedicated to advancing peritoneal dialysis (PD) and improving the lives of PD patients. After graduating in India and receiving his post-graduate training in nephrology at University of Alberta, Dr. Dasgupta started his career as a nephrologist in the 1970s. In 1990, he became the director of the PD division of the Northern Alberta Renal Program in Edmonton, Alberta. He remained in this position until 2002. Among his many accomplishments, Dr. Dasgupta was also the founder and past-president of the Western Canada Peritoneal Dialysis Society.

A respected nephrologist and researcher, Dr. Dasgupta was recognized by the broader nephrology community as a key leader in PD. He has demonstrated qualities of leadership and mentorship in his numerous clinical and academic activities in the field of nephrology. He was honoured with the 2008 Lifetime Achievement Award for Peritoneal Dialysis at the Annual Dialysis Conference in Orlando, Florida.

Dr. Dasgupta has been active in clinical work, teaching and research. His research focused on immune-mediated damage in multiple sclerosis and cystic fibrosis and in catheter-related infections in PD, particularly on the role of biofilms. Dr. Dasgupta participated in various academic activities, including presentations at national and international conferences, as well as having many publications in journals and book chapters.

One of Dr. Dasgupta's passions is teaching. He loves to teach, whether it's to a resident or to a nurse, a five-minute bedside session, or in a formal session. He always makes time for explanations and discussions and always with a pen and paper in hand. For those who don't know Dr. Dasgupta, he is actually quite artistic. Every one of his explanations is often accompanied by a graph or an illustration. Beyond teaching, he is also a strong believer in ongoing education. He was instrumental in developing annual continual medical education programs like Alberta Nephrology Days and Peritoneal Dialysis Conferences. He also spearheaded the **Western Peritoneal Dialysis Society Journal**, with its first publication in October 2006. This journal provided a medium to share clinical practices, innovative research and timely updates of protocols and guidelines.

Dr. Dasgupta's philosophy has always been communication, collaboration and information sharing, with a primary focus on patient-centred care. His dedication and commitment to patient care is evident by little gestures, such as a comforting hand on a patient's shoulder, a soft word or a gentle smile. His humility and gentleness are the foundation for his approach to patients and family and his interaction with staff nurses.

Like many of the astounding nephrologists in the program, Dr. Dasgupta was very supportive, patient and understanding of my new role as a Nurse Practitioner. As a novice Nurse Practitioner in 2004, he always gave me a kind and encouraging word, and was always very willing to answer my ongoing questions. As he shared his gift of teaching, Dr. Dasgupta also showed me how to be more patient and to learn to "slow down". When I initially started rounding with him in the hemodialysis units, I used to dance on the spot, as I would get very restless and impatient and wondered why he was taking so long. While I used to view his way as slow and unproductive, I grew to realize that he knew a secret I didn't. Despite the busyness of the unit or other people rushing him, he dictated his own pace and took his time with each of his patients. His calm, thoughtful demeanor and genuine presence had a significant impact on his patients.

Congratulations, Dr. Dasgupta, for your Lifetime Achievement Award in PD. Thank you for your years of dedication to the program. I am grateful for your teaching, support, encouragement and patience. And, most importantly, I appreciate your reminder to "slow down".

"Life is not a race
Do take it slower
Hear the music
Before the song is over…"
– *Unknown author*

Acknowledgement

Special thanks to Hazel Ginther, RN, MN, for reviewing this article.

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Membership fee is tax deductible.

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❑ Student Rate: $32.50 + 1.63 GST = $34.13*

**Proof of full-time enrolment must accompany application.*

I enclose $ _____
made payable to Canadian Association of Nephrology Nurses and Technologists.

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Cardholder Name: _____

Visa Number: _____

Expiry Date: _____

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❑ I have attained CNeph(C)/cdt designation
Year of designation _____

Professional registration # _____

Date last renewed: _____

❑ I am a member of CNA

Ontario applicants only
Do you belong to RNAO?
❑ Yes ❑ No

Professional Status

❑ Registered Nurse
❑ Registered Practical Nurse/Registered Nursing Assistant/ Licensed Practical Nurse
❑ Technician
❑ Technologist
❑ Other (Specify) _____

Number of Years in Nephrology _____

Area of Responsibility

❑ Direct Patient Care ❑ Teaching
❑ Administration ❑ Research
❑ Technical ❑ Other (Specify)

Work Environment

❑ Acute Care ❑ Independent Health Care
❑ Self-Care Unit ❑ Private Sector

What is Your Highest Level of Education?

Nursing	*Non-Nursing*
❑ Diploma	❑ Diploma
❑ Baccalaureate	❑ Baccalaureate
❑ Master's	❑ Master's
❑ Doctorate	❑ Doctorate

I am At Present Studying Toward:

Nursing	*Non-Nursing*
❑ Specialty Certificate	❑ Specialty Certificate
❑ Baccalaureate	❑ Baccalaureate
❑ Master's	❑ Master's
❑ Doctorate	❑ Doctorate

Primary Area of Practice

❑ Progressive renal insufficiency (pre-dialysis)
❑ Transplantation
❑ Hemodialysis
❑ Peritoneal
❑ Pediatrics
❑ Other (Specify) _____

Return to **CANNT**
Mailing Address:

Debbie Maure, CANNT,
Suite #322, 336 Yonge St., Barrie, Ontario, L4N 4C8
Telephone (705) 720-2819 Fax (705) 720-1451

Demande d'adhésion

Prénom _____

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Acceptez-vous que l'ACITN ajoute votre nom et votre adresse sur des listes d'envois qu'elle juge pertinentes et appropriées? ❑ Oui ❑ Non

❑ Nouveau membre ou ❑ Renouvellement

Numéro de l'ACITN # (si renouvellement) _____

Nom de la personne qui vous a recommandé de joindre l'ACITN: _____

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Les frais d'adhesion sont deductibles d'impots.

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**La demande doit inclure une preuve d'inscription à plein temps*

Je joins $ _____

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Numéro de la carte: _____

Date d'expiration: _____

Signature: _____

❑ J'ai obtenu la désignation CNeph(C)/cdt

Année de désignation _____

Numéro d'enregistrement professionel _____

Date du dernier renouvellement : _____

❑ Je suis membre de l'ACI

Demandeurs de l'Ontario seulement

Faites vous partie de l'AOIA?

❑ Oui ❑ Non

Statut professionnel

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❑ Infirmière(ier) auxilaire autorisée(sé) / infirmière(ier) auxilaire

❑ Technicienne / technicien

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❑ Autre (spécifier) _____

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❑ Doctorat	❑ Doctorat

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❑ Transplantation

❑ Hémodialyse

❑ Péritonéale

❑ Pédiatrie

❑ Autre (spécifier) _____

Poster à **ACITN**

Adresse postale :

Debbie Maure, ACITN,
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Téléphone (705) 720-2819 Télécopieur (705) 720-1451

Pr Renagel® Tablets

(sevelamer hydrochloride)

800 mg tablets

INDICATIONS AND CLINICAL USE

RENAGEL (sevelamer hydrochloride) is indicated for: the control of hyperphosphatemia in patients with end-stage renal disease (ESRD) undergoing dialysis.

CONTRAINDICATIONS

RENAGEL (sevelamer hydrochloride) is contraindicated in the following situations:

- patients with hypophosphatemia
- patients with bowel obstruction
- patients hypersensitive to sevelamer hydrochloride or one of the other ingredients in the product (colloidal silicon dioxide, stearic acid).

WARNINGS AND PRECAUTIONS

General

RENAGEL (sevelamer hydrochloride) tablets should be swallowed intact and should not be crushed, chewed, or broken into pieces.

Patients with renal insufficiency may develop hypocalcemia. As RENAGEL does not contain calcium, serum calcium levels should be monitored and elemental calcium should be supplemented whenever considered necessary. In cases of hypocalcemia, patients should be given an evening calcium supplement. Approximately 1000 mg elemental calcium is recommended.

Caution should be exercised to avoid hypophosphatemia, a serum phosphorus of < 0.8 mmol/L (see DOSAGE AND ADMINISTRATION).

The safety and efficacy of RENAGEL in patients with renal disease who are not undergoing dialysis has not been studied.

Gastrointestinal

The safety and efficacy of RENAGEL in patients with dysphagia, swallowing disorders, severe gastrointestinal (GI) motility disorders, or major GI tract surgery have not been established. Caution should be exercised when RENAGEL is used in patients with these GI disorders.

Special Populations

Pregnant Women: The safety of RENAGEL has not been established in pregnant women. In preclinical studies, there was no evidence that RENAGEL induced embryolethality, fetotoxicity or teratogenicity at the doses tested (up to 1 g/kg/day in rabbits; up to 4.5 g/kg/day in rats). RENAGEL should only be given to pregnant women if the benefits outweigh the risks.

Nursing Women: There have been no adequate, well-controlled studies in lactating, or nursing women.

Pediatrics: The safety and efficacy of RENAGEL has not been established in pediatric patients. The minimum age of patients treated with RENAGEL in clinical trials was 18 years old.

Geriatrics: No special considerations are needed for elderly patients.

Monitoring and Laboratory Tests

Serum phosphorus and serum calcium should be monitored every 1 to 3 weeks until the target phosphorus level is reached. The dose of RENAGEL should be adjusted based on serum phosphorus concentration and titrated
to a target serum phosphorus of ≤ 1.8 mmol/L.

RENAGEL does not contain calcium or alkali supplementation; serum calcium, bicarbonate, and chloride levels should be monitored.

ADVERSE REACTIONS

Clinical Trial Adverse Drug Reactions

Because clinical trials are conducted under very specific conditions the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse drug reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.

In a combined safety database comprised of 483 patients with end-stage renal disease undergoing hemodialysis, adverse events reported at an incidence ≥10% are provided in Table 1. From this database, adverse events are also presented separately from a single long-term randomized clinical study for RENAGEL and calcium. The adverse events presented in the table below are not necessarily attributed to RENAGEL treatment. The incidence of these events was not dose related.

Table 1: Adverse Events in Patients with End-Stage Renal Disease undergoing Hemodialysis

	Total AEs reported.	52 weeks Study of RENAGEL vs. calcium (calcium acetate and calcium carbonate)	
System Organ Class Event	**RENAGEL** **N = 483** **%**	**RENAGEL** **N = 99** **%**	**calcium** **N = 101** **%**
Gastrointestinal Disorders			
Vomiting	24.4	22.2	21.8
Nausea	25.3	20.2	19.8
Diarrhea	21.1	19.2	22.8
Dyspepsia	15.7	16.2	6.9
Constipation	13.3	8.1	11.9
Infections and Infestations			
Nasopharyngitis	13.9	14.1	7.9
Bronchitis	5.4	11.1	12.9
Upper Respiratory Tract Infection	7.0	5.1	10.9
Musculoskeletal, Connective Tissue and Bone Disorders			
Pain in Limb	13.7	13.1	14.9
Arthralgia	11.4	12.1	17.8
Back Pain	6.0	4.0	17.8
Skin Disorders			
Pruritus	10.4	13.1	9.9
Respiratory, Thoracic and Mediastinal Disorders			
Dyspnea	15.7	10.1	16.8
Cough	11.6	7.1	12.9
Vascular Disorders			
Hypertension	9.3	10.1	5.9
Nervous System Disorders			
Headache	18.4	9.1	15.8
General Disorders and Site Administration Disorders			
Dialysis Access Complication	4.3	6.1	10.9
Pyrexia	8.7	5.1	10.9

In one hundred and forty three patients with end-stage renal disease undergoing peritoneal dialysis with treatment duration of 12 weeks, adverse events reported at an incidence ≥10% are provided in Table 2 below. The adverse events presented in the table below are not necessarily attributed to RENAGEL treatment. The incidence of these events was not dose related.

Table 2: Adverse Events in Patients with End-Stage Renal Disease Undergoing Peritoneal Dialysis

System Organ Class Event	**RENAGEL** **(N=97)** **%**	**calcium** **(N=46)** **%**
Gastrointestinal disorders		
Dyspepsia	17.5	8.7
Vomiting	11.3	4.3
Peritonitis	11.3	4.3

The most frequently occurring serious adverse event with RENAGEL use was peritonitis at 8.2%, compared to 4.3 % with calcium. Patients receiving dialysis are subject to certain risks for infection specific to the dialysis modality. Peritonitis is a known complication in patients receiving peritoneal dialysis (PD). Therefore, patients on PD should be closely monitored to ensure the reliable use of appropriate aseptic technique with the prompt recognition and management of any signs and symptoms associated with peritonitis.

Less common clinical trial adverse events

The following adverse events have been observed with RENAGEL use with an incidence of <10%, but greater than calcium and without attribution to causality, including: abdominal distension, constipation, diarrhea, nausea, chest pain, fatigue, pyrexia, catheter site infection, anorexia, headache, cough and pruritis.

Some patients experienced adverse events related to hypercalcemia in the calcium group but not in the RENAGEL group.

Post-Market Adverse Drug Reactions

During post-marketing experience with RENAGEL, the following have been reported without attribution to causality: pruritis, rash, and abdominal pain.

OVERDOSAGE

Since RENAGEL (sevelamer hydrochloride) is not absorbed, the risk of systemic toxicity is minimal. RENAGEL has been given to healthy volunteers at doses up to 14 grams per day for 8 days with no adverse effects. The maximum average daily dose of RENAGEL that has been given to hemodialysis patients is 13 grams.

DOSAGE AND ADMINISTRATION

Dosing Considerations

- The tablets should not be bitten, chewed or broken apart prior to dosing.
- RENAGEL (sevelamer hydrochloride) should be taken immediately prior to or with meals, since its action is to bind ingested phosphate (see ACTION AND CLINICAL PHARMACOLOGY, Mechanism of Action)
- When administering any other medication where a reduction in the bioavailability of that medication would have a clinically significant effect on safety or efficacy, the physician should consider monitoring blood levels or dosing that medicine apart from RENAGEL to prevent GI binding (at least one hour before or three hours after RENAGEL).

Recommended Dose and Dosage Adjustment

The recommended dosing to be used when initiating RENAGEL in patients not using another phosphate binder are outlined below:

When switching from calcium-based phosphate binders to RENAGEL,

Starting Dose	
Initial Serum Phosphorus	**RENAGEL Tablets 800mg**
> 1.8 and < 2.4 mmol/L	3 tablets per day (2.4 grams)
≥ 2.4 mmol/L	6 tablets per day (4.8 grams)

an equivalent starting dose on a mg/weight basis of RENAGEL should be prescribed.
Dosage adjustments, when necessary should be recommended every 1 to 3 weeks by increasing one tablet per meal (3 per day) until the target serum phosphorus levels are met.

The total daily dose should be divided according to meal portions during the day.

Average Maintenance Dose: Dosage should be adjusted based upon the target serum phosphorus levels. The dose may be increased or decreased by one tablet per meal at two week intervals as necessary. The average final dose in the chronic phase of a 52 week Phase 3 clinical trial designed to lower serum phosphorous to 1.6 mmol/L or less was approximately 7.1 grams, (approximately nine 800 mg tablets per day equivalent to three 800 mg tablets per meal). The maximum average daily RENAGEL dose studied was 13 grams.

Missed Dose

- If a dose is forgotten, it should be skipped. Double dosing is not advisable.

DOSAGE FORMS, COMPOSITION AND PACKAGING

RENAGEL (sevelamer hydrochloride) tablets are film-coated compressed tablets containing 800 mg of sevelamer hydrochloride. RENAGEL contains the following excipients: colloidal silicon dioxide and stearic acid. The RENAGEL tablet coating contains hypromellose and diacetylated monoglyceride. The printing ink contains iron oxide black (E172), propylene glycol, isopropyl alcohol and hypromellose (hydroxypropyl methylcellulose).

RENAGEL 800 mg Tablets are supplied as oval, film-coated tablets, imprinted with "RENAGEL 800," on the crown, single side.

RENAGEL 800 mg Tablets are available in bottles of 180 tablets.

STORAGE AND STABILITY

Store at controlled room temperature 15°C to 30°C. Protect from moisture.

Product monograph available on request.

genzyme CANADA INC

Genzyme Canada Inc.
800 – 2700 Matheson Blvd. East
West Tower
Mississauga, Ontario L4W 4V9 CANADA
www.genzyme.ca
Tel. 1-877-220-8918

Venofer® Iron Sucrose Injection, USP
20 mg elemental iron/mL

DIN 02243716

Prescribing Summary

Patient Selection Criteria

THERAPEUTIC CLASSIFICATION: Hematinic

INDICATIONS AND CLINICAL USE

VENOFER (Iron Sucrose Injection, USP) is indicated in the treatment of iron deficiency anemia in the following patients:

- non-dialysis dependent-chronic kidney disease (NDD-CKD) patients receiving an erythropoietin
- non-dialysis dependent-chronic kidney disease (NDD-CKD) patients not receiving an erythropoietin
- hemodialysis dependent-chronic kidney disease (HDD-CKD) patients receiving an erythropoietin
- peritoneal dialysis dependent-chronic kidney disease (PDD-CKD) patients receiving an erythropoietin.

Special Populations

Pregnant Women: Teratology studies performed in rats at IV doses up 13 mg iron/kg/day (more than 9 times the maximum recommended human dose for a 70 kg person) and rabbits at IV doses up to 13 mg/iron/kg on alternate days (approximately 9 times the maximum recommended human dose for a 70 kg person) have not revealed definite evidence of impaired fertility. Fetal growth effects at these doses appeared related to low maternal food consumption and low body weight gain. There are, however, no adequate and well controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, VENOFER should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

When iron sucrose was administered at deliberate overdoses to rabbit dams (up to 215 mg/kg/day) marked fetal/placental iron overload was noted. It is unlikely that significant fetal iron overload would occur in iron deficient pregnant women receiving therapeutic doses of VENOFER to correct iron deficiency (see General).

Nursing Women: VENOFER is excreted in the milk of rats. It is not known whether VENOFER is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when VENOFER is administered to nursing women.

Pediatrics: The safety and effectiveness of VENOFER in pediatric patients has not been established. In a country where VENOFER is available for use in children, at a single site, five premature infants (weight less than 1,250 g) developed necrotizing enterocolitis and two of the five expired during or following a period when they received VENOFER, several other medications and erythropoietin. Necrotizing enterocolitis may be a complication of prematurity in very low birth weight infants. No causal relationship to VENOFER or any other drugs could be established.

Geriatrics (> 65 years of age): Clinical studies with VENOFER have not identified differences in unintended responses between elderly and younger patients. Nevertheless, dose selection for an elderly patient should be cautious, usually starting with lower doses, reflecting the greater frequency of decreased hepatic, renal or cardiac function, and of concomitant disease or other drug therapy.

CONTRAINDICATIONS

The use of VENOFER (Iron Sucrose Injection, USP) is contraindicated in patients with evidence of iron overload, patients with known hypersensitivity to VENOFER, and patients with anemia not caused by iron deficiency.

Safety Information

WARNINGS AND PRECAUTIONS

General

Because body iron excretion is limited and excess tissue iron can be hazardous, caution should be exercised in the administration of parenteral iron formulations, and treatment should be withheld when there is evidence of tissue iron overload. Patients receiving VENOFER (Iron Sucrose Injection, USP) require periodic monitoring of hematologic parameters, including hemoglobin, hematocrit, serum ferritin and transferrin saturation. Generally accepted guidelines recommend withholding administration of intravenous iron formulations from patients demonstrating a transferrin saturation > 50% or a serum ferritin > 800 ng/mL (see **DOSAGE AND ADMINISTRATION** and **OVERDOSAGE**). Transferrin saturation values increase rapidly after IV administration of iron sucrose; thus, serum iron values may be reliably obtained 48 hours after IV dosing.

Local Reactions

Care must be taken to avoid paravenous infiltration. If this occurs, the infusion of VENOFER should be discontinued immediately. Ice may be applied to cause local vasoconstriction and decrease fluid absorption. Massage of the area should be avoided.

Carcinogenesis and Mutagenesis

No long-term studies in animals have been performed to evaluate the carcinogenic potential of VENOFER.

The Ames test, with or without metabolic activation, *in vitro* mouse lymphoma forward mutation test, mouse micronucleus test, and *in vitro* human lymphocyte chromosome aberration test were conducted with iron sucrose. No mutagenicity or genotoxicity was demonstrated.

Cardiovascular

Hypotension has been reported frequently in hemodialysis dependent chronic kidney disease patients receiving intravenous iron. Hypotension also has been reported in non-dialysis dependent (NDD-CK) and peritoneal dialysis dependent (PDD-CK) chronic disease kidney patients receiving intravenous iron. Hypotension following administration of VENOFER may be related to the rate of administration and total dose administered. Caution should be taken to administer VENOFER according to recommended guidelines (see **DOSAGE AND ADMINISTRATION**).

Sensitivity/Resistance

Serious hypersensitivity reactions have been rarely reported in patients receiving VENOFER. No life-threatening hypersensitivity reactions were observed in pivotal studies, although there were several cases of mild to moderate hypersensitivity reactions characterized by wheezing, dyspnea, hypotension, rash and/or pruritis in these studies. Anaphylactoid reactions have been reported in worldwide spontaneous post-marketing reports (see **ADVERSE REACTIONS**).

Sexual Function/Reproduction

VENOFER at IV doses up to 15 mg iron/kg/dose [about 10 times the maximum recommended human dose for a 70 kg person] given three times a week was found to have no effect on fertility and reproductive performance of male and female rats.

ADVERSE REACTIONS

Adverse Events observed in all treated populations

The frequency of adverse events associated with the use of VENOFER has been documented in six randomized clinical trials involving 231 hemodialysis dependent, 139 non-dialysis dependent, and 75 peritoneal dialysis dependent patients; and in two post-marketing safety studies involving 1051 hemodialysis dependent patients for a total of 1496 patients. In addition, over 2000 patients treated with VENOFER have been reported in the medical literature.

Adverse Events Observed in Hemodialysis Dependent Chronic Kidney Disease (HDD-CKD) Patients

Adverse reactions, whether or not related to VENOFER administration, reported by >5% of treated patients from a total of 231 patients in HDD-CKD studies were as follows: hypotension (39.4%), muscle cramps (29.4%), nausea (14.7%), headache (12.6%), graft complications (9.5%), vomiting (9.1%), dizziness (6.5%), hypertension (6.5%), chest pain (6.1%), and diarrhea (5.2%).

Adverse Events Observed in Non-Dialysis Dependent Chronic Kidney Disease (NDD-CKD) Patients

Among the 182 treated NDD-CKD patients, 91 were exposed to VENOFER. Adverse events, whether or not related to VENOFER, reported by ≥5% of the VENOFER exposed patients were as follows: dysgeusia (7.7%), peripheral edema (7.7%), diarrhea (5.5%), constipation (5.5%), nausea (5.5%), dizziness (5.5%), and hypertension (5.5%). One serious related adverse reaction was reported (hypotension and shortness of breath not requiring hospitalization in a VENOFER patient). Two patients experienced possible hypersensitivity/allergic reactions (local edema/hypotension) during the study. Of the 5 patients who prematurely discontinued the treatment phase of the study due to adverse events (2 oral iron group and 3 VENOFER group), three VENOFER patients had events that were considered drug-related (hypotension, dyspnea and nausea).

In an additional study of VENOFER with varying erythropoietin doses in 96 treated NDD-CKD patients, adverse events, whether or not related to VENOFER reported by ≥5% of VENOFER exposed patients are as follows: diarrhea (16.5%), edema (16.5%), nausea (13.2%), vomiting (12.1%), arthralgia (7.7%), back pain (7.7%), headache (7.7%), hypertension (7.7%), dysgeusia (7.7%), dizziness (6.6%), extremity pain (5.5%), and injection site burning (5.5%). No patient experienced a hypersensitivity/allergic reaction during the study. Of the patients who prematurely discontinued the treatment phase of the study due to adverse events (2.1% oral iron group and 12.5% VENOFER group), only one patient (VENOFER group) had events that were considered drug-related (anxiety, headache, and nausea). Ninety-one (91) patients in this study were exposed to VENOFER either during the treatment or extended follow-up phase.

Adverse Events Observed in Peritoneal Dialysis Dependent Chronic Kidney Disease (PDD-CKD) Patients

Among the 121 treated PDD-CKD patients, 75 were exposed to VENOFER. Adverse events, whether or not related to VENOFER, reported by ≥5% of these patients were as follows: vomiting (8.0%), diarrhea (8.0%), hypertension (8.0%), peritoneal infection (8.0%), pharyngitis (6.7%), nausea (5.3%) and peripheral edema (5.3%). The only drug related adverse reaction to VENOFER administration reported by ≥2% of patients was diarrhea (2.7%). No serious drug related adverse reactions were reported during the treatment phase of study. Two VENOFER patients experienced a moderate hypersensitivity / allergic reaction (rash or swelling/itching) during the study. Three patients in the VENOFER study group discontinued study treatment due to adverse events (cardiopulmonary arrest, peritonitis, myocardial infarction, hypertension) which were considered to be not drug-related.

Post-Market Adverse Drug Reactions:

Hypersensitivity Reactions: See WARNINGS AND PRECAUTIONS.

From the post-marketing spontaneous reporting system, there were 108 reports of anaphylactoid reactions including patients who experienced serious or life-threatening reactions (anaphylactic shock, loss of consciousness or collapse, bronchospasm with dyspnea, or convulsion) associated with VENOFER administration between 1992 and August, 2005 based on estimated use in more than 4.6 million patients.

Among the 517,736 patients (estimated on the basis of 10,354,715 ampoules sold) who received VENOFER between September 1, 2005 and February 28, 2006 through market exposure, 61 patients were reported to have experienced 104 adverse reactions considered at least "possibly related" to VENOFER. A review of all the symptoms concluded that 90 symptoms are listed, 38 serious and 52 non-serious; 14 symptoms are unlisted, 5 serious and 9 non-serious.

Considering the number of patients exposed to VENOFER, the number of adverse events at least possibly related to the product has been very limited. There was a moderate decrease in the frequency of unlisted symptoms and no changes in the nature of the listed ones. During this period no overdose of misuse have been reported.

Regarding the **serious and listed** cases: no particular change or trend in severity, outcome or involved populations could be observed. A total of 38 adverse reactions were reported in 18 patients. No reaction was considered to be life threatening. The symptoms observed were: dysponea (5), hypotension (4), pyrexia (2), injection site reaction (2), erythema (2), rash (2), arthralgia (2), chills (1), circulatory collapse (1), nausea (1), vomiting (1), tachycardia (1), myalgia (1), malaise (1), abdominal pain (1), exanthema (1), oedema peripheral (1), urticaria (1), loss of consciousness (1), dizziness (1), back pain (1), headache (1).

There was no particular evolution regarding the **non-serious and listed** events. A total of 51 adverse symptoms were reported in 37 different patients. The symptoms observed were: urticaria (5), headache (5), dizziness (4), injection site extravasation (4), exanthem (3), tachycardia (3), chills (3), dyspnoea (3), rash (2), flushing (2), pruritus (2), pyrexia (2), paraesthesia (2), malaise (2), hypotension (1), vomiting (1), injection site pain (1), injection site reaction (1), oedema peripheral (1), arthralgia (1), myalgia (1), asthenia (1), skin discolouration (1), erythema (1).

In total, eight non-serious and anaphylactoid reactions have been reported during 6-month period out of the literature. Cumulatively 116 anaphylactoid reactions have been reported out of the exposure of 5,123,048 patient years/ patient to VENOFER which results in a relative prevalence of 0.0023 %.

There were 5 **serious and unlisted** adverse symptoms, involving 4 different patients. The symptoms observed were: asthma, pulmonary test decreased; abortion; respiratory failure; arthritis.

In addition, 7 patients experienced 10 **non-serious and unlisted** adverse symptoms brought to the attention of the manufacturer during the period between September 1, 2005 and February 28, 2006: oedema (2), burning sensation (2), throat tightness (1), blood iron abnormal (1), arthritis (1), bone pain (1), feeling hot (1), influenza like illness (1).

DRUG INTERACTIONS

Interactions with other drugs, food, herbal products and laboratory tests have not been established.

Oral iron should not be administered concomitantly with parenteral iron preparations. Like other parenteral iron preparations VENOFER may be expected to reduce the absorption of concomitantly administered oral iron preparations.

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For Effective IV Iron Therapy

Get VERSATILE

Demonstrated Efficacy in Various Patient Types

A versatile IV iron for patients with chronic kidney disease (CKD), Venofer® is indicated in the treatment of iron deficiency anemia for[1]:

- Non-dialysis dependent (NDD) patients receiving or not receiving an erythropoietin
- Hemodialysis dependent (HDD) patients receiving an erythropoietin
- Peritoneal dialysis dependent (PDD) patients receiving an erythropoietin

...With Excellent Convenience

- Flexible dosing regimens (minimum total cumulative dose 1000 mg)
  - —100 to 400 mg dosing as per indication*
  - —slow IV push or infusion
- Available in vials, for expedient administration
- Over 50 years of worldwide clinical experience[2,3]

May be administered in various clinical settings

Nondialyzable†

No test dose required[1]

IMPORTANT SAFETY INFORMATION

Venofer® is contraindicated in patients with evidence of iron overload, patients with know hypersensitivity to Venofer, and patients with anemia not caused by iron deficiency. No life-threatening hypersensitivity reactions were observed in pivotal studies, although there were several cases of mild to moderate hypersensitivity reactions characterized by wheezing, dsypnea, hypotension, rash and/or pruritus in these studies. Anaphylactoid reactions have been reported in worldwide spontaneous post-marketing reports (see ADVERSE REACTIONS).

The most frequent adverse events (≥5%) whether or not related to Venofer administration, reported by: *hemodialysis dependent-CKD patients*, hypotension, muscle cramps, nausea, headache, graft complications, vomiting, dizziness, hypertension, chest pain, and diarrhea; *non-dialysis dependent-CKD patients*, dysgeusia, peripheral edema, diarrhea, constipation, nausea, dizziness, and hypertension; *peritoneal dialysis dependent-CKD patients*, vomiting, diarrhea, hypertension, peritoneal infection, pharyngitis, nausea, and peripheral edema. Hypotension has been reported frequently in hemodialysis dependent-CKD patients receiving IV iron, and has also been reported in non-dialysis dependent and peritoneal dialysis dependent-CKD patients receiving IV iron. Hypotension following administration of Venofer may be related to the rate of administration and total dose delivered.

VERSATILE IV IRON

Venofer®

iron sucrose injection, USP

*There is limited experience with administration of an infusion of 500 mg of Venofer® over 3.5–4 hours; hypotension occurred in 2 of 30 patients treated. See product monograph for complete dosing administration recommendations.
†Venofer® is not dialyzable through CA210 (Baxter) High Efficiency or Fresenius F80A High Flux dialysis membranes.

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References: 1. Venofer® product monograph, revised November 20, 2006. **2.** Van Wyck DB, Cavallo G, Spinowitz BS, Adhikarla R, Gagnon S, Charytan C, et al. Safety and efficacy of iron sucrose in patients sensitive to iron dextran: North American clinical trial. *Am J Kidney Dis.* 2000;36:88-97. **3.** Charytan C, Levin N, Al-Saloum M, Hafeez T, Gagnon S, Van Wyck DB. Efficacy and safety of iron sucrose for iron deficiency in patients with dialysis-associated anemia: North American Clinical Trial. *Am J Kidney Dis.*. 2001;37:300-7.

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PAAB

See prescribing summary on adjacent page.

formula® 2000 plus

The fruit of exploration: Dialysis monitoring evolves

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