The Renal Pharmacist

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ADDRESS/INFO CHANGES

Please forward any address / phone number changes to the Website co-ordinator jjani@cvh.on.ca. We are constantly updating our membership mailing list. Thank you

View from the Chair

The Renal Pharmacists Network Nephrology Education Day

We held a very successful RPN conference on Friday, April 3, 2009 in Toronto with approximately 70 people in attendance. Speakers and highlights included:

- Robert Richardson, M.D. "*Management of Hypertension in Hemodialysis Patients*". Dr Morton gave us new insights into diagnosing and managing hypertension in this population.
- *Collette Raymond, Pharm. D. "Update on Treatment Options for Calciphylaxis*". Dr Raymond summarized several cases of calciphylaxis that have occurred in Winnipeg and their management with sodium thiosulphate and pamidronate. She also reviewed the literature to date on this topic.
- Dan Martinusen, Pharm.D. "*Proteinuria – Why It's Important and What We Can Do About It*". Dr Martinusen gave an enlightening review of the treatment options to control hyperalbuminuria after ACEI or ARB therapy alone has failed.
- Lori MacCallum, Pharm. D. "*Managing Diabetes in People with Chronic Kidney Disease*". In addition to reviewing changes in the new diabetes guidelines wrt this patient population, Dr. MacCallum discussed some of the controversies in this area such as ACEI-ARB combinations and lipid management.
- Marianna Leung Pharm.D. "*Trouble Down the Line – To Pull or to Lock – BC Guidelines for Catheter-Related Infections*". Dr. Leung reviewed the recently created British Columbia Provincial Renal Agency guidelines for the management of CVC line infections. She presented several patient cases to illustrate her points.

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CHECK OUT OUR WEBSITE AT **www.renalpharmacists.net**

These presentations can be found on the RPN website. We also held three roundtable discussions on Hemodialysis, Peritoneal Dialysis, and Chronic Kidney Disease which were highly rated. The roundtables provided an opportunity for pharmacists across Canada to discuss treatment issues, perspectives and controversies in their region.

RPN Western Educational Dinner Seminar 2008

In an effort to promote RPN and broaden its scope across the country, co-chairs Karen Shalansky and Joanne Jung organized the first annual RPN Western Educational Dinner Seminar on Wednesday, November 05, 2008. It was a huge success with over 50 attendees from hospital and community pharmacies who provide patient care to chronic renal patients. Also, a number of our partners in the industry who have supported RPN were also in attendance. Two great talks were presented during the evening. The first presenter was Dr. Dan Martinusen, PharmD who repeated his stellar talk from CSN 2008 on "*Albuminuria – why it's important and what we can do about it*". Dr. Judith Marin, PharmD gave an excellent presentation on "*The ABC's on choosing the appropriate Vitamin D*". The slides from both talks can be found on the RPN website.

We have tentatively scheduled October 7, 2009 for this year's educational evening event. The topics will be a review of ACEI plus ARB combination therapy, a recent hot topic, and anticoagulation in HD patients – trials and tribulations. We are hoping for another successful turnout.

Sincerely,
Karen Shalansky and Joanne Jung,
RPN Co-Chairs

Member Profile

Amy Sood

Amy Sood obtained both her B.Sc.Phm and Pharm.D. degrees at the University of Toronto. She was a renal pharmacist for nephrology inpatients at Sunnybrook Health Sciences Centre from 2001 to 2003 and is thrilled to be back in nephrology once again. Currently, Amy practices in the interdisciplinary pre-dialysis Renal Health Clinics (CKD stage 4 & 5) at St Boniface General Hospital in the Manitoba Renal Program. The pharmacist's primary role for these patients is anemia management, mineral metabolism (in collaboration with the dietitian), cardiovascular risk reduction and medication review. Amy also provides clinical support to the other renal pharmacists at her site.

Since 2005, Amy has been actively involved in teaching in the Doctor of Pharmacy Program at University of Toronto. She was the Course Co-ordinator for Advanced Pharmacotherapeutics, General Medicine Part I in the Full-time program and currently fulfils this role in the Distance Pharm.D. Program. She also lectures in the B.Sc. Pharmacy Program at the University of Manitoba.

In her spare time, Amy has been spending time adjusting to life in Winnipeg with her husband, Manish (who happens to be a nephrologist). Since their move from Toronto in 2007, she has been stocking up on extra-strength DEET in the summers and in the winters, looks forward to days when it actually warms up to minus 30° Celsius. Seriously though, Amy is really enjoying all the great things Winnipeg has to offer. Currently, she is keeping busy watching the river swell up in her backyard.

Amy is excited to be joining the RPN executive this year as Vice-Chair and looks forward to hosting the first RPN dinner conference in Winnipeg, later this fall. Stay tuned for further details.

The growing trend of phosphate additives: Its impact on the renal and non-renal population

Summary or Presentation at NKF Spring Clinical Metings, April 2007, Orlando, Florida
Speaker: Lisa Murphy-Gutekunst, MSEd, RD, CSR, CDN
Submitted by: Christina Vaillancourt, Renal Dietitian, Lakeridge Health Corp., Oshawa, Ontario

Do you have patients with high phosphate levels and a diet history that reveals nothing to explain the elevation? Start looking at the prepared foods they are purchasing!

Phosphorous is added to foods during processing for many reasons some are listed below:

1) Stabilizer- stabilizes pH, buffers acids and acts as an emulsifier
2) Protectant- protects flavour, colour and product integrity
3) Leavening agent- e.g. baking powder
4) Conditioner- gives products meltability, pliability
5) Enhancer- enhances colour and flavour
6) Tenderizer- in many products not just meats
7) Supplement- added as a nutritional supplement

Lisa presented a study by Calvo, R 1988 in which it suggested that just after 8 days of a high phosphorus diet non-renal patients showed an increase in serum PTH and phosphate levels. Thus suggesting that both renal and non-renal populations are at risk when a diet high in phosphorous is consumed.

She noted that the phosphorus added to food is in a salt form, making it 100% absorbable. While the phosphorous found naturally in foods such as milk, vegetables and meats is in an organic form. The organic form of phosphorous is much less absorbable- approximately 40-60% of organic phosphorous is absorbed. In conclusion, phosphate additives, even when consumed in very small amounts, due to their high absorption rate can contribute greatly to your patients' intake of phosphorous.

The amount of phosphate additives in products is often considered proprietor information (the secret recipe) and is not often available. Usually the only way to address this issue is to encourage our patients to read labels and to avoid foods that list phosphate/phosphorous. Since phosphorus is added for so many reasons, there are many products that contain high amounts of phosphorus.

It may be surprising that many of the foods that are not traditionally thought of are high in phosphorus. For example, some flavoured bottled water and Sunny Delight have phosphate additives. She also stated that another significant source of phosphate additives are prepared foods such as "seasoned", "tenderized" or "pumped" meats such as flavored chicken breasts or the roast beef that is always tender no matter how long you cook it.

Addendum:
At the conference I received a handout from Genzyme called "The facts about Phosphorus". This handout suggests avoiding products with terms such as "Percentage of solution added", "with broth" or "flavour enhanced". It also states that the turkeys that are "self basting" may have added phosphorous. Finally it states that fresh and frozen meats that are high in sodium (more than 95 mg for a 3 ounce serving) contain a solution that is high in phosphorous as well.

Icodextrin Peritoneal Dialysate interacts with some Glucometers

Submitted by: Marion Visser, BSc.Phm, Pharmacy Resident at Sunnybrook HSC, Toronto, Ontario

Icodextrin is a starch derived polymer indicated for a single daily peritoneal dialysis (PD) exchange. It is typically used in the long (8- to 16-hour) dwell during continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD)[1]. It is also indicated to improve (compared to 4.25% dextrose) long-dwell ultrafiltration and clearance of creatinine and urea nitrogen in patients[1]. It decreases the carbohydrate load provided by PD solutions, which offers a potential advantage to diabetic patients. It is not metabolized to glucose within the peritoneal cavity which therefore limits the peritoneal exposure to glucose[1].

Since this solution is widely used, health care practitioners and patients must be aware of its potential drug-lab interaction with glucometers. This interaction can falsely elevate blood glucose levels and lead to erroneous administration of insulin and subsequent complications from hypoglycaemia[2]. These complications could potentially result in a hypoglycaemic coma or even death. As a result, warnings have been issued by Health Canada and the manufacturer of glucometers and icodextrin PD solution.

The interaction occurs as a result of the absorption of icodextrin into the blood stream and it's subsequent metabolism into oligosaccharides including maltose[3]. The maltose by-product can contribute to the blood glucose measurements of non-glucose specific glucometers resulting in falsely elevated blood glucose measurements[4]. Glucometers that use strips containing glucose dehydrogenase pyrroloquinolinequinone (GDH-PQQ) or glucose dye oxidoreductase (GDO) as the enzymatic assay are susceptible to this interaction[2]. On average, the use of icodextrin can increase blood glucose reading by approximately 3.6 ± 1.4 mmol/L with these monitors[4]. However, no conversion factor can be used because the overestimation varies widely. In order to safely monitor blood glucose levels in patients who use icodextrin PD solution, it is important for them to select a glucometer that uses a glucose specific assay. The following assays are glucose specific[2].

- Dehydrogenase-nicotinamide adenine dinucleotide
- Glucose dehydrogenase flavin adenine dinucleotide
- Glucose oxidase
- Glucose hexokinase

The two tables below are provided to assist renal pharmacists with glucometer selection for patients who use icodextrin PD solution. Information was obtained via verbal correspondence with each respective company on March 17th, 2009.

Monitors that may falsely elevate readings and therefore ***should <u>NOT</u> be used*** *by patients using icodextrin PD solution.*

Manufacturer	Name of Glucometer
Abbott	**All FreeStyle Glucometers:** FreeStyle Lite® FreeStyle Freedom Lite®
Bayer	Ascensia® Contour® (with the Ascensia MICROFILL® strips)*
Roche	ACCU-CHEK Compact Plus ACCU-CHEK Aviva

*Older versions of the Ascensia Contour do not use a glucose specific assay. These monitors can be differentiated from the newer Contour model that is glucose specific based on the type of test strip used. Models that are <u>not</u> glucose specific use the Ascensia MICROFILL® strips.

*Monitors that will not falsely elevate blood glucose readings and therefore **CAN be used** by patients using icodextrin PD solutions.*

Manufacturer	Name of Glucometer
Abbott	Precision Xtra®
Bayer	Contour® Breeze II®
LifeScan	**All LifeScan Glucometers:** OneTouch® Select™ OneTouch® Ultra® InDuo® System OneTouch® Basic® OneTouch® SureStep® OneTouch® FastTake® OneTouch® Profile® OneTouch® UltraMini OneTouch® Ultra 2 OneTouch® UltraSmart OneTouch® UltraLink
Roche	ACCU-trend GC

References:

1. Baxter. (n.d.). *Baxter U.S. - PD (Peritoneal Dialysis) Solutions.* Retrieved March 26, 2009, from http://www.renalsource.com/extraneal/fluid.html
2. Health Canada. (2008). *Health Canada Issued Important Safety Information on Possible interference of icodextrin, intravenous immunoglobulins, galactose and d-xylose with certain blood glucose monitors.* Ottawa: Health Products and Food Branch Inspectorate.
3. Riley, S. G., Chess, J., Donovan, K. L., & Williams, J. D. (2003). Spurious hyperglycaemia and icodextrin in peritoneal dialysis fluid. *British Medical Journal*, 608-609.
4. Schleis, T. G. (2007). Interference of Maltose, Icodextrin, Galactose, or Xylose with Some Blood Glucose Monitoring Systems. *Pharmacotherapy*, 1313-1321.

Upcoming Events

Fall CE Events

RPN will again be sponsoring fall dinner CE events across Canada
this year we have expanded to include Toronto, Winnipeg and Vancouver.
Stay tuned for dates in your area.
The CE event in Vancouver will be held at:
The Hart House Restaurant on Wed Oct 7 from 7-10pm.
Topics will include ACEI + ARB combination therapy - is there a role?;
and warfarin dosing challenges in dialysis patients.

Prevention, Treatment, & Monitoring of VA Related Infections

the RPN would like to acknowledge the BC Renal Agency for allowing this to be shared with the RPN members

BC Renal Agency
An agency of the Provincial Health Services Authority

Algorithm for Treatment of Catheter-Related Bacteremia (Page 1 of 2)

Reference: Providence Health Care Group algorithm, with modifications

Catheter-related bacteremia (CRB) suspected

• Fever >38^{0}C, chills +/-hypotension, WBC count; no apparent source for the CRB except the catheter

Perform clinical assessment

• Identify if source of infection is a location other than catheter (lung, GIT, bladder, skin (feet), abdominal, or AVF/AVG).
• Identify if metastatic infection in bones/joints or heart valves.
Perform echocardiogram1if organism is *staph aureus, viridans strep, &/or enterococcus*. Perform echocardiogram regardless of organism if clinical suspicion of endocarditis or an artificial valve is present. Perform bone scan if clinical suspicion of bone/joint involvement.

[1]Transthoracic echocardiogram (TTE) should be performed first. If negative, a TEE is required to exclude the possibility of endocarditis. In centres where a TEE is not available, recommend empiric treatment for endocarditis with 6 weeks of antibiotic therapy.

Note:
The type and frequency of antibiotics needs to consider the local context, including antibiotic susceptibility and experience with catheter related infections.

Obtain Cultures

• If possible, obtain paired blood cultures (1 set from the catheter & 1 from the periphery drawn at the same time); if not possible (e.g., limited access to veins), obtain 2 sets of 2 blood cultures from catheter at least 5 min apart (7.5 –10 mL each bottle)
• Culture from the most purulent aspect of the exit site if discharge present or suspicious
• Other cultures as indicated (e.g., sputum, wound, urine)

Start empiric antibiotics

• Vancomycin 25 mg/kg IV post HD x 1 dose
• +/-Gentamicin 2 mg/kg IV post HD x 1 dose (add if acutely ill or hemodynamically unstable or if suspect gram neg infection); if allergy to gentamicin, use ceftazidime 2 g IV post HD x 1 dose
• If patient is acutely ill or hemodynamically unstable, give antibiotics, remove catheter and admit
• If patient looks well, give antibiotics, leave catheter in situ, & f/u with results of culture

Note: While limited in number, studies suggest there are positive benefits to using antibiotic locking solutions for some patients/organisms if the catheter is to be retained; no studies have been done on the timing of starting antibiotic locks. For practical reasons, most do not start antibiotic locks until the specific organism has been identified and a decision made to retain the catheter.

If clinical assessment reveals any of the following, remove the catheter & insert a new one at a new site (if able, leave out x 48 hrs)

• Uncuffed catheter
• Presence of prosthetic heart valve
• Exit site or tunnel infection present
• Clinical signs & symptoms of sepsis (acutely ill or hemodynamically unstable)
• Temp remains >38^{0}C in 48 hrs
• Recent catheter related infection (with same catheter)
• Patient on immunosuppressants

Follow C&S; if culture negative @ 72 hrs, consider stopping antibiotics. If ongoing fever, investigate other sources.

If culture positive, adjust antibiotics based on sensitivity results

CONTINUED ON NEXT PAGE

While this algorithm indicates IV antibiotics are given "post HD," local practice will determine whether IV antibiotics are given during the last portion of HD or after HD is complete.

If culture positive, adjust antibiotics based on sensitivity results

All medication dose recommendations are for patients of average weight. Patients who are higher than average weight may require higher doses than specified (unless the specified dose is weight based)

Staph aureus (common; highest risk of complications)

Catheter & Locking Solution:
- Remove catheter and replace at new site; no guidewire exchange
- No need to use antibiotic lock because new catheter

Systemic Antibiotics:
- If clinical assessment negative:
  - If methicillin-resistant (MRSA) or penicillin allergic[1], vancomycin 500 mg IV post HD or 20 mg/kg post every second HD x 4 wks
  - If methicillin-sensitive (MSSA), cefazolin 2 g IV post HD x 4 wks
- If clin assessment positive:
  - If methicillin-resistant (MRSA), vancomycin 500 mg IV post HD or 20 mg/kg post every second HD x 4 wks
  - If methicillin-sensitive (MSSA), cloxacillin 2g IV q4h x 4 wks
- If using vancomycin, monitor level pre-HD at next run (titrate to target 15 - 20 mg/L)
- If metastatic complications (e.g., osteomyeltis, endocarditis, or septic thromosis), lengthen treatment time to 6-8 wks
- Consider hospital admission

Enterococcus

Catheter & Locking Solution:
- Remove catheter and replace at new site; no guidewire exchange
- No need to use antibiotic lock because new catheter

Systemic Antibiotics:
- If clinical assessment negative:
  - Vancomycin 500 mg IV post HD or 20 mg/kg post every second HD x 2 wks
  - Monitor level pre-HD at next run (titrate to target 10 - 20 mg/L)
- If clinical assessment positive, admit to hospital:
  - Ampicillin 1 g IV q12h or 2 g IV q24 hr (give post HD on HD days) x 2 wks
  - If no relative contradiction (e.g. hearing loss), add gentamicin 1 mg/kg IV post HD x 2 weeks[3] for synergy.
  - If using gentamicin, monitor level pre-HD (titrate to target <2 mg/L).
- Duration of antibiotic treatment assumes catheter is removed/replaced as per recommendation; if not, 3 wks of antibiotic treatment is required
- If endocarditis is present:
  - Lengthen vancomycin or ampicillin treatment to 6 weeks
  - Add gentamicin 1 mg/kg IV post HD x 2-4 weeks[3] for synergy
- If VRE positive, contact infectious diseases

Viridans streptococcus

Catheter & Locking Solution:
- If clinical assessment negative, remove catheter and replace at new site. Guidewire exchange of catheter also acceptable
- If clinical assessment positive, remove catheter and replace at new site
- No need for antibiotic lock because new catheter

Systemic Antibiotics:
- Cefazolin 2 g IV post HD x 2 wks
- If penicillin allergic:
  - Vancomycin 500 mg IV post HD or 20 mg/kg post every second HD x 2 wks
  - Monitor level pre-HD at next run (titrate to target 10-20 mg/L)
- Duration of antibiotic treatment assumes catheter is removed/replaced as per recommendation; if not, 3 wks of antibiotic treatment is required

Coagulase negative staph (significant if >1/4 bottles positive)

Catheter & Locking Solution:
- If clinical assessment negative, leave catheter in and use antibiotic lock solution post HD x 3 wks (doses are final concentrations):
  - If methicillin-sensitive, cefazolin 5 mg/mL + heparin 2500 units/mL[2]
  - If methicillin-resistant, vancomycin 2.5 mg/mL + heparin 2500 units/mL[2]
- If clinical assessment positive, remove catheter and replace at new site. Guidewire exchange of catheter also acceptable
- No need to use antibiotic lock because new catheter

Systemic Antibiotics:
- If methicillin-resistant:
  - Vancomycin 500mg IV post HD or 20 mg/kg post every second HD x 3 wks.
  - Monitor level pre-HD at next run (titrate to target 10-20 mg/L)
- If methicillin-sensitive, cefazolin 2 g IV post HD x 3 wks
- In special circumstances (e.g., persistent organism and do not want to remove the line), consider adding rifampin 600 mg po once daily
- If catheter is removed/replaced, duration of antibiotics may be reduced to 2 wks

Gram negative

Catheter & Locking Solution:
- If clinical assessment negative, leave catheter in and use antibiotic lock solution post HD x 3 wks (doses are final concentrations):
  - Ceftazidime 5 mg/mL + heparin 2500 units/mL[2]
  - If penicillin allergic, gentamicin 1 mg/mL + heparin 2500 units/mL[2] (note: cipro is not compatible with heparin so if on systemic cipro, use gentamicin in locking solution)
- If clinical assessment positive, remove catheter and replace at new site
- If catheter is replaced, no need to use antibiotic lock

Systemic Antibiotics:
- Ceftazidime 2g IV post HD x 3 wks.
- If penicillin allergic:
  - Gentamicin 1.5 mg/kg IV post HD x 3 wks[3] or ciprofloxacin 500 mg po or 400 mg IV daily x 3 wks.
  - If using gentamicin, monitor level pre-HD (titrate to target <3.5 mg/L)
- If catheter is removed/replaced, reduce duration of antibiotics to 2 wks
- Ceftazidime is not recommended as the sole antibiotic for enducible beta-lactamase producing organisms (serratia, Pseudomonas, Acinetobacter, Morganella, Citrobacter, and Enterobacter) or extended spectrum beta-lactamase (ESBLE) producing organisms. If any of these organisms are present, consider admitting to hospital and using appropriate antibiotics such as meropenem/imipenem or piperacillin-tazobactam or ticarcillin-clavulanate. If organism is Pseudomonas, cover with double antibiotics (e.g., ceftazidime 2 g IV post HD + ciprofloxacin 500 mg po or 400 mg IV daily).
- Consider hospital admission.

Repeat blood culture 1 wk after completion of antibiotic therapy

Note if the culture is positive for a fungus (usually Candida spp.), remove catheter and replace at a different site. Initiate appropriate antimicrobial treatment and continue for at least 2 weeks following line removal. Draw repeat cultures 1 week after antimicrobial completion to ensure eradication of the organism

1. Take history to confirm allergy and consider penicillin skin testing. Use of vancomycin should be restricted to patients with true penicillin allergies because beta-lactam antibiotics are more effective than vancomycin in treating staph aureus infections.
2. There is no consensus in the literature about the optimal concentration of heparin in lock solutions. Most studies used higher concentrations of heparin; no studies compared the use of higher vs lower concentrations. Heparin concentration for lock solutions will be determined by each HA upon consideration of safety concerns and current practice.
3. The risk for ototoxicity with gentamicin increases with duration, especially after 7 – 10 days of use. Weekly audiogram tests are recommended.

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