

Clinical Research

1. Successful Treatment of Critical Hypomagnesemia in a Peritoneal Dialysis Patient with Intraperitoneal Magnesium Sulfate

Affiliation	Vancouver General Hospital, VCH
Leader	Elaine Cheng
Team Members	Flora Yu, Orla Dunne, R. Suneet Singh

Summary	<p><u>Background</u> Magnesium is an important modulator of the electrical activity of cardiac cells. Its homeostasis is maintained through absorption, mainly in the small intestine, storage in the bone, and excretion via the kidneys and feces. In patients with advanced chronic kidney disease or on hemodialysis, hypermagnesemia is common due to decreased renal excretion. However, a high incidence of hypomagnesemia, occasionally requiring magnesium supplementation, has been reported in the peritoneal dialysis population. One of the contributing factors may be the daily use of low magnesium dialysate solutions. Coexisting hypokalemia, which happens frequently in these patients, further increases the risk of life threatening arrhythmias.</p> <p><u>Patient Case</u> In this paper, we report the successful treatment of critical hypomagnesemia with intraperitoneal magnesium sulfate in a 70 year old female PD patient with a history of celiac disease and recurrent atrial fibrillation. The patient was initially started on hemodialysis, then switched to peritoneal dialysis. At peritoneal dialysis initiation, her serum magnesium level was 0.51 mmol/L. She was initiated on oral potassium and magnesium supplements because of hospitalizations for uncontrolled atrial fibrillation. However, due to gastrointestinal intolerance, the oral magnesium supplement was replaced with intravenous magnesium sulfate. As a result of fluctuations in the patient's serum magnesium levels and inconvenience of intravenous administration, we trialed the patient on intraperitoneal magnesium sulfate. The patient was taught to instil 4 grams of magnesium sulfate into a 2 L bag of Dianeal 2.5% solution with a dwell time of 6 hours once weekly. A series of peak and trough serum magnesium levels were obtained to assess the adequacy of the dosage regimen. Her mean peak serum magnesium concentration was 1.13 mmol/L and mean trough magnesium concentration was 0.69 mmol/L. In the first year since the initiation of intraperitoneal magnesium sulfate therapy, 70% of the serum magnesium levels were within the normal range of 0.7-1.1 mmol/L. No adverse effects were reported by the patient and she has had no further admissions to hospital for atrial fibrillation.</p>
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2. Nutritional Intake of Children with Nephrotic Syndrome	
Affiliation	BC Children's Hospital
Leader	Nonnie Polderman
Team Members	M. Cushing, D. Matsell, M. Catapang, A. Sanchez, C. Mammen
Summary	<p><u>Purpose</u> To compare dietary intakes of patients with Nephrotic Syndrome(NS) to our pathway's nutrition recommendations. Methods: Retrospective chart review of NS patients (1-17 years) seen from Feb 2013-Aug 2015. Energy, sodium(Na), calcium(Ca) and Vitamin D(VitD) intakes were compared to recommendations.</p> <p><u>Summary of Results</u> Response rate was 50%. Mean energy intake was 103 +/-22% of daily recommendations with 47% exceeding. Mean Na intake was 116 +/-58% of recommendations with 53% exceeding. Mean Ca intake was 70 +/-25% of DRI. Only 13% met DRI for Ca. Of 6 patients who reported Ca and VitD supplementation, 83% had total Ca intakes that met DRI and 67% met DRI for VitD.</p> <p><u>Conclusions</u> Analyses of food intake records of children with NS indicate that half of patients exceeded our pathways' recommendations for daily energy and Na. Overall low intakes of Ca and VitD justify our pathway's recommendation of Ca and VitD supplementation.</p>

3. Development of intervention-related quality indicators for renal clinical pharmacists using a modified Delphi approach	
Affiliation	Kelowna General Hospital, IHA
Leader	William Nevers
Team Members	Kate Boutin, Dan Martinusen, Clifford Lo, Sean Gorman, Richard Salvik
Summary	<p><u>Background</u> One of the primary methods for a clinical pharmacist to improve the quality of patient care is to identify, prevent and resolve drug therapy problems (DTPs). Because of a finite availability of resources, renal clinical pharmacists must prioritize who they care for and what they do for these patients.</p> <p><u>Objective</u> Develop a list of renal quality indicator–DTPs (renal QI-DTPs), in adult chronic kidney disease and end-stage renal disease patients, that serve to advance renal pharmacist practice and improve quality of patient care.</p> <p><u>Design</u> Prospective, evidence-based consensus-building study conducted using a modified Delphi approach designed to generate renal QI-DTPs. Three rounds of Delphi survey were completed with 18 renal pharmacists across 10 Canadian provinces. Consensus was determined after all 3 Delphi rounds had been completed based on a priori-established criterion.</p> <p><u>Outcome Measure</u> A core of 17 national renal QI-DTPs were developed using a modified Delphi consensus process.</p>

4. Comparison of Corrected Serum Calcium Levels to Ionized Calcium Levels and Impact on Phosphate Binder Prescribing in Hemodialysis Patients	
Affiliation	St. Paul's Hospital, Providence Health Care
Leader	Wynnie Lau
Team Members	Wenxin (Cindy) Pan, Mercedeh Kiaii, Beverly Jung, Andre Mattman, Clara Sohn, Stan Marchuk
Summary	<p>Background Albumin-corrected calcium is recommended over ionized calcium (iCa) due to cost; however, its predictive validity in hemodialysis is controversial.</p> <p>Objective To determine the sensitivity and specificity of calcium correction formulas and total calcium to iCa; to assess prescribing-patterns following abnormal calcium measurements.</p> <p>Method Retrospective review of 122 stable hemodialysis patients. Payne and Jain correction equations were used. Prescription changes within 2 weeks of abnormal iCa's were recorded.</p> <p>Results Mean iCa, cCa, and total calcium were 1.17 ± 0.08, 2.37 ± 0.16, and 2.28 ± 0.15 mmol/L, respectively. Total calcium and cCa compared to iCa had kappa coefficients of 0.19 and 0.08 respectively for hypocalcemia, and 0.59 and 0.46 for hypercalcemia. Twenty-one interventions were made in hypocalcemic patients. If iCa were unavailable and total or cCa were used, only 8 and 5 interventions, respectively, would result.</p> <p>Conclusion When BCP assay is used, conventional correction equations should not be utilized in hemodialysis patients; uncorrected calcium has better predictive value compared to iCa.</p>

5. Willingness of Canadian ESRD Patients to Consider Transplant Tourism	
Affiliation	St. Paul's Hospital, Providence Health Care
Leader	Gurleen Gill
Team Members	Yayuk Joffres, Caren Rose, John Gill, Lara Russell, Chris Richardson, Jagbir Gill
Summary	<p>Background Transplant tourism refers to travel for transplantation that involves organ trafficking and/or transplant commercialism, and is associated with poor outcomes after transplantation. While characteristics of transplant tourists have been described, there are no data on Canadian end-stage renal disease (ESRD) patients who may be at high risk for engaging in this practice.</p> <p>Methods We surveyed Stage V chronic kidney disease (CKD) and dialysis patients in the lower mainland of British Columbia to determine their willingness to travel outside of Canada and purchase a kidney.</p> <p>Results Of 592 patients surveyed, 342 (58%) were willing to travel for transplantation, with 149 (25%) strongly willing to travel. Figure 1 shows the willingness of patients to travel for transplantation under different circumstances. N=354 (60%) were willing to travel if they had a related living donor in another country or could be placed on an official transplant list in another country, while 143 (24%) were willing to pay for the kidney on top of paying the medical costs of the transplant. Thirty-three percent were willing to travel even if they knew the donor was an executed prisoner, but only 4% admitted that they were willing to break the law to obtain the transplant. Patients that were willing to travel and purchase a kidney included a higher proportion of patients that were younger, male, of Asian ethnicity, had higher median household income, had initiated dialysis within the last year, and were less knowledgeable about the risks and legality of transplant tourism.</p> <p>Conclusion Nearly one quarter of ESRD patients surveyed were willing to purchase a kidney outside of Canada, and may be at high risk to engage in transplant tourism. Educating at-risk patients (particularly those who recently started dialysis) about the legal and medical risks of transplant tourism may help to deter this practice.</p>

6. A National Survey of Nephrologists Assessing the Perception of Prognostication in Patients with End-Stage Renal Disease (ESRD)	
Affiliation	Penticton
Leader	Brian Forzley
Team Members	Helen Chiu, Ognjenka Djurdjev, Rachel Carson, Gaylene Hargrove, Dan Martinusen, Adeera Levin, Mohamud Karim
Summary	<p><u>Background</u> Patients with ESRD have a relatively poor prognosis with higher risk of mortality. The care needs for these patients are unique as optimal care for these patients would depend on their prognosis. While prognosis is seen as an important issue in management of ESRD, little is known about how often and by what means Canadian nephrologists prognosticate for these patients, and how prognosis informs and guide clinical management.</p> <p><u>Objective</u> To guide robust management strategies for patients, we aimed to better understand how nephrologists in Canada consider prognosis during routine care.</p> <p><u>Methods</u> A web-based multiple choice survey was designed, refined and administered to all nephrologists in Canada through the e-mail list of the CSN. The core content of the survey consisted of two parts in which we asked the respondents about their routine practice of estimating survival and the perceived importance of prognostic practices and tools in patients with CKD and <15 ml/min not on dialysis and in those on dialysis. Descriptive statistics were used in analyzing the responses.</p> <p><u>Results</u> The survey response rate was 43%. Less than 50% of the respondents indicated they “always” or “often” make an explicit attempt to estimate and/or discuss survival with ESRD patients not on dialysis, and ≤25% reported they do so “always” or “often” with patients on dialysis. Survival estimation is primarily based on clinical gestalt. Respondents indicated a wide range of issues that are influenced by prognosis, including advance care planning, transplant referral, choice of dialysis access, medication management, and consideration of conservative care. Quality of life was the most important factor for recommending conservative management. Respondents expressed the need for a validated prognostic tool to guide clinical management.</p> <p><u>Conclusions</u> In conclusion, prognostication of patients with ESRD is an important issue for nephrologists and impacts management in fairly sophisticated ways.</p>

7. The Impact of Cinacalcet on Non-Calcium Based Phosphate Binders: A Retrospective Administrative Database Review	
Affiliation	BC Provincial Renal Agency
Leader	Matthew Lum
Team Members	Clifford Lo, Dan Martinusen, William Nevers, Jonathan Mailman, Robin Cho, Kevin Sin, Alexandra Romann
Summary	<p>Background In 2008, British Columbia approved cinacalcet use in patients with chronic kidney disease after demonstrating improvements in biochemical markers associated with mineral bone disorder. However, the EVOLVE trial failed to demonstrate reduction in cardiovascular events and death with its use (1). Despite this, British Columbia is 1 of 4 Canadian Provinces and Territories that continues covering cinacalcet based on limited evidence that it reduces patient centered outcomes such as joint and bone pain (2).</p> <p>Methods Phosphate binder doses, vitamin D analogue doses and biochemical markers (calcium/phosphate/PTH) were collected at baseline, 6 months, 1 year and 5 years from initiation of cinacalcet from the British Columbia Provincial Renal Agency's database between 2008-2015.</p> <p>Results Non-calcium based phosphate binder (sevelamer HCl and lanthanum carbonate) usage decreased by 42% after the initiation of cinacalcet, whereas biochemical markers did not change significantly.</p> <p>Conclusion Non-calcium based phosphate binder usage decreases with cinacalcet usage but does not significantly offset the cost of cinacalcet.</p>

8. Warfarin Related Nephropathy: A pediatric case report	
Affiliation	BC Children's Hospital
Leader	Rumi McGloin
Team Members	Karin Ng, Kathryn Haubrich
Summary	<p>Warfarin-related nephropathy (WRN) has been described in the literature as a significant complication of anticoagulation. Histological findings include acute tubular injury and occlusive RBC casts in the presence of glomerular hemorrhage. As it may be difficult to perform a biopsy in a fully anti-coagulated patient, clinical diagnosis is defined as unexplained acute kidney injury (AKI) within 1 week of an international normalized ratio (INR) > 3 with no record of hemorrhage. Glomerular hemorrhage causing tubular obstruction has been proposed as the main mechanism of AKI in WRN. The clinical course and outcomes of WRN remain unclear. We describe a case of a 17 year old male patient with complex cardiac history who developed warfarin-related nephropathy. Renal function should be monitored in patients on anticoagulation therapy and the diagnosis of WRN considered in patients with otherwise unexplained AKI in the context of a supra-therapeutic INR.</p>