1. **Evaluation of the BC Renal Agency's Evidence-Based Protocol for the Management of Catheter-Related Bacteremia in Hemodialysis Patients**
   Providence Health Care
   Leader: Marianna Leung
   Team members: Sarah Stabler, Jacky Siu, Rick Luscombe, Mercedeh Kiaii

   Bacteremia is the most significant cause of morbidity and mortality in patients receiving hemodialysis (HD) through a central venous catheter. In March 2008, the British Columbia Provincial Renal Agency (BCPRA) developed a protocol with the goal to reduce the incidence of and appropriately treat vascular access (VA) infections in HD patients.

   The primary objective of this study was to compare the accordances rate of CRB management with the practice standards described in the BCPRA protocol prior to and after protocol implementation: (1) blood culture collection at baseline, (2) use of empiric antibiotic(s), (3) removal of the HD catheter, (4) tailoring of antibiotic therapy based on culture and sensitivity results, (5) diagnostic investigations, (6) the use of an antibiotic lock solution if catheter remained in-situ, and (7) blood culture repeated 1 week after the completion of antimicrobial therapy.

   A retrospective chart review was conducted for adult inpatients and outpatients receiving hemodialysis via a tunneled catheter who had received systemic antimicrobial(s) for the treatment of CRB prior to and post-protocol implementation. Descriptive statistics were used.

   Thirteen patients in the pre-protocol and 12 patients in the post-protocol phase were included for analysis. The accordance rates to evidence based practice have improved after protocol implementation. However, the protocol adherence rates for repeat blood culture and the use of antibiotic lock solution were low at 33.3% and 75%, respectively. Due to the small sample size and short duration of follow-up, it was not possible to assess the impact of the protocol on the incidence of long-term complications associated with CRB.

   Overall, the management of CRB on the HD unit has improved with the introduction of the evidence-based protocol. However, there are still areas that require further improvement. Adherence to the current evidence based practice guidelines will hopefully reduce morbidity and mortality associated with CRB and improve the overall quality of patient care.

2. **Assessment of Midodrine Use in the Management of Intradialytic Hypotension**
   Providence Health Care
   Leader: Marianna Leung
   Team members: Kris Poinen, Joanne Jung, Mercedeh Kiaii, Bev Jung, Nicole Gorman

   Intradialytic hypotension (IDH) occurs frequently in the hemodialysis setting and may increase morbidity and mortality within this population. With its α-1 receptor agonist action, midodrine is a potential treatment option for IDH. Although midodrine may improve blood pressure (BP) values, it has not been shown to significantly reduce the severity and occurrence of IDH, or its associated morbidity. Midodrine is frequently used at the hemodialysis unit at this institution for the treatment of IDH despite its unknown impact.

Our objective was to evaluate midodrine use in the management of IDH at the hemodialysis unit. The primary objectives were to observe the impact of midodrine on BPs at various intervals during the HD sessions, and its usage pattern on the unit. The secondary objectives were to compare the patient characteristics and risk factors between the midodrine and non-midodrine (control) groups, while also determining the overall incidence of IDH and non-midodrine interventions made.

A prospective observational review was conducted to assess BPs, midodrine dosing and frequency of administration, and the number of IDH episodes during hemodialysis sessions in both midodrine and control groups. Patient characteristics and risk factors influencing IDH were also compared between the two groups. Descriptive statistics were used.

Fifty-five midodrine patients and 53 non-midodrine patients were included. The midodrine patients entered their hemodialysis sessions with lower mean BPs than the control group (123/65 vs. 133/70 mm Hg, respectively). This trend continued throughout the hemodialysis sessions and may have increased the susceptibility of these patients to IDH as this group also had a higher rate of symptomatic IDH (12% vs. 4.8%). A mean midodrine dose of 7.5 mg was used per hemodialysis session, although the range was quite large.

This study revealed that midodrine was used commonly for IDH at this hemodialysis unit despite a lack of well documented clinical benefits. The midodrine users had lower BP values throughout the hemodialysis sessions and experienced more symptomatic IDH despite the use of midodrine.

3. **The Use of Intravenous Sodium Thiosulfate for the Treatment of Calciphylaxis in an Elderly Peritoneal Dialysis Patient**
Northern Health Renal Program
Leader: Stefanie Finch
Team members: Irene Aspden, Lyn Johnson, Khalid Bashir

Calciphylaxis is a very painful condition which occurs in about 1-4% of patients with end stage renal disease. The use of Sodium Thiosulfate for the treatment of Calciphylaxis in patients undergoing peritoneal dialysis has not been widely studied. Most of the literature focuses on its use in hemodialysis patients.

Our primary goal for Mrs. X, an 85 year old patient with end stage renal disease, was pain management. Despite the regular use of narcotic, we were unable to achieve adequate pain control. Several case reports reviewed the use of Sodium Thiosulfate as a treatment option.

Based on a review of literature and a treatment cost evaluation, it was decided to give 5 g Sodium Thiosulfate IV 3 X/week for 3 months.

After the first 2 weeks, oxycodone was no longer required, following three weeks of treatment, fentanyl was also discontinued. Mrs. X's is currently managing pain quite well and overall experiencing a better quality of life.

4. **Coordinating the Journey Through Chronic Disease**
   Surrey Memorial Hospital, Fraser Health Authority
   Leader: Kate Hughes
   Team members: Christine O'Donnell, Sherri Kensall, Kathy Piper, Gurpreet Bains, Cherrie Wakefield

   Every patient has their individual "road map" or journey through chronic disease. It may be uneventful and easily navigated or fraught with difficulties and crises--or more usually a combination of both. This poster is case study of a typical patient followed by a renal care coordinator over a two year period. On referral, the renal care coordinators help to guide and support patients from the initial diagnosis of chronic kidney disease through the transition to chosen treatment modality. We follow-up after acute hospitalizations. We liase with community services, and work together with the other members of the renal team to provide the best service to patients--from supporting self-management efforts through to assisting with end-of-life issues.

5. **Is it Necessary to Hold Iron Gluconate Prior to Iron Studies?**
   Vancouver General Hospital, Vancouver Coastal Health Authority
   Leader: Karen Shalansky
   Team members: Jacek Jastrzebski, Morris Pudek, Jennifer Hanko

   The majority of hemodialysis (HD) patients receive IV iron for anemia management. As per our laboratory recommendations, all IV iron products are held x 2 weeks prior to assessment of transferrin saturation (TSAT).

   Our objective was to determine whether it is necessary to hold iron gluconate (Ferrlecit®) prior to TSAT testing.

   This was a 4-week open-label study at VGH HD unit of 20 patients receiving iron gluconate 125mg IV every 1-4 weeks. TSAT was drawn pre-dose, 48-72 hours later (at next HD session), then 1-2 weeks post-dose. A subset of 10 patients had a similar set of TSATs drawn at pre-, 48-72 hour post- and 1 week post-dose.

   There were no significant differences in mean TSAT values at any time period in the initial 20 patients (0.27 ± 0.08 vs 0.28 ± 0.08 vs 0.28 ± 0.1, p=0.93). A similar result was found in the repeat subset of 10 patients (0.30 ± 0.14 vs 0.25 ± 0.05 vs 0.26 ± 0.06, p=0.47).

   Iron gluconate does not need to be held prior to iron studies. TSAT can be drawn 48-72 hours after a dose, which is useful to assess accelerated iron protocols.

6. **The Kidney Case Place: a new case based website for the nephrology community with interactive simulation education**
   Fraser Health Authority
   Leader: Daniel Schwartz
   Team members: Lisa Semeniuk, Cam Fagrie, Monica Beaulieu

   The Kidney Case Place is the first Canadian website dedicated to providing continuing medical education in a patient case-study based format currently being reviewed for Royal College accreditation. This site reviews

and encourages sharing of best practice between nephrology health care providers with topics based on a national needs assessment completed by 43 nephrologists and 12 nurse practitioners from Canada. For optimum learning, cases can be viewed in a simulation mode whereby immediate feedback on chosen answers are provided with rationale provided for the best answers. The steering committee consists of 11 nephrologists and 1 nurse practitioner across Canada, with expert opinions provided from key nephrologists considered advanced in the particular hot topic being considered. The purpose of this abstract is to review the topics that are important to physicians from a learning perspective and to provide an update of the currently available case simulations on the website.

7. Catheter tip design: a question of functionality

St. Paul's Hospital, Providence Health Care
Leader: Rick Luscombe
Team members: Gary Nussbaumer, Mercedeh Kiaii, Monica Beaulieu

The Hemodialysis unit at St. Paul's Hospital in Vancouver, BC, has 43 stations and a patient population of 287. Approximately 1/3 of all hemodialysis patients require a long term hemodialysis catheters. Historically, chronic catheters have had problems with clotting, infection and interventions requiring the use of an anti-thrombogenic agent. This disruption of flow requires nursing time and effort and often will result in inadequate dialysis, thus rescheduling patients for further dialysis. This places additional stresses on an already overloaded system.

We looked at three different catheter types, from three different companies, to determine their functionality in terms of interventions, recirculation, alteplase (TPa) usage and cost.

We evaluated three different tip designs:
Catheter A: Staggered Tip design (3 brands)
Catheter B: Split Tip Design (2 brands)
Catheter C: Spiral- Tip Design (1 brand)

From July 31, 2008 to January 27th, 2009, three catheter types were evaluated prospectively. 36 of A, 23 of B, 12 of C. TPa (alteplase) usage and measuring recirculation via ultrasound dilution was felt to be the most objective criteria for catheter performance.

Alteplase usage was measured from Feb 1, 2008 to July 30, 2008 (before trial began). In this time period, 289 doses of Tpa were used, for a total cost of $31,212. From July 31, 2008- Jan 27, 2009 (trail period), 341 doses of Tpa were given. 116 doses (trail catheters), 225 doses (non trial catheters) for a total cost of $36, 328. For the purpose of this report 1 dose equals 4mg of alteplase at a cost of $108 dollars ($54/2mg or $108/4mg). Of note: one patient using catheter C is getting Tpa as a prophylactic measure once a week. There is no indication for usage (blood pump speeds consistently over 400ml/min). 4 doses were given.
Acceptable recirculation for a catheter < 7%.

Catheters	# of Catheters inserted	Recirculation: # of patients	Percentage of recirculation	# patients requiring TPa	Doses of Tpa (1doses=4mg)	Total Cost of TPA
C	12	1	5%	3 (1)	8 (4)	$864
A	16	1	10%	7	40	$ 4,320
A	13	4	27-36%	8	25	$2,700
A	7	0	0	5	6	$648
B	11	4	11-20%	7	9	$972
B	12	2	10-14%	6	24	$2,592

Based on this evaluation, we have concluded that Catheter C, the spiral tip design had the best outcomes in terms of recirculation rates, TPa usage and intervention rates.

8. **PVAST: Improving vascular access outcomes one poster at a time**
   St. Paul's Hospital, Providence Health Care
   Leader: Rick Luscombe
   Team members: Provincial Vascular Access Service Team (PVAST)

   Improving vascular access outcomes is one of the prime directives of the Provincial Vascular Access Service Team. Over the past year numerous posters have been developed to educate patients and health care professional. This poster compilation is composed of the educational materials developed to assist in improving vascular access outcomes.

9. **An Evaluation of Alteplase Practices in Hemodialysis Patients with Occluded Central Venous Catheters**
   Royal Jubilee Hospital, Vancouver Island Health Authority
   Leader: Dan Martinusen
   Team members: Kristen Nelson

   Alteplase (tPA) administrations to hemodialysis catheters has become commonplace. We studied the alteplase usage in our in-centre outpatient hemodialysis population in terms of fiscal trending but also to learn more about why patients were getting more alteplase. We examined the frequency of each administration method used, line reversal status, hemoglobin level, warfarin usage and INR levels. Additionally, we investigated an association between upper body type and alteplase use as CVC functioning may be affected. We also report a number of other findings regarding frequency of use, frequency of administration method, catheter prevalence. CVC was the predominant vascular access in this population and for those taking warfarin or not, the average INR was<2. Sixty-five percent of patients receiving alteplase had more than 2 administrations in a 2-week period. This work has prompted discussions regarding the BCPRA alteplase protocol, amongst other findings.

10. **Medication Reconciliation Across the Spectrum of Renal Care and Across the Province**
    Royal Jubilee Hospital, Vancouver Island Health Authority
    Leader: Dan Martinusen
    Team members: John Antonsen, Anne Gloster, Richard Bachand, Jennifer Di Castri

Medication reconciliation is a process designed to reduce adverse events due to medication errors. It improves the accuracy of patients' medication lists whereby any discrepancies are brought to the attention of the physician and resolved. The process should improve the clarity in communication and enable seamless care from one care setting to the next. Typically, this has centered on hospital admissions but is applicable to entire care spectrum of dialysis patients. Dialysis patients are at particular risk given the large number of medication prescribed, the frequent changes in these prescriptions and relatively frequent transitions in care. This project describes using an electronic database (PROMIS) to enable reconciliation. The poster describes the development of the process, VIHA in-centre hemodialysis unit outcomes and spread to the rest of the province.

11. Serum Beta2-Microglobulin Rises in Nocturnal Hemodialysis: An Unexpected Finding

Vancouver General Hospital, Vancouver Coastal Health Authority
St. Paul's Hospital, Providence Health Care
Leader: Melanie Brown
Team members: Adeera Levin, Ognjenka Djurdjev, Michael Copland

Beta-2 microglobulin (β2-M) clearance was enhanced four-fold with nocturnal hemodialysis in a small study. There has been very little subsequent investigation as to whether this is associated with improvement in the steady-state serum concentration of β2-M.

Subjects performing nocturnal hemodialysis, defined as at least 3.5 sessions per week each lasting 300-480 minutes, in the province of BC were included.

Fifty-eight adult subjects were included. β2-M levels actually rose over time (1570 nmol/L at baseline vs 1820 nmol/L at 12 months, $p = 0.03$). As the time on nocturnal hemodialysis increased, so did the increase in serum β2-M levels (1570 nmol/L at baseline vs. 2200 nmol/L at 24 months, $p = 0.0004$).

Serum β2-M concentrations rise over time on nocturnal hemodialysis contrary to previous findings. Given that patients on NHD have better clinical outcomes, the significance of high levels of β2-M levels may need to be reconsidered.

12. Developing a Peritoneal Dialysis Patient Assessment Tool

Kelowna General Hospital, Interior Health Authority
Leader: Karen Forsberg
Team members: Heather Zadorozniak, Janice James, Heather Bilan, Linda Turnbull

Our purpose was to develop and implement a Peritoneal Dialysis (PD) Patient Assessment tool which supports positive outcomes for all potential PD patients regardless of medical, physical, and social limitations. The creation of this tool will assist in the identification of potential barriers or challenges for patients desiring PD as a home therapy thus ensuring that patients training/education is matched with individual needs.

A cross hospital/provincial team of Health Care Professionals from three PD programs in Alberta and BC formed to develop and implement an assessment tool for patients who have shown an interest in performing

PD. The tool focuses on medical, physical and social parameters from a self management perspective. Questions were formulated to identify patients who show evidence of low, moderate, or high ability to successfully self manage PD in the home environment. The tool has been piloted at 3 hospitals with revisions made as identified.

The early identification of potential barriers or challenges permits the opportunity for PD programs to align clinical and educational support utilizing a self managed approach to ensure successful outcomes for patients desiring PD.

13. Renal Triage Nurse Study: the Impact of Education on Modality Choice in 'Parachute' Hemodialysis Patients
Vancouver General Hospital, Vancouver Coastal Health Authority
Leader: Nadia Zalunardo
Team members: Jennifer Hanko, Jacek Jastrzebski, Cheryl Nieva, Robert Balshaw, Guiyun Li

Due to late presentation, up to 50% of patients with ESRD do not receive the multi-disciplinary pre-dialysis care recommended in practice guidelines. Therefore, we dedicated a Renal Triage Nurse (RTN) to educating these “parachute patients” (PP) and facilitating transition to independent modalities of renal replacement therapy (RRT).

Retrospective cohort study of patients starting hemodialysis (HD) at Vancouver General Hospital (Canada) from Jan 1, 2005 - Sept 30, 2008. PP were defined as those followed in the pre-dialysis clinic <6 months prior to their first HD. Patients surviving 180 days from HD start were included. Characteristics and 6 month outcomes of PP were compared before and after the RTN position was established (Dec 1, 2006) and compared to patients from the pre-dialysis clinic.

166 patients started HD; 73 (43%) were PP and 93 started via the predialysis clinic. PP were younger (60.1 vs 71.1 years, p = 0.002) and started HD at a lower GFR (8.0 vs. 10.0 mls/min/1.73m2, p = 0.0009). The RTN saw 32 of the PP; these were more likely to live alone (26.7 vs. 7.3%, p = 0.018). At 6 months, 11 patients (34.4%) in the RTN group switched to an independent RRT modality vs. 6 patients not seen by the RTN (14.6%) (p = 0.047). PP seen by the RTN transitioned 13.2 days sooner.

Dedication of a nurse to the education of parachute HD patients increased the frequency and efficiency of switching to an independent RRT modality.

14. BC Provincial Home Hemodialysis Program
Province-wide
Leader: Donna Murphy-Burke
Team members: IAMHD Patient Educators Group

In October 2004 the BC Renal Agency, in partnership with the province’s five regional health authority renal programs, launched a province-wide independent hemodialysis program. The home hemodialysis (HHD) program was developed in response to patient demands for more dialysis choices and enhanced self-

management, and to achieve improved patient care (evidenced by the positive outcomes for patients who receive more dialysis) and increased system sustainability.

15. Home Hemodialysis – Patient Stories Show Program Success

Province-wide

Leader: Susan Haskett

Team members: HHD Educators Group - Katy Burke, Evangeline Cabezon, Jennifer Di Castri, Bonnie Harper, Wendy Hennings, Laurie Ledger, Angela Robinson, Pauline Sheppard, Vanessa Shortis, Bev Sondrup, Sarah Thomas

In this presentation we showcase three patients who, through their stories, illustrate our belief that there are few barriers for any renal patient who wishes to participate in home hemodialysis (HHD). We believe the benefits of HHD far outweigh any challenges and that it provides the best possible outcomes for a patient's health and happiness.

16. Practice Patterns of Intradialytic Parenteral Nutrition (IDPN) use in British Columbia

St. Paul's Hospital, Providence Health Care

Leader: Mhairi Sigrist

Team members: Eileen Carolan, Tracene Coulter, Karen Shalansky, Dan Martinusen

Moderate protein-energy malnutrition (PEM) is thought to affect 15% - 43% of maintenance hemodialysis (HD) patients and is independently associated with mortality in this population. One treatment option for malnourished HD patients is IDPN, however a recent systematic review found there was little high quality evidence in the literature to support the use of IDPN. In March 2008 the BCPRA published comprehensive guidelines for the initiation and discontinuation of IDPN in BC. The primary aim of this study was to asses the use of IDPN in the province of BC. The secondary aim was to assess the use of provincial IDPN guidelines 12 months after their introduction.

In March 2009 a short survey of IDPN use was distributed to all renal dietitians on the BC renal nutrition group e-mail list. This is a comprehensive list of all renal dietitians working in BC, which is maintained and updated regularly. The information on IDPN use was derived from the dietitian population as it is the role of the dietitian to assess the adequacy of each HD patient individually for initiation of IDPN.

All sixty of the clinical renal dietitians in BC returned their surveys within one month of its distribution. Results of the survey showed 2.4% (43/1791) of HD patients in BC were receiving IDPN at the time of the survey and 7% (126/1791) of HD patients had received IPDN during the previous 12 months. Only patients dialyzing at in-center units within major hospitals received IDPN as this intervention is not available in community units throughout BC. There was significant variation in the use of IDPN throughout the health authorities (HAs). The majority of HAs had 5% of HD patients on IDPN in the preceding year. In contrast, in the Vancouver Island HA 17% (54/313) of HD patients had received IDPN in the preceding year. Of the 19 renal dietitians who use IDPN in their practice, 17 were using provincial IDPN guidelines, but only 4 held a computerized record of IDPN used.

The results of this study show considerable use of IDPN throughout the province, and particularly in the Vancouver Island Health Authority. Given the lack of good evidence for the benefits of this intervention, we would propose that details from IDPN usage in BC be recorded in the provincial database (PROMIS) in order to better evaluate the effectiveness of this intervention.