NOREPINEPHRINE INFUSION FOR TREATMENT OF TYPE 1 HEPATORENAL SYNDROME

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Hepatorenal syndrome Type 1 (HRS-1) is a complication of advanced liver cirrhosis associated with high mortality and a median survival of 2 weeks. Treatment of HRS-1 and reversal of the underlying pathophysiology is extremely important for patients awaiting liver transplantation (OLT). Terlipressin is the treatment of choice for type 1 HRS but it is expensive and not approved by FDA. Norepinephrine (NE) has been shown to be equally effective and safe in two RCT.

We report a case of 27 year old white male with Child's C cirrhosis who was listed for OLT. His disease was complicated by refractory ascites and HRS type 2 at baseline. He was admitted for an acute change in mental status with a MELD score of 30 and serum creatinine (Scr) of 1.9 mg/dl. The Scr continued to rise to 2.7 mg/dl by hospital day 7 despite adequate volume expansion with normal saline and albumin. A diagnosis of HRS-1 was made after carefully ruling out other causes of renal dysfunction. A combination of octreotide and midodrine was initiated however the patient failed to respond with a continued rise in Scr to 3.5 mg/dl by day 11. At this point the above therapy was discontinued and an infusion of NE was started at 10 mcg/hr. Within 48 hours his urine output increased from 1445 ml on day 0 to 3575 ml on day 1and 3725 ml on day two, Scr decreased from 3.5 mg/dl to 2.8 mg/dl at day 2. The patient tolerated the infusion well. At this time a liver became available and the patient underwent a successful OLT. At a recent follow up visit, 9 months post OLT, the patient had a stable Scr of 1.0 mg/dl.

Infusion of NE can be an effective treatment of HRS-1. It should be considered as a primary therapy in patients whom are awaiting OLT due to its availability, cost and comparable efficacy to Terlipressin.

ACUTE INTERSTITIAL NEPHRITIS DUE TO BLUNT TRAUMA- A CASE REPORT

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Acute interstitial nephritis (AIN) accounts for 10-15% of the cases of Acute Kidney Injury (AKI) with more than 70% of the cases attributed to medications. NSAID induced AIN has typically been associated with prolonged use and rarely been reported with single dose. Blunt abdominal trauma hasn't been reported as an etiology. We report the unusual case of a patient with reversible AKI and biopsy proven AIN that occurred in the setting of abdominal blunt trauma and one single dose of Naproxen. This 23 year old *African American* female was involved in Motor Vehicle Accident and sustained a blunt abdominal trauma. Her initial evaluation showed no fracture or internal organ injury, her renal function was normal. She took one tablet of Naproxen for bilateral flank pain. Over the following three days she continued to have flank pain, nausea and vomiting. Evaluation this time showed AKI with Cr 5.3mg/dl and subnephrotic protienuria. CT abdomen showed bilateral enlarged kidneys, Ultrasound Scan was negative for hydronephrosis, Duplex scan showed no renal vein thrombosis. Urine sediment was bland, CPK was normal. Her kidney function continued to deteriorate despite fluid resuscitation over the next 2 days and Cr reached 8.3mg/dl, so was started on pulse steroid. The kidney biopsy showed evidence of AIN with normal glomerular histology. Renal function improved dramatically over the next 48 h of steroid initiation and discharge creatinine was 2.5mg/dl, she was discharged on tapered dose of Prednisone. Literature review on correlation of AKI and trauma revealed isolated case of acute proliferative GN secondary to renal blunt trauma. The time course of the events and the histological changes in our patient suggest renal trauma was the cause of AIN, which is a new unreported aspect

OXALATE NEPHROPATHY WITH END STAGE RENAL DISEASE: AN IRREVERSIBLE COMPLICATION OF GASTRIC BYPASS

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Gastric bypass procedure is the most common bariatric surgery in USA. Hyperoxaluria and nephrolithiasis with rapidly progressive end stage renal disease is increasingly identified as a complication of gastric bypass surgery.

Patient is a 57 year old man with past medical history significant for stage IV CKD coronary artery disease, IgA nephropathy, DM, hypertension, hyperlipidemia and gastric bypass for morbid obesity admitted with acute on chronic renal failure. His laboratory evaluation showed an increase in serum creatinine from baseline of 1.3-1.8 to 7.2 at admission. Urinalysis showed 30 mg of protein. Spot urine creatinine was 42 and spot urine protein was 54. Fractional excretion of urea was 48.3 in keeping with intrinsic renal failure. Renal ultrasound showed non-specific renal disease with benign renal cyst. Differential diagnosis at admission includes progression of IgA and diabetic nephropathy, oxalate nephropathy in view of gastric bypass history. Renal biopsy showed extensive calcium oxalate crystals associated with acute tubular injury in a background of diabetic and IgA nephropathy. Patient was then started on calcium carbonates to treat oxalate nephropathy with mild improvement in renal function. He is currently awaiting initiation of hemodialysis.

In conclusion, Oxalate nephropathy complicating gastric bypass presents as an acute renal failure superimposed on chronic renal insufficiency as seen in our patient. It often leads to irreversible kidney injury with rapid progression to ESRD. Early recognition of patient at risk for oxalate nephropathy with institution of appropriate treatment may lead to prevention or delay in the development of ESRD.

RHABDOMYOLYSIS CAUSED BY UNUSUAL INTERACTION BETWEEN SIMVASTATIN AND AZITHROMYCIN

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Rhabdomyolysis (rhabdo) is an uncommon but life-threatening adverse effect of statin therapy. We report a rare case of rhabdo caused by potential drug interaction between simvastatin and azithromycin.

A 73 yr Caucasian male with history of chronic kidney disease stage 3 due to idiopathic interstitial nephritis (baseline Cr 1.7 mg/dl), diabetes mellitus, hypertension, hyperlipidemia presented with weakness of lower extremities for 1 week. His medications included allopurinol prednisone, labetalol, bumetanide and simvastatin 80 mg/d (for 2 yrs). He received Azithromycin (AZI) 500 mg followed by 250 mg daily for next 4 days, 1 wk ago for acute bronchitis. He was found to have rhabdo with CPK of 11,240 U/L and Cr of 3.8 mg/dl. Discontinuation of simvastatin with IV hydration and bicarbonate resulted in resolution of rhabdo. Simvastatin was reintroduced at 40 mg/d after 2 months and later increased to 80 mg/d without any subsequent recurrence of myalgia or weakness.

Rhabdo related deaths have been reported with all statins except fluvastatin. Important variables affecting its occurrence include statin dose, patient characteristics and concurrent use of other medications that may alter the pharmacokinetics of the statins. Simvastatin and lovastatin are metabolized by CYP3A4, AZI by both CYP3A3 & 3A4 and fluvastatin by CYC2C9 enzyme system. Macrolides inhibit CYP3A4, thus elevating the statin levels. However, AZI (an azalide, subclass of macrolide) interferes poorly with CYP3A4 & after hepatic metabolism gets excreted in the bile. Although, rhabdo with AZI & lovastatin has been previously reported, this is a rare reported case of rhabdo caused by co-administration of AZI and simvastatin.

Polymorphism of CYP3A4 might explain such rare cases despite insignificant inhibition by AZT in studies. Interference in biliary excretion of statins by AZT (through P-glycoprotein and multi drug resistance protein) might be another mechanism. His advanced age, underlying CKD and high dose of simvastatin might also have contributed to this rare complication. In conclusion, AZI might be co-administered with statins, with caution as there is risk of rhabdo.

THE POLYETHERSULFONE MEMBRANE "EXPRESS" HAS A HIGHER PIPERACILLIN/TAZOBACTAM CLEARANCE INDEPENDANT OF THE DIALYSIS DOSE.

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In the intensive care setting, infection remains the leading cause of death in AKI. The goal of our study is to assess the impact of membrane types and continuous veno-venous hemodialysis (CVVHD) dose on the clearance and serum levels of piperacillin-tazobactam (pip-tazo).

Using high-performance liquid chromatography (HPLC), we measured the serum and dialysate concentrations of pip-tazo. We then calculated the total clearance and area under the curve (AUC) of the drug in 28 anuric ICU patients who were on CVVHD for uninterrupted 24 hours and received 3.375 g Pip-Tazo q 8 hours (n=21) or q 12 hours (n=7). The 15 patients on the polyacrylnitrile M100 had a total pip clearance of 50.3±17.56 ml/min compared to 64.28±25.77 ml/min in the 13 patients on the polyethersulfone membrane Express. We used regression analysis to examine the association between total clearance, trough level, AUC and the variables; filter type, CVVHD dose and dosing interval (the latter was included in the trough level and AUC analysis only). We showed a trend towards lower total clearance with the M100 membrane compared to the Express membrane (coefficient of -11.62, p=0.0203). There was a trend towards lower AUC with higher CVVHD dose (coefficient of -83.2, p=0.0281) and less frequent dosing (-3.8 coefficient for q12 vs q8, p=0.0322) independent of membrane type.

In conclusion, the membrane type and the CVVHD dose should be considered when deciding on antibiotics dosage in the critically ill patient. Larger studies are needed to study the impact of CRRT on antibiotics target pharmacokinetic levels and whether more frequent dosing of antibiotics would affect outcomes.

HAZING INDUCED RHABDOMYOLYSIS AND ACUTE KIDNEY INJURY (AKI).

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Hazing practices have become increasingly prevalent in schools within fraternities, sororities and athletic teams, as well as in nonacademic settings including the military and street gangs. Hazing is used for an individual to be initiated into an organization. Some of these acts can put the individual at risk for injury. Scant information about renal involvement from hazing is available in the literature.

A 19 year old man with no past medical problems presented with complaints of generalized aches, chills, back pain, right hand pain, and urine discoloration after suffering "an accident". On further questioning, patient stated that he had joined a "membership until fraternity" upon admission to a state college. For the last three months he had been subjected to hazing by receiving 700 to 1000 hard blows to his buttock areas and back with wooden paddles. This was done between hours of 10 pm and 3 am in off-campus secluded wooden areas.

Physical examination revealed a well built male, blood pressure of 133/92, temperature of 99.5º F, with extensive bruising on the lower back, both buttocks and upper thighs. Laboratory abnormalities revealed BUN 89 mg/dl, serum creatinine 13.7 mg/dl, calcium 7.8 mg/dl, phosphorus 9.7 mg/dl, magnesium 2.5 mg/dl, CPK 367.3 u/L, aldolase 13.3 u/L, and moderate hematuria. Renal ultrasound showed normal sized kidneys with increased echotexture. Percutaneous renal biopsy revealed 10% focal acute tubular injury with occasional muddy red-brown casts, with no chronicity and no immune complex disease. Patient required intermittent hemodialysis for 8 days with subsequent recovery of renal function.

Hazing can cause traumatic rhabdomyolysis and AKI. A common misconception exists among college students (as in our case) that once admitted, the fraternity would do its part to protect the individual from acts including hazing. Thorough education at community grass root level, in addition to utilization of legislation and institutional policies may prevent hazing and its associated severe traumatic injuries.

TENOFOVIR NEPHROTOXICITY WITH ACQUIRED FANCONI SYNDROME AND FEATURES MIMICKING ACUTE TUBULAR NECROSIS

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Tenofovir (TDF) is an acyclic nucleotide analogue reverse transcriptase inhibitor that is commonly prescribed as part of a highly active antiretroviral therapy (HAART) regimen in HIV-infected patients. Although it is generally well tolerated, it has been associated with AKI and Proximal Tubule Dysfunction.

We report a case of a 48 y/o male with history of HIV on a regimen of unboosted atazanivir 600mg daily plus tenofovir 300mg daily and emtricitabine 200mg daily for the past 13 months, his most recent CD4 count was 664 cells/ml with an undetectable viral load for 2 years. Patient was admitted with malaise and AKI, baseline creatinine 1.9mg/dl up to 13 mg/dl, with new onset proteinuria, urine protein to creatinine ratio of 0.7. Urine sediment was consistent with ATN. Features suggestive of Acquired Fanconi Syndrome including an associated nonanion gap metabolic acidosis, normoglycemic glucosuria, relative hypokalemia, and proteinuria were observed. Of note the patient previously experience indinavir stones with obstructive AKI, on renal US the stones were again seen, although without any evidence of hydronephrosis. We discontinued TDF and witnessed recovery of renal function without the need for renal replacement therapy. At follow up, AKI was recovering although with persistence of proximal tubule dysfunction.

Subnephrotic proteinuria and proximal tubule dysfunction is a common manifestation of TDF toxicity with a mean duration of onset 13.8 months into therapy. TDF causes ATN with distinctive tubular cell eosinophilic inclusions representing severe mitochondrial damage. Careful monitoring of renal function for prompt detection of TDF nephrotoxicity is critically important to ensure timely drug withdrawal before the development of irreversible tubulointerstitial injury.

LONG TERM OUTCOMES OF ACUTE KIDNEY INJURY (AKI) AFTER LUNG TRANSPLANTATION.

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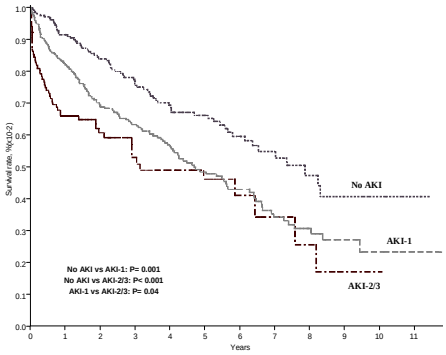
The purpose of this study was to determine the long term impact of AKI after lung transplantation.

We retrospectively evaluated data on 657 lung transplant patients from 1997 to 2009. AKI was defined and categorized into three stages according to creatinine criteria from the AKIN classification. Outcomes analyzed were death through August 2010.

We identified 424 patients (65%) who had at least one AKI (309 stage 1, 115 stage 2 and 3) event in the first 2 weeks after transplantation. 277 (42%) patients died (202 with AKI and 75 with no AKI). The survival curve (figure 1) showed that long-term survival decreased according to increasing AKI stages with significant difference between each stage. Controlling for age, gender, race, type and cause of lung transplant, and diabetes, adjusted hazard ratio for death was 1.7 (95% CI 1.2-2.2 P=0.0002) and 2.5 (95% CI 1.7-3.7 P < 0.001) for AKI stage 1 and stage 2/3 respectively.

This study showed that any AKI event, even those with minor rise in creatinine by 0.3 mg/dl, is associated with significant long term mortality.



MULTI-ORGAN CRYSTAL DEPOSITION IN A RARE CASE OF CRYSTALGLOBULINEMIA

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Introduction: Crystalglobulinemia syndrome has been described as an extremely rare complication of monoclonal gammopathy. This entity has a very rapid and progressive course with poor prognosis. It is important to recognize the presenting symptoms and initiate rapid treatment. We present a rare case of rapidly progressing disease presenting with renal injury. Case Report: A 66 year old Hispanic male rheumatoid arthritis (RA) treated with non-steroidal medications presents with acute renal injury (crt of 11.1mg/dl), 4.4gm of proteinuria, joint pains and anemia. All serological workup is negative and hemodialysis is initated. Serum protein electrophoresis showed gamma migrating paraproteinemia and urine immunofixation identified lambda type Bence Jones proteins. Clinically, the patient was rapidly deteriorating and died as a result of cardiogenic shock. Post-mortem analysis showed grossly enlarged kidneys with extensive infarction of the parenchyma of the kidneys. There were diffuse rectangular, rhomboid and sharp needle shaped hyaline-like crystals deposited in multiple organ systems, including the kidneys, myocardium, coronary arteries, tricuspid and pulmonary valves, lungs, bone marrow and other organs. IF for the renal tissue and bone marrow was positive for lamda light chains. Sections of the left anterior descending coronary artery showed seventy percent occlusion due to an atherosclerotic plaque the center of which was composed of the same crystalline material as in other tissues. Conclusion: Crystalglobunemia is a rare finding in myeloma disease. Our case provides a learning opportunity of this disease entity that progresses very rapidly. What sets this case apart from previous reports is the extensive amounts of extracellular crystalline deposits, causing rapid tissue destruction in multiple organ systems including the kidneys.

SEVERE METHANOL POISONING REQUIRING RECURRENT HEMODIALYSIS AND FOMEPIZOLE

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Diagnosing methanol poisoning requires both clinical and laboratory data and high index of clinical suspicion. Fomepizole is the first-line agent treatment; ethanol combined with hemodialysis remains the most appropriate alternative for treatment of ethylene glycol or methanol poisoning when Fomepizole is not available. We present the case of a young man with methanol poisoning requiring double treatment with an extremely high serum methanol level.

A 21 year old man with history of depression and alcohol abuse was admitted after drinking wind-shield wiper. He was drinking vodka and 12 beers daily for the previous 3 days. On admission he was alert and oriented, hemodynamically stable, had a calculated and measured serum osmolality of 291 and 549 mOsm/Kg respectively, with an osmolar gap of 258 mOsm/Kg and a methanol level of 745 mg/dL. Given the extremely elevated methanol level, he was given Fomepizole 15 mg/Kg loading dose, followed by 10 mg/kg every 4 hours. Patient was also treated with hemodialysis (HD) with dose calculated based on molecular weight of methanol (32.04 g/mol) with a large optiflux membrane size (200) and with a blood flow rate of 300 ml/min for 5.5 hours. Towards the end of dialysis the methanol level was 204 mg/dL and was 171 mg/dL after 4 hours. Despite Fomepizole treatment his level continued to be high so we decided to give a second dialysis treatment for 4 hours with the same HD dose. After second treatment his methanol level was 43 mg/dL. He was continued with Fomepizole 10 mg/Kg every 12 hours until methanol was not detectable. Patient improved and was transferred to the psychiatry facility for continuation of care.

Although treatment with Fomepizole eliminates the need for hemodialysis in many cases of ethylene glycol poisoning, this is not always clear with methanol poisoning. The literature documents a mean elimination half-time of methanol when alcohol dehydrogenase was inhibited with Fomepizole at 52 hours. This case argues for use of hemodialysis with Fomepizole therapy in patients with methanol poisoning with very elevated levels.

BIOPSY PROVEN CASE OF VANCOMYCIN INDUCED ACUTE TUBULAR NECROSIS

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With rising incidence of infections by resistant organisms, higher target levels of vancomycin (Vanco) are desired (trough concentrations of 10 to 20µg/mL) and endorsed by several clinical practice guidelines & recommended by the Infectious Diseases Society of America. Incidence of Vanco induced toxicity is rising but pathology is unclear as a vast majority of these cases are not biopsied.

A 24 year old female with Hyperimunoglobulin E syndrome (Job syndrome) and asthma since childhood with history of recurrent bacterial pneumonia, presented with chest tightness and shortness of breath not resolving with albuterol nebulisations. On exam she had labored breathing with room air oxygen saturation of 84% and a chest X ray revealed a new loculated pleural effusion with some reticular and cystic changes from before. Empiric treatment for pneumonia with Vanco 1 gm intra-venous (i.v.) every 12 hours was started which was then titrated up to 1 gm i.v. every 8 hours to target trough of 15-20µg/mL. Her condition deteriorated over the next 3-4 days with worsening respiratory distress and acute kidney injury. Vanco trough level was 70µg/mL and Vanco was held. Her creatinine progressively rose to 6.5mg/dl over the next 3-4 days as she became oliguric. She was started on hemodialysis (HD) without any improvement of her kidney function over the next week which prompted us to do a biopsy. Biopsy revealed acute tubular necrosis (ATN) with hydropic changes in tubular epithelium surrounded by mild interstitial inflammation with eosinophils consistent with medication induced ATN. She was dialysis dependant for 2 weeks. Her kidney function slowly improved and she was off HD by discharge with creatinine at baseline close to 1.5mg/dl and remained stable on outpatient follow up.

Although it is known to cause interstitial nephritis; biopsy proven cases of vancomycin induced acute tubular necrosis are rarely described.

SUSTAINED LOW EFFICIENCY DAILY DIALYSIS (SLEDD) IN THE ICU: OUTCOMES COMPARED TO INTERMITTENT HEMODIALYSIS (IHD)

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SLEDD as renal replacement therapy (RRT) is increasing in the intensive care setting. Little comparison or outcome data as to its effectiveness exists. We were interested in assessing our experience comparing SLEDD to IHD in critically ill patients with renal failure.

Records of 51 ICU patients requiring SLEDD between 2005 and 2008 were compared to 40 ICU patients receiving IHD from 2003 and 2004. 9 of the 51 were excluded due to initial use of IHD. Admission and pre-RRT APACHE II scores were calculated. The lowest serum potassium and phosphate levels after the start of RRT, as well as hospital days prior (HDP) to RRT were recorded.

The duration of 1st SLEDD treatment was 6.1 ± 2.8 hours, with subsequent treatments of 7.4±0.4 hours duration, and average blood flow rates of 150ml/hr. There was no significant difference in age, serum albumin, or admission APACHE II scores between the two groups. When comparing SLEDD vs. IHD, there was a greater Pre-RRT APACHE II score (25.1±1.1 vs 21.9±1.5, P=0.098 approaching significance), vasopressor use (76 vs 43%, P=0.0016) and HDP (7±1.7 vs 3±0.9, P=0.007), respectively. 3-day and in-hospital mortality were significantly increased in the SLEDD group (31 vs 13%, P=0.044). There were twice as many patients in the SLEDD group with phosphate levels <2.5 mmol/L compared to IHD. The average phosphate level was significantly lower in the SLEDD population (3.56±0.27 vs 4.48±0.37, P=0.042). There was no difference in average potassium level after the start of RRT.

Mortality (3-day and in-hospital) was significantly higher in the SLEDD population as compared to the IHD. However, the SLEDD group had a greater need for vasopressors, with a higher pre-RRT APACHE II scores. A higher length of stay prior to RRT in the SLEDD group may reflect a greater incidence of co-morbidities. Interestingly, the average phosphate level was significantly lower in the SLEDD group which may play an adverse role in outcomes.

A CASE OF ACUTE KIDNEY INJURY WITH UNEXPLAINED OSMOTIC NEPHROSIS

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Osmotic nephrosis is a pathologic term used to describe the pattern of vacuolization and swelling of the proximal renal tubular cells. This has been associated with infusion of sucrose, maltose, mannitol, dextran and iodinated contrast media. We report a case of osmotic nephrosis in a patient with no exposure to these agents. A 62 year old white female presented with 36 hour history of anuria. Her medical history is significant for hypertension and diabetes mellitus. Medications on admission included Valsartan, Hydrochlorothiazide, Metformin, Insulin,Simvastatin and Saxagliptin which was started 3 months before. On admission, physical exam was unremarkable. Initial laboratory exam revealed BUN 40 mg/dl, creatinine of 5.6 mg/dl, from a baseline of 1.3 mg/dl, 2 months prior. Both kidneys are of normal size and without hydronephrosis. Urinalysis revealed 3+ protein, 3+blood, 9-30 WBC. Complement levels, ANA, ANCA, hepatitis serologies and HIV were negative. Patient remained anuric, her serum creatinine peaked at 9.94 mg/ dL and she required 2 sessions of hemodialysis. A kidney biopsy was consistent with osmotic nephrosis. Patient spontaneously started diuresing on the 4th hospital day and was discharged a week later with a serum creatinine at its baseline 1 mg/dL. Cases of acute kidney injury and acute tubular necrosis have been reported with Sitagliptin (Januvia-another DPP4 inhibitor) and Exenatide(Byetta GLP-1 analog) and have been associated with rapid improvement once these medications were discontinued. Renal biopsies were performed in a minority of cases. This is, to our knowledge, the first case of AKI that occurred in the presence of Saxagliptin with no exposures that could explain the osmotic nephrosis.

CVVHDF DID NOT PROVIDE A SURVIVAL ADVANTAGE ON CVVHD IN 102 AKI PATIENTS IN A TERTIARY CARE CENTER.

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Large-sized solutes are cleared more effectively with continuous veno-venous hemodiafiltration (CVVHDF) as compared to continuous venovenous hemodialysis (CVVHD).Our goal is to assess whether CVVHDF is associated with lower mortality compared to CVVHD in AKI.

We conducted an observational trial on 102 acute kidney injury (AKI) patients who received continuous renal replacement therapy (CRRT) between 2004 and 2007. Solutes and electrolytes levels were collected before and 3 days after starting CRRT. Renal recovery and survival were defined as the primary outcomes. The sample consisted of 54 patients on CVVHD and 48 patients on CVVHDF. The mean age (64) and gender distribution (68% males) were similar in both groups. There was no difference in the prescribed dose between the 2 groups. All-cause mortality was high in both groups (65% in CVVHD and 73% in CVVHDF) and complete renal recovery was low in both groups (8/54 in CVVHD and 6/48 in CVVHDF). We used propensity score analysis to compare solutes changes and outcomes between the 2 groups. Urea reduction was higher in CVVHD (mean difference 14.55 and $p=0.02$). There was no significant difference in outcomes. Odds ratios (CVVHDF/CVVHD) for mortality and renal recovery were 1.09 ($p=0.87$) and 1.04 ($p=0.95$) resp.

Our study is limited by the fact that outcomes were not corrected for severity of illness. Our sample is not powered to detect differences in outcomes based on the etiology of AKI. Larger studies might elicit whether CVVHDF offers survival advantage in septic AKI. To date, CVVHD seems to provide an equal and cost-effective alternative to CVVHDF in critically ill patients.

INTRATHECAL METHOTREXATE NEPHROTOXICITY

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We are reporting a patient who presented with acute renal failure secondary to intrathecal methotrexate administration for treatment of acute lymphoblastic leukemia (ALL).

A 47 year-old Hispanic gentleman presented to our hospital complaining of generalized fatigue and lower extremity rash. Laboratory data disclosed a complete blood cell count with a WBC of 1.6, PLT < 61,000, HCT 40.9%, HGB 14.4 g/dl. Serum urea was 14 mg/dl, creatinine .9 mg/dL. Bone marrow biopsy showed a hypercellular bone marrow (90%) and with increased blast cells (nearly 100%) compatible with ALL. Patient received cyclophosphamide, vincristine, doxorubicin and dexamethasone and intrathecal methotrexate with hydration and aklalinization. The following day, creatinine increased to 2.5mg/dl, serum uric acid level was 10.6 mg/dL, methotrexate level was 23.56 µM, confirming tumor lysis syndrome. He was further treated with intravenous hydration, alkalinization of the urine, and supportive therapy with intensive leucovorin for 12 days.

This is the 2nd known case report that illustrates a previously unrecognized potential complication of intrathecal methotrexate -- acute tumor lysis syndrome. If not treated early and aggressively, methotrexate can damage normal cells leading to cell death and resulting in renal, hepatic, and central nervous system toxicity. As this case illustrates, even with intrathecal methotrexate toxicity, treatment with pharmacologically guided leucovorin rescue along with continuation of hydration and alkalinization will facilitate restoration of renal function and decrease the risk of impending systemic toxicity.

RENAL REPLACEMENT THERAPY (RRT) AFTER LUNG TRANSPLANTATION: INCIDENCE, PREDICTORS AND OUTCOME

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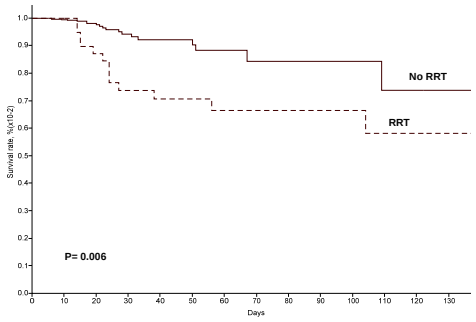
Purpose: Describe the incidence and outcome of lung transplant recipients requiring RRT in the perioperative period.

Method: We retrospectively evaluated data on 657 lung allograft recipients transplanted between 1997 and 2009. Outcomes measured were RRT in the first 2 weeks after transplantation and in-hospital mortality.

Result: We identified 40 patients (6 %) who required RRT. Predictors of RRT requirement by univariate analysis were double vs. single lung transplant, pulmonary hypertension (PHT) and pre-transplant eGFR <60 ml/min/1.72m^2. On multivariate analysis, PHT (OR=6.3, 95% CI 1.9-19) remained independently associated with need for RRT. There were 34 (5%) deaths in the post operative period, 13 (32%) in the RRT group and 21 (3%) in the no RRT group. In hospital mortality was higher in those who required RRT (fig 1). After adjusting for age, race, type of lung transplant, PHT, baseline eGFR and pre-transplant diabetes, the need for post-transplant RRT remained independently predictive of in-hospital death (HR=2.8,95% CI:1-4.1).

Conclusion: PHT is a strong predictor for dialysis need after lung transplantation and RRT is associated with significant in-hospital mortality.



INTRAVENOUS IMMUNOGLOBULIN ASSOCIATED RENAL FAILURE IN A PATIENT WITH POST TRANSFUSION PURPURA

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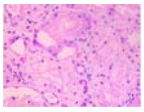
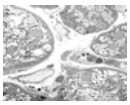
Introduction: Intravenous immunoglobulins (IVIG) are commonly prescribed in auto-immune disorders and are generally well tolerated. Acute kidney injury associated with IVIG therapy has been described in very few instances.

Case report: A 59 year old African American male with a past medical history significant for hypertension, diabetes mellitus and extensive peripheral vascular disease was admitted with left toe gangrene and complete occlusion of the femoro- popliteal bypass graft. The patient underwent an amputation of the left knee. Postoperatively, he received 2 units of packed red blood cells (PRBC`s) due to the blood loss related to the procedure and was subsequently discharged home. Five days later he was readmitted with complaints of persistent fever. Labs data showed a rapidly plummeting platelet count from 180,000 to 4,000 in a matter of three days. Post transfusion purpura was considered and IVIG therapy (Carimune NF) was initiated. Three days later, the patient developed oliguria and serum creatinine worsened from 1.4 to 6.6. A renal biopsy was obtained which was consistent with osmotic nephropathy. IVIG was withdrawn following which the patient started making good volume of urine and serum creatinine normalized in about a week.

Discussion: Renal failure secondary to IVIG is extremely rare. The suggested mechanism is the effect of the osmotic load posed by the sucrose content in the IVIG resulting in vacuolization of tubules. Most cases resolve spontaneously. Diagnosis is by establishing a temporal association, ruling out other causes and can be confirmed by a biopsy.





MODEST PARACENTESIS IN CIRRHOTIC PATIENTS HAS NO EFFECT ON RENAL FUNCTION

Mohit Gupta, Yevgeniy Latyshev, Mailha Ahmed, Rouzbeh Afsari, Neha Bansal, Shahid Nauman, Prasanna Srinagesh, Ziauddin Ahmed. Drexel University College of medicine Philadelphia, PA, USA

The effect of paracentesis on renal function has been an ongoing debate. Controversy exists if paracentesis leads to improvement or deterioration of renal function. We reviewed at the effects of paracentesis on kidney function as determined by the serum creatinine.

Data was collected on 10 patients with cirrhosis of liver who received at least one therapeutic paracentesis. Patients with ongoing sepsis, those receiving renal replacement therapy and on nephrotoxic medications were excluded.

All patients received IV albumin as per hospital protocol to support BP. Data analysis revealed that 500 cc – 6000 cc with a mean of 3.6 Liter of ascitic fluid was removed with each paracentesis.

Out of the ten patients, one (10%) had an improvement in their creatinine over next three days. One patient's (10%) creatinine worsened following the paracentesis. The other 8 (80%) patients had no significant change in their creatinine levels over the next 3 days.

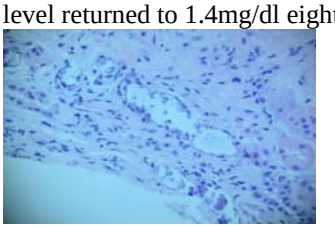
One in 10 patient (10%) had improved BP readings, 1/10 (10%) had decreased BP readings and 8/10 (80%) had BP unchanged BP readings over next 3 days. From this observational study it appears that performing paracentesis does not have a significant effect on the serum creatinine in cirrhotic patient with significant ascites.

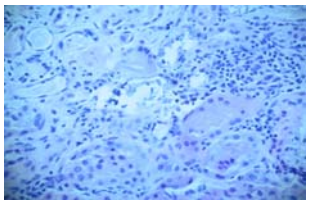
ACUTE KIDNEY INJURY SECONDARY TO KIDNEY CRYSTALLIZATION ATTRIBUTABLE TO NELFINAVIR.

Zaher Hamadeh, Tejinder S. Ahuja[2], Jeffrey Kopp[3].
Jacobi Medical Center, New York, NY; [2]University of Texas Medical Branch, Galveston, TX; [3]National Institutes of Health, Bethesda, MD.

Indinavir a Protease Inhibitor (PI) that can cause nephrolithiasis, crystalluria and acute kidney Injury (AKI). We are reporting a case of AKI and kidney crystallization induced by Nelfinavir another PI.

A 72 years old African American male with history of HIV infection admitted with a creatinine of 3.2mg/dl (0.9mg/dl 4 months ago). His CD4 lymphocyte count is 753cells per cubic millimeter, viral load < 75 copies/ml and has been on the same highly active antiretroviral therapy (HAART) regimen including Nelfinavir for the last 2 years. He denied hematuria, back or flank pain. There was no history of urinary retention, nephrolithiasis or Nephrotoxins use. Labs showed no eosinophilia. Urinalysis showed bland urine sediment with no proteinuria. Renal ultrasound was unremarkable. Percutaneous kidney biopsy was performed and light microscopy showed tubules with intraluminal deposits and chronic tubulo-interstitial nephritis (see Fig); Electron Microscopy confirmed the amorphous crystals within the tubular lumina. Nelfinavir serum trough level was 3ug/ml at the upper normal (normal range of 1-3ug/ml). HPLC was done on a urine sample which detected Nelfinavir. A kidney tissue sample was sent for Mass Spectrometry which showed MW of the kidney crystals consistent with Nelfinavir free-base. HAART regimen was discontinued and creatinine level returned to 1.4mg/dl eight months later.



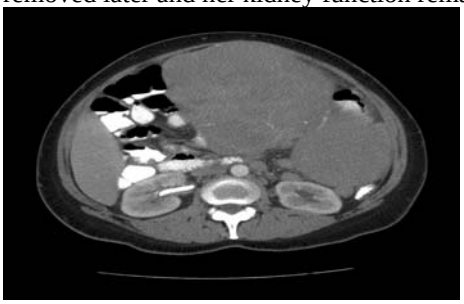


Nelfinavir is another PI that can cause tubular crystals deposition and AKI.

SEVERE OBSTRUCTIVE NEPHROPATHY DUE TO LARGE UTERINE FIBROID IN YOUNG NON PREGNANT WOMAN

Zaher Hamadeh, Naheed Ansari. Jacobi Medical Center, Albert Einstein College of Medicine, New York, USA.

Uterine Leiomyomas are prevalent benign monoclonal tumors but their presentation with obstructive Nephropathy is very uncommon. We report a case of reversible severe Acute Kidney Injury (AKI) from Obstructive Nephropathy with secondary hypertension in young non pregnant female from large Leiomyomas. 38 years old Female with history of Uterine Fibroids was admitted with Creatinine of 8.3mg/dL (creatinine of 1.0mg/dL 6months ago) Physical examination revealed new onset hypertension 169/106mmHg and 40 week size uterine mass on abdominal exam. Renal Ultrasound showed bilateral hydronephrosis. Foley catheter drained only 400cc of clear urine. Patient went for cystoscopy and bilateral ureteral stents were placed. CT scan was done and confirmed the large uterine fibroids (see pic). Her renal function improved with Creatinine of 0.9mg/dL a month later. Also Her Blood pressure normalized without any medications. Patient underwent total abdominal Hysterectomy and pathologic examination revealed fibroids with no malignancy. Ureteral stents were removed later and her kidney function remained unchanged.



Renal Complications from Uterine Fibroids including Obstructive Nephropathy and secondary Hypertension are rare but could be very serious and they need to be recognized early since they could be reversible.

ESOMEPRAZOLE INDUCED ACUTE INTERSTITIAL NEPHRITIS (AIN).

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University of Connecticut Health Care Center, Farmington, CT

We present a case of suspected esomeprazole-induced AIN and discuss the controversy about the role of steroids in its treatment.

A 42 year old man with past medical history of type I diabetes mellitus for 7 years was admitted for pneumonia and had a complicated surgical course requiring prolonged hospital stay. On day 20, patient developed acute kidney injury (AKI) with creatinine increasing from 1 to 2.4 mg/dl. The only new medication was esomeprazole, started 3 days prior to the kidney injury. Other medications in the past one week were tylenol, zofran and dilaudid. Patient had stable blood pressures, no recent NSAID or contrast exposure. He had frank pyuria on urinalysis with repeated urine cultures positive only for skin contaminants. There were no urine eosinophils. A gallium scan demonstrated significant bilateral renal uptake compatible with suspected esomeprazole induced AIN. He was treated with pulse steroids.

AIN causes 5-15% of all AKIs, two-thirds of which are due to antibiotics. Contrary to popular belief, eosinophilia is seen in only 35% of patients with 80% showing eosinophiluria. The most common presentation is non-nephrotic proteinuria. A recent survey shows that 96% of physicians were not aware of AIN as an adverse effect of proton pump inhibitors despite their widespread use. The mainstay of therapy is removal of the offending agent. However, studies have shown that 30-70% patients may not recover completely.

Due to the lack of large, prospective, randomized, control trials, there is still controversy about the role of steroids in the treatment of AIN. Only 2 major retrospective studies have compared steroid versus conservative therapy. Although, there are discrepancies in the results of these studies, we feel that steroid therapy is worthwhile in patients not responding to conservative management. Our conclusion, based on the review of the literature, is that starting steroids within 2 weeks of discontinuation of the offending agent has potential for maximum benefit.

ACUTE KIDNEY INJURY AS THE INITIAL PRESENTATION OF ACUTE RETROVIRAL SYNDROME

Pooja Kayi, Swapna Kamadana, Anil Agarwal. Department of Internal Medicine, The Ohio State University, Columbus, Ohio, U.S.A.

Infection with human immunodeficiency virus (HIV) can cause acute kidney injury (AKI) via multiple mechanisms. Highly active antiretroviral therapy (HAART) has revolutionized the medical management of HIV and AIDS infection; nevertheless, there are still cases in the United States of undetected acute retroviral syndrome which can present with AKI as their initial manifestation posing a diagnostic dilemma.

A 31 year old male with a history of epilepsy initially presented with acute necrotizing gingivitis only to subsequently be hospitalized with profound malaise, anuria for 3 days, and evidence of AKI with BUN 32 and Cr 5.6. Further workup revealed pancytopenia, elevated liver function tests, low complement levels, CK 1184, but negative hepatitis panel for A, B, C, and HIV-1/2 antibody testing. CT scan of the abdomen and pelvis and renal ultrasound were nondiagnostic. The patient's renal function continued to decline, necessitating 4 sessions of hemodialysis. Further probing into his social history revealed his homosexual lifestyle and no history of IV drug usage. Renal biopsy showed acute tubular necrosis, positive myoglobin and mild to moderate glomerular basement membrane thickening. Testing with HIV RNA PCR revealed a viral load of >750,000. The patient was started on HAART and eventually recovered full renal function.

In conclusion, our case illustrates AKI as the initial presentation of HIV infection during the seronegative window. Considering his constitutional symptoms and viral like prodrome it is likely that acute retroviral syndrome significantly contributed to his AKI. Although he required renal replacement therapy, his kidney function recovered with prompt antiretroviral treatment and supportive therapy. Raising awareness of this diagnostic dilemma is important as expeditious treatment can result in recovery of renal function.

CAST NEPHROPATHY AS A HARBINGER OF HISTOLOGIC TRANSFORMATION OF WALDENSTROM MACROGLOBULINEMIA

Binaya Khanal, Anjali Parajuli, Sylvia Betcher
SUNY Upstate Medical University, Syracuse, New York

We report a 71 year old male who was diagnosed with Waldenstrom macroglobulinemia 9 years ago with urine Ig M paraprotein and retroperitoneal lymphadenopathy. Of note, he was treated with four cycles of Rituximab infusion in the past. He presented suddenly with non-oliguric acute kidney injury with serum creatinine of 4.6. He was asymptomatic and hemodynamically stable. Random urine protein creatinine ratio was 4 although urine dipstick showed only 30 protein. Renal biopsy showed myeloma cast nephropathy with Ig G lambda paraprotein. Glomeruli did not show mesangial matrix increase, hypercellularity or amyloid. Of note, serum immunofixation electrophoresis showed Ig G kappa and Ig M lambda paraproteins quantitatively increased compared to 9 years ago. Similarly, urine immunofixation electrophoresis also showed much higher quantitative free kappa and lambda light chains. The patient underwent series of plasmapheresis and his renal function improved. Bone marrow biopsy was suggestive of Ig G lambda plasma cell myeloma with 60% plasma cell infiltration. Of note, bone marrow biopsy 9 years ago was negative for myeloma. He was then treated with Bortezomib and Dexamethasone. Unfortunately, he gradually worsened kidney function and was started on hemodialysis.

Waldenstrom macroglulinemia is a rare disorder characterized by circulating monoclonal Ig M and lymphoplasmocytic lymphoma in bone marrow. Although our patient was asymptomatic, patients present with symptoms due to infiltration of hematopoitic tissues or the effect of circulating Ig M. Renal failure is unusual and especially cast nephropathy doesnot occur due to very less urinary light chains compared with myeloma. Acute kidney injury in this setting deserves renal biopsy because of rare possibility of cryoglobulinemia, tumor cell infiltration or immune mediated glomerulonephritis. The cast nephropathy on renal biopsy in our case suggested the histologic transformation of bone marrow to plasma cell myeloma.

SUNITINIB INDUCED HYPERURICEMIA AS A CAUSE OF ACUTE KIDNEY INJURY: AN UNDERRECONGNIZED ASSOCIATION

Karilyn Larkin, Amir Mortazavi, Susan Vandlik, Swapna Kamadana

Acute kidney injury (AKI) is a significant complication of cancer therapy. While most etiologies of AKI secondary to chemotherapy agents are well described, some of the more nephrotoxic effects of sunitinib are underrecognized.

A 66 year-old male was diagnosed with metastatic bladder cancer in 2005. He initially had a good response to chemotherapy but eventually had progression of disease. Based on Phase II trial results, he was started on sunitinib, a multi-targeting receptor tyrosine kinase inhibitor, in 2009. Two months after starting sunitinib, he presented to the hospital with altered mental status, poor appetite, and abdominal and leg pain. He was noted to be arousable, afebrile, hypertensive, with lower extremities very tender and edematous. Admission labs revealed BUN 120, Cr 6.4mg/dl, and potassium 7.2. Eventually the patient was found to have severe gouty arthritis and uric acid was found to be 16.3mg/dl. He was treated with vigorous hydration, rasburicase, and steroids. With these specific therapies, his uric acid normalized, and his kidney function and mental status returned to baseline.

In conclusion, it is felt his hyperuricemia was the inciting event for his clinical picture. This case demonstrates an underrecognized cause of AKI secondary to sunitinib therapy. Sunitinib has been associated with tumor lysis syndrome, acute interstitial nephritis, thrombotic microangiopathy, rhabdomyolysis, and nephrotic syndrome. Although, the incidence of clinically significant hyperuricemia is reported as 12% in the package insert, the significance of sunitinib-related hyperuricemia is not well reported in current literature, and to the best of our knowledge, there is no other case report like this. Importantly, sunitinib is used to treat a variety of malignancies and the side effect of hyperuricemia is one that should be remembered and treated properly, when clinically indicated, to prevent morbidity and mortality.

FIBROMUSCULAR DYSPLASIA IN A MAN WITH RENAL INFARCTION

Kayode Lawrence, Peter Soltani, Salwa Rhazouani, Saad Bhatti, Joseph Lieber, Aaron Stern. Elmhurst Hospital Center, MSSM, NY.

Fibromuscular dysplasia (FMD) is a rare non atherosclerotic, non inflammatory arterial disease, commonly affecting young women presenting as hypertension. A string of beads appearance on renal arterial imaging is characteristic of this disorder. We report a case of fibro-muscular dysplasia presenting as acute renal infarction in a young man.

A 36 y/o man presented to the ER with sudden onset of left flank pain. Vital signs showed an elevated BP of 164/91 and temperature of 100.2 F. Abdominal exam revealed tenderness in left posterior lumbar region. Rest of the physical exam was unremarkable.

Labs were significant for WBC 16 k which peaked to 23 k on day 2, neutrophil of 84%, bun/cr (mg/dl) of 7/1.4, UA was negative for nitrite or leukocyte esterase, 0-3 wbc/hpf & 0-2 rbc/hpf. ALT, AST, LDH (U/L): 65, 47, 211 respectively, repeat was 105, 90,974.

CT scan showed poor perfusion of the mid upper pole of left kidney suggesting infarction, MRA and subsequent angiogram showed multiple stenosis of left renal artery typical of FMD with widely patent right renal artery and abdominal vessels. He underwent balloon angioplasty, subsequent creatinine was 1.2 with normalization of liver function test.

FMD with a prevalence of < 1% among hypertensive patients is an under diagnosed condition.

ANABOLIC STEROIDS:BODYBUILDER'S BEST FRIEND OR WORST ENEMY

Devang Lodhavia, Jatinder Singh, Zohreh Soltani
LSU-Health Sciences Center, New Orleans, LA.

Introduction: The non-therapeutic use of anabolic steroids and protein supplements is common among amateur bodybuilders. Although FDA issued public health advisory warning consumers to stop using any bodybuilding product that contains anabolic steroids in 2009, unfortunately these compounds are still available and used by young adults without realizing the serious side effects.. We report a case of cholestasis-induced kidney injury (CIKI) secondary to anabolic steroid-enriched dietary supplement (testadrol).

Case: A 31 year old male presented with jaundice and abdominal pain after taking testadrol supplements for 3 weeks. Labs showed total bilirubin of 34mg/dl, AST 63 u/L, ALT 222uU/L and normal renal function. Abdominal imaging studies, and other labs including acute hepatitis panel were unremarkable. Therefore, jaundice was attributed to testadrol- induced cholestasis and supportive treatment was initiated. 3 weeks later, although the steroid had been discontinued, patient's clinical condition deteriorated and he was readmitted with persistent vomiting and nausea. Laboratory results were significant for a creatinine of 15.6mg/dl, Na 111 mmol/L, Total bilirubin 59mg/dl, AST 140 u/L, ALT 62 u/L, INR >9.7, CPK 5785u/L, Cl 71 mmol/L, HCO3 17mmol/L and positive myoglobinuria. His spun urine was consistent with acute tubular injury (ATN). Due to oliguria and metabolic acidosis, he was started on renal replacement therapy for few hours. Ursodeoxycholic acid was also initiated for liver dysfunction.. After 48 hours, the urine output improved and Na trended up to128 mmol/L..

Discussion: CIKI due to anabolic steroids is reported in few cases. The exact mechanism still remains unclear. Our case is further remarkable because it is the first report of the constellation of CIKI, hyponatremia and rhabdomyolysis. In spite of elevated CPK and myoglubinuria, our patient never reported history of recent exercise, muscle injection, and muscle pain. We believe that his severe liver injury, persistent vomiting, low oral intake, and AKI resulted in severe hyponatremia. The rhabdomyolysis would occur because of severe hyponatremia which were also reported in PUBMED.

SOLUTE CLEARANCE IN CRRT: COMPARING MEASURED EFFLUENT VOLUME TO ACTUAL DELIVERED DOSE

William Lyndon, Keith Wille, Ashita Tolwani
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Substantial efforts have been made towards defining the dose threshold of continuous renal replacement therapy (CRRT) associated with improved survival in critically ill patients with acute kidney injury. Published studies have based dose of CRRT on small solute clearance, expressed as total effluent volume (TEV) per weight and unit time (ml/kg/hr). These studies have not compared CRRT dose based on the measured TEV to the actual delivered dose as determined by direct quantitative measurement of the solute in the effluent. The purpose of this study was to determine whether the measured TEV corrected for pre-dilution replacement fluid (RF) accurately estimates actual delivered small solute clearance.

We retrospectively analyzed data that had been prospectively collected for 200 patients enrolled in a randomized controlled trial comparing survival with a prescribed effluent rate of 20 ml/kg/hr (standard dose) to 35 ml/kg/hr (high dose) using pre-dilution continuous venovenous hemodiafiltration (CVVHDF). Filters were changed every 72 hours. Effluent urea nitrogen (EUN) and creatinine (ECr) levels, and TEV were obtained daily. Estimated effluent dose was defined as the TEV corrected for the pre-dilution effect of the RF. Actual delivered dose was calculated as: (EUN/BUN)*TEV for urea and (ECr/SCr)*TEV for creatinine. Complete data were available for 165 patients.

The difference in actual delivered dose for the standard dose compared to the high dose group was statistically significant for both measured urea and creatinine clearances ($p<0.0001$). For the standard dose group, there was no difference between the estimated effluent dose and actual delivered urea and creatinine clearances. For the high dose group, estimated dose based on TEV differed significantly from both the delivered urea clearance by 7.1% ($p<0.0001$), and the creatinine clearance by 13.9 % ($p<0.0001$).

Direct measurement of solute clearance is indicated if providing pre-dilutional CVVHDF.

HYDRALAZINE INDUCED ANTI NEUTROPHIL CYTOPLASMIC ANTIBODY VASCULITIS PRESENTING AS PULMONARY RENAL SYNDROME

Vamsee Marina, Dinkar Kaw
University of Toledo Medical Center, Toledo, Ohio

Hydralazine is a commonly used drug for treatment of hypertension and is known to cause drug induced lupus erythematosus. It has rarely been reported to cause ANCA positive vasculitis. Although, drug induced vasculitis has been infrequently associated with crescentic rapidly progressive glomerulonephritis, pulmonary involvement presenting as a pulmonary-renal syndrome is extremely rare.

A 58-year-old male with a past medical history of hypertension and non-ischemic cardiomyopathy presented with a 3 week history of worsening shortness of breath, hemoptysis, fatigue, generalized weakness and arthralgias. His medications include hydralazine 50 mg three times a day, lisinopril, bumex, aldactone and carvedilol for three years. The physical examination was only significant for bilateral crackles. Chest X-ray showed diffuse alveolar infiltrates. He required intubation and mechanical ventilation for respiratory distress. Serum creatinine on admission was elevated at 11 mg/dl (base line creatinine was 1.6 to 1.7 mg/dl). CRRT was initiated for clearance and to maintain volume status. Urinalysis was positive for many RBC/hpf and few RBC casts. Serology for p-ANCA, anti myeloperoxidase (MPO) antibody, anti nuclear antibody (ANA) and anti histone antibodies was positive in high titers. Anti double stranded DNA antibodies were negative and serum complements were normal. Bronchoscopy showed diffuse alveolar hemorrhage. Transbronchial biopsy showed vasculits and intra- alveolar hemorrhage. His was ventilator dependent and hemodynamically unstable, which precluded native kidney biopsy.

Hydralazine has been associated with several antibodies like ANA, anti MPO, anti histone, anti sjogrens and anti elastase. Additionally, we are reporting the presence of anti phospholipid antibodies specific to anti cardiolipin, anti beta-2 glycoprotein and anti phosphatid in this patient that have previously not been reported. Despite initiating aggressive treatment with high dose intravenous corticosteroids and cyclophosphamide, the patient had a fatal outcome, which emphasizes the importance of clinical suspicion and early diagnosis.

ASSOCIATION OF HYPERKALEMIA AT CRITICAL CARE INITIATION AND MORTALITY

Gearoid M. McMahon, Fiona K. Gibbons, Kenneth B. Christopher. Brigham and Women's Hospital, Massachusetts General Hospital, Boston, MA

The relationship between serum Potassium and mortality in critical illness is not known. We performed a multicenter observational study of 39,705 critically ill adult medical and surgical patients treated between 1997 and 2007. The exposure of interest was the highest Potassium on the day of critical care initiation and categorized as 4.0-4.5, 4.5-5.0, 5.0-5.5, 5.5-6.0, 6.0-6.5 or >6.5 mEq/L. Logistic regression examined death by days 30, 90 and 365 post-critical care initiation and in-hospital mortality. Adjusted odds ratios were estimated by multivariable logistic regression models. Adjustments included age, race, gender, Hct, WBC, BUN, Cr, Deyo-Charlson Index, transfusion, patient type (medical vs. surgical), sepsis, Renal Replacement, and AKI.

Potassium was a strong predictor of 30-day mortality with a significant risk gradient across K groups following adjustment: K 4.0-4.5 OR for 30-day mortality 1.00 (Referent group), K 4.5-5.0 OR 1.25(95% CI, 1.16-1.35; P<.0001), K 5.0-5.5 OR 1.44(95% CI, 1.31-1.58; P<.0001), K 5.5-6.0 OR 1.75(95% CI, 1.55-1.98; P<.0001), K 6.0-6.5 OR 1.76(95% CI, 1.48-2.10; P<.0001), K >6.5 OR 1.84(95% CI, 1.60-2.12; P<.0001). Results were similarly significant at 90 and 365 days and for in-hospital mortality. The presence of AKI did not modify the results.

Even a modest elevation of serum Potassium at critical care initiation is a significant predictor of all cause patient mortality in the critically ill.

RARE AND FATAL CAUSE OF MASSIVE RHABDOMYOLYSIS AND KIDNEY INJURY: PROPOFOL INFUSION SYNDROME

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Hofstra North Shore-LIJ School of Medicine, Great Neck, NY

As nephrologists, we often encounter cases of rhabdomyolysis, but the syndrome described here is rare and often missed in the differential diagnosis especially in intensive care settings. We report a unique case of propofol infusion syndrome PRIS that developed with low dose propofol infusion and associated with severe hyperthermia.

24-year old male, brought to us after a motor vehicle crash and sustained multiple cervical fractures and left fronto-temporal subdural hematoma. Patient was unresponsive at the scene and the Glascow Coma Scale scored 7; for which he was intubated for airway protection. Propofol infusion was started at a rate of 3mg/kg/hr. On day four, he started spiking fever peaked at 107 F. This is followed by acute circulatory shock requiring Norepinepherine and Vasopressin infusion. He also developed oliguric acute kidney injury with creatinine up to 3.0 mg/dl from a normal baseline. Creatine Kinase noted to be 60,100U/L which increased to 238,160U/L after four hours, and the level continues to increase dramatically to max level of 640,800U/L within the next 2 days. Arterial blood gas showed severe metabolic acidosis and lactic acid of 5.0mEq/L. Other blood work were consistent with rhabdomyolysis; potassium 6.7mEq/L, Calcium 4.4mg/dl, phosphorus 15.9mmol/L. Eventually, continuous renal replacement therapy was started. Despite maximal supportive therapy; however, he had cardiac arrest and died. Patient's entire constellation of signs and symptoms could not be explained by other possible causes.

PRIS is a fatal event with mortality rate exceeding 80% of the published case reports. Due to the rapidity of its progression and its high fatality; high suspicion and early recognition can potentially shift the course of the disease into a favorable outcome. Early signs include signs of cardiovascular collapse, lipemia, unexplained metabolic acidosis, rhabdomyolysis and lactic acidosis. Critical care staff and mainly nurses should be trained to recognize PRIS and those patients at high risk to develop it especially with the use of high dose of propofol >4mg/kg/hr for longer than 48 hours.

ACUTE OXALATE NEPHROPATHY FROM INTRAVENOUS VITAMIN C THERAPY

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Ascorbic acid, or vitamin C, is an important antioxidant and plays a role in collagen synthesis. However, there are growing concerns of using excessive amounts resulting in impaired renal function. Ascorbic acid has been shown to be eliminated by the kidney via filtration and active tubular resorption. It has also been demonstrated that ascorbic acid is converted to oxalic acid and may lead to oxalate deposits in renal tubules. Previous case reports have described renal insufficiency associated with chronic and high doses of vitamin C therapy. We present a unique case of intravenous ascorbic acid therapy causing acute renal failure confirming that it is not a benign medication and should be used cautiously in patients with normal kidney function.

A 79 year old male with history of metastatic prostate cancer presented to emergency room with worsening edema, decreasing urine output, and gross hematuria for one week. Patient had been undergoing alternative treatment for metastatic prostate cancer in Tijuana, Mexico since one month prior to presentation. Per outside records his therapy consisted of 6 doses of 30 grams of intravenous vitamin C over the course of one month. His last dose was noted to be 2 weeks prior to admission. Prior to treatment, patient had a normal creatinine of 0.8 mg/dl but on admission was noted to have an elevated creatinine of 3.2 mg/dl. Patient's urine revealed nephrotic range proteinuria and hematuria; moreover imaging of kidneys revealed no abnormalities. Follow up labs revealed normal complement levels, along with antinuclear antibody, antineutrophil cytoplasmic antibody, and antistreptolysin O antibody titers that were negative. Patient was initiated on dialysis and renal biopsy was performed which demonstrated acute tubular necrosis and oxalate deposition. We illustrate a unique case of intravenous vitamin C therapy leading to acute oxalate nephropathy.

ARE WOMEN AT HIGHER RISK TO DEVELOP RADIOCONTRAST-INDUCED NEPHROPATHY (RCIN) FOLLOWING CORONARY ANGIOGRAPHY?

Javier Neyra, Gordon Jacobsen, James E Novak
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RCIN is the third leading cause of hospital-acquired acute kidney injury in the United States and is associated with unfavorable outcomes. It is unknown whether female gender influences the development of RCIN.

We retrospectively utilized a population-based linked administrative database of hospitalized patients who underwent coronary angiography from January 2008 through December 2009 to assess multiple risk factors for RCIN. We excluded patients with baseline estimated glomerular filtration rate (eGFR) < 15 mL/min/1.73m^2 and those with double contrast exposure or need for acute or chronic dialysis. RCIN was defined as an increase in creatinine > 25% from baseline, absolute increase in creatinine ≥ 0.5 mg/dL, or decrease in eGFR ≥ 25% within 72 hours after contrast exposure.

A total of 1211 patients were included in the study, 481 (39.7%) with eGFR between 15 and 59 mL/min/1.73m^2 and 730 (60.3%) with eGFR ≥ 60 mL/min/1.73m^2. There were 530 (43.8%) female patients included in the study (242 in the group with eGFR between 15 and 59 mL/min/1.73m^2 and 288 in the group with eGFR ≥ 60 mL/min/1.73m^2). Among these patients, RCIN occurred in 105 (19.8%) women and in 93 (13.6%) men (p = 0.004). After adjustment for possible confounders, multivariable analyses identified female gender to be an independent predictor of RCIN (odds ratio [OR] 1.62, 95% confidence interval [CI] 1.17 – 2.21, p = 0.003). Other predictors included the use of furosemide (OR 2.53, 95% CI 1.83 – 3.47, p < 0.001) and contrast media volume > 100 mL (OR 1.44, 95% CI 1.04 – 1.98, p < 0.001). Subgroup analyses of female gender as a risk factor for RCIN showed a significant OR (1.94, 95% CI 1.25 – 2.99, p = 0.003) in patients with eGFR ≥ 60 mL/min/1.73m^2 but not in those with eGFR between 15 and 59 mL/min/1.73m^2 (1.09, 95% CI 0.66 – 1.81, p = 0.742).

Women with eGFR ≥ 60 mL/min/1.73m^2 are at higher risk than men to develop RCIN following coronary angiography.

INCIDENCE OF RADIOCONTRAST-INDUCED NEPHROPATHY (RCIN) FOLLOWING CORONARY ANGIOGRAPHY

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RCIN is the third leading cause of hospital-acquired acute kidney injury in the United States and is associated with unfavorable outcomes. Biochemically defined RCIN sometimes is not necessarily equivalent to clinically significant RCIN, especially in patients with normal kidney function.

We retrospectively utilized a population-based linked administrative database of hospitalized patients who underwent coronary angiography from January 2008 through December 2009. The biochemical definition of RCIN included increase in creatinine > 25% from baseline, absolute increase in creatinine ≥ 0.5 mg/dL, or decrease in estimated glomerular filtration rate (eGFR) ≥ 25% within 72 hours after contrast exposure. Clinically significant RCIN implied inpatient mortality, inpatient initiation of dialysis, or delayed hospitalization due to RCIN.

From a total of 1207 patients who underwent coronary angiography, 194 patients (16%) had biochemically defined RCIN but only 42 patients (3.5%) developed clinically significant RCIN. Among these patients, the incidence of clinically significant RCIN was 29% in the group with baseline eGFR between 15-59 mL/min/1.73m^2 (group A = 72 patients) and 16% in those with baseline eGFR ≥ 60 mL/min/1.73m^2 (group B = 105 patients) (odds ratio [OR] 3.87, 95% CI 1.62 – 9.42, $p < 0.001$). 7 patients (10%) died in group A and 8 (8%) died in group B (median follow up of 38 months and 20 months, respectively) ($p = 0.621$), 7 patients (10%) were started on dialysis as outpatients in group A but none patients in group B ($p = 0.001$), and 37 patients (51%) had significant and irreversible increase in creatinine (> 0.3 mg/dL) in group A compared to 27 (26%) in group B (median follow up of 30 months and 19 months, respectively) ($p = 0.004$).

In our population, patients with baseline eGFR between 15 and 59 mL/min/1.73m^2 and biochemically defined RCIN following coronary angiography have higher incidence of clinically significant RCIN, irreversible increase in follow-up serum creatinine, and outpatient initiation of dialysis compared to those with higher eGFR.

IS CHRONIC EXPOSURE TO ANGIOTENSIN-CONVERTING ENZYME INHIBITORS (ACEI) OR ANGIOTENSIN RECEPTOR BLOCKERS (ARB) A RISK FACTOR FOR RADIOCONTRAST-INDUCED NEPHROPATHY (RCIN)?

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RCIN is the third leading cause of hospital-acquired acute kidney injury in the United States and is associated with unfavorable outcomes. It is unknown whether chronic exposure to ACEI or ARB influences the development of RCIN.

We retrospectively utilized a population-based linked administrative database of hospitalized patients who underwent coronary angiography from January 2008 through December 2009 to assess the risk of RCIN associated with chronic exposure to ACEI or ARB. Patients were considered chronically exposed if they had been prescribed an ACEI or ARB within one month prior to coronary angiography.

A total of 1211 patients were included in the study, 481 (39.7%) with estimated glomerular filtration rate (eGFR) between 15 and 59 mL/min/1.73m^2 and 730 (60.3%) with eGFR $\geq$ 60 mL/min/1.73m^2. There were 616 (50.7%) patients (302 in the group of eGFR between 15 and 59 mL/min/1.73m^2 and 314 in the group of eGFR $\geq$ 60 mL/min/1.73m^2) who were chronically exposed to ACEI or ARB. Among these patients, RCIN occurred in 118 of the exposed group (19.2%) and in 80 of the unexposed group (13.4%) ($p = 0.007$). After adjustment for possible confounders, multivariable analyses identified chronic exposure to ACEI or ARB to be an independent predictor of RCIN (odds ratio [OR] 1.42, 95% confidence interval [CI] 1.04 – 1.96, $p = 0.03$). Other predictors included the use of furosemide (OR 2.53, 95% CI 1.83 – 3.47, $p < 0.001$) and contrast media volume > 100 mL (OR 1.44, 95% CI 1.04 – 1.98, $p < 0.001$). Subgroup analyses of chronic exposure to ACEI or ARB as a risk factor for RCIN showed a significant OR (2.47, 95% CI 1.39 – 4.36, $p = 0.002$) in patients with eGFR between 15 and 59 mL/min/1.73m^2 but not in those with eGFR $\geq$ 60 mL/min/1.73m^2 (1.52, 95% CI 0.97 – 2.36, $p = 0.066$).

Patients with eGFR between 15 and 59 mL/min/1.73m^2 who are chronically exposed to ACEI or ARB are at higher risk to develop RCIN following coronary angiography.

SUCCESSFUL TREATMENT OF HIV ASSOCIATED THROMBOTIC THROMBOCYTOPENIC PURPURA WITH RITUXIMAB: A CASE REPORT

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Thrombotic thrombocytopenic purpura (TTP) is a rare life threatening disease associated with the classic pentad of renal failure, fever, thrombocytopenia, neurologic abnormalities and microangiopathic hemolytic anemia. Human immunodeficiency virus (HIV) infection is an increasingly common cause of TTP in the United States. TTP responds well to plasmapheresis in a majority of patients. However a small subset of patients remains refractory to plasmapheresis and up to a third of patients experience relapses. We report a case of TTP in a patient with HIV infection refractory to plasma exchange and steroids treated with rituximab infusions. After completion of 4 weekly rituximab infusions of 375mg/m2 there was complete clinical and laboratory remission of TTP. Viral load stayed undetectable and there was no reported incidence of unusual opportunistic infections documented. At 9 months of follow up patient has remained relapse free with undetectable viral loads. This case shows that in HIV positive patients with refractory TTP, rituximab is a safe and effective therapy to achieve durable disease remission.

XANTHINE OXIDASE INHIBITORS USE TO IMPROVE OUTCOMES IN PATIENTS UNDERGOING CARDIAC SURGERY Amber Podoll, Debbie Kurian, and Kevin Finkel
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Mortality after cardiac surgery is often due to complications such as peri-operative myocardial infarction, impaired myocardial function, arrhythmias, and acute renal failure. Based on the hypothesis that oxidant injury is a consequence of cardiac surgery, the beneficial effects of administration of xanthine oxidase inhibitors were studied in a series of patients in the 1990's. Although the results of these studies were variable, a 2003 review article recommended "that allopurinol be considered in all patients undergoing standard coronary artery bypass surgery unless contraindicated." This study was not a systematic review and did not include five studies available at the time. Adoption of the recommendation was poor. With a recent renewed focus on the importance of oxidative stress and the role of uric acid and its metabolites, we conducted a systematic review of the use of xanthine oxidase inhibitors and the complications of cardiac surgery.

A systematic review and meta-analysis was conducted on the use of allopurinol in cardiac surgery. A search strategy using PubMed, Embase, and the Cochrane Library identified randomized controlled and prospective cohort studies. Study quality was assessed by the U.S. Preventive Task Force guidelines. A meta-analysis was conducted on mortality and pooled cardiac complications of cardiac function, arrhythmias and ischemic events.

Two level I randomized controlled trials with 219 patients demonstrated a decreased risk of hospital mortality (RR 0.85, $p<0.001$) and decreased cardiac complications (RR 0.78, $p<0.004$). An additional 8 studies of Level II and III quality (n=454) analyzed separately were associated with decreased cardiac complications (RR 0.87, $p<0.04$), although mortality was not consistently reported.

In patients undergoing cardiac surgery, the use of allopurinol may reduce mortality and cardiac complications but the evidence to support its routine use is not robust. Our findings indicate that a large randomized control trial using xanthine oxidase inhibitors to reduce the post-operative complications of cardiac surgery is warranted.

ACUTE INTERSTITIAL NEPHRITIS ASSOCIATED WITH SITAGLIPTIN USE

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Sitagliptin is an oral hypoglycemic agent classified under Dipeptidyl 4 (DPP-4) inhibitor. It is used for treatment of type 2 diabetes. Apart from hypoglycemia, common adverse effects are mainly nasopharyngitis (5%) and gastrointestinal (2-4%). No report of acute interstitial nephritis (AIN) from Sitagliptin has, so far, been reported although a case of rhabdomyolysis and acute renal failure (ARF) from combination of Sitagliptin and Simvastatin was reported about two years ago (Diabet Med: 2008).

We present a patient who developed ARF after starting Sitagliptin. She developed an erythematous rash day after Sitagliptin was started which rapidly spread all over her body. At the same time, her renal function also got worse with serum creatinine as high as 4.2 after six days (baseline serum creatinine 1.5-1.7) with peripheral blood leukocytosis and eosinophilia. Sitagliptin was discontinued and patient was put on steroid. Renal function gradually returned to baseline.

Drugs are the most common cause of AIN. Although kidney biopsy was not done, the clinical scenario, the time course of drug exposure and improvement of renal function on withdrawal (plus steroid) suggested Sitagliptin was the cause. With the widespread use of Sitagliptin, increased awareness for AIN is needed.

IS HIGH VANCOMYCIN TROUGH LEVEL NEPHROTOXIC?

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Vancomycin remains the first-line therapy for Methicillin-resistant Staphylococcus aureus (MRSA) infection .Limited data are available regarding toxicities associated with higher vancomycin doses. The purpose of this retrospective study was to examine incidence of vancomycin associated nephrotoxicity in patients with higher vancomycin trough levels. We did a retrospective chart review of patients who received intravenous vancomycin for a suspected or proven gram-positive infection at Temple University Hospital between January 1 2007 and 31 May 2009.Eligibility Criteria: 1) Age >18 years 2) Received vancomycin > 48 hrs 3) Baseline eGFR >30 ml/min. Exclusion Criteria: 1) Received IV contrast 2) Use Aminoglycosides 3) Use of vasopressors during hospital stay 4) Use of NSAIDs. Review of records identified 55 pts that fulfilled the eligibility criteria. Patients were divided into two groups according to vancomycin trough levels above or below 20 mg/liter. Average baseline creatinine was 1.2 and 1.3, and mean age was 54.9 and 52.9 respectively. Occurrence of nephrotoxicity was defined as an increase in SCr levels of 0.5mg/dl or an increase of 50% from baseline.

		Renal Failure			
Trough level (Avg)		Yes	No	Total	Incidence
>20	28.6	10	17	27	37%
<20	11.6	5	23	28	17%
Total		15	40	55	27%

In conclusion, compared to therapeutic level, higher vancomycin trough level is more nephrotoxic.Drug level should be monitored and vancomycin dose adjusted accordingly to prevent renal injury. The mechanism of vancomycin induced nephrotoxicity is still unclear.

STEROID-DEPENDENT ALLERGIC INTERSTITIAL NEPHRITIS-CASE REPORT.

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Background: Acute interstitial nephritis (AIN) is a common cause of acute renal failure. The most common cause is drug-induced while the main treatment is to stop the causative agent. Steroids can useful especially early in the course of disease.

Aim: To report a case of steroid dependent recurrent AIN.

Clinical Vignette: A 76-year old white female developed biopsy proven AIN secondary to Celecoxib. She has received 9 months course of prednisone followed by total histopathological recovery. Few months after withdrawal of steroid therapy, she has experienced recurrent symptoms of anorexia, malaise, chills and nausea as well as worsening in her kidney function. A repeat kidney biopsy showed recurrent AIN. Prednisone therapy was resumed at this point. A steroid sparing regimen with Mycophenolate was introduced to side effects of steroids. The patient has been maintained on 500mg of mycophenolate mofetil twice daily and prednisone of 2.5 mg for almost 3 years with no recurrence.

Discussion: Drug induced AIN is a relatively common cause of AKI. The classic triad of AIN includes fever, rash and eosinophilia with renal insufficiency. Histopathology gives a definitive diagnosis. The features include interstitial inflammation, tubulitis, edema and interstitial fibrosis. The main treatment is steroids especially when administered early in the course of disease with discontinuation of the causative agent. Our patient had recurrent AIN and to avoid long term steroid complications she was started on steroid-sparing therapy.

A RARE CASE OF RENAL RECOVERY IN A YOUNG PATIENT WITH MULTPIPLE MYELOMA.

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Multiple Myeloma (MM) is an uncommon hematologic malignancy accounting for 1% of all malignancies. Renal involvement is a common complication of MM. Rapid intervention to reverse renal dysfunction is critical for management, especially in patients with light chain cast nephropathy. Recovery rate ranges from 5%-15%. We describe an atypical presentation of MM in a young patient with a favorable outcome.

A previously healthy, 31year-old Caucasian male presented with complaints of abdominal pain radiating to the flanks, dark colored urine, and fatigue of 2 month duration. On physical examination, patient was noted to be afebrile and his blood pressure was 130/84 mmHg. He had pale conjunctivae, clear lung sounds bilaterally on auscultation, and was neurologically intact. Extremities revealed no pedal edema. Laboratory analysis revealed a normal white blood cell count, hemoglobin of 8.5 gm/dl, serum blood urea nitrogen of 79mg/dl, creatinine of 22.5 mg/dl, and serum calcium of 11.2 mg/dl. The computed tomography of abdomen and pelvis for abdominal pain evaluation demonstrated diffuse lytic bone lesions which initiated work-up for multiple myeloma. Serum and urine protein electrophoresis revealed low IgG, IgA, and IgM with predominant kappa light chains. However, there was no M-spike detected. Bone marrow biopsy showed 60% -70% of bone marrow area involvement by plasma cells. Kidney biopsy revealed cast nephropathy with moderate interstitial fibrosis.

The patient was initiated on hemodialysis and received one cycle of chemotherapy (Bortezomib, Doxorubicin, and Dexamethasone). After 4 weeks of hemodialysis, patient's renal function improved with no further need for dialysis. During his outpatient follow-up visits, creatinine remained stable around 2.0 mg/dl.

The present case illustrates recovery of renal function with chemotherapy in a young patient with an atypical presentation of MM.

RHABDOMYOLYSIS-INDUCED REVERSIBLE ACUTE TUBULAR NECROSIS (ATN) IN A PATIENT WITH HIV ON ANTIRETROVIRAL THERAPY

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Antiretroviral medications, specifically tenofovir, have recently been linked to acute tubular necrosis in humans with a suggested mechanism of direct tubular injury. Recently, rhabdomyolysis has been described in an HIV patient on antiretroviral therapy and a statin. We report a case of biopsy-proven heme pigment-induced oliguric acute kidney injury (AKI) in a patient with HIV on antiretroviral therapy.

A 42-year-old male with known history of HIV presented with a one-week history of right buttock pain, generalized muscle aches, and decreased urine output. His medications on presentation included efavirenz, emtricitabine, and tenofovir. On physical exam, the patient was afebrile and had a normal blood pressure. He had bilateral lower extremity pitting edema and a right perirectal abscess. The patient was also found to have oliguric AKI on admission with a serum creatinine of 7.38mg/dl. Urinalysis was significant for moderate proteinuria, large blood, and 10-20 RBC/hpf. Further laboratory evaluation revealed elevated creatinine kinase (199,000 u/L), elevated LFTs, and low C3 and C4 levels. Serological workup, including ASO titers, was negative. HIV viral load was undetectable. CT scan showed a right perianal abscess involving the subcutaneous tissue. Blood cultures were negative. Antiretroviral therapy was discontinued on admission. The abscess was drained surgically and found to be MRSA positive. The patient was initiated on hemodialysis. He underwent kidney biopsy which showed ATN with myoglobin casts and mild acute interstitial nephritis. His renal function started to improve and his creatinine kinase normalized after two weeks. Hemodialysis was subsequently discontinued and his serum creatinine normalized after two months.

In conclusion, we describe a case of reversible rhabdomyolysis-induced oliguric acute kidney injury in an HIV patient caused by combination antiretroviral therapy in the setting of infection. It is likely that both tenofovir and emtricitabine contributed to the development of rhabdomyolysis and AKI in our patient.

A RARE CASE OF REBIF INDUCED THROMBOTIC THROMBOCYTOPENIC PURPURA

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Thrombotic thrombocytopenic purpura (TTP) is a rare disorder of the blood-coagulation system, causing extensive microscopic thromboses to form in small blood vessels throughout the body (thrombotic microangiopathy (TMA)). Most cases of TTP arise from inhibition of the enzyme ADAMTS13. Current therapy is plasmapheresis to reduce Abs against ADAMTS13 and replenish levels. Here we report a case of TTP, occurring in a 33-year old Caucasian female, induced by Rebif (Interferon beta-1a).

Patient initially presented to the hospital in October 2010 with 3 day history of nausea, vomiting, generalized weakness, fatigue and lower extremity edema. Labs showed creatinine of 4.1, hemoglobin (Hb) of 6.9 and platelets of 99 with prior normal labs in April 2010. Urinalysis showed greater than 600 mg/dL of protein, 3+ blood, few dysmorphic RBC's with RBC casts on microscopy. She has history of multiple sclerosis and was on Rebif 44 mcg subcutaneous 3 times a week starting Dec 2009. Rebif was discontinued and she had renal biopsy which showed TMA with focal glomerulosclerosis. Serological tests were all negative except for low C_3 complement levels. ADAMTS13 level was 28%. Patient was started on plasmapheresis ,steroids,4 doses of Rituxan and then started on hemodialysis secondary to anuric acute kidney injury. After 2 weeks of pheresis, repeat ADAMTS13 level increased to 74% with improved platelet levels.

Incidence rate of TTP with use of Rebif is 8%. Plasma exchange and discontinuation of Rebif replenished the ADAMTS13 and platelet levels. So far 5 cases of TTP have been reported secondary to Rebif with two patients requiring renal transplant.

HYPOPHOSPHATEMIA IN CRRT: QUANTIFYING PHOSPHATE REMOVAL BY A FRACTIONAL EFFLUENT COLLECTION METHOD.

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Hypophosphatemia is a frequent complication during continuous renal replacement therapy (CRRT), and may contribute to poor patient outcomes due to phosphate's critical role in energy metabolism in every organ system. We sought to quantify the clearance of phosphate during continuous hemofiltration, the main CRRT modality used in our institution. We modified the effluent line of the CRRT setup by adding a T-connector to divert approximately 1% of the total effluent volume to a collection bag over 24 hours. Estimated phosphate removal was calculated by multiplying the total effluent volume with concentration of phosphate in the effluent fraction. Results were verified by comparison to 4 h complete collections in a subset of enrolled patients. To date, eight 24-hr effluent collections were performed on 3 patients, all of whom were anuric and none of whom received intravenous or oral phosphate during the 24 hour period.

	Patient 1	Patient 2	Patient 3
Serum phosphorus (mg/dl)	3	2.7	3.8
Infused phos (mg)	0	0	0
Estimated phos removed (mg)	1248	1512	1824
Phos mass balance (mg)	-1248	-1512	-1824

CVVH results in a negative phosphate balance. Substantial amounts of phosphate may be cleared by CVVH before overt hypophosphatemia develops. Prophylactic replacement of phosphate in patients undergoing CVVH may be prudent. Our preliminary data suggests the need for future studies to examine the potential clinical consequences of intracellular phosphate depletion during CRRT.

METHOTREXATE NEPHROTOXICITY: IS THERE A CASE FOR HEMODIALYSIS IN THE CPDG2 ERA?

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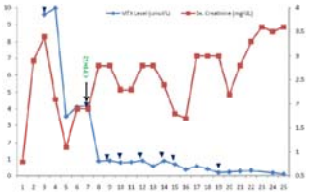
Methotrexate (MTX), widely used as a chemotherapeutic drug is primarily (>90%) cleared by kidneys. Serum levels of ≥ 0.01 µmol/L are considered toxic. The efficacy of high flux Hemodialysis (HD), in addition to conventional therapy, is being questioned especially with the recent availability of recombinant carboxypeptidase-G2 (CPDG2) that can quickly reduce the MTX levels. This case highlights several dilemmas faced by a Nephrologist while dealing with MTX toxicity.

45 year old female with primary CNS Lymphoma, underwent Rt Frontal craniotomy and was started on chemotherapy including high dose IV MTX (3.28 g/m²). During 5th cycle of chemo, Pt developed AKI and systemic MTX toxicity (serum level >50 µmol/L at 48 hrs.), (Fig. 1), despite Leucovorin rescue, IV hydration, and alkalinization of urine. CPDG2 was not immediately available and HD was started. MTX levels were checked before and after HD and remained elevated, with a rebound effect observed several times post HD. A single dose of CPDG2 brought down the MTX level quickly, but not below the toxic threshold. HD was finally stopped as Pt developed a DVT from the temporary HD access.

The efficacy of HD in managing MTX toxicity is at best debatable in today's era when CPDG2 can quickly bring down the serum levels. However CPDG2 is not freely and quickly available across U.S. The immunoassay used commonly to measure MTX level is unable to differentiate between the active and inactive MTX metabolites and thus serves as another impediment in management of such patients.



MIXED CRYOGLOBULINEMIA FROM MONOCLONAL GAMMOPATHY WITH MEMBRANOPROLIFERATIVE GLOMERULONEPHRITIS: A RARE EVENT

Anil Singh (SUNY,Upstate), Noel Nivera, Kenneth Liss, Spiros Arbes, Alan Haratz, Allan Tunkel (Monmouth Medical Center)

A 78-year-old woman with diabetes mellitus and hypertension was seen for acute renal insufficiency with a creatinine of 2.5 mg/dl, increased from a baseline of 1.0 mg/dl. Urinalysis showed evidence of hematuria and proteinuria, but no cellular casts. A 24-hour urine collection revealed 5.9 grams of protein. Serum protein electrophoresis showed a decrease in the total serum protein and albumin fraction. Urine protein electrophoresis was negative for any monoclonal proteins. Renal ultrasound revealed normal sized kidneys.Further studies were significant for hypocomplementemia, C3 of 57 mg/dl (normal 85-183 mg/dl) and a C4 of <6mg/dl (normal 16-45 mg/dl). Renal biopsy showed membranoproliferative glomerulonephritis (MPGN) with mixed cryoglobulinemia; immunoflorescence was positive for IgM kappa and polyclonal IgG. Serum immunofixation electrophoresis studies showed monoclonal protein (IgM kappa) and polyclonal IgG in the cryoglobulin fraction Additional studies failed to reveal a cause for her cryoglobulinemia including negative serologies for hepatitis B and C, an ANA titer of 1:40, normal quantitative immunoglobulin concentrations, normal serum viscosity, undetectable hepatitis C RNA, and negative anti-glomerular basement membrane antibodies. Bone marrow biopsy revealed monoclonal gammopathy; kappa-based light chain accounted for 10% of the cellularity. A diagnosis of MPGN with cryoglobulinemia secondary to monoclonal gammopathy was made. The patient responded well to the treatment with daily corticosteroids and once weekly rituximab therapy; as evidenced by decrease in rheumatoid factor from an initial value of 3000 IU/ml to 500 IU/ml after 4 cycles of therapy.

The finding of monoclonal gammopathy causing mixed cryoglobulin formation resulting in MPGN is a rare event. There is no standard treatment for monoclonal gammopathy associated cryoglobulinemia with MPGN. Current recommendations are based on limited clinical experiences.

SCLERODERMA RENAL CRISIS (SRC) IN A PATIENT WITH NORMAL RENIN LEVELS. Ruchir Trivedi, Wilner Samson, Nancy Day Adams, Herold Yamase, Andre A. Kaplan, University of Connecticut, Farmington, CT 06001

SRC is a complication seen in a minority of patients with systemic sclerosis (SSc) and is manifested by accelerated hypertension and progressive renal failure. Proposed pathogenesis involves vasospasm of renal cortical arterial system. We present a case of SRC as initial presentation of SSc. A 64 y/o Hispanic female was under care of rheumatology for 10 years with undifferentiated vasculitic ulcer of left leg, GERD and Sjogren syndrome. She was on hydroxychloroquine, prednisone and lisinopril. No skin manifestation of SSc was identifiable at presentation. She presented with abdominal pain, nausea, vomiting, microangiopathic hemolytic anemia (MAHA) and progressive renal failure. Hemolysis was characterized by anemia (Hb-6.2g/dL), schistocytes, high LDH (800-1155), thrombocytopenia (39,000) and haptoglobin of <15 mg/dL. Patient was treated with plasmapaheresis while awaiting further serological investigation. ANA was >1:5120 with homogeneous pattern and positive SCL-70 Ab. Anti dsDNA, anti Sm, anti cardiolipin Ab and complement were all within normal limits. Anti RNA polymerase AB, ADAMTS13 activity was also unremarkable. Plasma renin levels were 1.4 and 0.3 ng/mL/hr on two different occasions. Patient became anuric and dialyisis dependent within first week of hospitalization. A renal biopsy was performed.

Renal interlobular arteries showed marked edematous intimal expansion, some with skeins of fibrinoid material. Intimal expansions were fibromyxoid in character. Patient was optimized on CEI and ARB therapy but remained anuric and dialysis dependent. Profound thrombocytopenia associated with MAHA and prior treatment with steroids are proposed by some as risk factors for SRC. This presentation was remarkable as there was no admission diagnosis of SSc and absence of hypertension on presentation. Normal renin level in this patient raises the possibility of non renin mediated mechanisms of hypertension in some patients with SRC.

AUTOIMMUNE HEMOLYTIC ANEMIA AS A FIRST MANIFESTATION OF HIV NEPHROPATHY. Kalyan Uppaluri[1], Hilana Hatoum[1], Sundar Ramanathan[1], Fadi Rzouq[2], Aileen May Arguelles[1], Daniel Gutteridge[1], Kesari[1]. :Internal Medicine Department, Michigan State University/MRMC, Flint, MI. 2: Internal Medicine Department, Michigan State University/Covenant Health Care, Saginaw, MI, USA. Background: Anemia is the most common hematologic abnormality associated with Human immunodeficiency Virus (HIV) infection; affecting in late stage disease and usually multifactorial. Autoimmune Hemolytic Anemia (AIHA) is pretty uncommon presentation in HIV. AIHA is an uncommon but potentially lethal disorder requiring prompt diagnosis and treatment. Aim: To report a case of HIV nephropathy first manifested as AIHA. Clinical Vignette: A 44 y/o white man admitted to the hospital with one-month history of fatigue and weight loss. Other associated symptoms included generalized weakness, loose stools (2-3 times/ day), and no intentional weight loss. There was no significant medical history except than being a smoker. Physical exam was normal. Laboratory work-up was relevant for pancytopenia, Acute Kidney Injury (Creatinine= 2.19 mg/dL), high Lactate dehydronase (LDH), and positive direct Coombs test. An extensive work-up of AIHA, AKI, and pancytopenia ruled out other possible etiologies except for positive HIV serology. Renal biopsy revealed Focal Segmental Glomerulosclerosis (FSGS). HIV induced AKI and AIHA was considered as final diagnosis and the patient was started on HAART and steroid therapy. Conclusion: Although anemia is common in HIV, AIHA is rare and barely presents as the first manifestation of this infection. The mechanism is still unclear as well as the prognosis. It is really important to check for HIV in any patient with AKI and anemia of unknown etiology.

PROPYLENE GLYCOL INDUCED ANION GAP LACTIC ACIDOSIS

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Propylene glycol (PG) is used as a solvent in the pharmaceutical industry. Large amounts of PG are potentially toxic leading to hyperosmolarity, lactic acidosis, acute kidney injury (AKI) and a sepsis-like syndrome. We present a case of probable PG-induced toxicity in a patient on a pentobarbital infusion. 66 year old male with a recent diagnosis of an acute leukemia for which he had received a stem cell transplant presented with a subdural hematoma and developed intractable seizures that did not respond to Lorazepam, Dilantin and Keppra. A pentobarbital-induced coma was instituted. As he continued to have breakthrough seizures, incremental doses of the infusion were utilized. By day 3, patient developed a severe anion gap lactic acidosis with an osmolar gap, AKI and sepsis-like picture with shock liver and severe hypotension needing 3 pressors. He had received 170 grams of PG in three days. There was no alternative explanation for his clinical presentation.

Day/data	Pre-icu	Day 1	Day 2	Day 3
Bicarbonate	26	24	19	10
Anion gap	4	4	8	27
Lactate	-	-	16	>20
Osmolar gap	-	-	-	35
PG	-	-	-	48

PRE-DIALYSIS FLUID STATUS IS AN IMPORTANT PREDICTOR OF RENAL RECOVERY IN PATIENTS WITH ACUTE KIDNEY INJURY REQUIRING RENAL REPLACEMENT THERAPY.

Dawn Wolfgram , Mallika Kommareddi, Peter Song, Michael Heung. University of Wisconsin, Madison WI, University of Michigan, Ann Arbor, Michigan

Acute kidney injury (AKI) in hospitalized patients is associated with poor short and longterm outcomes. Identifying factors that correlate with renal recovery (REC) in patients with AKI requiring renal replacement therapy (RRT) can help clinicians develop strategies to prevent non-recovery (NREC). We hypothesized that fluid status is an important factor in REC and that lesser volume overload at dialysis initiation would be associated with higher rates of REC defined as dialysis independence.

To further evaluate we did a retrospective study of consecutive hospitalized patients who developed acute tubular necrosis-related AKI requiring RRT. Data included demographics, comorbidities, and treatment variables. Primary outcome was REC at 1 year following dialysis initiation. Fluid status was defined as percent change in weight at dialysis initiation compared to baseline and was analyzed as both a continuous and categorical variable ($<10\%$ versus $\geq 10\%$).

Results showed that 170 patients met criteria and were included in analysis. Mortality was 53% in hospital and 65% at 1 year. REC occurred in 69% survivors. Patients in the REC group were found to have 6.2% +/- 11.5% increase in fluid status at dialysis initiation compared to 11.6 +/- 13.2% in NREC patients ($p = 0.006$). Multivariate analysis showed a 3% decline in hazard for recovery for every one unit increase in percent fluid overload ($p = 0.043$]).

Our study showed that worse baseline Cr, higher severity of illness and ≥ 1 comorbidities were significant risk factors for NREC. We did find that lesser degree of fluid overload at initiation of RRT was associated with increased REC. While other studies have shown that fluid status is predictive of mortality our study shows that pre-dialysis fluid status is also associated with renal recovery. Based on our results further studies evaluating conservative fluid management strategies and looking at the impact of fluid removal strategies on renal recovery would help clinicians guide therapy in AKI requiring RRT.

ACUTE TUBULO-INTERSTTIAL NEPHRITIS IN A PATIENT WITH HEPATITIS B ON TENOFOVIR.

Hima Bindu Yalamanchili, Bridgeport Hospital, Bridgeport, Connecticut, USA, Sandeep Ravi, Gilbert W. Moeckel, George Abdelsayed, Irwin Feintzeig.

We are reporting a patient who presented with acute renal failure secondary to acute tubulo-interstitial nephritis in temporal association with tenofovir.

67 year-old African American male with past medical history of chronic active Hepatitis B infection treated with tenofovir and hypertension presented to our hospital with a one week history of nausea, poor appetite, poor oral intake and generalized weakness. His medications were atorvastatin, hydrochlorothiazide, and atenolol. There were neither any new medications nor any dosage changes prior to current presentation. Laboratory data disclosed BUN 173mg/dL, serum creatinine 18.6mg/dL (a baseline creatinine 1.23), sodium 126mmol/L, potassium 3.5mmol/L, chloride 82mmol/L, bicarbonate 22mmol/L, calcium 6.6mg/dL, phosphorus 12.5 mg/dL, creatinine phosphokinase of 741 IU/l and the anion gap was 23. Renal ultrasound, complement levels, ANA, ANCA and HIV were normal or negative. Urine analysis was negative for casts with rare urine eosinophils. Renal biopsy demonstrated acute tubulo-interstitial nephritis with focal glomerulosclerosis.

His renal function gradually improved with transient hemo-dialysis (10 days), Tenofovir discontinuation and 3-day course of pulsed methylprednisolone followed by prednisone taper.

To our knowledge acute tubulo-interstitial nephritis due to tenofovir was not previously described in literature. Few previous case reports of AIN were reported in patients with HIV on combination of tenofovir and atazanavir. Tenofovir alone was associated with Fanconi's syndrome and proximal tubular dysfunction.

With this case report we want to emphasize that acute tubule interstitial nephritis should be considered in the differential diagnosis of renal failure associated with tenofovir and early discontinuation of tenofovir is essential for recovery of renal function.

EPOETIN ALFA AND DARBEPOETIN ALFA COSTS BY DOMINANT DOSING INTERVAL IN CHRONIC KIDNEY DISEASE NOT ON DIALYSIS

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To examine epoetin alfa(EPO) and darbepoetin alfa(DARB) treatment patterns and costs in patients with chronic kidney disease not on dialysis(CKD). The HealthCore Integrated Research Database from 1/1/2004-7/31/2009 was used to identify CKD patients treated with EPO or DARB. Patients with cancer, receiving chemotherapy or dialysis were excluded. Drug cost was calculated using January 2010 Wholesale Acquisition Cost. Dominant dosing interval was stratified by ≤15 or >15 days. 1,660 EPO- and 1,175 DARB-treated CKD patients were identified. Mean (SD) cumulative dose was 300,596 (468,371) units for EPO and 1,205(1,824) mcg for DARB. Dose ratio (EPO units ÷ DARB mcg) was 249:1. DARB was 38% higher in cost compared to EPO. When stratified by dominant dosing intervals of ≤15 days or >15 days, dose ratios and DARB cost premium were similar between groups and similar to the total population. In CKD, DARB costs were higher compared to EPO in the total population. Observations were similar when stratified by dominant dosing interval.

PERCUTANEOUS KIDNEY BIOPSIES IN A SOUTHEASTERN TEACHING HOSPITAL: INDICATIONS, BIOCHEMICAL PROFILES, AND RECOVERED HISTOLOGICAL DIAGNOSES.

Justin Bain, David Pruett, Lajos Zsom, Albert Dreisbach, T. Fulop. University of Mississippi Medical Center, Jackson, MS.

Indications for procedures may evolve over time and display a regional pattern of variation as well. We sought to review our current experience with percutaneous kidney biopsy (PKB) in our institution. We have performed a retrospective data review of PKB obtained via renal trainees over a 3-year period (01/2007 - 12/2009) at the University of Mississippi Medical Center. We collected information on baseline parameters, underlying diagnoses, PKB indications and the recovered diagnoses. Data was analyzed with PAWS Statistics 18 and results expressed as either percents (%) or means with standard deviation (SD). The study was reviewed and approved by the University of Mississippi Human Research Office. Results from 70 PKB (71.4% native, 24.3% deceased donor) were analyzed; main indications for biopsy were impaired renal function in 37 (52.9%) and proteinuria in 33 (47.1%) patients. Baseline Blood Urea Nitrogen was 38 (29.8) mg/dL, creatinine 3.15 (3.09) mg/dL, and random urine protein/creatinine (UPC) ratio 5.85 (7.27). Mean platelet count was 274,770 (101,301)/mm3, PT 10.4 (1.1) sec, PTT 25.9 (3.1) sec. Major recovered histological diagnoses included lupus nephritis (23.5%), focal sclerosis (20.6%), chronic scarring (20.6%), acute tubular necrosis (11.8%), diabetes (7.4%), acute cellular or humoral rejection (7.4%) and membranous nephropathy (4.4%). Diabetes and lupus on biopsy correlated closely with proceeding history (r 0.580 and 0.847; $p<0.001$ for both). Only 3 specimens returned with “No diagnostic changes”. Thus, in this Southeast cohort of patients, indications for PKB remained vigorous and a large array of significant diagnoses were recovered.

PROFILING URINE CELL AND EXOSOME MICRORNA USING A BARCODED SMALL RNA DEEP SEQUENCING APPROACH

Iddo Z. Ben-Dov, Miguel Brown, Veronica M. Whalen, Thomas Tuschl. Laboratory of RNA Molecular Biology, The Rockefeller University, New York, NY, USA

We aimed to develop an inexpensive method to profile miRNA in urine for biomarker identification. Duplicate 50 ml urine samples were obtained from 20 volunteers. RNA was extracted from cells and from ultra-filtered exosome preparations. One cDNA library was transcribed from 20 barcoded samples. Synthetic RNA was included for calibration, and miRNA profiles were based on read frequencies. Participants' age was 23-31 years. Medical history, physical examination and laboratory evaluation were normal. Cells in urine were scarce and median RNA recovery was 10 ng per 50 ml, while exosomes yielded additional 80 pg RNA per sample. On average, 440,000 reads were recovered per sample, miRNA constituting 31%. MiRNA differed in cells and exosomes, but a more striking difference was noted between genders. An unexpected finding involved the abundance of miR-124 and miR-9, both considered brain-specific. In addition, miR-320a, also found in neurons, was the most abundant miRNA in urine yet differed between genders and between urine fractions. Test-retest variability (r=0.67) was lower than between-subject variability (r=0.39 for exosomes and 0.57 in cells).

In conclusion, we show the feasibility of multi-sample urine miRNA profiling by barcoded sequencing. Meaningful profiles are observed despite minute amount of RNA. The observed variability, presumably due to differences in cell populations, suggests a role for urine miRNA as biomarkers of disease progression and response to treatment, but also as a diagnostic aid.

DIALYSIS CLINIC: A VALUABLE FIELD EXPERIENCE TO TEACH MSW INTERNS ADVANCED GENERALIST PRACTICE.

Steve Bogatz, FMS- Central Connecticut Dialysis Center, Meriden, CT

In recent years, some graduate social work programs have embraced the tenets of advanced generalist practice: the ethical and cross-culturally competent application of interventions at the micro, mezzo, and macro levels. The dialysis clinic presents rich educational opportunities for MSW interns to learn and practice these skills.

On the micro level, the intern learns the fundamentals of psychosocial assessment and counseling to improve patient and familial adjustment. Useful practice theories include Hepworth and Larson's Five Stages of Empathy, Prochaska and colleagues' Stages of Change Model, and evidence based practice with the Kidney Disease and Quality of Life tool. Connecting the client with concrete resources usually enhances the therapeutic relationship. The result illustrates how concrete and clinical services together may be necessary for client's total well-being. Also, the student can hone communication skills working with varied interdisciplinary-team personalities. Since kidney disease affects all races, genders, classes, and sexual orientations, work with diversity is ever present.

On the mezzo level, dialysis clinics are heavily regulated with most employers worried about tight margins. The cost of supplies and services is strictly monitored along with patients' clinical indicators. This dynamic can help build a student's ethical reasoning and create advocacy opportunities. The intern can interact with insurance companies, drug manufacturers, transplant centers and the home agency to ensure patients receive access to care. One learns to navigate complex systems and formulate effective arguments based on data.

On the macro level, dialysis patients depend on federal institutions. Assisting patients with Medicaid and Medicare means contact with state and federal agencies. Organizations like the NKF and American Kidney Fund lobby for research dollars and social justice for their constituency. Interns can observe and/or participate in the political process that these national organizations employ to achieve their goals.

Over the course of 9 years, the author supervised 6 MSW interns using an advanced generalist philosophy. Four have gone on to have successful careers in medical social work.

RACE DOES NOT INFLUENCE ESRD AND MORTALITY IN OBESE PATIENTS WITH CKD STAGES 3-4: RESULTS FROM THE KIDNEY EARLY EVALUATION PROGRAM (KEEP)

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Our recent cross-sectional analyses of KEEP participants suggested that obesity and metabolic syndrome are heterogeneous disease states among African Americans (AA) and whites with CKD. Here, in longitudinal analyses spanning 8 years of follow-up, we examine whether race influences ESRD and mortality rates in obese participants with CKD stages 3-4. Univariate and multivariate survival analyses were performed for outcomes of ESRD and death.

Of 6409 obese participants with CKD stages 3-4, 34% were AA and 66% white. AA participants had higher rates of hypertension and family history of kidney disease, but diabetes status was similar among participants. AA participants had a higher baseline mean eGFR (49.0 vs. 46.5 ml/min/1.73m2, $p<0.0001$), higher prevalence of micro- and macroalbuminuria ($p<0.001$), greater degree of anemia (mean hemoglobin 12.7 vs. 13.5 g/dl, $p<0.0001$), and higher rates of secondary hyperparathyroidism (63.1% vs. 47.7%, $p<0.0001$). In univariate survival analyses, AAs had significantly higher progression to ESRD but overall mortality rates were similar. In multivariate models, AA race did not influence either ESRD (HR 1.29, 95% CI 0.65-2.57) or death (HR 0.95, CI 0.63-1.44). In these models increased age, male race, and diabetes were predictive of higher rates of ESRD; age, male race, diabetes, hypertension, and BMI were also predictive of overall mortality.

While obesity and metabolic syndrome may be heterogeneous disease states among AAs and whites, race does not appear to impact kidney and overall survival among obese individuals with CKD.

POOR GLYCEMIC CONTROL BUT NOT DYSLIPIDEMIA IS ASSOCIATED WITH ALBUMINURIA IN PATIENTS WITH CHRONIC KIDNEY DISEASE (CKD) AND TYPE 2 DIABETES MELLITUS (T2DM): A KIDNEY EARLY EVALUATION PROGRAM (KEEP) REPORT

Subhasish Bose,[1] Nehal N. Mehta,[1] Shu-Cheng Chen,[2] Suying Li,[2] Peter A. McCullough[3]. [1]University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania; [2]Chronic Disease Research Group, Minneapolis Medical Research Foundation, Minneapolis, Minnesota; [3]St. John Providence Health System, Providence Park Heart Institute, Novi, Michigan.

Dyslipidemia and albuminuria have both been associated with unfavorable cardiovascular prognosis in patients with T2DM. However, the direct relation between lipid abnormalities and overall glycemic control with urinary albumin-creatinine ratio (ACR) in CKD patients with T2DM has not been elucidated. We sought to investigate the association of dyslipidemia and glycemic control with albuminuria in KEEP participants with T2DM and CKD stage ≤3. Our study included a total of 6639 eligible KEEP patients from June '08 to December '09 with glycosylated hemoglobin (HbA1c) values. After excluding non-diabetic, non-CKD and patients with missing values of urinary ACR, the total sample size was 2141. Baseline characteristics and health screening results based on quartiles of HbA1c were compared. We performed multivariate logistic regressions in estimating individual association of lipid parameters (per 10 mg/dl change in serum level) and HbA1c values with ACR, adjusting for age, gender and race. These associations were compared across different degrees of ACR groups: normo-albuminuria (<30 mg⁄g), micro-albuminuria (30 to 300 mg⁄g) and macro-albuminura (>300 mg⁄g). Association between components of serum lipid profile with ACR was not significant. HbA1c was associated with ACR when compared between normo-albuminuria and micro-albuminuria groups [OR=1.32, (95% CI: 1.23-1.41), p<0.001]. Association was attenuated in the micro-albuminuria versus macro-albuminuria groups [OR=1.15, (95% CI: 1.05-1.27), p<0.01].
In this cross-sectional study of 2141 KEEP participants with T2DM and CKD, overall glycemic control measured by HbA1C but not dyslipidemia was associated with urinary ACR.

EXTENDED-RELEASE NIACIN/LAROPIPRANT LOWERS SERUM PHOSPHORUS LEVELS IN DYSLIPIDEMIC PATIENTS WITH STAGE 3 CHRONIC KIDNEY DISEASE (CKD)

Prerna Ganjoo, Diane Tipping, Andrew M. Tershakovec, Andrew G. Bostom, Rhode Island Hospital, Providence, Rhode Island, and Merck and Co., Rahway, New Jersey.

Niacin compounds lower serum phosphorus levels in patients with stage 5 CKD, i.e., an estimated glomerular filtration rate (eGFR) of <15 ml/min/1.73 m^2. We evaluated the impact of extended release niacin (ERN), given in fixed-dose combination with laropiprant (L), a specific inhibitor of prostaglandin-mediated, niacin-induced flushing, versus placebo (PBO), on serum phosphorus (P) levels, measured serially over 24-weeks (wk) among n=261 dyslipidemic patients with a baseline eGFR of 30-59 ml/min/1.73 m^2 (stage 3 CKD), pooled from two randomized, controlled trials. Subjects received 1 tablet daily of ERN-L (1g ERN/ 20 mg L) for the first 4-wk and 2 tablets once daily, thereafter, or matched placebo. Between groups 12 to 24-wk mean changes in P were compared using repeated measures analysis of P data collected at 0,4,8,12,18, & 24-wk.

	ERN-L (n=177)	PBO (n=84)
Baseline P, mg/dl, mean ± SD	3.46 ± 0.50	3.57 ± 0.45
Wk 12-24 mean Δ in P, mg/dl, ERN-L vs. PBO, mean (95% CI)	-0.42 (-0.52, -0.33)	
p-value	< 0.001	

These data confirm once daily ERN-L's P-lowering effects, which are likely mediated via an elegant mechanism that targets, and inhibits, the Na-dependent active intestinal P transporter, NaPi-2b. No comparable, placebo-controlled P-lowering efficacy data in stage 3 CKD are available for *any* of the high pill-burden, thrice daily phosphate-binders. Our findings have therapeutic implications for the management of hyperphosphatemia, and possible prevention of cardiorenal outcomes in CKD among the very large population of CKD patients with less advanced, i.e., stage 3 CKD.

ACCURACY OF A SINGLE, UNTIMED MORNING URINE SAMPLE FOR ESTIMATION OF PROTEINURIA IN MORBIDLY OBESE PATIENTS.

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Individuals with morbid obesity (BMI≥40 kg/m²) have increased lean body mass and creatinine generation, factors potentially affecting the accuracy of random urinary protein-to-creatinine ratio (PCR) for the estimation of proteinuria.

We assessed the correlation of PCR from single-void, untimed morning urine samples with urinary protein measured by 24-hr, timed urine collections among adult, morbidly obese individuals evaluated for bariatric surgery in the Weight Management Clinic at Geisinger Medical Center. Subjects collected 24-hour urine specimens and a simultaneous untimed morning void. Correlation between timed protein excretion and PCR was asessed using Spearman correlation test.

48 patients consented to participate and of these, 28 adequately performed timed urine collections. 15 (53%) were female, and 10 (35%) had diabetes; mean (SD) age and BMI was 47.6 (10.6) years and 47.6 (6.8) kg/m², respectively. Median (range) 24 h urine protein excretion was 88.6 (20.0-420.0) mg. Estimations of proteinuria from PCR correlated poorly with 24 hour proteinuria (r=0.11). On average, PCR underestimated 24 h proteinuria by 15.2 mg. 70% of the PCR measurements over- or under-estimated the measured 24 hour proteinuria by more than 15%.

In morbidly obese individuals, random urine PCR does not accurately estimate proteinuria. Further testing in those with higher levels of proteinuria is warranted.

CONTENT AND CHARACTERISTICS OF CHRONIC KIDNEY DISEASE DISCUSSION IN PRIMARY CARE VISITS WITH DIABETIC PATIENTS

Kimberly Carter, T. Alp Ikizler, Kerri Cavanaugh
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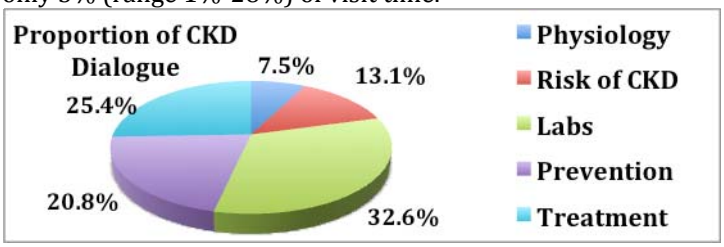
Primary care providers (PCPs) are fundamental to managing patients at risk for or bearing chronic kidney disease (CKD), but little is known about the discussion of CKD during routine visits. We examined 101 audio-recordings of visits in an academic resident and attending clinic and described the occurrence and characteristics of the CKD dialogue between PCPs and adults with diabetes. Health literacy (HL) was determined using REALM. The patients were median (IQR) age 56 (49, 64) years, 48% male, 50% Black, 19% with low HL, A1C 7.6% (6.6%, 8.4%), and 51% with CKD. Nearly half of all visits (48%) discussed CKD. However, median time of CKD talk was 33 (18, 76) seconds, accounting for only 3% (range 1%-28%) of visit time.



Overall, no patient or provider characteristics were associated with having a CKD discussion, except for total visit time (p=0.09) Compared to adequate HL patients, low HL patients were less likely to have CKD discussed (22% vs. 61%; p=0.038). After adjusting for age and visit time, patients with low HL were nearly five-fold less likely to have a discussion of CKD (AOR [95% CI]: 5.76 [1.01 – 32.7]).

In conclusion, the majority of CKD dialogue focuses on ordering or reviewing laboratory tests. Placing importance on the discussion of risk and prevention of CKD could improve awareness amongst diabetic patients. This can be achieved by better tools to communicate with low literacy patients with CKD.

CKD STAGE 3 IN THE PRESENCE OF MICROALBUMINURIA (MA) HAS EQUIVALENT MORTALITY RISK AS PRIOR MI

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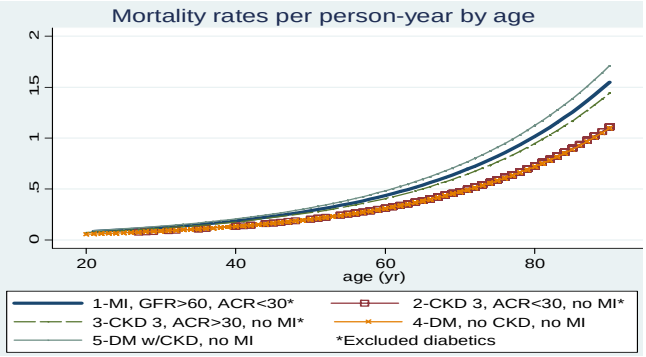
A graded and inverse relationship between estimated glomerular filtration rate(eGFR) and cardiovascular (CV) disease and death exists at eGFR<60ml/min/m^2. National Kidney Foundation guidelines propose that CKD be considered a coronary risk equivalent. Mortality rates in adults with CKD stage 3 +/- albuminuria (albumin/creatinine ratio > 30 mg/g) and no diabetes were compared with mortality rates among adults with a previous myocardial infarction(MI) and no CKD or diabetes mellitus (DM) and with mortality rates in adults with DM and no previous MI +/- CKD. We used data from the Third National Health and Nutrition Examination Survey (1988-1994) linked with the National Death Index through December 31, 2006. Analyses accounted for the complex survey design. Poisson regression was used to determine adjusted incidence rates for all-cause mortality for each group: 1-Prior MI, no CKD or DM(n=303); 2-CKD stage 3 without MA, no MI or DM (n=481); 3-CKD stage 3 with MA, no MI or DM(n=169); 4-DM, no CKD, no MI(n=920); 5-DM with CKD, no MI (n=655). Mean age for the 5 groups was 64, 72, 74, 56, and 65 years, respectively, and mean eGFR was 85, 52, 48, 98, and 75 ml/min/m^2, respectively. CKD stage 3 with MA(group 2) had similar adjusted mortality rates(0.95, 0.78-1.17) compared to group 1, demonstrating that CKD stage 3 with MA has equivalent mortality risk as a prior MI.



LIFESTYLE BEHAVIORS AND INCIDENT CHRONIC KIDNEY DISEASE (CKD): THE CARDIA STUDY

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Lifestyle likely influences risk of CKD, yet few studies have explored the impact of lifestyle behaviors such as smoking, exercise, and diet. The purpose of this study was to investigate whether lifestyle behaviors in addition to age, sex, and race can accurately predict incident CKD. We used data from the Coronary Artery Risk Development in Young Adults (CARDIA) study, a longitudinal study of cardiovascular risk factors in 18-30 year old black and white adults at year 0 in 1985-1986.

The analysis was limited to participants with eGFR>80ml/min/m^2 by CKD-EPI formula and no HTN or DM at baseline. Our definition of incident CKD required the presence of microalbuminuria (ACR ≥ 25mg/g after adjustment for sex and race (A/kC where k=0.68 if male, k=0.88 if black) or eGFR<60ml/min/m^2 at years 20 in addition to either years 10 or 15. We used logistic regression to examine univariate associations between CKD and baseline BMI, smoking status, exercise, and dietary score, which was composed of 7 categories (fruit intake, low-fat dairy, nuts, whole grains, sodium, sugar-sweetened beverages, and red/processed meats) based on the Dietary Approaches to Stop HTN (DASH) diet. Significant variables ($p<0.05$) were placed in the multivariate model below (AUC 0.80). Notably, individuals who did not follow a DASH-like diet had increased risk for incident CKD (40% increased odds for each unit increase; $p<0.001$). Modifiable lifestyle factors including diet, obesity, and smoking predict incident CKD.

Baseline Predictors of CKD	Individual OR	Multivariate OR
Age(per 1-yr increase)	1.09 (1.03-1.15)	1.08(1.02-1.15)
Male gender	3.14(2.04-2.64)	3.44(2.20-5.39)
Black race	5.09(3.16-8.21)	3.35(2.03-5.53)
Obese (BMI≥30)	3.08(1.89-5.03)	2.95(1.80-4.84)
Current smoking	1.66(1.09-2.52)	1.44(0.94-2.22)
Diet score (0-7) 7=Worst	1.45(1.23-1.70)	1.40(1.19-1.65)

ACUTE RENAL FAILURE AS SOLE MANIFESTATION OF INFECTIVE ENDOCARDITIS

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Renal impairment is observed in up to one-third of patients with bacterial infective endocarditis (IE) and its presence increases mortality five-fold. By biopsy and necropsy data roughly 30% had emboli, 20% ATN, 10% Acute Interstitial Nephritis and rarely immune complex-mediated glomerulonephritis. Most patients with native valve IE have typical features of fever, chills, constitutional symptoms with positive blood cultures, heart failure with or without a heart murmur, embolic or immunological manifestations. We present a case of isolated acute renal failure for which renal biopsy led to the diagnosis of IE.

A 69 year old, white farmer with atrial fibrillation on chronic anticoagulation and hypertension with associated Stage 3 CKD presented for routine follow up with pallor and a purpuric rash limited to the lower extremities; he was afebrile and normotensive. Blood work revealed marked anemia, normal WBC and platelet count with an acute rise in creatinine from 1.6 to 3.4 mg/dl with a nephritic urinary sediment. Workup showed evidence of hemolysis with haptoglobin <6 mg/dl, LDH > 900 U/L., low C3, low C4, positive ANA 1:160 (speckled pattern), negative anti-DNA, negative ANCA, positive rheumatoid factor and cryoglobulins. Hepatitis C (by PCR), hepatitis B and HIV Ab (by EIA), ASO titers and UPEP were negative; SPEP revealed polyclonal gammopathy and IFE had no monoclonal protein spike. Renal biopsy showed mild mesengial and cellular proliferation, fibrinoid necrosis and crescent formation (3/12 glomeruli) with predominant subendothelial immune complex deposits testing 3+ positive for C3 and IgM. Transesophageal echocardiogram showed mitral and aortic vegetations, yet endocarditis protocol blood cultures remained negative. With antibiotic therapy, he clinically improved with some recovery of renal function, sufficient to avert the need for renal replacement therapy.

In conclusion, endocarditis can masquerade as acute kidney injury in isolation without typical signs and symptoms and should be included in the differential diagnosis of patients with infectious glomerulonephritis and minimal or no isolated source.

AN ASSOCIATION OF OXIDATIVE STRESS BIOMARKERS AND MITOCHONDRIAL DNA COPY NUMBER IN CHRONIC DIALYSIS PATIENTS

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The purpose of study is to investigate the association of mitochondrial biogenesis and oxidative stress in chronic dialysis patients. A total of 199 chronic dialysis patients (hemodialysis: 111, peritoneal dialysis: 88) (mean age 48.9 year-old, male/female, 80/119) and 213 healthy control (mean age 49.4 year-old, male/female, 83/130) were enrolled as investigated subjects. Demographic, hematological, biochemical data, oxidative stress biomarkers, mitochondrial (mt) DNA copy number were compared between two groups. Plasma thiobarbituric acid-reactive substances (TBARS) and plasma free thiols were measured as indicators of oxidative damage to plasma lipids and antioxidant defense, respectively. mt DNA copy number in peripheral blood leukocytes was determined by calculating the relative mtDNA amount to the nuclear DNA by quantitative polymerase chain reaction. The mt DNA copy number were expressed by transforming to log values. The results showed dialysis patients had higher serum BUN, Cr, P, K, triglyceride levels, and lower Hb, albumin, cholesterol levels than control. TBARS levels (1.09 *vs* 0.77 uM/L, p=0.00) and mt DNA copy number (2.92 *vs* 2.54, p=0.00) were higher in dialysis patients than control. Free thiols levels were lower in dialysis patients (1.5 *vs* 2.12 uM/L, p=0.00) compared to control. The mt DNA copy number in dialysis patients were correlated with age, free thiols levels, body height (Pearson correlation). However, diabetes, cardiac disease, hypertension, stroke did not show positive impact on mt DNA copy number. In conclusion, chronic dialysis patients showed an increased oxidative stress status and thus leading to compensatory increased mt DNA copy number.

PREVALENCE OF RENAL IMPAIRMENT IN LUNG, COLORECTAL & BREAST CANCER PATIENTS: RESULTS FROM THE HENRY FORD HEALTH SYSTEM (HFHS)

Laura Chu[1], Marianne Ulcickas Yood[2,3], Mahmoud Logham-Adham[4], Karen Wells[5], Wei Dong[1]

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Little published data are available regarding prevalence of renal impairment (RI) in cancer patients. The objective of this study was to determine prevalence of RI, defined as the presence of proteinuria (PR), acute renal failure (ARF), or chronic kidney disease (CKD) at time of cancer diagnosis. Patients were diagnosed with cancer between 2000-2007 & identified using the tumor registry at the HFHS. ARF was defined using relevant lab data & classified based on RIFLE (severity categories only). CKD was defined based on NKF-KDOQI criteria.

The proportion of patients (%) with PR, ARF & CKD are presented in the table.

Cancer type →	Lung (n=2743)	Colorectal (n=1657)	Breast (n=2715)
Median age (years)	66.9	66.8	60.9
Proteinuria (protein/creatinine >30 mg/g)	0.5	0.7	0.4
Acute renal failure	24.8	14.7	11.8
Risk	*18.8*	*11.4*	*10.2*
Injury	*5.1*	*2.5*	*1.3*
Failure	*1.0*	*0.8*	*0.2*
Chronic kidney disease	34.5	37.3	28.8
Stage 2	*11.2*	*15.5*	*14.2*
Stage 3	*18.8*	*17.6*	*12.6*
Stage 4	*3.2*	*3.1*	*1.4*
Stage 5	*1.4*	*1.1*	*0.6*

In conclusion, renal impairment is a highly prevalent comorbidity in cancer pts. Extent of RI seems to be associated with tumor type, especially ARF. Quantifying background risk of RI may help put observed & treatment-related risks into context.

QUALITY IMPROVEMENT PROJECT: IMPROVING CARDIOVASCULAR RISK FACTOR MODIFICATION IN CHRONIC KIDNEY DISEASE PATIENTS IN NEPHROLOGY FELLOW CONTINUITY CLINIC

Jason Cobb, Sejal Sarolia, Titlayo Ilori, Jeff Sands, & James Bailey.
Division of Nephrology, Emory University, Atlanta, GA, USA

Chronic kidney disease (CKD) is an independent risk factor for the development of cardiovascular disease (CVD). We developed a quality improvement project. The purpose is to improve CVD risk factor modification in CKD patients by 25% at the Emory University Nephrology Fellow Continuity Clinic by focusing on physician factors.

We used PDCA (Plan, Do, Check, Act) cycle of continuous improvement. First, chart review to obtain baseline information and created fishbone diagram to explain current fellow practices. Established outcomes in the clinic progress notes included aspirin usage (medication list or assessment and plan). Other outcomes included management of dyslipidemia, diet, and exercise (assessment and plan). Intervention 1: Fellow lectures on quality improvement and guidelines on CVD in CKD. Intervention 2: E-mail and presentation to attendings encouraging participation during fellow clinic. Intervention 3: Weekly clinic journal club on CVD in CKD for one month.

Baseline data: aspirin usage 52%, dyslipidemia management 14%, diet counseling 12%, and exercise counseling 2%. After each intervention aspirin usage 52%, 65%, and 86% respectively, and dyslipidemia management 41%, 32%, and 63% . After each intervention diet counseling 59%, 47%, and 68%, and exercise counseling 34%, 10%, and 43% respectively.

Development of quality improvement curriculum allowed fellows to evaluate current practices and utilize tools to improve practice. It was difficult to maintain the increase in CVD risk factor modification, but with further interventions and repetition we were able to increase above our predetermined goal.

RENAL HEALTH OUTREACH (RHO) IN MANITOBA: OPPORTUNITIES FOR IMPROVEMENT

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The Manitoba Renal Program's (MRP) RHO interdisciplinary team (nurses, dietitians, pharmacists, an exercise therapist, an occupational therapist, and an Aboriginal liaison coordinator) has provided renal health education to First Nation communities in Manitoba since 2001. The RHO team educates health care providers and the public regarding risk factors and early identification of renal disease.

This study obtained perspectives of key stakeholder groups regarding important content, delivery method, and barriers to provision of renal health education in First Nation communities. Five open ended semi-structured focus groups with a total of 32 participants were conducted to gather perspectives of community members and health care providers, elders, and leaders of a First Nation community in Manitoba as well as the MRP staff. Qualitative description was used to identify themes.

Major themes identified were: consideration of environmental and contextual factors in communities is important, along with building partnerships between communities and health care programs. Multiple delivery methods (including story telling and interactive lectures) are preferred methods to engage community members. Community participants felt that hearing stories from people living with renal disease was valuable, as well as providing renal health education to children. Health care providers and community elders emphasized the importance of early identification and screening.

The outcomes of this study led to the development of strategic priorities for RHO, including defining and streamlining roles among RHO team members, development of educational toolkits, marketing of RHO both within and outside of the MRP, and building capacity in communities for provision of renal education. This poster presentation will describe the study findings and the directions taken for RHO resulting from this project.

CLOPIDOGREL USE AND MORTALITY IN VETERANS WITH CHRONIC KIDNEY DISEASE AND ACUTE CORONARY SYNDROME.

Michael Fischer[1], Michael Ho[2], Kelly McDermott[3], Elliott Lowy[3], Chirag Parikh[4]. [1]Hines VA, [2]Denver VA, [3]VA Puget Sound, [4]West Haven VA

Chronic kidney disease (CKD) affects up to 50% of patients with acute coronary syndrome (ACS) and is associated with worse health outcomes. While clopidogrel in addition to aspirin is effective in reducing recurrent events in patients with ACS, less is known about the benefits of dual antiplatelet therapy in patients with CKD.

We identified all Veterans hospitalized at VA facilities with ACS and at least one outpatient serum creatinine in the Cardiac Care Follow-up Clinical Study between 10/1/2005 – 10/1/2009. Estimated glomerular filtration rate (eGFR) was calculated using the CKD-EPI equation. CKD was defined as an eGFR < 60 ml/min/m^2. Logistic regression analyses adjusting for demographics, comorbidities, medications, and stent placement were used to examine the association between eGFR, receipt of clopidogrel, and death.

Among 14,289 Veterans hospitalized with ACS, the prevalence of CKD was 54.1% and 14% died by 1-year after discharge. Compared with Veterans without CKD, those with CKD were more likely to have ACS involving myocardial infarction (88% v. 79%) but less likely to have percutaneous coronary intervention (26% v. 41%) including stent placement (25% v. 39%) and aspirin+clopidogrel at hospital discharge (55% v. 64%) ($p < 0.05$). In multivariable analysis, while a non-significant trend existed for a lesser odds of receipt of clopidogrel with CKD (OR: 0.92, 95% CI: 0.84-1.01), a significantly lesser odds of receipt of clopidogrel was found per 10 ml/min/m^2 decrements in eGFR (OR: 0.97, 95% CI: 0.95-0.99). In adjusted analysis, CKD was associated with a significantly increased odds of death (OR: 1.71, 95% CI: 1.49-1.96), while aspirin (OR: 0.85, 95% CI: 0.72-0.99) and clopidogrel (OR: 0.89, 95% CI: 0.79-1.00) were associated with decreased odds of death.

In Veterans with ACS, lower levels of kidney function were associated with a lower receipt of beneficial antiplatelet medications and substantially higher mortality. Efforts are needed to improve processes of care and outcomes among adults with CKD after ACS.

IMPROVING CHRONIC KIDNEY DISEASE CARE IN PRIMARY CARE PRACTICES

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The purpose of this study is to improve treatment of CKD in primary care practices by increasing diagnosis of CKD, diagnosing and treating anemia, improving proteinuria with use of ACE/ARB medications, checking for bone disease, treating vitamin D deficiency, and avoiding medicines such as NSAIDS which are harmful to the kidney.

Twelve practices have been recruited – 6 were randomly assigned to a basic intervention; 6 to receive an enhanced intervention. All practices received a quick reference guide summarizing the Kidney Disease Outcomes Quality Initiative (KDOQI) chronic kidney disease care guidelines. The 6 enhanced intervention sites were assigned a Practice Enhancement Assistant (PEA) to promote implementation of the guidelines. Six practices also received CINA, a computer point of care decision support protocol engine, which integrates with the practices' existing electronic health record.

Data is collected through manual chart review by a research assistant or PEA at the 6 sites without computer decision support. Data is extracted by CINA at the remaining 6 sites. At sites with support of a PEA, data is reported regularly to the practices throughout the 2 year study as part of the quality improvement cycle. This paper will present baseline, 3 month, and 6 month data for each arm of the study with results of chi-square and t-test analyses demonstrating whether differences exist between participating practices.

TRANSFUSION BURDEN AMONG CHRONIC KIDNEY DISEASE (CKD) PATIENTS NOT ON DIALYSIS. Kathleen M. Fox[1], Jerry Yee[2], Ze Cong[3], John Brooks[4], Lois Lamerato[2], Jeffrey Petersen[3], Shravanthi Gandra[3]
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Transfusion patterns are not well characterized in non-dialysis (ND)-CKD patients. This study describes rates and units of blood transfused and hemoglobin (Hb) level at the time of transfusion in chronic, moderately-severe anemic, ND-CKD patients in routine practice. A retrospective observational cohort study of administrative data from Henry Ford Health System identified 374 adult, ND-CKD patients with chronic anemia (Hb <10 g/dL and subsequent medical care as either erythropoiesis-stimulating agent (ESA) therapy, blood transfusion, or second Hb <10 g/dL) between 01/2004-06/2008. Exclusions included those with prior diagnoses of cancer, renal or liver transplant, end-stage renal disease, acute bleeding, trauma, sickle cell disease, or aplastic anemia. At least 1 transfusion (mean of 2 units per episode; range, 1-4) was administered in 20% (75/374) at mean follow-up of 459 days. The mean Hb level closest and prior to a transfusion was 8.8 g/dL (SD ± 1.5); 20% had Hb 7-7.9, 36% had Hb 8-8.9, and 13% had Hb 9-9.9 g/dL. In conclusion, transfusions were prevalent and the mean hemoglobin level at the time of transfusion was 8.8 g/dL among ND-CKD patients with anemia. To reduce the transfusion burden, clinicians should consider other anemia treatments including ESA therapy.

CLINICAL AND *ACE* GENETIC PREDICTORS OF INCIDENT CHRONIC KIDNEY DISEASE IN NON-DIABETIC HYPERTENSIVE VETERANS

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Chronic kidney disease (CKD; an MDRD estimated GFR <60 ml/min/1.73 m2) is common and is associated with increased morbidity and mortality. The *ACE* gene has been associated with kidney diseases.

We performed a prospective study in non-diabetic hypertensive veterans without CKD recruited from San Diego VA primary care clinics. We used an electronic medical record (EMR) and evaluated functional *ACE* genetic variants to determine clinical and genetic predictors of incident CKD. Adjusted hazard ratios and concordance statistics for progression to incident CKD (by the MDRD equation) using Cox regression were performed, censoring for death and loss to follow-up, over a mean follow-up of 3.2 years in the entire cohort, and in white and African American subgroups.

768 non-diabetic hypertensive veterans without CKD were included in this study, predominantly male (96.6%) and Caucasian (67.2%). After a mean of 3.2 years, 2.7% died and 35.2% developed incident CKD. We validated that well accepted CKD risk factors, eGFR, hemoglobin, history of cancer and coronary artery disease at the start of the study, and increased number of blood pressure lowering agents were predictors of incident CKD. Additionally, a polymorphism in the *ACE* gene (G2350A; rs4343) was strongly predictive of incident CKD in univariate and multivariate models in the entire sample and in the ethnic specific analyses.

In hypertensive non-diabetic veterans, incident CKD was predicted by age, baseline renal function and anemia, and comorbid conditions such as coronary artery disease. Genetic variation within the renin-angiotensin system may also play an influential role.

SOCIAL ADAPTABILITY INDEX PREDICTS SURVIVAL IN CHRONIC DISEASE (CKD) PATIENTS

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While individual socioeconomic factors have been associated with clinical outcome, a composite index has not been developed. In our study, we hypothesize that Social Adaptability Index (SAI) based on employment, education, income, marital status and substance abuse predicts survival in Chronic Kidney Disease (CKD) patients. This is a retrospective analysis of patients with CKD stage 2 or greater. We used data from the Third National Health and Nutrition Examination Survey (NHANES III) cohort. All subjects enrolled in the survey between 1988 and 1994 were included in the study. Patient under 18 years of age were excluded from the analysis. SAI is the primary variable of interest in our study. Each component of SAI (employment status, education, marital status, and substance abuse) has been graded on the scale of 0–3, income has been graded on the scale 0–1. Age, sex, race, diabetes, co-morbidity index, body mass index (BMI), geographic location, hemoglobin, serum creatinine, serum albumin, serum cholesterol and Hba1c were used as covariates in multivariate analysis. The outcome of the study is patient's mortality. We analyzed 13,400 subjects (8614 with CKD stage 2 and 4786 with CKD stage 3–5) with mean age of 50.6 ± 20—53.6% males, 44.4% white, 29.7% African American and 22.1% Mexican American—with 8.5% having diabetes. Lower SAI is associated with greater stage of CKD. Higher SAI was associated with decreased mortality (HR 0.88, $P < 0.001$, 95% CI 0.86–0.89 per 1 point increment in SAI). When SAI quintiles were analyzed, we demonstrated a ‘dose-dependent’ association between SAI and survival. This association of SAI and survival was also present in every subgroups studied in this project. We demonstrated that SAI has a strong and clinically significant association with mortality in CKD patients.

HEPATITIS C AND MICROALBUMINURIA: DOES IT DIFFER BASED ON GENOTYPE?

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Hepatits C has been associated with chronic kidney disease. The association between albuminuria and hepatitis C has been previously observed in several studies. However, the involvement of specific hepatitis C genotype in glomerular disease has not been extensively assessed. This study evaluates the association between hepatitis C genotype and microalbuminuria.

The dataset from the Third National Health and Nutrition Examination Survey, 1988-1994, (NHANES III) was analyzed to evaluate the association between hepatitis C genotype and microalbuminuria. Multivariate analyses were adjusted for age, gender, race, hypertension, diabetes. Data was analyzed using Statistical Analysis Software (SAS 9.2).

264 individuals on whom information was available on HCP genotype were included in the analysis. Mean age of the individual was 41 years and 63% were males. Chronic co-morbidities such as diabetes and hypertension were present in 9% and 23% respectively. Hepatitis C genotype 1 was the most common (79%). Multivariate analysis adjusted for age, gender, race, hypertension, diabetes did not show a statistically significant association between any specific Hepatitis C genotype and microalbuminuria. ($p < 0.5840$).

Microalbuminuria was not associated with any specific hepatitis C genotype. However, since hepatitis C genotypes were not equally distributed, the results of this study cannot be generalized and it is worthwhile to study this association further in diverse population.

MISSED OPPORTUNITY? -- DENTAL VISITS BY CHRONIC KIDNEY DISEASE STATUS IN UNDERSERVED PATIENTS

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Chronic kidney disease (CKD) affects an estimated 13% of the US population. As several studies have demonstrated an association between periodontal disease and CKD, dental visits may be an important strategy for reducing the burden of CKD.

We examined dental visits by CKD status among a cohort of 6,484 randomly selected adult (≥ 20 years) patients with at least 1 year of follow-up and two or more creatinine measurements (≥3 months apart) between January 2005 and May 2010 within the San Francisco Department of Public Health Community Health Network. CKD was defined by an average glomerular filtration rate<60 ml/min/1.73m^2

Over one-third of the cohort had CKD (34.5%). Overall, 500 (7.7%) patients had at least one outpatient dental visit: 405 of 4,249 (9.5%) among patients without CKD and 95 of 2,235 (4.2%) among patients with CKD. Those with CKD were 58% less likely to have a dental visit [OR=0.42, 95% CI (0.33-0.53)] than those without CKD in univariate analysis. With adjustment for age, gender, race/ethnicity, language, and insurance, this association remained statistically significant [0.58, (0.46-0.74)]. Although Blacks and Hispanics were significantly more likely to have a dental visit than Whites [2.46, (1.89-3.19) and 1.77, (1.22-2.56), respectively], within-race associations between dental visit and CKD status were significant only among Blacks [0.55, (0.38-0.80)] and Hispanics [0.51, (0.30-0.88)] after adjusting for other variables.

In conclusion, dental visits in an underserved population are low overall but particularly low among patients with CKD. Given the high prevalence of CKD in this population, mitigating factors that impede dental access may be important for reducing the disparate burden of CKD in this population.

CIPROFLOXOCIN-ASSOCOATED SEIZURES A PREVENTABLE ADVERSE DRUG REACTION

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Background: Ciprofloxacin-associated seizures (CAS) is an uncommon drug complication which occurs frequently in patients with special risk factors that may cause accumulation of drug such as renal insufficiency or that may decrease the threshold of epileptogenic activity like electrolyte abnormalities. Aim: To report a case of ciprofloxacin-associated seizures in an elderly gentleman with CKD. Clinical Vignette: An 86-year-old male admitted to the hospital for a first episode of a generalized tonic-clonic seizure. His CKD was secondary to essential HTN and he has been in good health till few days prior to his presentation where he had urinary tract infection treated with ciprofloxacin. Systemic workup for seizure was done and ruled out the possibility of infection, metabolic disorder, cerebral vascular accident, and malignancy. Upon discharge it was determined seizure activity was likely due to improper dosing of ciprofloxacin in chronic kidney disease, antibiotics were changed and adjusted to his renal function. One month later, his follow-up was totally unremarkable. Discussion: Ciprofloxacin is eliminated primarily by renal excretion; it interferes with neuronal inhibitory activity by blocking the binding of GABA, a major inhibitory neurotransmitter with GABA-A receptor. Advanced age, seizure history, electrolyte imbalances, drug interaction and unadjusted dose for renal insufficiency increase the risk for CAS. Conclusion: Although ciprofloxacin is a safe drug we still need to check the renal function and adjust the dose to prevent serious complications.

URINOTHORAX AS A CAUSE OF PLEURAL EFFUSION

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Urinothorax is a rare cause of pleural effusion. It is the accumulation of urine in the pleural space. A 78 years old female with history of malignancy with unknown primary and chronic kidney disease (CKD) stage 5 presented with increased shortness of breath was found to have large right-side pleural effusion. Thoracentesis was done and revealed a transudative fluid which was yellow and smells like urine. PH of the fluid was 7.25 and the pleural fluid to serum creatinine was more than one. CT showed multiple renal cysts but no hydronephrosis. In order to confirm the diagnosis of urinothorax a nuclear renal perfusion MAG-3 scan was done and showed a line of radiotracer activity extending from the right kidney into the right hemithorax (Fig 1).

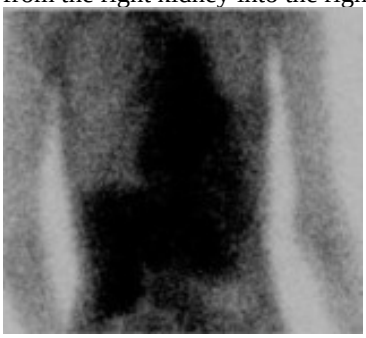

Fig 1

Urinothorax is a rare cause of pleural effusion. It is caused by the leakage of urine into the retroperitoneal space which then reaches the pleural space by diaphragmatic lymphatics or passing through defects in the diaphragm. It is usually classified as obstructive or traumatic but there have been few reports of association with renal cysts, nephrolithiasis, blunt trauma to the kidney, and malignancy.
Our patient did not have any evidence of obstruction and denied any recent trauma or urologic procedure; her urinothorax could be related to renal cysts or her malignancy process.

CARDIOVASCULAR EVENTS AND DEATH AFTER BISPHOSPHONATE THERAPY AMONG FEMALE PATIENTS WITH NDD-CKD

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Accelerated vascular calcification contributes to the cardiovascular disease burden among patients with CKD. We performed a retrospective cohort study of adult, female patients with non-dialysis dependent CKD (NDD-CKD) but without cardiovascular disease to determine the association between bisphosphonate therapy, death, and cardiovascular (myocardial infarction, heart failure, stroke, and limb amputation) events. Patients were enrolled between January 1, 2004 and December 31, 2009, and followed for outcomes through July, 2010; ESRD was a censoring event. Cox proportional hazards modeling was performed to identify independent risk factors for death and cardiovascular events.

9,604 female patients with NDD-CKD were enrolled; of these, 3,234 were treated with bisphosphonate therapy. Median (IQR) follow-up was 3.2 (1.9, 4.8) and 4.2 (2.4, 5.6) years in the treated and untreated groups, respectively. The incident rate ratio (95% CI) for death (treated vs. not) was 0.88 (0.65, 1.20; p=0.411), while that for the composite of all cardiovascular events was 0.85 (0.72, 0.99; p=0.042).

Table. Hazard ratio (95% CI) for death and cardiovascular events* among patients treated with bisphosphonate therapy

	Death[†]	**Cardiovascular events**[††]
Bisphosphonate therapy (vs none)	0.76 (0.66, 0.89) P=0.005	0.93 (0.78, 1.12) P=0.427

*Myocardial infarction, heart failure, stroke, TIA, or limb amputation.
[†]Model adjusted for age, smoking status, blood pressure, high-risk cardiovascular testing, HTN, obesity, thyroid disease, non-obstructive ASCAD, medications, antiplatelet agents.
[††]Model adjusted for all above variables as well as baseline eGFR, serum cholesterol, serum albumin, diabetes, OSA, hospitalization in prior 12 months, and nephrology and cardiology visits in prior 6 months.

Among female patients with NDD-CKD and without clinically evident cardiovascular disease at baseline, treatment with bisphosphonates is associated with a lower risk of death, but not incident cardiovascular events.

Chronic Kidney Disease Surveillance for the United States: A Centers for Disease Control and Prevention Initiative

Elizabeth Hedgeman[1], Laura Plantinga[2], Nilka Rios Burrows[3], Jerry Yee[4], Neil Powe[2], Desmond Williams[3] and Rajiv Saran[1] for the CDC CKD Surveillance System. [1]University of Michigan, Ann Arbor, MI; [2]University of California, San Francisco, CA; [3]Centers for Disease Control and Prevention, Baltimore, MD; [4]Henry Ford Health System, Detroit, MI.

Chronic kidney disease (CKD) affects 10-15% of the population within the US, yet no comprehensive system has thus far existed to track the disease and its outcomes. In 2006, the Centers for Disease Control and Prevention (CDC), as a major part of its CKD Initiative, funded two teams to jointly develop and implement a CKD surveillance system. A Steering Committee and Advisory Group of external stakeholders provided input toward selection of priority measures and key data sources. Data from national and regional data sources have been analyzed and comprehensive written reports submitted to the CDC since 2008. All findings of the CDC CKD Surveillance System will be available at www.cdc.gov/ckd by early 2011. The website covers priority measures under six major topic areas (burden of disease, awareness, risk factors, health consequences, processes and quality of care and healthcare system capacity for CKD) from a variety a data sources selected to represent the population. Figures and tables of specific measures will be updated regularly including relevant stratifications and time trends. The system will evolve to reflect feedback, scientific advances and changing patterns of disease. We believe that the CDC CKD Surveillance System will heighten awareness and provide timely information to regulatory agencies, research and clinical communities, and the general public, thereby providing a solid basis toward stemming the national epidemic of CKD.

RELATIONSHIPS BETWEEN FGF23, DIETARY PHOSPHORUS, URINARY PHOSPHATE AND VASCULAR STIFFNESS

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Fibroblast growth factor 23 (FGF23) is a central regulator of phosphorus metabolism that may serve as a novel prognostic indicator of vascular disease risk. While dietary phosphorus has been shown to modulate FGF23 secretion in health, the association of diet with FGF23 in chronic kidney disease (CKD) has been studied in less detail. Similarly, data on the association of FGF23 with markers of vascular disease in CKD are limited. Accordingly, we evaluated cross-sectional associations of FGF23 with estimated dietary phosphorus intake, 24-hour urinary phosphate and augmentation index (AI, a validated measure of vascular stiffness) in 74 CKD patients with mean creatinine clearance of 51 ± 19 ml/min. Serum phosphate varied little with worsening renal function. In contrast, average daily phosphorus intake and 24-hour urinary phosphate excretion substantially decreased from the highest to lowest quartile of creatinine clearance (by 44 and 62%, respectively, *P* for trend < 0.05 for both). While FGF23 was inversely associated with creatinine clearance (r=-0.4, *P*=0.001) there was no significant association of FGF23 with dietary phosphorus, and only a trend towards an association between FGF23 with 24-hour urinary phosphate excretion (r= -0.23, P=0.06). Increased AI was independently associated with older age, higher systolic blood pressure, female gender and black race, but not with FGF23, serum phosphate, dietary phosphorus intake, or urinary phosphate excretion.

In this CKD population, there were no significant associations between FGF23 with dietary phosphorus intake or urinary phosphorus excretion, suggesting that additional unmeasured factors may mediate FGF23 elevation in CKD. In addition, FGF23 was not associated with surrogate measures of vascular stiffness. Future studies are needed to determine the primary mediators of increased FGF23 levels in CKD and to further assess the association of FGF23 with subclinical markers of vascular disease.

MAINTENANCE OF HEMOGLOBIN LEVEL WITH LESS FREQUENT DARBEPOETIN DOSING IN NON DIALYSIS PATIENTS

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Darbepoetin alfa differs from recombinant human erythropoietin rHu-EPO in that it contains 5 *N*-linked oligosaccharide chains. The additional carbohydrates result in longer half-life and increased biologic activity for erythropoiesis. Currently it is approved for use once-weekly or once every two weeks. The objective of this retrospective analysis was to determine if Aranesp can be administered to patients at longer intervals to maintain hemoglobin value of more than 10.0g/dL in pre-dialysis CKD patients.We reviewed the records of clinically stable out-patient pre-dialysis CKD patients stage III-V(mean GFR 30.9) seen between 2002-2010 receiving darbepoetin at least once every two weeks. The goal of therapy was hemoglobin of 10-12g/dL. Once the hemoglobin was within the target range of 10-12g/dL the interval was extended, per physician decision, to once every three to five weeks. Hemoglobin values were evaluated after 16 weeks of extended dosing and were termed successful with maintenance of mean hemoglobin > 10g/dL.Of the 26 patients selected on chart review, 18 were on or switched to Aranesp once every 3 to 5 weeks. 4 patients were receiving Aranesp every 3 weeks, 12 every 4 weeks and 2 every 5 weeks. No changes in dose or frequency were made till then end of the evaluation period for these subjects. The amount of Aranesp administered per dose was between 60-200 microgram. The above data suggests that Aranesp dosing intervals may be further extended beyond the approved one to two-week frequency. This could further ease the workload for healthcare staff, achieve desirable hemoglobin levels reduce costs and improve patient compliance, especially for those self administering Aranesp at home.

ANEMIA MANAGEMENT AND HEMOGLOBIN VARIABILITY IN CKD PATIENTS NOT ON DIALYSIS

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Body: There has been an increasing interest in the concept of hemoglobin (Hb) variability (var) in patients (pts) with chronic kidney disease (CKD) receiving ESAs. Few studies have examined Hb var in CKD pts not on dialysis. We hypothesized that in these pts Hb var can be reduced by careful monitoring, judicious iron dosing and tight control of darbepoetin alfa (DP) administration.

Design: Pts were included in the analysis if they had CKD (Stage 3-5) and received 12 months of ESAs between 1/06 and 12/08in our out-pt clinic. Hb was targeted to 11-12.5 gm% ,DP initiated if Hb levels were <10 and iron stores were adequate (ferritin > 100 ng/ml and TSat > 20%). DP was given only if a Hb level was checked in the preceding week; iron studies were checked quarterly; iron therapy (po or IV) was given as needed .

Results: Of 360 pts, Hb was measured monthly for 13 mths and analyzed for Hb var. 48 pts (13.3%) were new starts; data from these pts were included after the initial 3 mths of treatment. Cohort Means of age 75 ±12, eGFR 28±11, ferritin 161±160, TSat 27±12. The mean Hb level at each of the 12 mths intervals varied between 11.4-11.6. The average % of pts each mth with Hb levels >12.5 was 10.3% , 11-12.5 66.1% , < 11 23.6% ; 3.6% had Hb levels >13 and 6.2% had levels <10 at any time point. No patients had Hb levels consistently > 12.5 and only 1 pt (0.3%) had Hb levels consistently <11. 20.5% remained consistently > 11, 34% remained consistently < 12.5.The mean DP dose each mth was 234.4 U (192.6-253.6). 106 pts (29.5%) were hospitalized, 17 (4.7%) received a transfusion and 45 (12.5%) received IV iron.

Conclusions The data suggest that with careful monitoring of Hb in non-dialysis CKD pts maintained on DP, Hb levels in the majority of pts were maintained within the clinic targeted Hb range.

SUCCESSES OF A NURSE PRACTITIONER CKD CLINIC

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Nurse practitioner (NP) led chronic kidney disease (CKD) clinics have shown promising results. In this study, we compared the performance measures between a protocol-driven NP CKD clinics (group A) and the CKD patients seen by nephrologists (group B) for patients with stage 3 and 4 CKD.

Patients seen between 2006 and 2009, and had at least 1 year follow-up in our hospital were included. Proportion of patients who had their KDOQI guidelines recommended laboratory parameters measured during 1-yr follow up and whether they were renin-angiotensin system (RAS) blockers and statins at visit 1were compared between groups (table 1).

We included 2091 patients. Patients in group A were older, more likely to be African American and lower eGFR and had more frequent office visits. Group A had a higher proportion of patients who had laboratory measures and use of statins which was also consistent after adjustment for patient demographics (Table 1).

Table 1. Process of care (POC) during one year follow-up

Process of care	**NP Clinic N(%) (N = 425)**	**MD clinic N(%) (N = 1666)**	**OR (95%CI) of having POC**
Laboratory measures			
Hb	409 (96)	1229 (74)	7.9 (4.7, 13.4)
Serum calcium	411 (97)	1449 (87)	4.1 (2.3, 7.2)
Serum phosphorus	377 (89)	684 (41)	8.7 (6.3, 12.0)
25[OH]D	317 (75)	658 (40)	4.1 (3.2, 5.2)
Intact PTH	376 (88)	597 (36)	10.9 (7.9, 15.1)
Lipid profile	350 (82)	939 (56)	3.7 (2.8, 4.9)
Medication use			
RAS blockers	187 (44)	682 (41)	1.20 (0.95, 1.52)
Statin use	296 (70)	965 (58)	1.48 (1.16, 1.89)

Protocol driven NP CKD clinic had superior performance measures than traditional nephrologist run CKD clinic.

TUBEROUS SCLEROSIS PRESENTING AS END STAGE RENAL DISEASE

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Tuberous sclerosis (TS) is a multisystem autosomal dominant disorder that is characterized by seizure, mental retardation, cutaneous lesions and visceral hamartomas. The diagnosis of TS is made clinically and the presentation of the disease varies. Renal involvement in TS includes angiomyolipomas, renal cysts, and renal cell carcinoma. Despite the high incidence of renal involvement, development of chronic renal failure is unusual. We report an unusual case of advanced kidney disease secondary to renal involvement of TS.

A 36-year-old African American female with a past medical history of childhood seizures presented with fatigue, depressed mood, nausea and vomiting, dysgueusia, and nocturia. She denied any other symptoms nor using any medications. She has a 15-year-old son with an established diagnosis of TS (with renal involvement namely angiomyolipoma). Her physical exam was significant for blood pressure 156/95 and pale appearance. Exam showed angiofibromas along malar region of the face and a right 5^{th} digit subungual fibroma. She also had asterixis and clonus. Initial investigation showed blood urea nitrogen of 164 mg/dl, serum creatinine of 23.45 mg/dl, calcium 4.1 mg/dl, phosphorus 10.1 mg/dl, parathyroid hormone 962 pg/ml, serum albumin 3.2g/dl and hemoglobin 6.4 g/dl. Urine analysis showed 3+ protein, 1+ blood, 1+ leukocyte esterase. Extensive serology workup was negative. A CT scan of the abdomen/pelvis showed bilateral atrophic kidneys with a 5.5cm large angiomyolipoma in the left kidney and multiple small cortical cysts bilaterally. Hemodialysis was initiated and she later underwent selective embolization of the renal angiomyolipoma due to progressive enlargement on the follow up CT scan of the abdomen. TS was diagnosed on the basis of a positive family history, kidney CT scan findings, presence of facial angiofibroma, and subungual fibromas.

This case illustrates that advanced kidney disease can be the first clinical presentation of previously undiagnosed TS.

CKD-MINERAL AND BONE DISORDER AND FIBROBLAST GROWTH FACTOR 23 IN CHRONIC KIDNEY DISEASE AND ITS PROGRESSION

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CKD-mineral and bone disorder (CKD-MBD) and elevated fibroblast growth factor 23 (FGF-23) are being increasingly recognized as risk factors for cardiovascular disease (CVD) in CKD populations. Their role in CKD progression is not well defined. In this cohort study, we followed 203 clinically stable adult participants with CKD (eGFR >15 ml/min/1.73 m^2) prospectively for a median of 28 months. We assessed the relationship between circulating levels of intact FGF-23 and other calcium-phosphate homeostasis related factors including serum calcium (Ca), parathyroid hormone (PTH), serum phosphate (P) and 25-OH vitamin D (25OHD) and their role in progression of CKD. The mean±SD age of the CKD population was 60.4±15.1 years, 56% were male, 17% African American and 30% were diabetic; 21% of subjects were CKD KDOQI stage 1 and 2, 51% stage 3 and 28% were stage 4. Hyperphosphatemia was present in 24% and elevated PTH in 69%; Median (IQR) FGF-23 level were 16.6 (10.7-28.5)pg/mL and were above the reference ranges in 7%. Both FGF-23 and PTH levels correlated inversely with eGFR, and were positively correlated with each other ($r=-0.55$, $p<0.001$; $r= -0.40$, $p<0.001$; and $r=0.25$, $p=0.002$ respectively). The highest levels of FGF-23 were seen in patients with CKD stage 4 (median FGF-23 levels 25.9pg/ml vs. 16.3pg/ml stage 3 and 7.2pg/ml stage 1 and 2). The study outcome of end stage renal disease (ESRD) or doubling of serum creatinine occurred in 34 participants who had significantly lower eGFR and 25OHD, and higher PTH and intact FGF-23 levels at baseline (all <0.001). However in a multivariate Cox regression model, the most important predictors of CKD progression were the kidney function and PTH levels at baseline. Each log increase in PTH level was associated with a doubling of risk of the outcome (HR 1.98, 95% CI 1.17-3.36). In summary, PTH and FGF-23 levels increase with declining kidney function and play a major role in deranged mineral metabolism in CKD. Other than its role as a cardiovascular risk factor, PTH may also have a role in CKD progression.

ASSESSMENT OF RECENT ERYTHROPOIESIS-STIMULATING AGENT GUIDELINES CHANGES ON DOSING PATTERNS IN CHRONIC KIDNEY DISEASE PATIENTS NOT ON DIALYISIS

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This study compared the utilization of epoetin alfa (EPO) and darbepoetin alfa (DARB), two erythropoiesis-stimulating agents (ESAs), in chronic kidney disease (CKD) patients not receiving dialysis before and after the National Kidney Foundation/Kidney Disease Outcomes Quality Initiative (KDOQI) Anemia Treatment Guideline changes in March 2007. An analysis of medical claims from PharMetrics (2002-2009) and i3 In Vision Data Mart (Ingenix, Eden Prairie, MN) (10/2005-12/2009) databases was conducted. Patients ≥18 years old, newly initiated on ESAs, with ≥1 claim for CKD were included. Patients diagnosed with cancer, receiving chemotherapy or dialysis, or receiving both agents were excluded. Patients initiating ESA prior to 03/31/2007 were classified into the pre-guideline changes group and compared with patients initiating ESA after 03/31/2007 using the same time window prior and after KDOQI guideline changes. The number of injections per patient and the mean weighted weekly dose were compared. A total 3,654 patients were identified from both data sources. The number of patients initiating ESAs decreased after the guideline changes in both databases (PharMetrics: 1,429 pre- and 1,369 post-guideline changes; i3: 453 pre- vs. 403 post-guideline changes). Among ESA-treated patients, the mean number of injections per patient decreased after the KDOQI guideline changes (PharMetrics: EPO: 7.9 pre- vs. 7.3 post-guideline changes; DARB: 6.0 vs. 5.6; i3: EPO: 7.2 vs. 6.5; DARB: 6.0 vs. 5.3). Mean weighted weekly dose also decreased post-KDOQI guideline changes (PharMetrics: EPO Units: 10,345 pre- vs. 9,282 post-guideline changes, DARB mcg: 41 vs. 40; i3: EPO Units: 14,423 vs. 10,943, DARB mcg: 63 vs. 40). This observational study suggests that the recent KDOQI guideline changes impacted the ESA utilization patterns in CKD patients not receiving dialysis.

COMPARISON OF EPOETIN ALFA AND DARBEPOETIN ALFA DOSING PATTERNS AND COSTS IN A CHRONIC KIDNEY DISEASE POPULATION TREATED IN THE HOSPITAL INPATIENT AND OUTPATIENT SETTING

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This study examined real-world dosing patterns of epoetin alfa (EPO) and darbepoetin alfa (DARB) in inpatients and outpatients with CKD not on dialysis. Electronic records from the Premier Perspective Comparative Hospital Database were analyzed. Patients, identified through hospitalizations and hospital outpatient visits recorded between 2006Q1-2009Q4 from over 500 hospitals nationwide, were ≥18 years old, had ≥1 claim for CKD, and were treated with EPO or DARB. Patients were excluded if they had cancer, received chemotherapy or renal dialysis, or were treated with both drugs. Mean cumulative dose was used to calculate costs, based on April 2010 wholesale acquisition costs (EPO $15.15/1,000 Units; DARB $4.96/mcg). A total of 148,746 (EPO: 116,017; DARB: 32,729) inpatients and 11,012 (EPO: 6,921; DARB: 4,091) outpatients were identified. EPO patients were slightly younger than DARB patients (inpatients: 71.0 vs. 71.2 yrs; P=0.020; outpatients: 71.0 vs. 71.6 yrs; P=0.034). Proportion of women was higher in EPO patients (inpatients: 52.3% vs. 51.3%, P=0.002; outpatients: 62.2% vs. 58.8%, P<0.001). Mean hospitalization length of stay (LOS) and outpatient treatment duration were longer for EPO patients than for DARB (inpatients: 9.9 vs. 9.7 days, P=0.001; outpatients: 3.6 vs. 3.4 months, P<0.001). Mean cumulative dose per treatment episode was EPO 37,333 Units and DARB 149 mcg for inpatients, and EPO 137,101Units and DARB 533 mcg for outpatients, corresponding to similar dose ratios of 251:1 and 257:1 (Units EPO: mcg DARB), respectively. The corresponding treatment cost was significantly higher for DARB in both settings (inpatients, $739 vs. $566; outpatients, $2,644 vs. $2,077, P<0.001 for both). This analysis reported higher drug costs for DARB compared to EPO. Based on the cumulative dose administered, DARB price premiums of 31% (inpatients) and 27% (outpatients) were observed.

PATIENT CHARACTERISTICS ASSOCIATED WITH CONTINUED ERYTHROPOIESIS STIMULATING AGENT TREATMENT IN CHRONIC KIDNEY DISEASE PATIENTS NOT ON DIALYSIS

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This study describes the baseline characteristics associated with continued use of erythropoiesis-stimulating agents (ESAs) in a chronic kidney disease (CKD) population not on dialysis. Health insurance claims from the i3 InVision Data Mart (Ingenix, Eden Prairie, MN) between 10/2005 and 12/2009 were analyzed. Selected patients were ≥18 years old, had ≥1 claim for CKD, ≥1 ESA dose, and ≥90 days of follow-up after the date of the index ESA treatment. The observation period (up to one year of follow-up) was censored one month prior to the first dialysis claim for patients initiating renal dialysis during the study. Patients with cancer, myelodysplastic syndrome, or receiving chemotherapy were excluded. Patients were classified into continued-ESA treatment (C-ESA, ≥3 ESA doses) and limited-ESA treatment (L-ESA, ≤2 ESA doses) groups. Both univariate and multivariate (logistic regression) analyses were conducted to compare baseline characteristics between the two groups. Of the 1,107 patients identified, 837 (76%) were classified into C-ESA. At index date, 62.2% of patients with L-ESA treatment were treated by a nephrologist, compared to 58.7% for the C-ESA group. Adjusted analysis revealed that lower Hb at baseline (Hb<10g/dL) increased the likelihood of receiving C-ESA by 80% (odds ratio [OR] =1.80, *P*=0.018). Patients hospitalized at baseline were 35% less likely to receive C-ESA (OR=0.65, *P*=0.014), whereas those with diabetes or censored for dialysis within one year of treatment initiation were more likely to C-ESA (diabetes: OR=1.51, *P*=0.001; censored for dialysis: OR=2.56, *P*=0.003). Compared with nephrologists, being treated by a hematologist/oncologist increased the likelihood of C-ESA use (OR=1.43, *P*=0.055). The current study showed that Hb <10 g/dL, diabetes, CKD severity as expressed by initiation of renal dialysis, and hospitalizations were factors associated with the probability of receiving C-ESA in CKD patients not on dialysis.

TREATMENT OF 25-OH VITAMIN D DEFICIENCY IN PATIENTS WITH MODERATE CHRONIC KIDNEY DISEASE REDUCES CARDIOVASCULAR EVENTS

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Observational studies in healthy people suggest an inverse relationship between serum 25-hydroxyvitamin D (25OHD) levels and cardiovascular (CV) mortality. Treating vitamin D deficiency in patients with moderate chronic kidney disease (CKD) may reduce CV events in this high risk population.

Study data was abstracted from Harry S. Truman Memorial Veterans Hospital electronic medical record system. Medical records of all veterans who had CKD stage 3 and 4 and had 25OHD levels determined from 4/2006 to 9/2007 were reviewed. Patients with 25OHD deficiency, serum level <30 ng/ml, were included (n= 126, all men, mean age 70 years). Successful 25OHD replacement was defined as prescription of ergocalciferol sufficient to increase serum 25OHD level by 25% from baseline within 6 months (treatment group, n=90). Otherwise patients were considered as untreated controls (n=36).

During median follow up 27.2 months, 44% of controls had CV events while only 21 % of the patients in the treatment group had CV events (p= 0.001). In multivariate logistic regression analysis adjusting for CV events predictors age, initial PTH level, statin use, history of CV disease and GFR, the estimated odds ratio (OR) for 25OHD replacement status was 0.37 (95% Confidence Interval, CI : 0.14- 1.0). Both overall survival and disease specific survival were shown to be lower in the untreated group and the difference in survival curves were statistically significant (p-values=0.008, 0.02, respectively).

Treatment of 25-OHD deficiency with ergocalciferol in moderate CKD patients is associated with significant reduction in cardiovascular events.

ERYTHROPOIESIS-STIMULATING AGENTS (ESAs) ORDER SET USAGE: IMPROVEMENT IN UTILIZATION & COST SAVINGS ACROSS CROZER KEYSTONE HEALTH SYSTEM. COMPARING PRE AND POST IMPLEMENTATION ERA

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Erythropoietin stimulating agents (ESAs) are expensive medications with significant impact on many health-system budgets. Payers have curtailed ESA reimbursements and excess use has been linked to increase risk of cancers and stroke. Hospitals are developing strategies to optimize ESA use. Crozer Keystone health system developed an ESA order set based on FDA recommended ESA uses along with proper dosing interval, targeting and monitoring response according to hemoglobin levels. Crozer Keystone Pharmacy and therapeutic committees approved ESA order set for use in March 2007, mandating its use in 2008. Data was obtained from CKHS Pharmacy records. Buying, utilization and ESA administration records were reviewed. Comparison was made pre and post March 2007. Cost, units of ESA use and number of treatments given were analyzed. ESA use decreased progressively 34.13%, 43.25% and 13.57% from 2006-2009, with a 58.1% (116.5 million units) reduction comparing 3 years pre and post ESA order set initiation. After ESA form initiation in March 2007, cost decreased 30.88% ($887,698), 51.23% ($928,367) and 28.67% ($253,410) respectively from 2007-2009. There was an overall cost reduction of 57.4% ($3,935,574) comparing 3 years pre and post order set implementation. ESA treatments administered remained similar; 28,826 compared to 24, 699 after order set implementation. The mandatory order set helped CKHS optimize ESA use. Most notably realizing cost savings, without significant loss of treatments provided and minimizing the complications associated with excess ESA use.

RECRUITMENT OF HISPANICS WITH CKD: THE HISPANIC CHRONIC RENAL INSUFFICIENCY COHORT STUDY EXPERIENCE

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Despite the large burden of chronic kidney disease (CKD) in Hispanics, this population has been underrepresented in research studies. We describe the effectiveness of various strategies in recruiting a cohort of Hispanics with CKD into the Hispanic Chronic Renal Insufficiency Cohort (HCRIC) Study.

Recruitment efforts took place in high density Hispanic neighborhoods in the greater Chicago area and focused on community clinics with Hispanic providers and accessible laboratory databases to ascertain eligibility by age-specific estimated glomerular filtration rate (eGFR) inclusion criteria. Providers made initial contact with potential participants. Subsequent contact was established by bilingual study staff drawn from the community. Other sites of recruitment included university clinics and nephrology practices. Limited screenings at health fairs were employed and the study was publicized at churches and in local Hispanic print media, television and radio stations.

From October 2005 to July 2008, we recruited 327 Hispanics ages 21-74 with mild-moderate CKD as determined by age-specific eGFR inclusion criteria. Of 718 individuals completing a screening visit, 365 (51%) did not meet eGFR criteria and < 1% were excluded for other reasons. Approximately 69% of participants are Mexican American, 16% are Puerto Rican, and 25% have another Latin American ancestry. Spanish speakers comprise 81% of participants. Community practices accounted for 76% of recruitment, University and nephrology clinics 33%, and publicity <1%.

A strategy focused on community clinics with Hispanic providers in combination with the use of bilingual recruiters allowed us to overcome barriers to the recruitment of the understudied Hispanic population with CKD.

OBSERVATIONAL STUDY OF ANEMIC PATIENTS WITH PRE-DIALYSIS CHRONIC KIDNEY DISEASE (CKD) CONVERTING FROM DARBEPOETIN ALFA (DARB) TO EPOETIN ALFA (EPO)

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The purpose of this study was to compare erythropoiesis-stimulating agent (ESA) dosing patterns, associated ESA drug costs, and hemoglobin (Hb) outcomes in pre-dialysis CKD patients converted from DARB to EPO. This was a retrospective observational study of electronic medical record data in pre-dialysis CKD patients from a nephrology center in the Midwestern U.S. Patients were initially treated with DARB and subsequently converted to EPO between January 2008 and March 2009. Patients included were age ≥18 years, had ≥1 medical claim for CKD, received ≥2 doses of both DARB and EPO, and received ≥180 days of treatment on either side of the ESA conversion. Exclusion criteria included a treatment gap of >90 days, dialysis initiation, or active cancer/chemotherapy during study period. ESA drug costs were calculated based on 1/2010 Wholesale Acquisition Costs. A total of 170 patients met inclusion criteria. Mean (SD) age was 70.3 (13.6) years, and 64.7% were female. Mean ESA dosing interval was greater during EPO treatment versus DARB treatment (DARB 33.4 days, EPO 37.2 days, $P = 0.017$). Mean Hb levels were statistically different, but maintained close to 11 g/dL (DARB 11.2 g/dL, EPO 10.9 g/dL, $P < 0.001$). The weighted mean weekly DARB dose was 37.9 mcg and EPO weighted mean weekly dose was 7,399 Units associated with an observed dose ratio of 195:1 (Units EPO: mcg DARB). Associated mean weekly ESA costs were $196 for DARB and $112 for EPO reflecting a 75% DARB price premium. In this study of pre-dialysis CKD patients converted from DARB to EPO, longer dosing intervals and lower drug costs were associated with EPO treatment. Hb levels were maintained within the recommended target range throughout the observation period. Further research in other centers is warranted.

EFFECT OF BONE METABOLISM PROTOCOL ON STAGE 4 CHRONIC KIDNEY DISEASE PATIENTS

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Hyperphosphatemia and secondary hyperparathyroidism have both been shown to be associated with increased mortality in patients with Chronic Kidney disease (CKD).

In our CKD Clinic, we designed and implemented a bone metabolism protocol based on the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) Guidelines in an attempt to achieve improved phosphorus and intact PTH (Parathyroid Hormone) levels.

We enrolled all stage 4 CKD patients in our practice and we obtained serial measurements of phosphorus and intact PTH at 1 year, 6 months, and 1 month prior to and after implementation of the protocol on 102 patients. We calculated the mean phosphorus and intact PTH levels, averaging the levels both before and after protocol implementation and compared these using paired student t-tests. The mean difference in phosphorus prior to protocol implementation compared to after was 0.02 mg/dL, and for intact PTH was 2.06 pg/mL (p values for phosphorus and intact PTH levels were 0.75 and 0.83 respectively and not statistically significant).

In conclusion, our standardized KDOQI based bone metabolism protocol in stage 4 CKD, was as effective as the provider directed, non protocol based therapy but far more time efficient than the latter as the patients' lab data were much more organized and accessible.

OUTPATIENT VERSUS INPATIENT OBSERVATION AFTER PERCUTANEOUS NATIVE KIDNEY BIOPSY; A COST-MINIMIZATION STUDY

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Percutaneous kidney biopsy (PKB) is the primary diagnostic tool for kidney disease. Outpatient "day surgery" (ODS) following PKB in low risk patients has been described as a safe alternative to inpatient observation (IO). This study aimed to determine the least costly strategy while accounting for all institutional costs (IC) including post-PKB complications and death.

A cost-minimization study was performed using decision analysis methodology which models relative costs in relation to outcome probabilities yielding an optimum decision. The potential outcomes included major complications (bleeding requiring blood transfusion or advanced intervention), minor complications (bleeding or pain requiring additional observation), and death. Probabilities were obtained from the published literature and a base case selected. IC were obtained for all complications from institutional activity-based cost estimates.

The base case assumed an overall complication rate of 10% with major bleeding occurring in 2.5% of patients and death in 0.1% and 0.15% of IO and ODS patients, respectively. The IC of death was estimated at $500,000, which includes insurance costs and potential litigation. ODS cost $1390 per patient compared to $1770 for IO. In order to justify IO for all by cost minimization, the overall complication rate needed to exceed 19%, major complication rate 5.4%, and IC per death $1.1 million. The IC of death for ODS would need to be 50% higher compared to IO in order to favor the latter for all.

ODS may be a safe alternative to IO and potentially less costly from the institutional perspective. ODS should be considered for low risk patients who understand the signs of a post-KB complication and who would seek immediate care if they were to arise.

DIASTOLIC BLOOD PRESSURE MAY BE AN EARLY MODIFIABLE RISK FACTOR IN PREVENTING AORTIC STIFFNESS AMONG CHRONIC KIDNEY DISEASE PATIENTS

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Chronic kidney disease (CKD) is estimated to affect approximately 15 million American people; the majority being greater than 60 years of age. Although aging increases the risk of cardiac complications in the general population, CKD is associated with as additional 10-20% increased risk of cardiovascular death. Discovering the factors that may increase this risk and intervening earlier in patients with CKD may improve mortality among this population.

Aortic stiffness is a common finding in both the aging and the CKD populations but through different pathophysiologic mechanisms. A prospective longitudinal study was launched to investigate the hypothesis that patients over the age of 65 with moderate CKD will have increased vascular stiffness when compared to age matched controls.

Enrollment was conducted at the University of Wisconsin Hospital and Clinics in Madison, Wisconsin. There were 14 subjects with moderate CKD stage 3 (defined as GFR 30-60 ml/min). The control group was comprised of 23 age-matched controls without CKD. Pulse wave velocity (PWV) was measured using tonometry, which is a noninvasive assessment used to estimate vascular stiffness. Individuals performing and interpreting the tonometry readings were blinded to the study group.

Recruitment yielded demographically similar cohorts. PWV did not differ between the groups but diastolic blood pressure (DBP) was significantly higher in the CKD group ($P=0.03$) while SBP showed no difference. Of note, a high colinearity was seen between DBP and PWV.

Patients over age 65 with moderate chronic kidney disease have higher diastolic blood pressures compared with age matched controls. This suggests that intervention targeting diastolic blood pressure at this stage has potential for cardiovascular risk factor modification. Further investigation is underway.

NODULAR GLOMERULOSCLEROSIS DUE TO SMOKING IN A PATIENT WITH WALDENSTROM MACROGLOBULINEMIA

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We report a case of CKD diagnosed with nodular glomerulosclerosis due to smoking and HTN. A 77 year old Caucasian male presented to our office with CKD III for work up of CKD. He also had a past medical history of CAD, HTN, treated Bladder CA and NHL, 20years ago, gout. His CKD was diagnosed about 3 years ago. Home medicines included lasix, allopurinol, metoprolol, amlodipine, simvastatin, fosinopril, niacin, ASA. He was a smoker with nearly 60 pack year's history.

Lab work up showed normal CBC, Creatinine of 2.67, normal LFT's, 6 months ago his creatinine was 2.08. UA showed triple phosphate crystals, 2+ proteins, 1+ glucose. Urine sediment contained no RBCS, WBCs or blood cell casts; 24 hour urine protein was 4.9g/d. P-ANCA was positive. C3, C4, CH50, ANA, Anti dsDNA, HbSAg, Cryoglobulin, HCVAb, Anti GBM Ab were negative or normal. SPEP and UPEP were obtained which showed a monoclonal M spike of 0.6g/dl.

Initially his BP was controlled, diabetes was ruled out with fasting glucose and HbA1C, RAS was ruled out, and an appointment with Hematology was arranged. A diagnosis of MGUS was made and SPEP, UPEP and Immunofixation electrophoresis was recommended for 6 monthly follow up. The patient then had renal biopsy.

Renal biopsy showed diffuse mesangial sclerosing glomerulopathy, interstitial granulomas, tubular atrophy and interstitial fibrosis with arterio and arteriolosclerosis. No cellular cresents were noted. No immune complexes, amyloid or light chains were noted. As diabetes was ruled out a diagnosis of smoking and HTN induced nodular glomerulosclerosis was made. A year later his creatinine remains fairly stable with tight control of HTN, he was diagnosed with Waldenstrom macroglobulinemia and is receiving treatment.

This case shows the importance of renal biopsy in a CKD patient with rising creatinine in spite of appropriate management of medical problems. Also, biopsy should be considered in these patients even if SPEP is positive as only 50% of these patients have myeloma kidney.

DISCOVERY AND DEVELOPMENT OF BARDOXOLONE METHYL, AN ANTIOXIDANT INFLAMMATION MODULATOR (AIM) TARGETING THE KEAP1-NRF2 PATHWAY

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Bardoxolone methyl and related analogs in the AIM class are the most potent known inducers of the Keap1-Nrf2 pathway. AIMs were discovered through an approach to identify novel molecules to inhibit inflammation-induced carcinogenesis. Oleanolic acid, a triterpenoid natural product, was selected as the initial scaffold due to its weak anti-inflammatory and anti-carcinogenic activity. Synthetic derivatives were evaluated by measuring suppression of NO production in activated macrophages; bardoxolone was one of the most potent analogs (IC_{50}=0.11 nM). Biochemical assays established that bardoxolone directly interacts with regulatory cysteine residues on Keap1. Activation of Keap1 promotes accumulation of Nrf2 in the nucleus, inducing transcription of genes that increase antioxidant capacity, induce glutathione synthesis, and conjugate and export potentially harmful molecules from the cell. In addition, Keap1 activation suppresses the pro-inflammatory activity of NF-κB. Bardoxolone protects against pro-inflammatory stimuli *in vitro* and *in vivo* in an Nrf2-dependent manner. Bardoxolone and related analogs have also been shown to improve endothelial dysfunction, suppress mesangial cell contraction, and increase inulin clearance in preclinical studies. Open-label clinical trials of bardoxolone resulted in substantial improvements in measures of kidney function in most patients. In a recent double-blind, randomized trial, placebo-controlled trial, treatment with bardoxolone for 24 weeks in patients with Stage 3b/4 chronic kidney disease and type 2 diabetes resulted in a large increase in eGFR of 10.1±1.1 mL/min/1.73m^2 relative to no change in the placebo group ($p<0.001$). Significant improvements were also noted in other measured of kidney function, including blood urea nitrogen, serum phosphorus, and serum uric acid relative to placebo. Bardoxolone has been well tolerated to date. A Phase 3 study (BEACON) is being initiated in the same population to measure time to a composite of 50% decline in eGFR, renal replacement therapy, or death.

KIDNEY SARCOIDOSIS SECONDARY TO EXPOSURE TO WTC COLLAPSE

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Multiple health effects on survivors and rescuers of World Trade Center (WTC) collapse were described. Most people experienced new or worsening respiratory symptoms, heartburn/reflux and severe headaches.

We present a case of renal sarcoidosis developed secondary to exposure to dust and debris after WTC collapse. A 53 year-old Caucasian male with history of DM, gout and HTN was sent to nephrologist for clearance for cardiac catheterization. The patient was a first responder to WTC collapse. Medical history was significant for a hospital admission 4 years ago with left pleural and pericardial effusion of unknown origin; lung biopsy showed only mild chronic inflammation and edema. Vasculitis and SLE were ruled out, and baseline creatinine was 1.3 at that time. On this visit creatinine was 2.87, urine analysis showed 1+protein, no blood. Serum calcium level was normal. Patient was diagnosed with diabetic vs. hypertensive nephrosclerosis. Urine immunofixation showed monoclonal gammopathy, but multiple myeloma work-up was negative. Rheumatologic workup including vasculitis and SLE was negative. CT scan of the chest showed a minimal stable area of chronic scarring in upper lobes anteriorly. Patient's renal function continued to decline, and new onset hematuria developed. Kidney biopsy was consistent with non-necrotizing granulomatous interstitial nephritis(GIN). Lack of necrosis in the granulomas and other clinical conditions predisposing to GIN made renal sarcoidosis the leading diagnosis. Prednisone therapy was started, and creatinine, proteinuria and hematuria improved.

In conclusion, although multiple cases of lung sarcoidosis were registered in people who were exposed to dust and debris after the WTC collapse, to the best of our knowledge, no cases of isolated kidney sarcoidosis were previously described in literature.

IMMUNE RESPONSE TO HEPATITIS B VACCINE IN END STAGE RENAL DISEASE POPULATION

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End-Stage Renal Disease patients have a low seroconversion rate compared to the general population, following Hepatitis B vaccination. We conducted a prospective study to evaluate the possible association between inflammation (measured by TNFα, CRP & ferritin) and the immune response following Hepatitis B Vaccination and to identify clinical parameters that can predict seroconversion. Thirty five ESRD patients who were negative for hepatitis B surface antigen and antibody, received 40 μg of Hepatitis B Vaccine in the deltoid muscle at 0, 1 & 6 months. Immune response to vaccine was evaluated 1 month after completion of the vaccination series by quantitative antibody titers. Clinical parameters and inflammatory markers were compared between patients who responded and those who did not. Patients who responded to Hepatitis B Vaccine (22 or 63%) were younger than those who did not (53.95 +/- 15.47 vs. 68.85 +/- 9.67, p=0.018). There were no differences in other parameters (sex, ethnicity, type of access, number of years on hemodialysis, urea reduction ratio, serum iron, hemoglobin, albumin, PTH, calcium, phosphorus and bicarbonate), and in the use of erythropoietin stimulating agents or vitamin D analogues between the two groups. We specifically evaluated the association of inflammatory markers (TNFα, CRP, ferritin) with seroconversion after Hepatitis B Vaccination, but there were no differences between the two groups. Patients were also stratified according to their Hepatitis B antibody titers, but there were no differences in any of the parameters described.

In conclusion, the immune response to Hepatitis B Vaccination in chronic HD is low as compared to the general population. Younger age seems to be associated with an adequate response to vaccine. We did not identify any association between inflammation, measured by inflammatory markers and the lack of seroconversion after vaccination.

EARLY DETECTION, SCREENING, AND MANAGEMENT OF CHRONIC KIDNEY DISEASE AMONG ACTIVELY EMPLOYED – AN INTEGRATED POPULATION HEALTH MANAGEMENT APPROACH

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The employer burden of CKD in terms of lost productivity, short and long term disability use, and high total healthcare costs has been well documented and warrants an employer-sponsored population health management program to improve the health and lives of the workforce.

Georgia Power Company has implemented a chronic care management program aimed at early identification, disease awareness, and counseling of employees through on-site screenings. Individuals are offered voluntary participation in the CKD management program with their PCPs and nephrologists depending upon their risk and CKD stage. Health outcomes including, clinical, resource utilization, and self reported health status and productivity are compared pre- and post-program implementation. Preliminary results at the 6-month mark show that: a) 2,589 employees were screened, 638 (25%) met program criteria for participation and 110 (17.2%) agreed to participate in the study, b) Among the current enrollees, 17% have diabetes and 51% have hypertension, c) Mean eGFR rates are 61.27, and HbA_1C levels of 7.7, and a mean BMI of 30.5 indicating a population at high risk for developing CKD, d) Participants reported missing on average 10.5 hours/week due to their CKD, e) Baseline total healthcare expenditures were $19,776 per member per year indicating a high cost population as well. In conclusion, CKD is a high-cost disease for GPC. Resources invested in creating novel CKD management programs to identify, raise awareness, and manage CKD are a worthwhile investment for employers.

MANAGING HEALTH-RISKS, HEALTH STATUS, AND PRODUCTIVITY IN CHRONIC KIDNEY DISEASE – AN INNOVATIVE CHRONIC CARE MANAGEMENT SOLUTION FOR EMPLOYERS

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20 million adults in the US suffer from chronic kidney disease (CKD). Nearly half are unaware of their elevated risk for CKD. Anemia, a common occurrence among CKD patients, can also cause significant disruptions in productivity. From an employers' perspective, CKD identification and management have important implications due to the high costs and productivity loss. To evaluate the impact of a chronic care management model aimed at slowing the progression of CKD in employed populations. HealthCare 21's project tests a face-to-face health coaching intervention and studies medical and pharmacy utilization, self-reported health status and productivity, clinical markers and total healthcare expenditures. A total of 219 employees were enrolled with complete data on all outcomes. Results at the one-year mark show the following: a) $36,047 per member per year reflecting a high cost and high risk population, b) participants reported missing on average 2.7 hours/week as a result of their CKD (8% of their total work week), c) 32% reported being in fair or poor health, d) 68% reported feeling depressed some of the time, e) 78% reported that their disease (CKD) interfered with their work at (both within and outside) at some time. In conclusion, these results show that the productivity and cost burden of CKD is very high for employers. Early identification and chronic care management programs can help employees manage their condition appropriately and slow down the progression of CKD. The health-risk management model (HRMM) can be effective for managing CKD and related comorbidities, and be easily adopted by employers in their worksite settings.

METABOLIC SYNDROME, INSULIN RESISTANCE, AND KIDNEY FUNCTION IN NONDIABETIC INDIVIDUALS

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The metabolic syndrome has been recently identified as a risk factor for chronic kidney disease (CKD). Since components of the metabolic syndrome have been individually identified as risk factors for CKD, the metabolic syndrome diagnosis may represent an aggregate of CKD risk factors. On the other hand, the components of the metabolic syndrome have also been associated with insulin resistance, which may directly mediate the increased CKD risk.

In a cross-sectional study, we evaluated the relationship among the metabolic syndrome, insulin resistance and estimated glomerular filtration rate (eGFR) in 574 nondiabetic volunteers. Insulin resistance was directly quantified using the insulin suppression test, and the metabolic syndrome components were measured. eGFR was calculated using three validated estimation equations: the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation, the Mayo quadratic equation, and the Modification of Diet in Renal Disease (MDRD) study equation. Statistical analysis was performed using SPSS, version 17. Comparisons of clinical and laboratory characteristics were performed using analysis of variance (ANOVA) or chi-square tests for categorical variables. A linear model was used to evaluate the relationship between insulin resistance (SSPG) and eGFR adjusted for age, gender, and ethnicity.

While CKD prevalence was higher and mean eGFR was lower in individuals who met the metabolic syndrome criteria compared with those who did not, we did not observe a significant relationship between the degree of insulin resistance and eGFR. Out of all of the components of the metabolic syndrome, only hypertension was significantly associated with CKD prevalence (OR (95% CI), 3.5 (1.2-10.1), p=0.02). In conclusion, while CKD is more common among subjects with the metabolic syndrome, insulin resistance does not appear to be a common associated factor.

IS VITAMIN D DEFICIENT IN THE SUNSHINE STATE OF FLORIDA?

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Vitamin D has an import role in skeletal and extra skeletal functions. The high prevalence of vitamin D deficiency has been increasingly recognized as an important public health problem. One of the major risk factors for vitamin D deficiency is Chronic Kidney Disease (CKD). Recent studies have been challenging the assumption that vitamin D deficiency may be less prevalent in people living in sunny climate; however limited data is available so far. To verify the prevalence of Vitamin D deficiency in sunny areas and its association with other co morbidities, we conducted a cross sectional descriptive study at Cleveland Clinic Florida on patients with CKD stage III to V from spring 2008 to winter 2009. Over 2000 patients admitted to Internal Medicine and its subspecialties were screened, from those 84 patients with eGFR < 60 (MDRD equation) met the inclusion criteria, and were checked for vitamin D levsl. 25-OH vitamin D levels below 30 ng/ml were considered to be insufficient, and below 15 ng/ml as deficient.

Hypovitaminosis D was prevalent in 70% of the study group (52% vitamin D insufficient and 18% vitamin D deficient). The majority of patients were CKD stage 3, and 75% of those were vitamin D deficient. Also hypovitaminosis D showed significant association with Diabetes Mellitus (p= 0.03), and some association with anemia (p 0.437), and with cancer (p 0.221). In conclusion, Vit D deficiency is highly prevalent in CKD patients admitted to a South Florida Hospital and is significantly correlated with Diabetes Mellitus. Routine monitoring of vitamin D levels in early stages CKD and in diabetes can be beneficial even in sunny areas. Larger multi-center population-based studies are needed to verify the prevalence and outcomes of vitamin D deficiency.

COCAINE USE AND CHRONIC KIDNEY DISEASE: FINDINGS FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY

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Purpose: Studies have reported a possible link between cocaine use and chronic kidney disease (CKD). The purpose of this study was to specifically examine this relationship in a nationally representative sample.

Methods: We performed a cross-sectional analysis of data from the National Health and Nutrition Examination Survey 2005-2008**.** The sample included 6,168 participants who completed the drug use survey and were between the ages of 20-59 years. CKD was defined as an MDRD estimated glomerular filtration rate (eGFR) ≤60 mL/min/1.73m^2 or the presence of microalbuminuria (>20mg/g). We compared non-cocaine users to those who used any form of cocaine, recently used cocaine (defined as within the last 30 days), and also examined the number of times used (<5, 5 times or more). Using logistic regression models, we estimated odds ratios for CKD with cocaine use adjusted for demographic factors and medical history.

Results: Between cocaine and non-cocaine users, there was no significant difference in eGFR (90.3±0.87mL/min/1.73^2 vs 91.4±0.73 mL/min/1.73^2, p = 0.268) and albumin/creatinine ratio (23.7±5.8mg/g vs 28.8±4.9mg/g, p = 0.519). There was also no significant difference in eGFR and albumin/creatinine ratio between recent cocaine users or those that had used cocaine 5 times or more compared to non-users and those with a history of distant cocaine use or < 5 times used (p>0.05). Unadjusted and adjusted logistic regression analysis revealed no significant association between cocaine use and prevalent CKD

Discussion: In a representative sample of the U.S. population, there was no substantial difference in kidney function or albuminuria between non-drug users and those who used cocaine.

COST-EFFECTIVE MANAGEMENT OF IRON DEFICIENCY AMONG PATIENTS WITH ANEMIA AND NON-DIALYSIS DEPENDENT CHRONIC KIDNEY DISEASE

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The optimal treatment of iron-deficiency among anemic patients with stage 3 or 4 chronic kidney disease has not been determined. We designed a Markov, state-transition model exploring oral vs. IV iron as initial therapy for newly anemic (hgb < 10 g/dL), iron deficient patients with non-dialysis dependent chronic kidney disease (NDD-CKD). The perspective was that of a health care system. Probabilities of state transitions, cardiovascular events and blood transfusions, as well as direct health care costs incorporating hematologic response and downstream ESA use, were derived from a retrospective cohort (2004—2009) of adult patients with iron deficiency, incident anemia, and stage 3 or 4 chronic kidney disease at Geisinger. The timeframe and analytic horizon were median life-expectancy. Outcomes assessed included costs, quality-adjusted life years (QALYs), and the incremental cost-effectiveness ratio (ICER). Sensitivity analyses across subgroups with varying responsiveness to oral iron and across a range of healthcare resource utilization and IV iron dosing regimens were conducted. Over the course of 4.0 years follow-up, for average and robust responders to oral iron therapy (as measured by probability of achieving a hemoglobin of 11.0 g/dL or greater), an initial strategy of oral vs. intravenous iron was associated with modestly higher effectiveness (0-80 quality-adjusted life-days) and lower costs (cost savings range $2500-$12,000). Among those with the poorest early hematologic response to oral iron therapy, intravenous iron was modestly more effective (18 quality-adjusted life days) and cost-saving ($300), but sensitive to background health care resource utilization

Oral iron is the optimal first treatment strategy for the majority of iron-deficient, anemic NDD-CKD patients.

PREVALENCE OF DIAGNOSED RISK FACTORS IN UNDERSERVED PATIENTS WITHOUT CREATININE MEASUREMENTS IS HIGH

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Diabetes and hypertension account for the vast majority of CKD in the United States. Persons with these risk factors should be tested regularly for declines in kidney function.

A cohort of 1617 adult ($\geq$20 years) patients with at least 12 months of follow-up and two or more primary care visits, but without recorded creatinine measurements, was randomly selected within the San Francisco Department of Public Health Community Health Network (a consortium of >30 clinics delivering care to underserved patients) , starting in January 2005. ICD-9 diagnostic coding in outpatient, inpatient, and emergency department records defined diagnosed diabetes (250.x, 249.x) and hypertension (401.x-404.x, 997.91).

The majority of this untested cohort had neither diabetes nor hypertension (93.9%); however, while only 1.1% had diabetes, 5.5% had hypertension (6.1% with either condition). With adjustment for age, race/ethnicity, gender, poverty, insurance, and language, both middle (45-64 years) vs. younger (20-44 years) age [OR=2.22, 95% CI (1.25-3.94)] and black vs. white race/ethnicity [3.18 (1.54-6.55)] were statistically significantly associated with higher odds of having either diagnosed risk factor in this cohort. Medicare vs. Medicaid insurance was also marginally associated with higher odds of having these conditions [2.72 (0.90-8.22)]. Similarly, middle age and black race were associated with higher risk of having hypertension alone; for diabetes, the associations were similar but not statistically significant. Other insurance vs. Medicaid was associated with decreased odds of having diabetes alone [0.17 (0.04-0.84)].

Up to 6% of underserved patients who have not had creatinine measured may have powerful, diagnosed risk factors for CKD (hypertension and diabetes) that are not recognized by providers. Provider education regarding appropriate creatinine testing in the setting of known CKD risk factors may be warranted to optimize preventive care.

LOW SOCIAL SUPPORT IS ASSOCIATED WITH INCREASED ALL-CAUSE MORTALITY IN AFRICAN AMERICANS WITH HYPERTENSIVE CKD

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Low levels of social support have been found to predict worse outcomes and higher mortality in ESRD patients. Less is known about the association of social support and outcomes in earlier stages of CKD. We examined the relationship between baseline social support and doubling of serum creatinine (SCr)/incident ESRD, cardiovascular (CV) events, and all-cause mortality in African Americans with hypertensive CKD from the African American Study of Kidney Disease and Hypertension (AASK) Cohort Study. Social support was assessed using the Interpersonal Support Evaluation List-16 (ISEL-16).

The mean ISEL-16 score was 36 (out of a maximum score of 48) in 659 participants. Lower income, less education, unemployment, lack of marriage, higher body mass index, history of psychiatric disease, and increasing number of comorbidities were associated with lower ISEL-16 scores ($p<0.05$). Relative risks (RR) and 95% confidence intervals (CI) for each outcome with ISEL-16 scores below the cohort mean (ref: above cohort mean) are as follows:

	Unadjusted		Adjusted	
Outcome	RR, CI	p	RR, CI	p
CV Events	1.25 (0.84, 1.88)	0.27	1.28 (0.85, 1.93)	0.23
Renal Events	0.89 (0.64, 1.24)	0.48	0.92 (0.65, 1.30)	0.63
All-cause mortality	1.41 (0.95, 2.10)	0.09	1.52 (1.01, 2.30)	0.046

The model is adjusted for age, gender, eGFR, and proteinuria.

Lower social support was associated with lower socioeconomic status and greater burden of comorbid illness in this cohort. Low social support was independently associated with an increased risk for all-cause mortality but not CV events or CKD progression. Future work will need to focus on mechanisms underlying this relationship.

KIDNEY FUNCTION PREDICTS COGNITION IN PATIENTS WITH HEART FAILURE

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Kidney function has been shown to be associated with cognition in the general population. Although 25-50% of patients with heart failure (HF) have cognitive decline, the association of kidney function and cognition has not been investigated in this population. This study explored the predictive role of kidney function on cognition in patients with HF.

We recruited 274 patients with HF from 3 sites in the northeastern US. Patients on dialysis, with major depression or dementia were excluded. Clinical parameters were obtained from medical records and demographics were provided by self-report. Glomerular filtration rate was estimated (eGFR) by the new CKD Epi equation; patients were grouped by eGFR at a cut-off point of 60ml/min/1.73 m^2. Five neuropsychological tests were used to measure cognitive function: Digital Symbol Substitution Test (DSST), Probed Memory Recall Test (PMR), Trail Making Test A and B (TMTA/B), the Letter Number Sequencing Test and lapses on the Psychomotor Vigilance Task (PVT). To assess the predictive role of kidney function in cognition, linear and logistic regressions were performed. Significance was set at $p<0.05$.

The sample was 64% male with a mean age of 62$\pm$ 12years, 54% had at least some college education, and 58% were in New York Heart Association (NYHA) class III. The mean eGFR was 64.5$\pm$25.7ml/min/ 1.73m^2. Compared to HF patients with eGFR $\geq$60ml/min/1.73m^2, those with eGFR<60ml/min/1.73m^2 had higher odds of having 2 or more abnormal measures of cognitive functioning (OR=1.88, p=0.034), specifically scoring below the norm on DSST (β= -5.86, p=0.001), TMTA (β=8.02, p=0.002) and TMTB (β=15.48, p=0.022) after adjusting for age, gender, race, clinical site, and highest level of education achieved.

In conclusion, deteriorating kidney function is a determinant of cognitive decline in HF patients. Efforts to defer kidney function deterioration may improve cognitive function in adults with HF.

RISK FACTORS FOR 30-DAY HOSPITAL READMISSION AMONG PATIENTS WITH NON-DIALYSIS DEPENDENT CKD

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Hospitalization rates among patients with non-dialysis dependent chronic kidney disease (NDD-CKD) exceed those without CKD. We performed a retrospective cohort study (January 1, 2004 through March 31, 2010) to determine the rate of, and risk factors for, 30-day hospital readmission among adult patients with NDD-CKD at Geisinger. Patients were censored for death within 30 days of index discharge, ESRD, and for discharge to hospice care or to another acute-care hospital. Multivariable logistic regression analysis was performed to identify those factors independently associated with readmission.

11,048 patients with NDD-CKD were admitted and survived a minimum of 30 days after discharge. 1,377 (12.5%) were readmitted within 30 days.

Table. Independent risk factors for 30-day readmission among patients with NDD-CKD*

Variable	**HR (95% CI)**	**P-value**
Admitted from clinic, vs scheduled	1.74 (1.37-2.19)	<0.001
Admitted from ED, vs scheduled	1.47 (1.26-1.72)	<0.001
CHF prior to index admission	1.24 (1.07-1.45)	0.005
Cancer prior to index admission	1.15 (1.01-1.32)	0.034
Narcotic prescription at index admission	1.21 (1.07-1.37)	0.003
Length of hospitalization (per day)	1.03 (1.02-1.04)	<0.001
Discharged with home health, vs none	1.24 (1.06-1.44)	0.049

*Adjusted for age, number of prior admissions, days from last clinic visit to index admission, number of index discharge diagnoses, stage of CKD, prescription at admission for loop diuretic, statin, or NSAID, BNP level, HDL test order, troponin test order, assessment for proteinuria, and season of year of index admission.

Among patients with NDD-CKD, readmission occurs frequently. Common clinical factors predict readmission and suggest a target subpopulation for testable interventions.

VALIDATION OF THE KIDNEY DISEASE QUALITY OF LIFE 36 (KDQOL-36) U.S. SPANISH AND ENGLISH VERSIONS IN HISPANICS WITH CHRONIC KIDNEY DISEASE

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Assessment of quality of life in chronic kidney disease (CKD) has received increased recognition but has not been evaluated in Hispanics with CKD. The KDQOL-36 is a 36-item instrument to assess quality of life in patients with kidney disease. We evaluated the reliability and validity of this instrument in U.S. Hispanics with CKD.

The KDQOL-36 was self-administered at study entry to 420 Hispanic participants (150 English and 270 Spanish speakers) in the Chronic Renal Insufficiency Cohort (CRIC) and Hispanic CRIC (HCRIC) Studies, and 409 non-Hispanic white participants in the CRIC Study matched by age (mean 57 yrs), gender (60% male), renal function (mean estimated glomerular filtration rate 35.9 ml/min/1.73m^2), and diabetes status (70% with diabetes mellitus).

Internal consistency reliability of all KDQOL-36 subscales (SF-12 Physical Health and Mental Health Composite, Symptoms/Problems, Burden of Kidney Disease, and Effects of Kidney Disease) was very good, with a Cronbach's alpha above 0.8. Construct validity was supported by the expected negative moderate correlations between all KDQOL-36 subscales and the Beck Depression Inventory score. There was negative strong correlation between the Symptoms/Problems subscale and the Symptoms Severity Index. We also found significant, moderate positive correlation between the Physical Health subscale and the MESA Typical Week Physical Activity Survey, as well as between each KDQOL-36 subscale and most of the Kansas City Cardiomyopathy Questionnaire components. The correlation between all KDQOL-36 subscales and the Davies Comorbidity Index was weak. Similar results were found across all three groups analyzed separately.

Our findings support the reliability and validity of the KDQOL-36 as a measure of kidney disease-related quality of life in these cohorts of English and Spanish speaking U.S. Hispanics with CKD.

SAVE THE VEIN BRACELET MAKES IMPACT ON VEIN PRESERVATION IN ADULT CKD PATIENTS

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Arteriovenous fistula (AVF) is a patient's lifeline on hemodialysis. The purpose of this study is to review the impact of Save the vein bracelets on vein preservation. All clinic patients with GFR <20 were educated on the importance of early placement of fistula. Each patients was given a Save the Vein bracelet to wear to encourage vein preservation in designated arm. Evaluations were completed at 30, 60 and 180 days to see if patients were still wearing their bracelets, had AVF/AVG placed or started dialysis with a functional AVF. Results: At 180 days, 21 bracelets were given to patients in the CKD program. 34% were for vein preservation before placement. 85% agreed to wear, 81 % were wearing on the next visit. At 180 days, 100% of patients have started HD have a functional AVF. Of those who have not yet started HD, 100% have AVF/AVG placed which are maturing. 4 patients refused to wear, of which 50% did not have AVF placed. In summary, patients who wear Save the Vein bracelets are more likely to have access placed.

Bracelets also prevented any damage to the new fistulas due any unexpected ER visits, blood draws, accidents and the patient was unable to communicate. FMCNA has moved to provide the Save the Vein bracelets as part of its national catheter reduction collaboration to improve and preserve vascular access placement.

STAGE OF CKD AND ASSOCIATED COSTS IN A TYPE 2 DIABETES MANAGED CARE POPULATION

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The prevalence of chronic kidney disease (CKD) is significant and continues to rise in the United States. Costs for CKD patients are double their age-matched controls and diabetes remains one of the largest cost modifiers; however, less is known about specific CKD costs within a primary care diabetes population treated in a managed care setting. We sought to characterize the total costs of care at all stages of CKD among a primary care population with Type 2 diabetes.

The Pathways Study is a prospective longitudinal cohort study of diabetic patients within a large managed care system. Stage of CKD was defined by the National Kidney Foundation guidelines. Costs were examined at 6 months from baseline and included: primary and specialty care, pharmacy, laboratory, emergency room, inpatient costs, and a total sum across all cost categories. Cuzick non-parametric testing was used to assess for trend with all CKD categories compared to CKD stage 0. Of the 3754 patients included in the study, 3283 individuals met one of the definitions of CKD. The mean absolute total costs for CKD stages 0-5 at six months were: $2076, $3508, $3292, $4867, $7905, $14233, respectively. Absolute percentage of total outpatient costs at each stage was: 66%, 48%, 53%, 49%, 48%, and 37%. Compared to stage 0, patients in stages 2 to 5 demonstrated significantly increased costs within each cost category and overall. Those in stage 1 also had increased total costs compared to stage 0, but this did not reach statistical significance ($p=0.051$). Cuzick non-parametric tests showed a significant, increasing cost trend by CKD stage in all cost categories ($p<0.0001$), as well as for total costs ($p<0.0001$).

Total costs of care increase significantly with increasing stages of CKD. Much of this economic burden of disease may be attributable to a larger percentage of inpatient costs at the later stages of CKD. Stage of CKD is an important predictor of health care costs in a managed care organization for patients with Type 2 diabetes.

EVALUATING SERUM PHOSPHOROUS ACROSS DIFFERING LEVELS OF RENAL FUNCTION WITHIN A LARGE ETHNICALLY DIVERSE POPULATION

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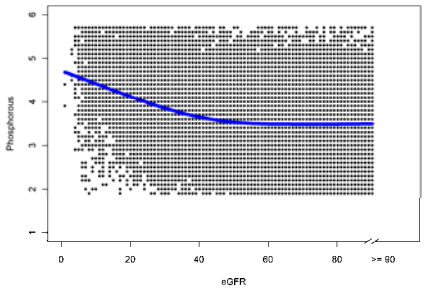
We sought to examine the relationship of serum phosphorous across declining levels of eGFR.Retrospective cohort study within KPSC of those with valid measurement of serum phosphorous 01/01/1998 - 05/31/2010. Comparisons of cohort characteristics among population based quartiles of phosphorous with ANOVA and chi-square tests. Generalized additive models with cubic smoothing splines were used to determine the relationship btwn phosphorous and eGFR. Subgroup analyses were performed stratified by age group, gender and race. Calcium, PTH, and vitamin D levels were also analyzed for their relationship with eGFR. A total 325,357 patients had a valid serum phosphorous measurement and 159,535 (49%) had concurrent eGFR. Average phosphorous began to increase at eGFR < 50 while it remained at 3.5 when eGFR>50. This trend holds among different age groups, genders and races.

We observed similar trend for PTH in relation to eGFR. But the average vitamin D and calcium levels seem to be independent of the eGFR values. Males, older age, and black race had lower phosphorous levels. While hyperphosphatemia is a manifestation of advanced renal failure, our observational cohort demonstrates rising serum phosphorous levels earlier in CKD at an eGFR of 50 mL/min/1.73 m^2 which was consistent across different ages, gender, and races.



LIGHT CHAIN TUBULOPATHY WITH FANCONI SYNDROME

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Plasma cell dyscrasias cause an array of kidney disorders with light chain tubulopathy being hard to diagnose due to its subtle and variable presentation. However, its recognition is important because it causes kidney disease and acquired Fanconi syndrome.

A 29 year old African American man with no significant past history presented with arthralgias, unintentional 25 pound weight loss, and fatigue. Physical exam was unremarkable. Blood work showed glucose 94mg/dl, creatinine 2.31mg/dl, bicarbonate 25.2mmol/L, and calcium 9mg/dl. Baseline creatinine was not known. Liver function tests were normal except for an elevated alkaline phosphatase. Urine exam revealed 1000mg/dl glucose, 1.95g/24 hours protein, and 43% fractional excretion of phosphorus, without cells or casts. Further blood work showed phosphorus 1.8mg/dl, uric acid 1.6mg/dl, and HbA1C 5.1%. HIV, anti-nuclear antibody, antiproteinase-3 antibody and antimyeloperoxidase antibody were negative. Kidney ultrasound was unremarkable. Kidney biopsy was consistent with light chain proximal tubulopathy (LCPT), lambda type. Serum and urine protein electrophoresis confirmed an Immunoglobulin G lambda chain peak with high serum free lambda chain levels at 169.75mg/L. Skeletal survey was negative and bone marrow biopsy showed 8% plasma cells with lambda chain positive clone. LCPT, hyperphosphaturia, hypouricemia and normoglycemic glycosuria, were consistent with light chain fanconi syndrome (LCFS). Patient refused treatment and his creatinine is stable at 2mg/dl, 6 months after diagnosis.

LCFS is a rare kidney disorder classically presenting with Fanconi syndrome and LCPT. Incomplete degradation of the crystallized light chains and subsequent accumulation is the suspected mechanism of kidney injury. LCFS is almost always caused by kappa chains unlike our patient who had lambda chain LCFS. Timely evaluation for Fanconi syndrome in a normoglycemic adult with persistent glycosuria will help prevent metabolic and bone diseases. Fanconi syndrome in adults is rare and should prompt a thorough evaluation for a plasma cell dyscrasia, as treatment of dysproteinemias can restore kidney function.

ASSESSING DAILY ILLNESS BURDEN OF PATIENTS WITH ESRD

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Patients on maintenance dialysis often live lives of compromised quality due to the burden of illness, yet little is known about their daily life experiences. The purpose of this study was to obtain detailed information about daily activities and events that dialysis patients engage in on a daily basis and to quantify the emotional experiences in the dialysis patients' home settings. A total of 71 dialysis patients completed the Daily Reconstruction Survey, an experience sampling method to systematically reconstructing participants' activities and experiences of the previous day. Time spent on their activities, settings, and associated emotions were assessed to compute U-Index scores (the percentage of time a person spent in an unpleasant or undesirable state).

The mean U-Index score was 34.45 (SD=29.26), suggesting that patients spent approximately 6 hours of their day in an unpleasant or undesirable state, excluding sleep hours. U-Index scores did not differ by race (African American vs. White), age, sex, and years on dialysis. Only 9.9% of the sample reported exercise activities performed the previous day. While all peritoneal dialysis patients (n=15) reported health-related activities, including self-management, only 12 hemodialysis patients (21.4%) reported performing any health-related activities. U-Index scores on dialysis days were significantly higher than those on non-dialysis days (43.80 vs. 21.20; p=.012) for hemodialysis patients.

The findings may assist clinicians to better understand the daily activities and burdens experienced by dialysis patients and suggest areas for future research and clinical considerations to improve the quality of their lives.

NKF-KDOQI CKD STAGE PROGRESSION AND REGRESSION AMONG PRIMARY CARE PATIENTS WITH MILD-TO-MODERATELY IMPAIRED KIDNEY FUNCTION

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Little is known about the stability of kidney function over time in large, community-based populations. We identified predominantly Caucasian adult (≥30 yrs) primary care patients from The Geisinger Clinic (central/northeastern Pennsylvania). Using electronic health records, patients (n=105,026) were followed from Jan 2004 to Dec 2009 and assigned to 1 of 7 initial CKD stages (stage 1-5, including 3A/3B, or no CKD) based on NKF-KDOQI criteria and the CKD-EPI eGFR formula. The primary outcome was the CKD stage at final follow-up for patients initially in stage 3A or 3B. Patients (n=6267) in stage 3A had a median age of 65 and were 62.7% female. Patients (n= 2891) in stage 3B had a median age of 70 and were 66.5% female. Over a median follow-up period of 5.9 years, only 1/3 of patients with stage 3 CKD changed in stage. For stage 3A patients, progression to 3B was slightly more likely than regression, though regression to a milder CKD stage was 10 times more likely than progression to CKD 4 or 5. For stage 3B patients, 13% progressed to stage 4-5 and regression (largely to stage 3A) was about as likely as progression.

CKD cases by initial stage (3A or 3B) and status at final follow-up

Initial Stage	Final Stage n(%)				
	0	1-2	3A	3B	4-5
3A (n = 6267)	608 (9.7%)	295 (4.7%)	4176 (66.6%)	1100 (17.6%)	88 (1.4%)
3B (n = 2891)	24 (0.8%)	19 (0.7%)	434 (15.0%)	2030 (70.2%)	384 (13.3%)

Regression to relatively milder CKD among patients with stage 3A and 3B CKD is not uncommon, and progression to stage 4-5 is relatively uncommon, particularly for those with stage 3A disease at baseline. The implications of these findings for current NKF/KDOQI screening and risk stratification guidelines should be further investigated.

USE OF IV IRON IN NONDIALYSIS CKD PT CARE

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Intravenous iron (IVfe) use is a key component of anemia management in CKD. Use of IVfe is not well studied in nondialysis CKD patients (pts). The purpose of this retrospective study was to assess characteristics and effects of IVfe in our CKD clinic.

Utilizing electronic medical records, pts who received IVfe were identified from 2006-2009. Pts with active malignancy and GI bleeding were excluded. Frequency and type of IVfe used were assessed for effect on Hgb, iron stores, GFR and ESA dosing.

112 patients received 1of 3 iron preparations. Mean eGFR was 32 ± 21 ml/min. About 25% of pts were not followed in a CKD clinic, and were more likely to receive a transfusion $p<0.02$, incomplete iron dosing $p<0.021$, and less likely to receive ESA $p<0.012$. Use of IVfe ↓ESA dosing by 2000 units/mo for up to 6 mo following IVfe. Mean interval between IVfe doses was 253.5±137 dys. Response to IVfe with ↑ in %fe and ↓ ESA dose was correlated to ↓PTH. No difference between the 3 iron preparations was noted.

IVfe corrected iron deficiency and ↓ ESA dosing for almost a 6 mth period. Correction of iron stores and ↓ESA dose was impacted by degree of mineral metabolism disorder. Increases in ESA dosing may predict IVfe need.

THE GREAT MASQUERADER

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We present a case of 64 yr old AA male with history of hypertension admitted from correctional facility for worsening renal function. He complained of progressive weight loss and fatigue over last 6 months. He denied fever, cough, shortness of breath, chest pain, bony pain or any joint symptoms. Clinical examination revealed no skin lesions, erythema nodosum, uveitis , arthritis or abnormal chest findings. His only medication was Enalapril which was stopped on admission.

Routine blood work 1 month prior had revealed Bun/Cr of 28/1.8 mg/dl with Serum Ca of 9.8 mg/dl.. Follow up lab showed BUN/Cr of 40/4.0 mg/dl with Serum Ca =13.5mg/dl prompting this admission. Further workup revealed normocytic , normochromic anemia with normal iron profile (Hgb/Hct=30/10.3), normal PTH, 25 OH VitD, ACE level. USG kidney revealed no hydronephrosis. HIV test and Quantiferon tubercular assay were negative. Skeletal survey showed lucent lesions within right distal radius, ulna and femoral head. SPEP showed polyclonal elevation of gamma globulins with band of IgA lambda on immunofixation. These collaborative findings raised the suspicion of multiple myeloma. Bone marrow biopsy done to evaluate for myeloma showed multiple noncaseating granuloma. CT thorax revealed hilar adenopathy, which on biopsy showed noncaseating granuloma consistent with Sarcoidosis. Treatment was initiated with steroids and IV fluid resulting in gradual recovery of renal function.

Sarcoidosis , often referred to as " the great masquerader" , remains true to the epithet due to diversity of its presentation. Renal failure as an isolated manifestation of sarcoidosis is uncommon and can be secondary to granulomatous nephritis, interstitial nephritis without granulomata or hypercalcemia with nephrocalcinosis. Diagnosis of sarcoidosis causing renal failure remains a challenge as it can masquerade as multiple different pathology, as it mimicked multiple myeloma in our patient.

LIMITED ENGLISH PROFICIENCY AND ACUTE HEALTH CARE UTILIZATION AMONG PATIENTS WITH CKD

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Language barriers are associated with decreased access to health care. Patients with limited English proficiency (LEP) may hesitate to access services due to anticipated communication difficulties. We examined the effect of LEP on acute health care utilization among patients with chronic kidney disease (CKD).

We examined the impact of LEP status on rates of hospital admissions and emergency department (ED) visits among a cohort of 2249 adult ($\geq$20 years) patients with CKD and at least two primary care visits within the San Francisco Department of Public Health Community Health Network (a network of >30 public health clinics) between 2005 and 2010. LEP was defined by preferentially speaking a non-English language. CKD was defined by average estimated glomerular filtrate rate <60 ml/ min/1.73m^2 on two or more creatinine measurements ≥3 months apart. Incidence rate ratios (IRRs) were calculated with negative binomial regression, adjusting for sociodemographic variables and co-morbid conditions.

Nearly a third of the cohort (32%) had LEP; 11% spoke Spanish and 13% spoke Chinese (Cantonese or Mandarin). LEP patients had higher rates of hospital admission than English-speaking patients [IRR=1.2, (95%CI, 1.0-1.4)]. This association was similar among Chinese speakers [1.3 (1.0, 1.8)] but not statistically significant among Spanish speakers [1.0 (0.78, 1.4)], relative to English speakers. LEP patients had lower rates of ED visits than English-speaking patients [0.82, (0.67, 1.0)]. This association was similar among Chinese [0.7 (0.5, 0.99)] and Spanish [0.77 (0.55, 1.1)] speakers.

Among patients with CKD within a safety net system, LEP was associated with lower ED visit rates but higher hospital admission rates. LEP patients -- particularly those speaking languages uncommon among providers— may anticipate communication barriers, thus delaying ED presentations and increasing likelihood of hospital admission.

IRON REPLETION DOES NOT SIGNIFICANTLY DECREASE PLATELET COUNTS IN CKD PATIENTS

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Platelet counts (PLT) have been reported to vary directly with the severity of iron deficiency in hemodialysis (HD) patients. Moreover, PLT were reduced after IV iron administration in the recent DRIVE study, as also in a recent NKF abstract. This has led some to hypothesize that iron deficiency may produce a relative thrombocytosis that may contribute to thrombotic events noted in clinical trials of ESA's in CKD patients.

We sought to confirm the reduction in PLT by IV iron repletion in CKD patients with iron deficiency anemia (IDA).

We conducted a retrospective chart review, including all patients with CKD and IDA who were treated with iron dextran total dose infusion (TDI) during a 5 year period (2002-2007). TDI diluted in normal saline was administered IV, given as a single bolus over 4-6 hours. Patient demographics were noted; lab values for creatinine, hemoglobin (Hgb), serum iron (Fe), % transferrin saturation (Tsat), ferritin (Ftn) and PLT were recorded pre- and post-dose. Data were analyzed using Student's t-test to compare mean values and linear regression analysis to elucidate possible relationship between pre-dose PLT and Tsat and Fe.

153 patients received a total of 250 doses of TDI (mean$\pm$SD = 971$\pm$175 mg); age=69$\pm$12 years and creatinine=3.3$\pm$1.9 mg/dL. All stages of CKD were represented (stage 4 commonest). Hgb and Fe stores improved post-TDI ($P<<0.001$). There was a very mild decrease in PLT (pre-TDI 255 *vs.* post-TDI 244, $P=0.30$). The mild reduction in PLT after TDI remained non-significant ($P>0.05$) when data was stratified by molecular weight (MW) of iron dextran used (low *vs.* high), as well as by dose administered (<1000 *vs.* $\geq$1000 mg). Linear regression analysis between pre-dose PLT and Tsat and Fe showed R^2 of 0.01and 0.04 respectively.

In conclusion, correction of iron deficiency did not significantly lower PLT in CKD patients, regardless of MW or dose used. Correlation of PLT to severity of iron deficiency was very weak. Association of recently reported PLT reduction to postulated improvement in thrombotic outcomes needs additional long-term study.

COMPLICATIONS OF CHRONIC KIDNEY DISEASE (CKD) BY LEVEL OF ALBUMINURIA AND PROTEINURIA IN THE IRBESARTAN IN DIABETIC NEPHROPATHY TRIAL (IDNT)

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Based on the improved prediction of cardiovascular and renal outcomes, it has been proposed to include levels of both albuminuria and Glomerular Filtration Rate (GFR) for the classification of CKD. However, it is not known whether albuminuria is associated with concurrent complications of CKD and whether these associations are different for proteinuria versus albuminuria.

Cross-sectional analysis of 1576 participants enrolled in the IDNT trial and who had complete data ascertainment was conducted to evaluate the association of 24-hour albuminuria and proteinuria with anemia (hemoglobin < 12 g/dL for women, <13.5 g/dL for men) and hyperphosphatemia (phosphate > 4.6 mg/dL). For comparability, albuminuria and proteinuria were categorized by tertiles.

The median albuminuria and proteinuria were 1.9gm (IQR 2.4) and 2.9gm (IQR 3.4) respectively. The table shows the OR (95%CI) for the complications, adjusted by age, sex, race and eGFR

Complication	24-hour Albuminuria, grams			
	<1.06g (n=388)	1.06-3.5gm (n=796)	>3.5gm (n=392)	p-trend
Anemia	1 (ref)	1.3(1.0,1.7)	1.6(1.2,2.1)	<0.01
Hyperphosphatemia	1 (ref)	1.3(0.8,2.0)	2.2(1.4,3.6)	<0.01
	24-hour Proteinuria, grams			
	<1.73g (n=394)	1.73-5.2gm (n=788)	>5.2gm (n=394)	p-trend
Anemia	1 (ref)	1.4(1.0,1.8)	1.8(1.3,2.5)	<0.01
Hyperphosphatemia	1 (ref)	1.4(0.8,2.2)	2.4(1.5,3.9)	<0.01

Both albuminuria and proteinuria were significantly associated with anemia and hyperphosphatemia in patients with diabetic nephropathy. The magnitude of the association was similar for albuminuria and proteinuria. The implications of these findings in the management of CKD should be taken into account when considering including albuminuria level in the classification of CKD.

PROGRESSION OF CHRONIC KIDNEY DISEASE (CKD) IN ADULT MALE FABRY PATIENTS TREATED WITH ENZYME REPLACEMENT THERAPY (ERT).

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The Fabry Registry is designed to provide long-term follow-up of children and adults with Fabry disease, including all forms of disease-directed therapy. This analysis examines long-term progression of kidney function in adults who were treated with at least 24 months of ERT (agalsidase-beta 1.0 mg/kg i.v. every other week). Subjects included in the analysis had at least 3 serum creatinine measurements over 24-months on ERT and at least 1 measurement of urine protein/creatinine ratio (UPCR). Estimated glomerular filtration rate (eGFR) was calculated with the CKD_EPI equation, and eGFR slopes were calculated for individual patients, from values reported after the first infusion of ERT. Within each gender, patients were categorized into quartiles based on the calculated eGFR slope.

The median age of the 151 male patients who met the inclusion criteria was 38 years. Those in the highest and lowest quartiles for eGFR loss showed important differences in the following clinical parameters: median eGFR slope (–6.2 vs. –0.5 ml/min/1.73 m^2/year); averaged UPCR (median=1.5 vs. 0.3 g/day); baseline eGFR (median=61 vs. 104 ml/min/1.73 m^2); age at first infusion (median=43 vs. 35 years); and time from symptom onset to first infusion (median=35 vs. 20 years). Overall, 46% of males reported receiving anti-proteinuric therapy during ERT.

These results suggest that agalsidase-beta treatment outcomes are strongly related to key clinical parameters and that early intervention may lead to optimal renal outcomes. Furthermore, adult Fabry males on ERT may be at risk for progressive loss of eGFR, particularly if proteinuria is not controlled with appropriate adjunctive anti-proteinuric therapy.

DISEASE STATE AWARENESS, KIDNEY DISEASE, AND RELATIONSHIP TO ESRD AND DEATH

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Despite a high morbidity and mortality in those with CKD, lack of awareness is common and complicates timely detection and intervention. Thereby, we sought to determine if awareness improved CKD-related outcomes, mortality and progression to ESRD.

We utilized 2000-2009 data from the NKF KEEP™, a large nat'l screening program to detect CKD. All-cause mortality data was determined by cross reference of the KEEP study cohort to the Social Security Admin Death Master File and data on RRT in the USRDS.

Of 109,285 participants, 28,244 were identified with CKD and 81,041 without. Of those identified, 25,584 were unaware of their KD. Individuals with CKD were predominantly older, female, white, well-educated and had access to healthcare. Of the 2660 aware of their KD compared to those unaware, there were higher rates of DM (47.4% vs 42%), CVD (42.6% vs 28.4%), and cancer (22.6% vs 13.9%) compared to those unaware. On 8.5 years of follow up, awareness compared to those unaware further increased adjusted risks for all-cause mortality [hazard ratio 95% CI: 3.45 (2.96-4.02)] and ESRD [448.59 (262.72-765.98)] as well as a conveyed a higher mortality and incident ESRD on survival analysis ($p<0.001$ for all comparisons).

Awareness is associated with risk for adverse outcomes, a finding likely related to increased CVD and cancer in this population. We conclude this highlights an at-risk population rather than a true cause-effect relationship.

HIGHER PREVALENCE OF CV-RELATED COMORBIDITIES IN US ADULTS WITH STAGE IIIB CKD SUPPORTS A MODIFICATION TO THE EXISTING NKF/KDIGO CLASSIFICATION OF CKD

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Some clinicians have recommended revision of the current NKF/KDIGO classification of CKD and establishing Stages IIIa and IIIb CKD because of perceived differences in CV risk profiles in Stage III. CKD is often associated with CV target organ damage and CHD risk equivalents. In this analysis of a nationally representative database, we quantified the prevalence of CVD and CHD risk equivalents in US adults by CKD stage, utilizing the suggested modification of Stage III CKD, in an attempt to determine if such a revision is warranted. Data from NHANES 2001–2008 were stratified by CKD stage; eGFR was calculated using the 4-variable MDRD Study equation. CKD staging used modified NKF criteria: Stage III CKD was subdivided into Stage IIIa (eGFR $\geq$45–<60 mL/min/1.73m^2) and Stage IIIb (eGFR 30–<45 mL/min/1.73m^2). CVD history was self reported; DM was identified by self report, use of diabetic medications, or fasting glucose $\geq$126 mg/dL. Of the NHANES participants with valid renal data, 12% had CKD. The prevalence of CV-related comorbidities increased with progressive renal impairment (Table). Prevalence of CVD, CHD and stroke increased markedly between CKD Stage IIIa and IIIb. Prevalence of DM was notably higher in Stage IV versus Stage I CKD.

CKD Stage	CVD*	CHD	Stroke	DM
Normal	5.9%	4.2%	1.9%	7.8%
I	10.9%	7.2%	2.8%	33.7%
II	24.3%	17.6%	6.5%	30.9%
IIIa	25.6%	19.1%	7.9%	20.4%
IIIb	48.7%	33.6%	23.5%	33.1%
IV	60.1%	42.6%	33.2%	49.1%
*Composite of CHD, stroke and CHF				

Persons with CKD, especially those with advanced renal impairment, have a high prevalence of concomitant CVD. Our analysis supports the proposed revision of the current NKF/KDIGO classification of CKD, as the prevalence of specific CV comorbidities and CHD risk equivalents was substantially higher in Stage IIIb versus IIIa CKD.

UNDERTREATMENT OF MODIFIABLE CV RISK FACTORS PERSISTS IN A VERY HIGH-RISK CKD POPULATION

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Clinical trial data suggest that aggressive treatment of dyslipidemia and hypertension reduces CV events and may modify the progression of renal disease in CKD. However, undertreatment of these CV risk factors has consistently been reported in patients with CKD. The NKF recommend an LDL-C goal of <100 mg/dL and a BP <130/80 mmHg for those with CKD. Nearly 30% of CHD patients, and 40% of patients with DM, have concomitant CKD. In this analysis of US adults from a national database, we assessed the utilization of lipid-lowering and BP-lowering agents, and rates of LDL-C and BP goal attainment, in a very high-risk population with CHD or DM, concomitant with CKD. Data from NHANES 2001–2008 were stratified by CKD stage; eGFR was calculated using the 4-variable MDRD Study equation. CKD staging used modified NKF criteria: Stage III CKD was subdivided into Stage IIIa (eGFR ≥45–<60 mL/min/1.73m^2) and Stage IIIb (eGFR 30–<45 mL/min/1.73m^2). Disease history and drug utilization were self reported. Of the NHANES participants with valid renal data, 212 had concomitant CHD and CKD; 326 had concomitant DM and CKD. As renal impairment progressed, the use of lipid-lowering agents remained steady in CHD patients and increased in DM patients (Table). Attainment of an LDL-C <100 mg/dL improved with advancing CKD, with the exception of CHD patients with Stage IV CKD. BP goal attainment was unchanged in CHD patients, and decreased in DM patients between CKD Stage IIIa/IIIb and IV, despite the increased use of antihypertensives. Few patients (10–40%) attained the optional LDL-C goal of <70 mg/dL for CKD patients at very high risk.

CKD Stage	Dyslipid. Tx		Hyperten. Tx		LDL-C <100		BP ≤130/80	
	CHD	DM	CHD	DM	CHD	DM	CHD	DM
IIIa	55.2%	40.1%	62.6%	80.9%	53.5%	45.5%	47.3%	40.7%
IIIb	55.8%	52.5%	73.8%	80.7%	68.4%	64.6%	49.9%	51.5%
IV	54.6%	49.5%	83.8%	100%	24.3%	53.7%	48.0%	28.2%

Undertreatment of CV risk factors persists in these very high-risk populations and represents an unmet medical need in CKD. Future treatment guidelines should recommend aggressive, comprehensive CV risk factor modification to maximize CV event reduction and progression of renal disease in CKD patients at high risk for CHD.

HIGH BLOOD PRESSURE IS A RISK OF CKD IN JAPANESE POPULATION WITH AND WITHOUT HISTORY OF HYPERTENSION---RESUTLTS FROM KEEP JAPAN

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The International Kidney Evaluation Association Japan (IKEAJ) started the Japanese version of Kidney Early Evaluation Program (KEEP JAPAN) following the US National Kidney Foundation since 2006.

The 1537 participants with diabetes or hypertension, or family history of diabetes, hypertension, or kidney disease (KEEP group) and 587 participants without above risk factors (non-KEEP group) were included. Overall, mean age was 54.4 ± 17.8 years; 969 were men and 1155 were women. Of them, 451 participants were yearly examined up to forth year.

Of KEEP group, CKD prevalence was 28.4%, defined by positive albumin-creatinine ratio (= or >30 mg/gCr) and decreased estimated glomerular filtration rate using Japanese equation (<60 ml/min). In contrast, of non-KEEP group, the prevalence was 15.5%. In KEEP group, 780 participants (50.8%) reported a history of hypertension, and of them, 429 participants (55.0%) had high blood pressure (= or >140/90 mmHg) and 122 (15.6%) had very high blood pressure (= or >160/100 mmHg). In the participants with history of hypertension, although the high blood pressure was not a significant risk of CKD (prevalence: 43.6%, odds ratio: 1.12 [95%CI: 0.84 to 1.50]), the very high blood pressure was a significant risk of CKD (prevalence: 52.4%, odds ratio: 1.63 [95%CI: 1.10 to 2.40]). Among 757 KEEP participants without history of hypertension, 148 participants (19.6%) had high blood pressure and their prevalence of CKD was 21.6% (odds ratio: 1.99 [95%CI: 1.26 to 3.16]). Similarly, among non-KEEP group who did not have history of hypertension, 135 participants (23.0%) had high blood pressure and their prevalence of CKD was 27.4% (odds ratio: 2.78 [95%CI: 1.73 to 4.47]). During the yearly follow-up, the incidence of CKD in KEEP group participants with high blood pressure was 57% (odds ratio: 2.65 [95%CI: 1.45 to 4.85]).

In conclusion, as the measurement of blood pressure is essential for the examination in the evaluation program of CKD. The blood pressure control and the early identification of undiagnosed hypertension may prevent or delay the progression of CKD.

IDIOPATHIC NODULAR GLOMERULOSCLEROSIS ALONG WITH PROLIFERATIVE RETINOPATHY AND SENSORIMOTOR NEUROPATHY IN A NON-DIABETIC, NON-HYPERTENSIVE REFORMED SMOKER

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We report the first case of idiopathic nodular glomerulosclerosis (INGS) along with proliferative retinopathy and sensorimotor neuropathy in a non-diabetic, non-hypertensive reformed smoker. A 65-years old Caucasian female was seen in the office of a primary care doctor with a creatinine of 1.6 mg/dl in November 2009. She quit smoking five years ago. She denied history of diabetes, hypertension, kidney disease or use of NSAIDs. In August 2010, she presented with anasarca, nephrotic range proteinuria (3.8 g/day) and moderate size right pleural effusion. A serological work up including ANA, Anti dsDNA, Anti SSA/SSB, Anti RNP, C-ANCA, P-ANCA, complement factors (C3, C4), HIV and hepatitis panel was unremarkable. Oral glucose tolerance test and three measurements of glycosylated hemoglobin (HbA1C) over a period of three months were less than 4.5 %. Renal tissue analysis with light and electron microscopy showed nodular glomerulosclerosis and thus INGS, as there was no evidence for diabetes and other conditions causing nodular glomerulosclerosis. She was found to have proliferative retinopathy on a detailed retinal examination and fluorescein angiography performed for an evaluation of declining visual acuity. Nerve conduction and electromyographic studies were consistent with symmetric sensorimotor polyneuropathy. Serum levels of vitamin B-12 and folate were within normal limits. We speculate that there may exist an increased sensitivity to a non-diabetic range of blood glucose levels resulting in an exaggerated response of the microvasculature of the glomeruli, retina and nerves.

EFFECT OF INSULIN THERAPY OR ORAL HYPOGLYCEMIC THERAPY ON THE ARTERIAL BLOOD PRESSURE AND CARDIOVASCULAR EVENTS IN PROTEINURIC NEPHROPATHY PATIENTS

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Diabetic patients have significantly increased cardiovascular and renal events.

We evaluated the possible effect of insulin treatment alone or oral hypoglycemic agents (OHG) treatment alone on the blood pressure and cardiovascular outcome in type 2 diabetes patients with nephropathy.

We recruited 508 proteinuric diabetic nephropathy patients, 53.3% males were included. One hundred and ninety two patients were on oral hypoglycemic treatment while 28 patients were on insulin alone, while the remaining patients were on combined insulin-and oral hypoglycemic therapy. Duration of diabetes was 13.7±8 vs. 13.82±7 years. The initial serum creatinine was 109±95 vs. 94±71.2 µmol/L. The eGFR at initial visit was 96.6±56.5 vs. 85.3±37.7 mL/min per 1. 73 m^2eGFR at last visit was 69.19±37 vs. 55.4±34 mL/min per 1. 73 m^2. Patients treated with insulin had improvement in their systolic blood pressure and diastolic blood pressure, further they were at lower risk of having cardiovascular and renal events. SBP was reduced in insulin treated group significantly as compared to OH treated group 24.9±19.5 vs. 135.9±24.5 mmHg (p=0.02). DBP was significantly lower in insulin treated group 74.8±10 vs. 79.5±9.9 mmHg (p=0.02).

There was no significant effect of insulin on renal or cardiovascular outcome, and that what we concluded our study.

Treatment Choice	uncntl'd HTN	Stroke	MI	Angina
On Insulin	17.9%	14.3%	21.4%	25%
On OHG	31.8%	14.1%	25%	36.5%
p value	< 0.001	0.97	0.7	0.2

SLEEP APNEA (SA) IS AN EFFECT MODIFIER OF ASSOCIATIONS OF DIABETES MELLITUS (DM) ON ALBUMINURIA AND CARDIOVASCULAR DISEASE (CVD): NHANES

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SA is often associated with DM but whether SA augments the risk of kidney disease and CVD in DM is unknown. We therefore examined these associations in the 2005-2008 continuous National Health And Nutrition Examination Survey (NHANES). Diagnoses of SA and CVD (myocardial infarction, stroke or CHF) was considered present if the participant reported physician diagnosed presence of these conditions .DM was defined as self reported physician diagnosed history of diabetes, use of insulin or oral diabetic medications or fasting serum glucose > 125 mg/dl. There were 10914 participants. Mean age was 45.7 ± 14.5 years, 48.1% were men, and 11.4% were African-American. 9.5% had DM and 4.6% had SA. Urine albumin to creatinine ratio (ACR) was used to quantitate albuminuria.

Table 1. Associations of SA and DM with ACR and CVD in multivariable logistic regression models

	ACR 30-300 mg/g*	ACR > 300 mg/g*	CVD Composite**
Both absent	reference	reference	Reference
SA only	1.11(0.73-1.70)	1.82(0.42-7.96)	2.09(1.44-3.04)
DM only	2.99(2.31-3.87)	5.82(3.86-8.78)	2.76(2.13-3.56)
Both present	3.40(1.80-6.39)	11.39(4.60-28.42)	6.18(3.82-9.98)

*adjusted for demographics, CVD, blood pressure and BMI, **adjusted for demographics, blood pressure and BMI

Regression coefficients for ACR > 300 mg/g and CVD for DM only group were significantly ($p < 0.001$) different from the corresponding regression coefficients for both DM and SA present group indicating that the presence of SA modifies the associations of DM with ACR and CVD. We conclude that SA is an effect modifier of the associations of DM with ACR and CVD. Targeting SA in DM might improve kidney and CVD outcomes in DM.

SODIUM INTAKE IN TYPE 2 DM IS HIGH

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ENHANCE was a RCT in those with DM2 to test a self-management intervention. Three-day baseline dietary data were collected on 251 subjects and are the basis of this report: 67% women, 28% AA, 67% college graduates, 93% insured, 52% married, 40% DM2 > 5 years, 12% eGFR < 60 ml/min. Mean age was 56y. Mean Na intake was 3214 mg/d (±1140), median 3101 mg /d. Na intake (mg/d) is shown below:

		n	Mean	SD	Median	p value[1]
Gender	Male	83	3790	1239	3693	<0.001
	Female	168	2930	973	2833	
Race	AA	70	3042	1165	2956	0.07
	White	181	3281	1127	3135	
Have Insurance?[2]	No	17	2687	625	2748	0.04
	Yes	232	3263	1160	3124	
Currently employed[2]	No	101	3109	1229	2837	0.07
	Yes	149	3292	1075	3166	
Married[2]	No	119	3030	1134	2804	0.002
	Yes	131	3389	1125	3246	
CVD[2]	No	213	3300	1158	3159	0.004
	Yes	36	2719	920	2606	
CKD	eGFR≥60[3]	156	3137	1014	3047	0.71
	eGFR≥60[4]	66	3315	1258	3133	
	eGFR<60	29	3398	1468	3165	

[1] Non-parametric test; [2] Some data are missing; [3]A1c<8%; [4]A1c≥8%

Na intake did not differ by education, duration of DM2, A1c, or eGFR. Multivariate analysis controlling for kcals/d ($p< 0.001$) found predictors of reduced Na intake: CVD ($p<0.01$), women ($p<0.001$) (adjusted R^2 0.66). In summary, Na intake in DM2 exceeded the AHA recommended limit of 1500 mg/d. Those with CVD had decreased Na intake suggesting the dietary instruction for this group was superior to those without CVD. Those with eGFR <60 had high Na intake.

GLYCEMIC CONTROL IN SPANISH SPEAKING PATIENTS WITH TYPE II DIABETES MELLITUS USING A GROUP VISIT MODEL

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Diabetes is the leading cause of chronic kidney disease in Latinos. Nationally there is a disparity in diabetes mellitus health outcomes in the Spanish speaking versus English speaking type II diabetes mellitus population.

To determine whether attending a group based, four-part education program, will effect glycemic control in Spanish speaking type II diabetes mellitus patients.

We conducted a retrospective analysis of adult, Spanish-speaking patients (n= 113) with diabetes who attended a four-part, group based program at an outlying general medicine clinic. Clinical information such gender, HA1C, LDL, BMI, age, medication regimen, GFR, microalbuminuria, and presence of CAD was collected. We compared outcomes, using a paired T-test to evaluate the change in HA1C, blood pressure, and LDL from before to after attending the program.

Values of HA1C for Spanish speaking patients before (mean HA1C, 9.8) and after (mean, 7.2) attending all four sessions showed a HA1C drop (2.5).

Glycemic control in Spanish speaking patients with type II DM can be achieved using a four-part, group session program

POSITIVE IMPACT OF A RESIDENT QUALITY IMPROVEMENT (QI) PROJECT ON ACCURACY OF INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)-9 CODING FOR DIABETIC NEPHROPATHY AND ADHERENCE TO MICROALBUMINURIA SCREENING: A FOLLOW-UP STUDY

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Diabetic nephropathy occurs in 20-40% of patients with diabetes and is the single leading cause of end stage renal disease (ESRD).[1] Early recognition of diabetic kidney disease (DKD) by screening for microalbuminuria and accurate documentation of diabetes mellitus (DM) with renal manifestations aid in delaying or preventing progression to ESRD.

A pilot QI project was conducted in April 2009 to assess accuracy of ICD-9 coding for type 2 DM with renal manifestations and adherence to microalbuminuria screening at the Unity Faculty Practice, Unity Health System, Rochester, NY. This study revealed that the resident-run, faculty-supervised outpatient clinic, has a higher rate of microalbuminuria screening compared to the national average, 43% and 30% respectively.[2] However, it showed a dismal compliance rate of 11% for accurate ICD-9 coding.[2] These results were shared to our faculty and residents and disseminated at a grand rounds presentation.

We revisited the data 18 months after the initial report to evaluate the impact of the QI project in our outpatient practice. We performed a comparative cross sectional chart review involving 243 patients with type 2 DM.

	1st Study (2009)	2nd Study (2010)	P Value
Patients Screened for Microalbuminuria	43%	80%	<0.001
Accurate ICD-9 Coding for DM with Renal Manifestations	11%	40%	<0.001

We believe that the significant improvement in the coding of DM with renal manifestations and rate of microalbuminuria screening is largely influenced by the report from the initial study. This illustrates how a QI project serves as a powerful tool to promote awareness and improve patient care in DKD and in quality clinical care at large.

URINARY NEPHRIN AS AN EARLY BIOMARKER OF DIABETIC NEPHROPATHY

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Diabetic nephropathy (DN) is a leading cause of ESRD. We sought to investigate urinary nephrin as an early biomarker of DN based on our previous study that indicated nephrin expression is lost completely in renal biopsies of DN. We measured urinary nephrin in 66 patients with Type II diabetes and in 11 healthy controls using an enzyme-linked immunosorbent assay (Exocell, Inc. Philadelphia, PA). A urine nephrin-to-creatinine ratio (UNCR) was calculated and nephrinuria was defined as UNCR >0.1 mg/g. Spearman correlations were calculated for continuous variables and to assess trend and Chi-square was used to assess associations of categorical variables. UNCR correlated positively with urine albumin-to-creatinine ratio (UACR) ($p<0.0001$), and negatively with serum albumin ($p=0.001$) and eGFR ($p=0.005$). Patients were categorized into 4 groups: healthy controls (n=11), normoalbuminuria (UACR <30 mg/g, n=25), microalbuminuria (UACR>30 mg/g but <300 mg/g, n=11), and macroalbuminuria (UACR> 300 mg/g, n=30). Median (interquartile range) UNCR (mg/g) were 0.06 (.04,.08), 0.11(.08,.17), 1.16 (.35,1.60), 9.15 (5.68,12.08) for the 4 groups respectively, with p for trend of 0.001. Furthermore, patients with nephrinuria in these groups were 0%, 54%, 100% and 100% (p for trend = .001) respectively, suggesting that nephrinuria completely differentiated healthy controls (0%) from those UACR >=30 mg/g (100%). The 54% with nephrinuria among diabetic patients with normoalbuminuria suggests that elevated UNCR (nephrinuria) might precede detection of microalbuminuria and in turn be an earlier biomarker of DN. If future study finds those with normoalbuminuria and elevated UNCR are at higher risk for DN, use of UNCR as an early biomarker might identify potential candidates for earlier treatment for renal protection among diabetic patients.

ARE PATIENTS BEING SCREENED APPROPRIATELY FOR MICROALBUMINURIA?

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Microalbuminuria is not only the earliest clinical manifestation of diabetic nephropathy, but also an important risk factor for development of cardiovascular disease. The National Kidney Foundation has provided recommendations on screening of microalbuminuria. Testing should be performed only when blood pressure is close to goal and hyperglycemia corrected. Our clinical observations suggested the hypothesis that patients are not screened appropriately for microalbuminuria according to the guidelines provided by the National Kidney Foundation.

Charts of all diabetic patients with no known kidney disease seen at the University of Oklahoma – Tulsa Internal Medicine and Family Medicine clinics from November 1, 2008 to October 31, 2009 were reviewed. Each chart was checked whether diabetics were screened for microalbuminuria. In those who had microalbuminuria, we checked if this screening was done according to guidelines provided by the National Kidney Foundation. Charts were also reviewed for documentation of the diagnosis and if an angiotensin converting enzyme inhibitor or angiotensin receptor blocker was prescribed.

In the scheduled time duration, four hundred ninety-nine diabetic patients were seen in the out patient clinics. Forty-two per cent (210/499) were tested for microalbuminuria. Fifty-five patients (55/210) had microalbuminuria and 5 (5/210) had macroalbuminuria. Of the 55 patients with microalbuminuria, 4 patients had repeat testing, of which 3 were negative, and 1 was positive. Only 1 out of the 5 patients with macroalbuminuria was started on an angiotensin converting enzyme inhibitor. None of the patients with confirmed microalbuminuria had the diagnosis added to their problem list.

Patients are not being screened appropriately for the presence of microalbuminuria according to the National Kidney Foundation guidelines.

URINARY LEVEL OF TGF-β1 IN PATIENTS WITH DIABETES MELLITUS: DEVELOPMENT OF A NEW DIAGNOSTIC TOOL

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Increasing evidence links TGF-β1 to progression of renal fibrosis including that associated with diabetic nephropathy. Urinary TGF-β1 is therefore a candidate biomarker for clinical investigation and patient care. The current study was completed to validate a sensitive urinary assay for TGF-β1 and compare levels in a group of healthy controls and patients with established diabetic nephropathy (DN). Among available ELISA kits the one from R&D Systems demonstrated greatest sensitivity. After validation, the assay was used in urine samples from a cross sectional cohort of 190 patients with DN and 80 controls. The assay demonstrated a limit of quantification of 15.6 pg/mL and limit of detection of 7pg/mL. Samples were stable if frozen promptly at -70°C without preservatives. Therefore, all samples were promptly collected, centrifuged and the supernatant stored at -70°C. At the time of assay, samples were rewarmed to room temperature and promptly processed with overnight incubation with Ab to increase sensitivity. In the controls, 22/80 (27%) had detectable levels of urinary TGF-β1 (range <7 to 40.9 pg/ml; mean±SD 6.4±11.1 pg/ml). This was significantly lower ($p<0.0001$) than in the DN group where 118/190 (62%) had detectable levels of urinary TGF-β1 (range <7 to 526.4 pg/ml; mean±SD 20.4±45.8 pg/ml). Urinary protein concentration and TGF-β1 demonstrated modest correlation in patients with DN ($R=0.47$, $P<0.001$). In conclusion, we have validated a sensitive ELISA assay for urinary TGF- β1. Levels are more likely to be detected and are higher in patients with DN. Further studies will be necessary in order to determine if this test can predict renal prognosis independent of known prognostic factors in diabetic nephropathy This ELISA test should be a valuable tool for clinical investigation, and potentially to monitor patient interventions and prognosis.

DISORDERED MINERAL METABOLISM IN CKD: EARLIER ONSET & GREATER SEVERITY OF DIABETES

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Greater than ten percent of the US adult population suffers from type 2 diabetes, which is a leading risk factor for cardiovascular disease (CVD) and chronic kidney disease (CKD). Disordered mineral metabolism is a novel risk factor for CKD progression, CVD and mortality, but few studies have examined differences according to diabetes status. Using the Chronic Renal Insufficiency Cohort study, we tested the hypothesis that individuals with type 2 diabetes have more severe abnormalities of mineral metabolism at comparable glomerular filtration rate (GFR) than patients without diabetes: higher serum phosphate, parathyroid hormone (PTH) and fibroblast growth factor 23 (FGF23) levels.

Compared to participants without diabetes (n=2000), those with diabetes (n=1879) were more likely to have lower estimated glomerular filtration rate (eGFR), lower serum albumin and higher urinary albumin to creatinine ratio (all $P<0.0001$). Unadjusted serum phosphate, PTH and FGF23 were higher and calcium was lower among those with diabetes compared to those without (all $P<0.0001$). With the exception of PTH these differences persisted after adjusting for eGFR, age, sex, race, and ethnicity (all $P<0.01$). Adjustment for serum albumin abolished the relationship between diabetes and lower calcium. The eGFR decile at which 50% of participants met criteria for secondary hyperparathyroidism (PTH $\geq$65 pg/ml) or elevated FGF23 levels ($\geq$100 RU/ml) was higher in patients with diabetes compared to those without (PTH: eGFR 30-39 vs. 20-29; $P<0.001$; FGF23: eGFR 50-59 vs. 40-49; $P<0.001$).

These data suggest that disordered mineral metabolism begins earlier in the course of CKD and is more severe among CKD patients with diabetes compared to those without. Future analyses will explore vitamin D levels, mechanisms for these differences, and determine whether these differences contribute to worse outcomes among CKD patients with diabetes.

EXTRA RENAL METABOLIC ALKALOSIS: A TEACHING POINT: A CASE SERIES OF METABOLIC ALKALOSIS FROM CRACK COCAINE USE IN DIALYSIS PATIENTS

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Advanced renal disease is usually associated with metabolic acidosis. Metabolic alkalosis in a dialysis patient if not associated with vomiting is usually exogenous. We report case series of 4 patients admitted with metabolic alkalosis despite missing maintenance hemodialysis attributable to cocaine use. Purpose of the study is to delineate the possible underlying physiologic process for metabolic alkalosis in dialysis patients abusing cocaine. Methods**:** Data was collected from chart review of patients with ESRD presenting to the emergency department with history of missing dialysis and crack cocaine use from November 2008 to January 2009. Case series of 4 such patients with brief relevant clinical and laboratory data is presented here.

Case	ESRD	HCO3	Urine Toxicology	Last dialysis	K	BP	Volume Status
1	Yes	27	Cocaine Positive	3 days ago	6.3	230/125	Volume overloaded
2	Yes	28	Cocaine Positive	4 days ago	5.3	153/105	Volume overloaded
3	Yes	26	Cocaine use reported	4 days ago	6.9	62/41	Not documented
4	Yes	34	Cocaine use reported	2 days ago	5.2	167/70	Volume overloaded

Results All 4 patients were dialysis dependent with varying degrees of residual renal function and had inappropriately high bicarbonate levels for the degree of renal dysfunction and missing dialysis. **Conclusion:** Metabolic acidosis is the more common acid-base abnormality encountered in patients with ESRD. Crack cocaine can cause inappropriate metabolic alkalosis in this subset of patients from excess alkali that is used to convert cocaine to crack cocaine Hence metabolic alkalosis after missing dialysis should prompt a search for exogenous sources of alkali including use of crack cocaine.

ASSESSMENT OF THE RELATION OF RIGHT ATRIAL DIMENSION AND PULMONARY PRESSURES IN THE CARDIORENAL SYNDROME

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The high morbidity and mortality in patients with acute decompensated heart failure (ADHF) is increased with patients who develop worsening renal function (WRF) or cardio renal syndrome type I. Increase in central venous pressure (CVP) and right atrial pressure have been correlated with WRF and ADHF. We measured the right atrial area (RAA), ejection fraction, mean pulmonary artery systolic pressure (PASP) and ventricular function by echocardiography in 54 patients admitted with ADHF, of whom 15 developed AKI (using the AKIN criteria). Patients were 61% male, 21 with diabetes and 19 had chronic kidney disease. Mean age of all patients was 66±16 yrs with average BMI of 27±7 kg/m^2, mean Hb 11.7±1.8 g/dL, serum Alb 3.2±4 g/dL, systolic BP of 141±31 mmHg and diastolic BP of 86±18 mmHg. Systolic dysfunction was present in 37 pts while 10 pts had diastolic dysfunction. We found no significant correlation between the right atrial size in patients developing AKI (r^2=0.47). Development of AKI also did not correlate with PASP (p> 0.10) and left ventricular function (p>0.10). Additional studies on the relationship of non-invasive measurements of right atrial pressures are needed to evaluate patients with cardiorenal syndrome.

POLYETHYLENE GLYCOL-INDUCED HYPONATREMIA, SEIZURE, AND RHABDOMYOLYSIS

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Polyethylene Glycol (PEG) bowel prep solution has rarely been associated with hyponatremia and seizures. In addition, hyponatremia has uncommonly been associated with rhabdomyolysis. We describe the first reported case of PEG solution associated with a triad of hyponatremia, seizure, and rhabdomyolysis.

A 52 year old male with no significant past medical history developed confusion, headache, and dizziness 6 hours after beginning consumption of PEG solution. He developed a tonic-clonic seizure, with labs revealing sodium 120 mmol/L, phosphate 2.6 mg/dL, potassium 2.9 mmol/L, creatinine 0.8 mg/dL, serum osmolality 264 mos/kg, TSH 2.6 uIU/mL, and negative urine toxicology. On second day of admission, CK was noted to be 53,000 U/L. He denied use of statin, diuretic, SSRI, or any illicit drug use. He was treated initially with hypertonic saline, and subsequently with hypotonic fluids until serum sodium normalized at 138 mmol/L and CK decreased.

In conclusion, PEG solution is a rare cause of fluid and electrolyte abnormalities. Due to the prevalent use of bowel-prep formulations, care must be taken to avoid these electrolyte abnormalities and awareness of signs and symptoms of hyponatremia should be maintained. Early intervention to treat hyponatremia and rhabdomyolysis is necessary to prevent life threatening complications.

HYPERCALCEMIA DUE TO VALACYCLOVIR TOXICITY

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Hypercalcemia is a common complication in hospitalized patients. We report a case of symptomatic hypercalcemia in an elderly lady after she received 2 courses of inappropriately-dosed valacyclovir.

An active 80 year old woman with CKD III (eGFR 53 mL/min) developed shingles and received 7 days of valacyclovir 1000 mg PO TID. She was subsequently admitted for severe abdominal pain and constipation. Her initial labs showed mildly elevated serum calcium of 10.7 mg/dL and her condition improved with supportive treatment. She then received 10 more days of high-dose valacyclovir for recurrent shingles, after which her hypercalcemia worsened to 13.5 mg/dL and she developed altered mental status, acute kidney injury, respiratory distress, hepatic dysfunction, anemia, and thrombocytopenia.

Upon transfer to our institution, valacyclovir was immediately discontinued and a work-up for hypercalcemia was initiated (see below), including an extensive malignancy work-up with breast biopsy, thoracentesis, CT chest/abdomen/pelvis, and bone scan, all of which revealed no malignancy. Valacyclovir toxicity from inappropriate dosage for her renal function was suspected to be the culprit. She was treated with isotonic saline, IV furosemide, subcutaneous calcitonin, IV pamidronate, and IV hydrocortisone. Her serum calcium improved over the next 7 days to 9.9 mg/dL and her neurological, renal, respiratory, hepatic, and hematopoietic functions also improved.

In conclusion, we report a case of severe symptomatic hypercalcemia due to valacyclovir toxicity inappropriately dosed for renal function. Practitioners need to be aware of this possible complication.

Test	Result	Interpretation
Ionized Ca	1.68 mmol/L (H)	Confirms hyperCa
Intact PTH	4.5 pg/mL (L)	Suggests non-PTH hyperCa
FeCa	14% (H)	r/o familial hypocalciuric hyperCa
PTHrP	20 pg/mL (N)	r/o humoral hyperCa of malignancy
1,25 Vit D	40 pg/mL (N)	r/o lymphomas or granulomas
SPEP/ UPEP	No monoclonal/ light chains (N)	r/o multiple myeloma

DIETARY POLYHERBACY AND THE PROBLEM OF A DIDN'T ASK, DON'T TELL ATTITUDE

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Recent national surveys reveal that at least one in three patients use a dietary supplement and the average patient uses three to five dietary supplements – a practice termed polyherbacy akin to polypharmacy.A 79-year-old male reported increasing weakness for a month to the point of collapsing prior to admission. He was registering elevated systolic blood pressures of 170 -180 mmHg. He was noted to be profoundly hypokalemic, 2.1 mmol/L (Normal 3.4-5.1 mmol/L), had bicarbonate of 37 mmol/L (Normal 22-28mmol/L) and a creatinine of 0.9mg/dL. Dietary history confirmed adequate potassium intake. The trans-tubular potassium gradient of 14 (normal < 10) with urinary potassium-creatinine ratio of 8 in the face of severe hypokalemia (normal < 3mEq/mg creatinine) confirmed renal potassium wasting raising a differential diagnosis of Primary Hyperaldosteronism or Adrenal tumor. Abdominal CT was unremarkable and a.m. cortisol was 28 ng/dl. Unexpectedly, the plasma aldosterone was very low, < 2.5ng/dL (Normal 3-34), plasma renin was low normal, 0.24ng/mL/hr, which led to the diagnosis of an Apparent Mineralocorticoid Excess state. On repeated enquiry his wife brought in a respiratory herbal supplement - Second Wind, which he had been taking for 6 weeks for his COPD. Content review revealed Licorice root extract 250 mg per serving size of a capsule. He recovered two weeks after discontinuation of the supplement, with aggressive potassium replacement. Despite growing knowledge of the widespread use of dietary supplements many patient-physician encounters are "didn't ask, don't tell" when it relates to use of dietary supplements. This case highlights the unintended consequences of polyherbacy and the need to consider a concerted effort for a public health policy and clinical practice guideline to address this burgeoning problem.

GITELMAN SYNDROME WITH SPINAL CORD INJURY

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Gitelman's syndrome is characterized by hypokalemic metabolic alkalosis, hypomagnesemia and hypocalciuria. It is an inherited disorder which leads to a loss of function mutation in the Na-Cl Co-transporter in the distal convoluted tubule. In this case report, we describe a patient with a spinal cord injury who developed Gitelman-like syndrome.

Our patient, IG, is a 48 y.o. Hispanic male with a past medical history of C4-5 quadriplegia who presented complaining of increase frequency of syncopal episodes. IG had refractory hypokalemic metabolic alkalosis, hypomagnesemia and hypocalciuria despite daily supplementation. IG had chronic muscle spasms and several documented episodes of supra-ventricular tachycardia (SVT) during his stay. Upon treating IG with Spironolactone, an aldosterone antagonist, IG had fewer episodes of SVTs and his electrolytes began to normalize. He also required far less supplementation than before treatment.

Spinal Cord Injuries (SCI) can lead to a variety of clinical disorders. Among the many complications SCI patients must deal with, it seems from this case review that electrolyte abnormalities may exacerbate their condition and make their management more difficult. Therefore we conclude that in a patient with a SCI with hypokalemic metabolic alkalosis, hypomagnesemia with hypocalciuria, one should consider Gitelman-like syndrome to be the etiology and attempt to treat accordingly.

Bartter Syndrome	**vs**	**Gitelman Syndrome**
Defect in ascending limb of Henle		Defect in convoluted tubule
Onset in infancy/childhood		Onset in late childhood/adult
Serum Magnesium decreased		Serum Magnesium and Calcium decreased
NKCC2, ROMK or ClCNKB molecular channel defect		NCCT molecular channel defect

HYPONATREMIA AFTER HEAD INJURY: A COMPLEX CEREBRO-RENAL CONNECTION BEYOND SIADH

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A 76-year-old female who was admitted for subdural hematoma secondary to a fall presented with hyponatremia of 120 mmol/l. The blood pressure was 149/73, pulse 80, and she appeared euvolemic. The brain CT scan revealed a stable subdural hematoma which was managed conservatively. Since the lab data (urine Na 48meq/L, urine osm 401mosm/kg, and serum osm 250mosm/kg) was consistent with the diagnosis of SIADH in the context of recent head injury, the patient was placed on free water restriction. However, this was followed by worsening of hyponatremia to 117 mmol/l and alteration in mental status. A repeat brain CT scan showed worsening hematoma, and she underwent a surgical drainage. Review of the lab results revealed characteristics compatible with increased ADH release associated with features of renal proximal tubulopathy: persistent high urinary levels of electrolytes (e.g. K, Mg, and Phos) despite very low serum levels. Therefore the diagnosis of cerebral salt wasting (CSW) was made and the patient was started on hypertonic saline, which was followed by progressive improvement in serum sodium levels. Two days after resolution of hyponatremia, serum and urine studies were re-checked: serum uric acid remained very low (1.4 mg/dl) and fractional excretion of uric acid did not normalize; a finding that further supported the diagnosis of CSW, rather than SIADH. Other manifestations of proximal tubulopathy (e.g. hypokalemia and hypo-phosphatemia) gradually improved.

Hyponatremia after head injury is possibly the manifestation of a complex cerebro-renal connection, with poorly understood underlying mechanisms. In CSW, an unidentified mediator released from the brain disrupts the function of the proximal tubules and leads to leakage of electrolytes into the urine. Interestingly, ADH levels are also increased in CSW; hyponatremia is related to "appropriate" ADH secretion in response to intravascular volume depletion secondary to excessive tubular sodium excretion. As such, CSW and SIADH share several features and represent the biological consequences of a primary insult to the brain that can either be predominant in the brain (SIADH) or in the kidney (CSW). It is of utmost importance to appreciate the subtle differences existing between CSW and SIADH in order to avoid instauration of potentially-harmful management strategies such as this case.

EFFECT OF DIALYSATE BATHS ON SERUM BICARBONATE LEVELS IN HEMODIALYSIS PATIENTS

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The purpose of the study was to determine the effect of currently used dialysis baths in hemodialysis (HD) patients on serum bicarbonate (HCO3) levels. The Alkali used for HD has come full circle, from HCO3 in the 1950's to acetate from the1960s, and back to HCO3 in the 1990s. Dialysates currently used presently combine a 35-meq/L HCO3 alkali solution with an 8 meq/L of acetate bath (Granuflo). Assuming the acetate is completely metabolized, this combination equals a 43 meq/L alkali concentration.

This was a retrospective study of 50 HD patients receiving dialysis three times a week admitted to Albert Einstein Medical Center, Philadelphia in October 2010. Data collected on admission included serum (Se) bicarbonate, Se albumin and Anion Gap.

Se HCO3 meq/L (n=50)	
Mean value	31.3
Minimum value	23
Maximum value	42

Serum HCO3 (meq/L)	**No. of Patients (%)**
<21(acidosis)	0 (0%)
21-29(normal range)	23 (46%)
>30(alkalosis)	27 (54%)
Total (n)	50
Mean Serum Albumin	3
Mean Corrected Anion Gap	12.5

In conclusion, our study found that a majority 54% of patients had a higher than normal HCO3. Assuming the acetate is completely metabolized, HD units are dialyzing against a HCO3 bath of 43 meq/L (35+ 8). We recommend that attention be paid in lowering this gradient by either lowering the acetate concentration or a reduction in the 35 meq/L HCO3 alkali solution to avoid possible complications associated with metabolic alkalosis.

OSMOLAR GAP METABOLIC ACIDOSIS ASSOCIATED WITH LACTIC ACIDOSIS IN PATIENT TAKING METFORMIN: A CASE REPORT

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A 43 year old male with past medical history of type 2 diabetes, hypertension, hypothyroidism and dyslipidemia who was taking metformin presented with acute renal failure and anion gap metabolic acidosis (table). Further work up showed lactic acidosis (>14.9 mmol/L) without any evidence of acute bowel ischemia. Calculation of osmolar gap showed elevated osmolar gap 31.2 mOsm/L, but work up for any detectable levels of toxic alcohols typically associated with osmolar gap was negative.

Sodium	145 mEq/L
Chloride	94 mEq/L
Bicarbonate	5 mEq/L
BUN	74 mg/dl
Creatinine	10.9 mg/dl

He was also found to have methicillin-sensitive staphylococcal pneumonia which was initially treated with piperacillin/tazobactam and subsequently tapered to cafazolin based on culture reports. The patient required brief admission to intensive care unit and vasopressors administration for hypotension. Patient had worsening renal failure with development of hyperkalemia which required hemodialis during hospitalization. Extensive work up to identify the etiology of acute renal failure was negative. Patient recovered subsequently and was able discharged in stable condition. One week later, his renal function improved and dialysis was stopped.

Metformin use has been associated with lactic acidosis especially in patients with chronic renal insufficiency or congestive heart failure. However, lactic acidosis causing elevated osmolar gap is rarely reported. Here, we present a case of elevated osmolar gap without any detectable levels of toxic alcohols in presence of lactic acidosis in patient taking metformin. We conclude that lactic acidosis is an osmolar substance and if present at very high concentration, can possibly cause high osmolar gap.

MASSIVE INTRAVASCULAR HEMOLYSIS WITH THROMBECTOMY: A CASE REPORT

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Surgical rheolytic thrombectomy of arteriovenous access thrombosis is known to have high success rates with a low complication rate. We report a case involving mechanical thrombectomy resulting in severe metabolic disturbances requiring emergent dialysis.

A 57 year-old man with diabetes mellitus and chronic kidney disease stage 5 (CrCl 10 mL/min/1.73 m^2) presented for ambulatory access evaluation for a high-grade stenosis at the arteriovenous fistula anastamotic site. He was found to have access thrombosis and underwent mechanical thrombectomy with tPA infusion, angioplasty and brachial artery stenting done under local sedation. Pre-operative K^+ was 5.0 mEq/L. Minimal blood loss was noted intraoperatively. Upon arrival to the recovery room, the patient had a generalized tonic clonic seizure, bradycardia (56 bpm) and hypotension (60-70/30-40 mmHg). The patient received atropine and epinephrine and was emergently intubated. Labs were notable for K^+ 6.1 mEq/L, bicarbonate 8 mEq/L, Ca 6.5 mg/dL, Hgb 10.8 g/dL. EKG revealed a new bundle branch block. In the surgical intensive care unit, fluctuating wide and narrow QRS complex arrhythmias were noted on telemetry. Echocardiogram, CXR and head CT were unremarkable. Labs 2 hours post-seizure revealed K^+ 7.4 mEq/L, bicarbonate 10 mEq/L, Ca 6.9 mg/dL, Hb 9.8 g/dL and blood pH of 7.19. Multiple blood draws showed persistent marked hemolysis. Emergent dialysis for acute symptomatic hyperkalemia, hypocalcemia, and lactic acidosis (lactate 6 mmol/L) was performed. The patient tolerated dialysis well; his electrolytes, pH, BP and EKG normalized. His hemolysis resolved.

The rheolytic thrombectomy device AngioJet used in this case works through mechanical dissolution, fragmentation and aspiration, which can also result in the mechanical lysis of red blood cells with potassium and adenosine byproducts, precipitating EKG changes and bradycardia, respectively. This patient displayed extreme perturbation in serum K, Ca, pH levels with resultant hemodynamic instability, demonstrating that massive intravascular hemolysis can occur with thrombectomy.

AN OVER-THE-COUNTER REMEDY FOR CONSTIPATION

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Hypocalcaemia is a commonly encountered problem in the hospital settings. Phosphate enemas are widely available over the counter and frequently used by patients for relief of constipation. Severe hyperphosphatemia with resultant hypocalcaemia attributed to phosphate enema use is rarely reported. We describe a case of near fatal electrolyte abnormalities caused by phosphate enemas.

A 24 year old Caucasian woman with h/o quadriplegia from a motor vehicle accident, chronic constipation secondary to colonic inertia and outlet dysfunction, type 1 diabetes mellitus with complication of gastroperesis presented to the emergency department with abdominal pain and constipation for three days. She received six phosphate enemas in the past seven days. She also had poor oral intake before admission. Exam was remarkable for quadriplegia, decreased alertness and diffuse abdominal tenderness. Labs were significant for calcium of 5.5 mg/dL, phosphorus 16 mg/dL, BUN 21 mg/dL, creatinine 1.85 mg/dL (baseline around 1. 3 mg/dL) and sodium 159 mEQ/L. She had chronic kidney disease without baseline electrolyte abnormalities in the past. EKG demonstrated prolonged QT interval. She received tap water enemas in the hospital with successful wash out of the retained phosphate enemas. Calcium and phosphorus returned to normal limits with administration of IV Calcium gluconate injections. Her free water deficit was also replaced with IV fluids. This resulted in complete resolution of symptoms, QT prolongation on EKG and electrolyte abnormalities with return of her renal functions close to baseline.

Over the counter phosphate enemas are a less recognized cause of hyperphosphatemia. These agents can cause electrolyte disturbances which could be potentially fatal. Phosphate enemas should be avoided in patients with chronic constipation and baseline renal insufficiency. Physicians should be aware of the possible adverse effects of hypertonic phosphate enemas. Patient education should also be provided to avoid these problems

CHANGES IN SERUM ELECTROLYTES DURING LIVER TRANSPLANTATION AND RISK OF CENTRAL PONTINE MYELINOLYSIS: IS SODIUM THE ONLY CULPRIT?

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Central pontine myelinolysis (CPM) is a serious neurological complication that can occur with rapid correction of serum sodium while treating hyponatremia. CPM has also been reported after orthotopic liver transplantation (OLTx) but the role of rapid serum Na increase is less defined in these patients.

We retrospectively analyzed 59 patients who underwent OLTx from 2002 to 2010 at our center. We compared baseline serum Na, rate of change of serum Na and changes in serum calcium levels between patients who developed CPM or other neurological complications to those without neurological problems.

Of the 59 patients, 2 (3.38%) who were diagnosed with CPM by neuroimaging, 9 (12.25%) patients developed neurological problems other than CPM and 48 (81.35%) did not develop neurological problems. There was no difference in the initial serum Na between both groups (135.1 ± 4.8 vs. 134.38 ± 2.01). There was no significant difference in the final serum Na as well (142.49 ± 5.01 vs. 140.75 ± 6.48). Mean serum Na increase amongst all the patients was 7.11 mEq during the surgery. There was slightly higher increase in Na amongst patients with no neurological deficits as compared to those with CPM and neurological abnormalities (7.2 vs. 6.38). Average rate of rise of Na was not different between two groups (0.67 mEq/hr vs. 0.62 mEq/hr). In the two patients who developed CPM the average rise is sodium was 6.5±0.71 and the rate of change was around 0.54 ± 0.04 which is not higher than those without neurological problems. There was slightly higher increase in serum calcium (0.89 vs. 0.82) in patients without neurological problems as compared to those with neurological findings.

Rate of rise in serum Na in OLTx is significant but does not explain incidence of CPM alone. Other factors may contribute to development of CPM in these patients.

HYPONATREMIA; A RISK FACTOR FOR IN-HOSPITAL FALLS

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Others have recently reported that hyponatremia (serum sodium < 138 meq/L) is associated with out-patient falls as well as in-hospital and long term mortality. We hypothesized that hyponatremia would be a risk factor for in-hospital falls as well, a finding which would significantly impact morbidity as well as cost of care. We investigated all patients who fell at our hospital from 01/01/10 to 07/21/10 for serum sodium, medications with possibility of affecting serum sodium concentration and can cause fall, and co morbidities (cancer, CHF, DM, cirrhosis, HIV, ESRD). Fall data was obtained from incident reports. The data regarding patients with hyponatremia was gathered through ICD 9 discharge coding. From a total of 24,494 admissions (excluding pediatrics, Obstetrics-Gynecology, and intensive care units admissions) there were 73 hyponatremic patients (serum sodium <135) who fell. Odds Ratio of in-hospital fall if hyponatremic was 24.97(18.74 – 33.27, 95% confidence interval) and the P value using chi-square with Yates correction was < 0.0001. Among the hyponatremics mean serum sodium was 131.87meq/L and, mean age was 67.09 years. Additionally from all hyponatremics who fell there were twice as many men as women. There was no significant difference in terms of medications or co morbidities between hyponatremics and normonatremics who fell.

	Hyponatremics	Normonatremics	Total
Fall	73	313	386
No Fall	223	23,882	24,105
Total	296	24,195	24,494

In conclusion, mild hyponatremia which might be unrecognized in the elderly significantly increases the incidence of in-hospital falls. We plan to initiate a prospective investigation to determine impact of hyponatremia correction in reducing the incidence of in-hospital falls.

EVALUATION OF PREDICTIVE FACTORS OF POTASSIUM DERANGEMENT IN THERAPEUTIC HYPOTHERMIA

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Therapeutic hypothermia (TH) has been shown to improve survival and neurological outcomes in patients resuscitated from cardiac arrest. Hypothermia, however, is associated with potassium shifts that can lead to adverse cardiac events. Patient-specific factors that predict magnitude of potassium derangements have not been described. The purpose of this study is to evaluate potential relationships between patient characteristics and C_{max} - C_{min} potassium concentrations (ΔK). This is a retrospective study of patients who underwent the Therapeutic Hypothermia (TH) protocol at Albany Medical Center between January 2010 and November 2010. Data from twenty-four patients post-cardiac arrest was analyzed. Mean ± SD age was 60 ± 15 years, with 67% of subjects being male. Mortality was 46% (n=11). The magnitude of hypokalemia and rebound hyperkalemia was defined by a Δ K > 2.0. During the average 24 hour cooling and warming period, 50% of patients (n=12) had a Δ K > 2.0. Patients with Δ K > 2.0 had significantly higher average serum blood glucose concentrations during TH, 171 ± 47 vs. 138 ± 23 mg/dL (p=0.047). When using a multivariate analysis, the serum creatinine and the Δ bicarbonate were found to be independent predictors of Δ K (r^2=0.9, p<0.001). This data suggests that careful management of acid-base status and renal function may prevent large potassium shifts in patients undergoing TH who are at high risk of cardiac death.

HIPPURIC ACID NOT CALCIUM OXALATE CRYSTALS IN THE URINE OF A PATIENT WITH ETHYLENE GLYCOL INGESTION

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Ethylene glycol [EG] is a well known, potentially fatal cause of altered mental status and anion gap [AG] metabolic acidosis. Standard care includes prompt initiation of dialysis, despite the fact that many clinical centers do not have an expeditious manner of confirming the diagnosis with an EG level.

Hippuric acid [HA] is a metabolic end product of EG, and urinary HA crystals have been described in humans and animals that have ingested EG (Parry, 1974). However, we found no recent journal articles or case reports detailing this finding.

We report a 55 year old man found unresponsive on the floor of his garage. His emergency department laboratory values were as follows: pH 7.1 /HCO3 4.5/pCO2 13, AG 27, osmolar gap 27. Toxicology screening was negative, although a volatile panel had to be sent to an outside hospital by courier. Initial urine microscopy by nephrology revealed variably sized clear, elongated, six-sided crystals with rounded corners. They were inconsistent with calcium oxalate morphology, and not recognized as HA crystals. The patient's early care included intravenous sodium bicarbonate and fomepizole. When his mental status improved, he reported drinking 180 ml antifreeze in a suicide attempt, 4 hours before he was found. The fatal dose of EG is reportedly 100ml. His urine crystals were reexamined and strongly resembled previous descriptions and photographs of HA crystals (Graff, 1983). Acute hemodialysis [HD] was performed 12 hours after admission. EG level post HD was 13 mg/dl. The patient required chronic HD for six weeks after discharge, eventually recovering native kidney function.

We advocate more widespread education of the morphology of urinary HA crystals, as they provide a vital clue to early diagnosis of EG intoxication when serum levels are not readily available.

COMPLETE REMISSION OF PROTEINURIA WITH CELLCEPT AND CYCLOSPORINE IN NON-HIV COLLAPSING GLOMERULOPATHY

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This case report is the first evidence of a successful treatment in a non-HIV patient with Collapsing Glomerulopathy (CG) using Cellcept and Cyclosporine. A 40-years old African American female presenting with lower extremity edema was diagnosed with nephrotic syndrome (Urine protein 10 gm/day, serum albumin 1.4 mg/dl, serum LDL 278 mg/dl & serum creatinine 2 mg/dl). A serological work up including ANA, Anti dsDNA, Anti SSA/SSB, Anti RNP, C-ANCA, P-ANCA, complement factors (C3, C4), HIV and hepatitis panel was unremarkable. Renal tissue analysis with light microscopy, immunofluorescence and electron microscopy was consistent with collapsing variant of focal segmental glomerulosclerosis (FSGS). A steroid sparing immunosuppressive regimen consisting of Cellcept (500 mg every 12 hours) and cyclosporine (3mg/kg/day) was started. Proteinuria started declining after one month of treatment. The patient received cyclosporine for eight months and Cellcept for two years. Kidney function remained stable during and six months after discontinuation of treatment showing complete resolution of proteinuria and hypoalbuminemia in recent lab work (Urine protein 0.3 gm/day, serum albumin 3.8 mg/dl & serum Creatinine 2.2 mg/dl). This case strongly suggests use of Cellcept and cyclosporine for treatment of CG variant of FSGS.

EFFECT OF PROTEIN INTAKE ON AMELIORATION OF GLOMERULAR HYPERFILTRATION IN MORBIDLY OBESE ADULTS AFTER ROUX-EN-Y GASTRIC BYPASS SURGERY

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Glomerular hyperfiltration has been observed in morbidly obese adults without diabetes, and that improves after surgical weight loss. However, the factors associated with this change in glomerular filtration rate (GFR) after Roux-en-Y gastric bypass (RYGB) are not known. High protein consumption can increase GFR and it is not known whether change in protein intake after RYGB is associated with improvement in hyperfiltration.

We prospectively studied 13 obese adults who underwent RYGB and had 24 hour urine collections 2 weeks before, 1, 2, 4 and 6 months after surgery. GFR was measured as 24-hour creatinine clearance (CrCl, ml/min). Protein intake was assessed by the 24-hour urine urea nitrogen excretion (UUn, g/24h). Variables were analysed by ANOVA and results expressed as mean±sd. Mixed-effects regression model was used to determine association of CrCl with protein intake.

Eleven subjects were female, mean age was 41.1±7.2 years and none had history of diabetes. Body mass index decreased from 44.6±4.2 to 33.5±3.5 kg/m² at 6 months, $p<0.0001$. Across the time points at baseline, 1, 2, 4 and 6 months after RYGB, we observed significant decreases in CrCl: 173.0±61.7, 145.2±29.5, 134.3±32.5, 118.9±24.0 and 127.2±46.8 ml/min; $p=0.017$; proportion of adults with hyperfiltration (CrCl>140ml/min): 61.5%, 66.7%, 41.7%, 15.4% and 41.7%; $p=0.076$ ($p=0.037$ by linear trend) and 24-hour UUn: 14.4±5.2, 7.7±2.6, 8.2±3.0, 7.7±3.3 and 9.0±5.1g/24h; $p<0.0001$. Mixed effects regression showed the linear decrease in CrCl to be correlated with change in UUn ($p<0.001$) and that every g/24h unit decrease in UUn was associated with a 7ml/min change in CrCl.

We conclude that glomerular hyperfiltration improves after RYGB and is significantly associated with decreased protein intake as measured by 24h UUn. Surgical weight loss ameliorates hyperfiltration possibly by inducing restriction in protein intake. Future studies should evaluate whether changes in adipocytokines, angiotensin or insulin in addition to the protein intake can affect GFR in obese adults.

A RARE NEPHROPATHY IN PATIENT WITH SICKLE CELL DISEASE (SCD)

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Commonly known renal manifestations associated with SCD include hematuria, renal infarction, and proteinuria. We describe a case of rare variant of glomerulopathy in a patient with SCD.

A 20 year old African-American female patient with history of SCD with frequent sickle cell crises was admitted once again with a sickle cell crisis (chest pain and anemia with Hb of 5). However this time found to have nephrotic range proteinuria (7.1 g). Her serum albumin was 3.1 g/L, BUN 19, Cr 0.7 mg/dl, and ESR 112. ANA (1:640) and dsDNA came positive. Rests of serologies include ANCA, HIV, HBV and HCV were negative. Serum complements were normal. Echocardiogram showed mild pericardial effusion. She was transfused with 4 units of PRBCs. A renal biopsy was subsequently done and patient was discharged on hydroxyurea, lisinopril and prednisone 50 mg daily**.** Biopsy Results: LM showed "COLLAPSING" focal segmental glomerulosclerosis (FSGS). Immunoflorence staining for immunoglobulins, complements and light chains were negative. Surprisingly, "Parvo virus positive cells" were also seen in some glomerular epithelial cells. Interestingly it did not have any classic findings of lupus nephritis. EM showed no immune complexes. Her IgG for parvovirus came positive whereas IgM and PCR were negative.

Collapsing glomerulopathy is a rare entity and is characterized by segmental or global wrinkling of the GBM. Typically it has been described as idiopathic or with HIV and rarely with parvovirus. Only one case report so far has been reported to associate it with SCD. Our case is very unique since this patient had not only SCD but also had evidence of previous parvovirus infection. Treatments remain controversial and include ACEI, steroids. Different immunosuppressive regimens have been tried but prognosis remains poor. Interestingly due to associated glomerular hypertrophy, patients with SCD keep normal serum creatinine level at initial stages, despite evidence of mild to moderate glomerulopathy. Therefore a kidney biopsy should strongly be considered in such patients earlier in their disease course.

CRESCENTIC GLOMERULONEPHRITIS IN A PREDOMINATELY HISPANIC POPULATION IN THE US-MEXICO BORDER: A 6-YEAR REVIEW OF A SINGLE-CENTRE RENAL BIOPSY DATABASE

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Crescentic glomerulonephritis is a severe form of glomerular injury that produces a rapid deterioration of the renal function. It must be promptly diagnosed and appropriate treatment need to be started as quickly as possible. This clinical entity has been extensively described among black and whites populations, but Hispanics remain an underrepresented group.

We retrospectively reviewed the reports of 129 native renal biopsies performed at the University Medical Center of El Paso from January 2004 to December 2009.

Crescentic glomerulonephritis was found in 7 of 129 (5.42%) native renal biopsies reviewed. The most common immunopathologic category of crescentic glomerulonephritis was immune complex (58%), followed by pauci immune (42%). The mean age of all patients biopsied at presentation was 34 +/- 10 years; there was a female predominance (85%). All the cases described where in Hispanics. The mean creatinine at presentation was 4.3 mg/dl, all patients presented with hematuria and 85% with nephrotic range proteinuria.

In conclusion crescentic glomerulonephritis is a rare entity among Hispanics. Pauci immune and immune complex are the two main immunopathological causes of this disorder in our population. This information is an important contribution towards understanding the prevalence and clinical characteristics of crescentic glomerulonephritis among Hispanics.

GLOMERULAR DISEASES IN A HISPANIC POPULATION AT THE US-MEXICO BORDER

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The types of glomerular diseases affecting many ethnic groups have been extensively. However, the types of glomerular disease affecting Hispanics have not been fully descibed.

We retrospectively reviewed the charts of all 129 Hispanic patients who underwent native renal biopsies performed between 1/2004 and 12/2009 at the University Medical Center of El Paso, Texas.

The average age at the time of biopsy was 43 years, more women (85%) were biopsied than men (15%). Secondary glomerular diseases were more common than primary glomerulonephritides (58% vs 42% respectively). Among the primary glomerulopathies, focal segmental glomerulosclerosis was most common (32%), followed by membranous GN (19%); and the most common secondary glomerulopathy we had lupus nephritis (70%) followed by diabetic nephropathy (23%). The mean creatinine at the time of biopsy was 3.0 mg/dl, but it was been higher among those with secondary glomerulopathies.

The main cause of glomerular disease overall in this series of biopsied Hispanic patients is lupus nephritis while FSGS is the most common primary glomerulopathy. This study adds to the description of glomerular disorders affecting the largest minority group in the US.

PODOCYTURIA IN PATIENTS TREATED WITH ANTI-VEGF THERAPY FOR CANCER

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Anti-VEGF therapy has been associated previously with renal side effects, including proteinuria. Similarly, podocyturia has been associated with progression and activity of various proteinuric diseases and has been shown in patients treated with these agents.

We aimed to study whether podocyturia is present in patients whom, while undergoing anti-VEGF therapy, develop proteinuria. In addition, we compared podocyturia among patients on anti-VEGF therapy with proteinuria ranging from 101 to 9720 mg/d.

Age /Sex	Type of Ca	Anti-VEGF	GFR	Proteinuria	Cells /HPF
68/F	Cholangio	B	66	420 mg/d	0
60/M	Renal Cell	S/nib	39	101 mg/d	1
55/F	Colorectal	B	137	1+ dipstick	1
66/F	Colon	B + S/nib	77	330 mg/d	0
59/F	GBM	B + S/nib	78	152 mg/d	1
73/M	Renal Cell	B	63	2144 mg/d	>3
67/F	Renal Cell	Sunitib	43	2112 mg/d	>3
68/M	SBC	B	59	6361 mg/d	>3
70/M	GBM	S/nib	70	9720 mg/d	>9

Ca: cancer; GBM: glioblastoma multiforme; SBC: small bowel carcinoid; B: bevacizumab; S/nib: sorafenib; HPF: high power field.

Our results show a higher degree of podocyturia in patients undergoing anti-VEGF therapy with proteinuria in excess of 2 gr/d compared to those treated with the same agents and proteinuria <0.5 gr/d.

RENAL FUNCTION IN MORBIDY OBESE PATIENTS AT THE TIME OF REFERRAL TO A WEIGHT MANAGEMENT CLINIC

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Morbid obesity (BMI >40 kg/m²) is associated with proteinuria and glomerular hyperfiltration, and is a risk factor for chronic kidney disease. We retrospectively characterized renal function across a referred population of morbidly obese patients at a single tertiary care center in Central Pennsylvania. Subjects were stratified by Cockcroft/Gault creatinine clearance (low = <97 and <88 ml/min; normal = 97-137 and 88-128 ml/min; high = >137 and 128 ml/min, for males and females, respectively) using a previously validated lean body weight estimating formula.

Table. Characteristics of referred patients (n=1265, 82% female) with morbid obesity, by creatinine clearance and gender

	Low CrCl		**Normal CrCl**		**High CrCl**	
	M N=58	F n=514	M n=90	F n=441	M n=83	F n=79
Age, y; mean (sd)	56.3 (8.1)	49.2 (9.5)	47.0 (8.5)	39.7 (8.8)	39.1 (10.6)	33.6 (8.8)
BMI, kg/m2; mean (sd)	48.9 (8.1)	48.3 (6.8)	50.2 (8.5)	49.9 (7.8)	56.2 (10.7)	55.1 (9.4)
Hypertension, n (%)	49 (85)	298 (58)	64 (71)	179 (41)	52 (63)	34 (43)
Diabetes, n (%)	42 (72)	199 (39)	49 (54)	138 (31)	31 (37)	30 (38)
S. creatinine at referral, mg/dL; mean (sd)	1.4 (1.2)	0.9 (0.3)	0.9 (0.1)	0.7 (0.1)	0.8 (0.1)	0.6 (0.1)

25% of men and 50% of women referred for weight management had reduced creatinine clearance, while nearly 40% of men presented with an elevated creatinine clearance. Among both men and women, those presenting with elevated creatinine clearance tended to be younger and have a higher BMI, relative to those with normal kidney function ($p < 0.001$ for both comparisons).

Abnormal kidney function is highly prevalent in this referred population of morbidly obese patients. The identification of factors associated with impaired kidney function in this growing segment of the population should be further investigated.

IMMUNOTACTOID GLOMERULOPATHY IN AN INCIDENT HIV PATIENT

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Immunotactoid Glomerulpathy is a rare cause of Nephrotic Syndrome. While most cases are deemed to be idopathic, a small percentage are associated with Chronic Lymphocytic Lymphoma (CLL) and B cell lymphomas, while others can be associated with HIV infection which have been reported in the literature. We present a case of a patient with an initial presentation of Nephrotic Syndrome related to presumed Idiopathic Immunotactoid Glomerulopathy who subsequently developed an AIDS defining illness with a favorable clinical response to HAART Therapy.

30 year old Native American, homeless gentleman with no known past medical history presented with worsening, progressive bilateral lower extremity swelling associated with brown appearing urine over a period of weeks to months. On admission, he was noted to have preserved kidney function, but nephrotic syndrome. Complete serological workup was unremarkable without an HIV test due to lack of consent. A renal biopsy demonstrated immune complex mediated glomerulopathy consistent with Immunotactoid Glomerulonephritis. No secondary causes were identified and due to his marginal housing, the patient was lost to follow up for the next 6 months, at which time, he re-presented with a pulmonary embolus and cryptococcus meningitis consistent with AIDS. Patient was initiated on HAART and anticoagulation without cytotoxic therapy. Over the next 12 months, he had significant improvement in clinical status.

HIV has many associated immune complex glomerular diseases and as in this case, the nephrotic syndrome can be the initial presentation of an AIDS Defining Illness. Immunotactoid glomerulopathy is treated with caution when using cytotoxic therapy. The optimal therapy for immune complex glomerulonephritis in the setting of HIV infection is unknown, the role of antiretroviral therapy in modifying the course of these renal lesions appears to be promising as illustrated in this case.

A PROSPECTIVE STUDY OF ANGIOGENIC FACTORS IN THE DEVELOPMENT OF PREECLAMPSIA

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Preeclampsia is a syndrome of hypertension and proteinuria that occurs after 20 weeks gestation. Recent evidence implicates abnormal placentation with subsequent release of anti-angiogenic factors leading to widespread endothelial dysfunction. Elevated levels of sFlt-1 and endoglin, as well as low levels of PlGF, have been associated with the development of preeclampsia.

We prospectively enrolled 122 patients at first obstetric presentation. Blood samples were obtained at the second trimester, delivery, and 4-6 weeks post-partum. Serum levels of sFlt-1, endoglin, and PlGF were measured by ELISA. A univariate logistic regression model adjusting for gestational age was used to determine if angiogenic peptide levels were useful to predict later development of preeclampsia.

Preeclampsia developed in 10 women, 19 had gestational hypertension, gestational diabetes, or twin pregnancies, and 93 had normal pregnancies. Our analysis indicates that, at delivery, patients who developed preeclampsia compared to those who did not, had higher serum levels of endoglin ($p=0.01$) and sFlt-1 ($p=0.02$). At delivery, serum PlGF levels were not different in women who developed preeclampsia compared to those who did not ($p=0.22$). Mid-gestation serum levels of sFlt-1, endoglin, and PlGF were not predictive of preeclampsia ($p=0.39$, 0.78, 0.2, respectively).

We conclude that, at delivery, patients with preeclampsia compared to those without disease had higher levels of sFlt-1 and endoglin. Delivery serum PLGF levels were not different between the two groups. In addition, mid-gestation values of sFlt-1, endoglin, and PlGF were not different between the patients who developed compared to those who did not develop preeclampsia.

OUTCOMES OF FIBRILLARY GLOMERULONEPHRITIS: A SINGLE CENTER EXPERIENCE

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Fibrillary glomerulonephritis (FGN) is a rare glomerulopathy associated with poor long-term outcome and characterized histopathologically by deposition of fibrillary structures within the glomeruli. Therapeutic options for FGN are currently limited. Angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), cytotoxic agents, and combination therapies thereof have been utilized with limited success.

We have conducted a retrospective review of 458 native renal biopsies performed at Geisinger Medical Center from 1998 to 2009. 10/458 (2%) cases were identified as FGN and a retrospective chart review of these patients was completed. Progression to end stage renal disease and mortality were examined over a mean follow up period of 5.8 years. Mean age and eGFR at time of diagnosis was 49.7 years and 32ml/min/1.73m^2 respectively. Greater than 60% of the patients exhibited nephrotic range proteinuria and hematuria upon diagnosis.

Table 1: Characteristics of Patients Diagnosed with FGN at GMC, 1998-2009

Patient	Age (Years)	Sex	Serum Cr (mg/dL)	Proteinuria (g/day)	Serum Albumin (g/dL)	Fibril Size (nm)	Hematuria	Treatment	Outcome
1	57	Female	1.7	5.102	3.7	16	Yes	ACEI/ARB	Stable Current Creatinine: 2.0
2	35	Female	1.2	2.5	4.0	20	Yes	ACEI/Spironolactone	Stable Current Creatinine: 1.6
3	35	Female	0.91	3.33	3.7	18	Yes	Transplant Azathropine/Prednisone	HD; Death
4	48	Male	2.0	4.77	3.9	18	No	Transplant- Cyclosporine/ Azathropine/Prednisone	HD; Death
5	74	Male	3.62	1.569	4.4	25	N/A	N/A	Death
6	50	Male	6.5	9.744	2.2	22	Yes	ACEI	Death
7	47	Female	1.6	5.624	3.7	19	No	ACEI/Prograf	Stable Current Creatinine: 1.9
8	51	Male	4.9	1.557	3.7	23	Yes	Transplant Prograf/Cellcept	Death
9	35	Female	0.5	3.264	4.3	18	Yes	ACEI	Stable Current Creatinine: 0.8
10	65	Male	3.6	N/A	3.9	20	Yes	Transplant Prograf/Cellcept	Stable Current Creatinine: 1.5

Cr, Creatinine; ACEI, Angiotensin Converting Enzyme Inhibitor; ARB, Angiotensin Receptor Blocker; HD, Hemodialysis

Patients with fibrillary glomerulonephritis usually present late in the course of their disease and have poor outcomes. In this retrospective chart review, outcomes of progression to ESRD and mortality varied in all ten patients. Treatment options to reduce progression to ESRD and mortality have yet to be established.

RECURRENT AA-AMYLOIDOISIS IN KIDNEY TRANSPLANT ALLOGRAFT

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Recurrent AA-amyloidosis in kidney allograft is rare, with only a few case series described in patients with familial Mediterranean fever, ankylosing spondylitis and rheumatoid arthritis. To our knowledge, recurrent AA-amyloid in kidney allograft related to Crohn's disease has not been previously described, especially in the setting where the underlying inflammatory condition is under control.

A 59-year-old man who underwent a living-donor kidney transplant 17 years ago for renal failure due to AA-amyloid nephropathy in the setting of longstanding Crohn's disease. His Crohn's disease was quiescent prior to and post kidney transplant. His allograft function was stable until a month prior to the presentation when he developed worsening proteinuria and kidney dysfunction. Allograft biopsy revealed Congo red stains and reddish-brown material in the glomeruli, interstitium, and vessels typical for AA-amyloidosis. Because repeat esophageal gastroscopy and colonoscopy showed no histological evidence of Crohn's flare, specific treatments for Crohn's disease were not initiated. At 3-months follow-up, his serum creatinine was at 3.6 mg/dL. He was not on renal replacement therapy.

As exemplified in this case, despite clinical and histological control of underlying inflammatory condition (Crohn's disease in this case), AA-amyloidosis can still recur in the kidney allograft. The recurrence should be suspected when patients exhibit worsening proteinuria and kidney dysfunction. Allograft biopsy is critical in establishing the diagnosis. Moreover, conventional therapy for AA-amyloidosis with controlling underlying inflammation may not always be sufficient. Therapy directly targeting amyloid fibril formation, such as eprodisate, represents a promising future treatment addition for patients with AA-amyloidosis.

TUBULAR INJURY IS COMMON WITH COLLAPSING FSGS, AND OTHER LESSONS LEARNED FROM A CASE OF ABRUPT AKI MISDIAGNOSED AS ATN.

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Collapsing FSGS classically presents with renal failure and nephrotic range proteinuria. It is most often associated with HIV. The abrupt onset of AKI can be mistakenly attributed to acute tubular necrosis (ATN) if proteinuria is not identified. We present a 21-year-old African American female with systemic Lupus erythematosis (SLE) who presented with septic shock and pelvic inflammatory disease (PID). Serum creatinine (Cr) increased from 0.7 mg/dl to 10 mg/dl in 3 days requiring dialysis for 3 weeks. Urinalysis was negative on presentation but within 4 days showed large blood and protein. Protein/creatinine ratio was 3.6gm/gm. Renal ultrasound showed echogenic, large 13 cm kidneys. The low complements and lupus history prompted a renal biopsy which was interpreted as ATN. Prednisone was started and tapered down over two weeks for extra-renal lupus symptoms. Cr dropped to 1.7 mg/dl. She was readmitted after 1 month with gastritis and recurrent AKI (Cr 3.6 mg/dl). Repeat kidney biopsy showed collapsing FSGS with significant tubular injury. The first biopsy was re-read and collapsing FSGS was identified. HIV testing was negative. The patient was restarted on prednisone and Cr fell to 2.2 mg/dl. This case was remarkable in that the onset of disease was sudden, mimicking ATN clinically. The lack of proteinuria on presentation led to the biopsy changes of collapsing FSGS to be disregarded. ATN changes are a hallmark of collapsing FSGS that can help differentiate it from classic FSGS. SLE and PID can cause collapsing FSGS. Prednisone seems to have induced partial remission. It is unclear whether SLE patients with collapsing FSGS are more responsive to prednisone compared to the poor response to steroids seen in other cases of collapsing FSGS.

AN ATYPICAL PRESENTATION OF WALDENSTROM'S MACROGLOBULINEMIA

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Waldenstrom's macroglobulinemia is an IgM monoclonal protein-secreting plasmacytoid lymphocyte disorder, accompanied by bone marrow infiltration. Renal involvement is unusual, but when present, is characterized by intracapillary IgM with cryoglobulinemia or amyloidosis.

An 80-year-old man presented with anasarca despite optimized diuretic therapy, nephrotic range proteinuria (10gm/24 hr) and acute kidney injury (creatinine 1.8mg/dl). On further work up ANA and ANCA were negative, with normal serum complements. An IgM kappa restriction was discovered in the plasma and urine; skeletal survey was normal.

Due to progressive renal failure of unclear etiology, a renal biopsy was performed which showed PAS positive mesangial nodules, which did not stain with Congo Red. The basement membrane was not thickened. Immunofluorescence demonstrated glomerular staining for kappa light chains, with non-specific staining for IgM, and negative staining for IgA, IgG and C1q. The patient was referred to Oncology, and subsequent bone marrow biopsy was indicative of Waldenstrom's macroglobulinemia.

The patient was treated with Prednisone and two sessions of plasmapheresis. He was then started on weekly Rituximab.

In Waldenstrom's, the presenting clinical signs are highly variable, but constitutional symptoms and abnormal bleeding are common. Some patients may be asymptomatic at the time of diagnosis. Unusual aspects of this case include renal insufficiency and nephrotic, non-amyloid proteinuria with a nodular mesangial pattern on pathology consistent with monoclonal deposition disease.

MEMBRANOPROLIFERATIVE GLOMERULONEPHRITIS AFTER A PREMATURE DELIVERY FOR HELLP SYNDROME

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We present the case of a 22-year-old G1P1 postpartum female who was diagnosed with HELLP syndrome at 34 weeks EGA, resulting in urgent premature delivery. At delivery she had normal blood pressure and kidney function and no proteinuria. Two weeks postpartum she presented with hypertension, pulmonary edema and peripheral edema. She was treated for presumed preeclampsia and discharged on anti-hypertensive medications. Her HTN was difficult to control and 6 weeks postpartum she also developed AKI, nephrotic-proteinuria, hematuria and a hemolytic anemia and thrombocytopenia concerning for persistent HELLP syndrome, HUS or a rapidly progressive glomerulonephritis. She was empirically started on high-dose steroids and underwent a renal biopsy.

Renal biopsy revealed type I membranoproliferative glomerulonephritis (MPGN). She was tested for autoimmune diseases, viral infections, bacterial infections and monoclonal gammopathies to rule out secondary MPGN. All testing was negative. Aspirin and dipyridamole were added to her initial high-dose steroid course as well as an ACEi, statin, and diuretics. She responded well to therapy and her anemia and AKI quickly resolved; her proteinuria remitted six months into her steroid taper.

This is the first reported case (in the MEDLINE literature) of a postpartum diagnosis of idiopathic type I MPGN. A prior case report documented MPGN in a patient who prematurely delivered at 28 weeks EGA and required hemodialysis, high-dose steroids and 6 months of cyclophosphamide therapy before proceeding on to complete remission. Another case report documented an MPGN lesion in a patient with HELLP syndrome at 33 weeks EGA and anuric AKI that also recovered completely after delivery. Idiopathic type I MPGN is a rare disease that most commonly occurs in childhood and usually requires prolonged steroid therapy. Given the clinical recoveries of our patient and these case reports, adult idiopathic type I MPGN in the pregnancy setting may represent a different disease process that responds well to early aggressive medical therapy.

ANG II INDUCES FAK ACTIVATION AND PODOCYTE MIGRATION VIA A TRPC6-DEPENDENT MECHANISM

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Focal Adhesion Kinase (FAK) is a key regulator of cell-to-extracellular matrix interactions. In podocytes, dysregulation of FAK activity is linked to foot process effacement/migration and albuminuria. FAK activation is regulated by multiple kinases including Ca^{2+}/Calmodulin KinaseII (CaMKII) and the Extracellularsignal-Regulated Kinase (ERK). Angiotensin II (Ang II), a potent inducer of glomerular injury and albuminuria, is a known activator of CaMKII and ERK via Ca^{2+}-dependent signaling mechanisms. Previously, we established that selective gene "knock-out" of the Ca^{2+}-permeable transient receptor potential cation channel, type 6 (TRPC6) attenuates Ang II-induced glomerular injury and albuminuria, however, the mechanisms of the insult remain unknown. The purpose of this study was to determine if Ang II induces FAK activation and podocyte migration via the TRPC6-mediated activation of CaMKII and ERK. To address this hypothesis, conditionally immortalized podocyte were stimulated with Ang II following preincubation with pharmacologic inhibitors of TRPC6, ERK, and CaMKII vs. vehicle alone. Cell lysates were then analyzed by immunoblotting for FAK phosphorylation by CaMKII at serine residue 843 (S843) and by ERK at serine 910 (S910). Podocyte motility was assessed using scratch wound healing assays in Ang II-stimulated podocyte cultures in the presence or absence of the aforementioned pharmacologic inhibitors. Our studies revealed that Ang II induces the CaMKII and ERK-mediated phosphorylation of FAK at S843 and S910 respectively. These events were attenuated 2-3 fold in the presence of pharmacologic inhibitors of TRPC6, CaMKII, and ERK. Further, Ang II-induced podocyte migration is inhibited with pharmacologic inhibition of TRPC6, CaMKII and ERK.

In conclusion, Ang II induces FAK activation and podocyte migration via the TRPC6-mediated activation of CaMKII and ERK. These studies provide novel mechanistic insights into the pathologic intracellular signaling underlying Ang II-induced podocyte dysfunction and highlights the therapeutic potential of TRPC6 and FAK inhibition in the management of proteineuric kidney disease.

HYDROXYCHLOROQUINE-INDUCED LIPIDOSIS: BOON FOR LUPUS NEPHRITIS BECOMES BANE

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Hydroxychloroquine (HCQ) is commonly used to treat systemic lupus erythematosus (SLE) and lupus nephritis (LN). We report an interesting case of HCQ-induced lipidosis that was clinically thought to represent worsening LN.

A 24 year old Caucasian male with LN class IV-G diagnosed on renal biopsy in 2007 was treated initially with cyclophosphamide (CYC) for 6 months and high-dose steroids followed by tapering prednisone. He was started on mycophenolate mofetil (CellCept) in Feb 2008 along with prednisone and HCQ. In Sept 2008, 24-h urine protein was 2.8 g/day. He had a flare of LN in May 2009 treated with CYC and Solu-Medrol, and he required hemodialysis until July 2009. Renal function was normal until Sept 2009 when creatinine rose to 1.4 mg/dl. In Oct 2009, urine protein increased to 7.8 g/day, and he had foamy urine, abdominal pain, nausea, and vomiting. Due to suspected LN flare or onset of class V LN, CellCept was increased from 1 g to 1.5 g orally twice daily. A renal biopsy revealed no evidence of immune-mediated renal disease, making progression of LN unlikely. Rather, it showed mesangial infiltration by foamy macrophages with lamellated lysosomal inclusions (myeloid bodies), and subendothelial deposits of lipoid material, consistent with HCQ-induced lipidosis. Fabry's disease was excluded by normal serum alpha-galactosidase A level of 0.192 U/L (normal range 0.075-0.457 U/L). HCQ was discontinued, and he recovered normal renal function with proteinuria decreasing to 0.83 g/day in Nov 2009 and 0.38 g/day in Feb 2010.

Rarely, HCQ may cause morphological abnormalities that mimic Fabry's disease and often presents with similar clinical manifestations. It can erroneously be interpreted as either progression of LN or Fabry's disease, and renal biopsy is useful in diagnosis.

Knowledge of the rare occurrence of HCQ-induced lipidosis is important in the management of LN patients, and it must be considered in SLE patients presenting with worsening renal function and proteinuria. Withholding HCQ is the recommended treatment and can lead to remarkable improvement of renal function and proteinuria.

RENAL ABLATION USING URETERAL LIGATION IN NEPHROTIC SYNDROME DUE TO RENAL AMYLOIDOSIS

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The role of bilateral renal ablation for the management of severe proteinuria is not well defined in current practice, especially since the advent of anti-proteinuric medical therapy. We describe the successful outcome after bilateral ureteral ligation in a patient with progressive hypotension and functional decline in the setting of massive proteinuria secondary to AL amyloidosis. A 59 year old Caucasian male with three weeks of progressive anasarca with associated nephrotic range proteinuria was diagnosed with lambda light chain amyloidosis on renal biopsy. Evaluation of heart and gastrointestinal tract identified no amyloid deposition. Despite autologous stem cell transplantation and bortezomib therapy, there was no improvement in proteinuria. Nephrotic proteinuria reached massive levels with anasarca and progressive orthostatic hypotension with postural syncope such that he became wheelchair dependent. Renal function worsened with creatinine clearance of 15m/min, 24.4 grams of urinary protein excretion in 24 hours. Serum albumin dropped to 1.2 grams/dL. This led to alternate day albumin infusion with symptomatic improvement. Due to his poor functional status and the focused target involvement of his amyloidosis, the decision was to pursue bilateral renal ablation to reduce protein losses. The patient underwent hand assisted laparoscopic ligation of bilateral native ureters and placement of tunneled dialysis catheter. Post-operatively, his blood pressure and serum albumin improved and postural symptoms resolved. During 12 day hospitalization, nutritional status and activity level improved and he was dismissed home on dialysis. He was able to ambulate with the assistance of a walker at the time of discharge. This case highlights two important observations:1) Massive proteinuria from nephrotic syndrome can induce life-limiting volume depletion, malnutrition and postural hypotension. 2) Bilateral renal ablation using ureteral ligation can improve functional status and quality of life for patients with debility associated with nephrotic syndrome. Renal ablation should be considered in patients with refractory nephrotic syndrome associated with renal amyloidosis.

SUNITINIB INDUCED NEPHROTIC-RANGE PROTEINURIA

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Presented are two cases of patients with renal cell carcinoma (RCC) treated with nephrectomy and were subsequently treated with sunitinib for disease recurrence. Both patients had no proteinuria prior to sunitinib therapy. Nephrotic-range proteinuria of 11.6 g/g and 9.8 g/g was detected at 21 months and 24 months, respectively, after starting sunitinib on a 4-week-on, 2-week-off cycle. Both patients were also noted to have uncontrolled blood pressures during the 4-week-on cycles of their treatment.

Proteinuria and hypertension are well known side effects of bevacizumab, a vascular endothelial growth factor (VEGF) inhibitor. Sunitinib, which inhibits multiple tyrosine kinase receptors, including VEGF receptors, was not shown to induce proteinuria in clinical trials. This phenomenon has only recently been described in animal models as a preeclampsia-like syndrome induced by sunitinib and a similar drug, sorafenib. One previous case report of sunitinib induced renal failure with renal biopsy data showed thrombotic microangiopathy but presented with sub-nephrotic range proteinuria. Due to the poor long term survival of these patients and the paucity of biopsy data, we believe this clinical syndrome is under-reported. Clinicians should monitor patients treated with the aforementioned drugs for hypertension, proteinuria and renal dysfunction.

ANTI-GLOMERULAR BASEMENT DISEASE AND MALIGNANCY: GUILTY OR GUILT BY ASSOCIATION

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The association of Anti-GBM disease and malignancy is rarely reported. We hereby report on a case of anti- GBM disease associated with ovarian carcinoma as well a review of all the cases reported in the literature.

A 71 year-old woman with history of hypertension and hypothyroidism was admitted for weight loss, anemia and progressive worsening of renal function in the setting of recent discovery of an ovarian mass. Laboratory investigation showed a creatinine of 8.5 mg/dl, hemoglobin of 9.3 and normal platelet count. Urine analysis was notable for non dysmorphic RBC and 2 + proteinuria. There was no hydronephrosis on renal ultrasound. Serologies were normal except for P-ANCA and Anti-GBM antibodies. Kidney biopsy showed necrotizing and crescentic glomerulonephritis with IgG linear staining on immunofluorescence. Biopsy of the ovarian mass was consistent with a poorly differentiated carcinoma. Despite treatment with corticosteroids, cyclophosphamide and plasmapheresis, patient required initiation of dialysis which she remained on at her 3 month follow up.

Literature review of 6 clinically similar cases shows that these patients are elderly (mean age 66) with a mean creatinine of 4.4 mg/dl. Various form of adenocarcinma was the most common malignancy found. Treatment and outcomes were similar to our case. A possible immunopathologic mechanism includes the role of Uteroglobin. Acquired deficiency in this protein (by cancer or knock out mice) was associated with anti-GBM disease in animal studies.

In conclusion, the association of malignancy and anti-GBM disease is rare with few cases described. This raises the question if these findings are due to a temporal association as most of the case occurred in elderly or due to direct causality related to deficiency in Uteroglobin or other unknown immunologic process.

DECREASED SENSITIVITY OF ANTI-DSDNA ANTIBODY ASSAY IN A COHORT OF HISPANIC PATIENTS WITH BIOPSY PROVEN LUPUS NEPHRITIS

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It has been shown that Hispanic patients with American-Indian ancestry, have more severe manifestations of Systemic Lupus Erythematosus (SLE). An association with HLA-DRB1*08 with Lupus was also identified in Hispanic patients. It was also shown that Hispanic and African American patients with Lupus tended to develop Lupus Nephritis earlier in their disease course. Since clinical presentations of SLE differ in Hispanic patients, we theorized that the sensitivity of various diagnostic techniques may also differ. We retrospectively examined 56 of our patients who had a renal biopsy performed for suspicion of Lupus Nephritis. We then eliminated all those without a biopsy consistent with SLE nephritis and documented Anti-Nuclear-Antibody (ANA) results by Immuno-fluoresence Assay (IFA) and Anti-dsDNA assay by EIA prior to treatment. Forty-four Hispanic patients (38 females and 6 males) with biopsy proven SLE nephritis and these serological markers remained.

In our cohort of largely Hispanic females, the sensitivity of the ANA assay by ELISA was 97.8% comparable to the published population controls of 90-100%. The sensitivity of the Anti-dsDNA assay was only 41.3% differing from published values that range between 70% and 90%. In conclusion the sensitivity of the ANA IFA assay is comparable in our cohort of Hispanic patients with biopsy proven SLE nephritis, but the sensitivity of the Anti-dsDNA assay by EIA is markedly lower. Data collection and analysis of the clinical indicators, clinical course, treatment type, and response to treatment is ongoing in our cohort.

ACUTE RHEUMATIC FEVER (ARF) WITH COINCIDENT POSTSTREPTOCOCCAL GLOMERULONEPHRITIS (PSGN) IN AN ADULT: A CASE REPORT AND REVIEW OF LITERATURE

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ARF and PSGN, 2 non suppurative sequelae of Group A streptococcus (GAS), are known to occur together but rarely. Usually it occurs in children. The extremely low incidence of these conditions occurring together in adults in the developed nations makes it a challenging diagnosis. We report such an occurrence and review 17 similar cases.

A 46-year-old woman with no medical history presented with hypertensive urgency and new onset acute decompensated heart failure. Labs showed anemia, 4+ proteinuria, 50RBC/hpf and RBC casts. Additionally, sore throat & flu like symptoms 3 weeks ago were reported. Further work up including Echocardiogram showed low EF of 40% and new onset severe MR. Elevated ESR(70) and CRP(11). Positive streptozyme (1:600). Elevated ASO titers (1420 Todd U). 24 hour urine protein was 1.4g. Low C3(14 U) with normal C4. A diagnosis of Acute Rheumatic carditis with concurrent PSGN was made. The patient was started on NSAIDs & benzathine penicillin, and significant clinical improvement was noted in next 3 days. Hematuria and proteinuria resolved requiring no renal biopsy. Patient was discharged on monthly penicillin prophylaxis.

At least 17 similar cases have been reported in medical literature. Of these, 2 (11.7%) were adults and 15(88%) were children.11 (64.7%) presented with the combination of ARF with carditis along with PSGN, 3(17. %) developed PSGN during a recurrent episode of ARF and 3 (17.6%) had the unusual feature of PSGN preceding ARF. Erythema marginatum noted in only 4(23.5%) cases .Only 2(11.7%) cases had positive throat culture, but all had 100 % evidence of antecedent GAS infection. Proteinuria, hematuria, low C3 was present in all 17 cases requiring renal biopsy in only few cases. Even though there are a number of rheumatogenic strains of GAS and fewer nephritogenic strains only 2 (M1& 3) were associated with both the above discussed sequelae which might elucidate their low incidence. Recognition of this condition is critical for initiation of appropriate therapy and prophylaxis, and for prevention of further complications.

LYME DISEASE ASSOCIATED GLOMERULONEPHRITIS

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A 57-year-old woman presented with new onset dyspnoea, oedema and 6Kg weight gain. She noted a rash two weeks previously and subsequently developed nausea, fatigue, headache and myalgias. Serology was positive for acute Lyme disease, requiring treatment with oral doxycycline. Nephrology was consulted for 2+ blood and 2+protein on urine dipstick. Progressive symptoms prompted conversion to IV ceftriaxone for presumed early disseminated Lyme disease.

Physical exam was notable for BP 184/90mmHg, bilateral pleural effusions and dependent oedema; serum creatinine was 1.1mg/dL (baseline 0.8mg/dL); complements were normal. Urine microscopy revealed numerous dysmorphic red cells. Deteriorating renal function required treatment with high dose prednisone and performance of a renal biopsy. Kidney biopsy showed an immune complex-mediated membrano-proliferative glomerulonephritis. By 3 months, her creatinine and proteinuria had normalized.

Disseminated Lyme disease can affect multiple organ systems, including the kidney. MPGN-associated 'Lyme nephritis' has been reported only twice before in humans. In this case, we believe the temporal relationship, immune complex-mediated glomerular injury and resolution with treatment is consistent with Lyme disease associated glomerulonephritis.

UNUSUAL CASE OF PULMONARY MUCOSA ASSOCIATED LYMPHOID TISSUE (MALT) LYMPHOMA WITH TYPE 1 CRYOGLOBULINEMIA AND CRYOGLOBULIN-OCCLUSIVE GLOMERULOPATHY

Swati Mehta, Arthur Tatum, Sri Narsipur, Margaret MacDougall. SUNY,Syracuse,NY

A 77 yr old lady presented with progressive dyspnea, hemoptysis and a purpuric rash. She had bilateral pulmonary infiltrates on chest X-ray, elevated serum creatinine and microhematuria. Infectious causes were excluded. Serologies were normal except for low complement levels and an elevated cryocrit. CT thorax showed bilateral nodular infiltrates. Kidney ultrasound showed normal sized kidneys with mildly increased echogenicity. Lung biopsy showed B-cell infiltrates with kappa light chain restriction consistent with B-Cell MALT lymphoma. Skin biopsy of the rash revealed leucocytoclastic vasculitis. Light microscopy of the renal biopsy showed ischemic glomerulopathy with glassy arterial and arteriolar deposits typical of cryoglobulin. Electron microscopy showed endocapillary cryastalline deposits consistent with cryoglobulins. The patient required urgent plasmapheres. In conclusion, performing an extensive clinical investigation if monoclonal cryoglobulinemia is identified is essential in order to initiate early treatment.

HENOCH-SCHONLEIN PURPURA IN AN ADULT WITH HYPERSENSITIVITY REACTION TO CARBAMAZEPINE: A CASE REPORT

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Henoch-Schonlein Purpura (HSP) appears to be an immune-mediated vasculitis associated with IgA deposition. Although a variety of infectious and chemical triggers have been proposed, the underlying cause remains unknown. We present an unusual case of adult-onset HSP after an allergic reaction to carbamazepine.

The patient was a 62 year-old Caucasian male with bipolar disorder who was treated with carbamazepine and developed a diffuse rash in the past. He was later transitioned to lithium but unfortunately developed lithium toxicity. The patient's medications were adjusted, and he was started on oxcarbazepine, a derivative of carbamazepine. The patient once again developed a purpuric rash with a rapid decline in his clinical condition.

He had hematuria and acute kidney injury with a creatinine of 6.60 mg/dL from his baseline of 1.24 mg/dL and eventually required renal replacement therapy. He also had massive gastrointestinal bleeding requiring multiple transfusions. A skin biopsy of his right thigh was consistent with a leukocytoclastic vasculitis with immunofluorescence positive for granular staining with IgA. Renal biopsy demonstrated mesangial proliferative changes with the presence of IgA. Purpuric lesions were seen on esophagogastroduodenoscopy in the esophagus and stomach. Colonoscopy was limited because of profuse bleeding. Given these findings and the patient's clinical picture, he was eventually diagnosed with HSP. He was initially started on oral prednisone and later IV methylprednisolone but did not improve significantly. He later decompensated and received plasmapheresis and even intravenous immunoglobulin with no improvement. He was eventually placed on comfort measures and expired.

The exact etiology and pathogenesis of HSP has never been elucidated, but there have been reports of association with infective episodes, food allergens, autoimmune disease, and malignancies. This case indicates that a hypersensitivity reaction to carbamazepine may be a potential trigger as well.

C1Q NEPHROPATHY VS. MESANGIOPATHIC GLOMERULOPATHY IN A PATIENT WITH CHRONIC HEPATITIS C INFECTION

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A 49 year old female with past medical history of hypertension, chronic hepatitis C infection, cirrhosis of the liver and left ureteral stone presented to our ED with complaints of new-onset bilateral lower extremity edema of five days duration, associated with shortness of breath and sub-sternal chest pain. Physical examination revealed an obese female, with normal blood pressure and 3+ bilateral lower extremity edema from the level of ankles up to the knees.

Laboratory abnormalities included serum albumin of 2.3 gm/dl, proteinuria of 4.5 gm/day, C3 of 82mg/dl, C4 of 9 mg/dl and microscopic hematuria. ANA, anti-DNA, ANCA and HIV antibody was negative. HCV RNA-PCR was 207.77 x 1000 IU/ml. Renal USG, persantine cardiac scan and leg Doppler studies were normal.

CT-guided percutaneous kidney biopsy was done. LM revealed segmental mesangial hypercellularity and matrix increase with very mild interstitial fibrosis and tubular atrophy but no endocapillary proliferation or cellular crescents. Immunofluorescence microscopy revealed 2+ mesangial C1q and C3 staining and 2+ paramesangial IgM staining. EM revealed abundant mesangial immune deposits and patchy foot process effacement without subendothelial, intramembranous or subepithelial dense deposits. Immunoperoxidase staining for hepatitis C antigen was negative.

This case illustrates changes consistent with mesangiopathic glomerulopathy of uncertain classification. None of the classic glomerulonephritities (GNs) associated with hepatitis C infection i.e., membranoproliferative GN (MPGN), cryoglobulinemic GN or membranous GN were seen in our patient. Mesangioproliferative GNs have infrequently been described with hepatitis C infection and may sometimes serve as precursor lesions for MPGN. Alternatively, patient may have C1q Nephropathy (C1qN) typically characterized as a variant of focal sclerosis showing mesangial hypercellularity and mesangial C1q deposition. The association between C1qN and hepatitis C infection is unknown.

RESPONSE TO PEGINTERFERON IN A CASE OF HEPATITIS C VIRUS-ASSOCIATED NEPHROTIC SYNDROME FROM FOCAL SEGMENTAL GLOMERULOSCLEROSIS (FSGS)

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Membranoproliferative glomerulonephritis is the most common form of glomerular disease associated with hepatitis C infection. Less commonly it is associated with cryoglobulinemic or membranous glomerulonephritis. FSGS is an uncommon form of glomerular disease in hepatitis C infection. We report such a case with management.

A 47-year-old male was referred to office for evaluation of proteinuria and lower extremity swelling. He was married but admitted to having multiple sexual partners. His BP was 146/100mmHg. He was noted to have pitting edema of his lower extremities. At the time of presentation, serum creatinine was 1.7 mg/dl, serum albumin 1.7 g/dl, AST 43 u/l, ALT 57 u/l, alkaline phosphatase 71 u/l, and cholesterol 310 mg/dl. A 24-hour urine collection revealed 19.5g of protein. C3 and C4 were normal. ANA, Hep B surface antigen, cryoglobulins and ELISA for HIV antibody were negative. Hepatitis C antibody was however positive and hepatitis C PCR revealed 495,000copies/ml of viral RNA. Renal sonogram revealed normal sized kidneys with normal cortical echogenecity.

He was started on diuretics, angiotensin 2 receptor blocker and a statin. Renal biopsy revealed FSGS with focal foot process effacement. He was started on pegylated interferon alfa 2a 180 μg subcutaneous weekly for 12 months**.** Before initiation of interferon therapy, his serum creatinine rose to 2.1mg/dl. After 3 months of therapy, hepatitis C RNA levels became undetectable. At the completion of the treatment, his albumin returned to normal (3.9g/dl) and spot urine TP/CR ratio decreased to 1. His renal function has remained stable 5 years after he was initially seen with a serum creatinine of 2.1mg/dl. His spot urine TP/CR ratio has further decreased to 0.2.

Demonstrating the virus in kidney biopsy specimen can make a definitive association. Clinical response to pegylated interferon treatment with clearing of the viremia and remission of nephrotic syndrome in our patient is very encouraging, suggesting that the hepatitis C was involved in the pathogenesis of nephrotic syndrome.

RAPIDLY PROGRESSIVE GLOMERULONEPHRITIS WITH MICROSCOPIC POLYANGIITIS AND A PARASPINAL MASS

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Microscopic polyangiitis is a small vessel vasculitis that affects multiple organ systems, and very commonly causes glomerulonephritis. Pulmonary, gastrointestinal, cutaneous, and neurological manifestations can also occur. We present a case of microscopic polyangiitis involving a spinal mass and biopsy proven pauci immune glomerulonephritis.

Our patient is a 59 year old white male who presents with acute neurological symptoms and rapidly progressive glomerulonephritis. Subsequent workup demonstrated an elevation in his perinuclear Antineutrophil Cytoplasmic Antibodies (pANCA) and Myeloperoxidase (MPO) levels, which led to a renal biopsy that was consistent with microscopic polyangiitis. The patient's creatinine peaked at 8.0 mg/dL and came down to 2.5 mg/dL with immunosuppressant therapy. Neurosurgical intervention involved removal of the large fibrous connective tissue mass, which showed diffuse inflammatory tissue. Additional pathologic consultation demonstrated concern of granulomatous changes within that fibrous connective tissue.

There are few reported cases of systemic vasculitides involving central nervous system mass lesions. Prior reported cases have been associated with Wegener's granulomatosis and treated with standard immunosuppressant therapy in addition to neurosurgical mass removal. Our case of glomerulonephritis is consistent with microscopic polyangiitis, which responded to immunosuppresant therapy with steroids and cyclophosphamide, as demonstrated by improvement of renal function.

RELAPSING MEMBRANOUS NEPHROPATHY (MN) WITH ACUTE KIDNEY INJURY (AKI) FOLLOWING INFLUENZA VACCINE: ROLE OF ORAL CORTICOSTEROIDS

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The side effects of immunogenic vaccines are usually minor, although few major side effects like acute glomerulonephritis and acute myelitis have been reported. To our knowledge, only one case of minimal change disease following influenza vaccine has been described. We describe the first case of relapsing MN with AKI following influenza vaccine with management.

A 60-year-old female presented with one week history of abrupt onset lower extremity edema which developed five days after receiving 2009-10 influenza vaccine. Patient had been refusing influenza vaccine in the past as her father died from Guillain–Barré syndrome after receiving influenza vaccination. Her exam was significant for lower extremity pitting edema and hypertension. Her laboratory data revealed AKI with serum creatinine (Scr) of 10.2. Her spot urine total protein to creatinine ratio (TP/CR) was 23. Serological workup was negative. She underwent kidney biopsy which was showed stage 1 MN with acute interstitial nephritis (AIN). She was started on daily oral prednisone (0.75 mg/kg) with tapering doses over the next two months. Her renal function normalized (Scr-0.9) five weeks after initiation of oral prednisone. Her spot urine TP/CR decreased to 1.3. After one week of completion of therapy, patient was found to have elevated Scr of 2.3. Her spot urine TP/CR increased to 28. At this time, patient underwent repeat kidney biopsy which showed MN with resolution of AIN. Patient was restarted on daily oral prednisone (0.75 mg/kg) which was tapered over the next 4 months. One month after initiation of oral prednisone, her Scr decreased to 0.9. Her spot urine TP/CR decreased to 0.2 upon completion of therapy. She continues to be in remission, six months after completion of oral corticosteroid therapy.

Thus we conclude that abrupt onset of nephrotic syndrome after influenza vaccine is suggestive that there is activation of the immune system which is triggered by the vaccination. Based on our experience, a course of oral corticosteroid should be considered in patients who develop nephrotic syndrome with AKI after influenza vaccine.

PERIODIC FEVER SYNDROME (PFS) – RELATED GLOMERULONEPHRITIS (GN): A CASE REPORT

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Recurrence of acute postinfectious GN (PIGN) is a rare phenomenon. We report a case of relapsing GN, which had morphological and laboratory features consistent with PIGN and was associated with PFS in a 58-year-old patient. He has had two kidney biopsies done; both revealed changes typical for PIGN and acute tubular injury. Clinical presentation was unusual for PIGN: on each of the recorded 11 episodes during 4 year period the patient presented with symptoms of acute infection with high fever followed in 1-3 days by hematuria and other symptoms of acute GN with variable severity of acute kidney injury (AKI), proteinuria and thrombocytopenia. In 3 episodes patient even required initiation of renal replacement therapy for 7, 10 and 2 treatments, accordingly. Each time shortly after the fever has resolved, the kidney function recovered and serum creatinine went back to baseline. He has been cultured many times and no organism has ever been identified. Extensive ID work up all was negative. Anti strep-O and other serum serology studies were negative. SPEP shows a very small M spike of 0.2 g/dL in the gamma region. Immunofixation shows monoclonal IgG kappa peak. Immunology workup was showing a low IgA (26mg/dL), IgM (38mg/dL), IgG (346mg/dL), IgD (<1mg/dL) as well as low C3 (32mg/dL) and C4 (<6mg/dL). Hematology work up was negative for TTP, HUS, DIC and hemolysis. No schistocytes or other features of hemolysis were appreciated on peripheral smear. Bone marrow aspirate and biopsy revealed slightly hypercellular bone marrow (60% cellularity) with moderate megakaryocytic hyperplasia. No morphologic features of infection or lymphoma. Multiple treatment regimens with and without steroids were unable to control the disease. Alleviation of the symptoms, but no cure was observed with Rituximab therapy. Stable remission of the periodic fever and GN was finally achieved after Anakinra therapy initiation 18 month ago. Since then he had multiple episodes of infection without high fever and nephritic kidney manifestations. His kidney function remained stable with normal serum creatinine.

THE CLINICAL SIGNIFICANCE OF ANTI -C1Q ANTIBODIES IN IGA NEPHROPATHY

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Immunoglobulin A Nephropathy (IgAN) is the most common form of glomerulonephritis worldwide and is defined by deposition of IgA in glomerular mesangium. Exact pathogenesis of the loss of renal function is not clear; however activation of the complement via classical, alternative and lectin pathways is implicated. C1q antibodies are associated with worse outcomes in SLE patients; however their role in IgAN is not clear despite reported elevated levels of anti C1q IgA antibodies. We studied the outcomes of patients with C1q deposits in biopsy proven IgAN in respect to rate of decline of glomerular filtration rate (GFR) and progression on to ESRD.

This retrospective study included all patients with biopsy proven IgAN from February 2002 to October 2009. Data for age, sex, diabetes, hypertension, yearly creatinine (and GFR), urine protein/ creatinine ratio and biopsy findings including glomerular sclerosis, fibrosis, C1q, IgG and IgM deposits was abstracted. Multivariate regression analyses were conducted to examine the relationships between the presence of C1q deposits and the decline of GFR and progression on to ESRD.

220 cases of biopsy proven IgAN were reviewed. Eighty patients had sufficient data for analysis (32 female, 48 male). Twenty-two patients were C1q positive and 58 negative. Analysis did not reveal any significant association between C1q deposits and risk of progression to ESRD [OR 1.79, p=0.57, C.I. 0.23-13.44]. There was slightly higher risk with higher age at diagnosis [OR 1.06, p=0.022]. Other variables did not have significant bearing on progression to ESRD. Analyses also did not reveal any significant association between C1q deposits and the change in gfr at one year from date of biopsy. [β= 12.24, p= 0.11, C.I. -2.92, 27.4] Conclusion: The presence of C1q deposits does not confer a higher risk of development of ESRD in IgAN, nor does it affect the rate of progression of disease as measured by decline in eGFR at one year after diagnosis.

PODOCYTURIA AS AN EARLY MARKER OF PREECLAMPSIA

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Preeclampsia is a syndrome of hypertension and proteinuria that occurs after 20 weeks gestation. Recent work showed that podocyturia, the shedding of live podocytes in the urine, is present at the time of delivery in preeclamptic patients. We aimed to test whether podocyturia is predictive of preeclampsia and whether it can differentiate between preeclampsia and other hypertensive disorders of pregnancy.

We prospectively enrolled 122 patients at first obstetric presentation. Urine samples were obtained at presentation, the second trimester, delivery, and 4-6 weeks post-partum. Urine sediment was cultured for 24 hours to select for viable cells. Podocytes were then identified on the basis of podocin staining. The presence or absence of podocyturia was then correlated with the later development of preeclampsia or high risk pregnancy, including gestational hypertension, gestational diabetes, and twin pregnancy.

At delivery, podocyturia was consistently present in all 10 women with preeclampsia and absent from the 19 women with high risk pregnancy disorders. None of the 93 women with normal pregnancies developed podocyturia at delivery. At mid-gestation, all 10 women who later developed preeclampsia had podocyturia. In addition, women with high risk pregnancy disorders who did not develop preeclampsia and those with normal pregnancies did not develop podocyturia at mid-gestation.

We conclude that podocyturia may be helpful in the diagnosis of preeclampsia and in differentiating women with preeclampsia from those with other high risk pregnancy disorders, including gestational hypertension. At mid-gestation, the presence of podocyturia may identify women at risk of developing preeclampsia later in pregnancy.

IMATINIB for MPGN FROM TYPE II CRYOGLOBULINEMIA

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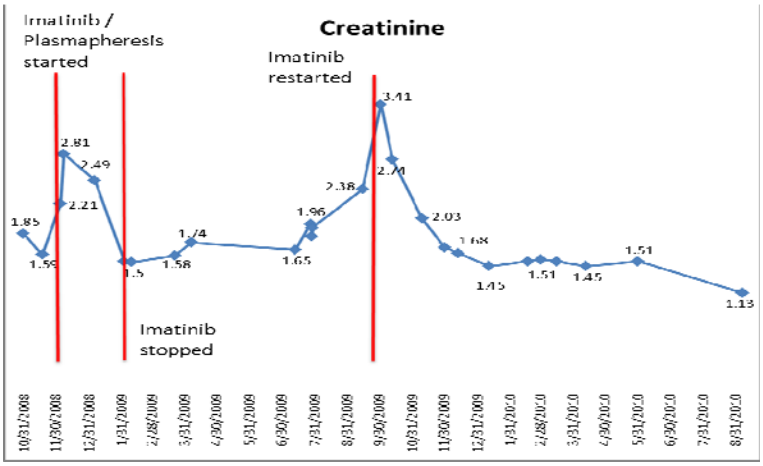
Cryoglobulinemia can lead to a systemic immune complex mediated vasculitis that can have significant morbidity and mortality. The standard of care of cryoglobulinemia including chlorambucil, steroids, plasmapheresis and more recently rituximab leaves much to be desired in the way of efficacy and adverse effects. Iyoda et al. demonstrated the efficacy of imatinib, a bcr/abl tyrosine kinase receptor blocker, in amelioration of the phenotype and renal injury in a rat model of cryoglobulinemia. We present a case of type II cryoglobulinemia with severe kidney involvement treated with 400 mg of imatinib administered orally daily, plasmapheresis, and steroids initially with resolution of symptoms, normalization of creatinine, and marked improvement in proteinuria and cryocrit. Furthermore, upon withdrawal of imatinib proteinuria, creatinine, and cryocrit worsened until reinstitution of therapy. This case provides evidence that imatinib is an effective treatment for cryoglobulinemia and should further be studied in the treatment of cryoglobulinemia and perhaps other antibody mediated diseases.



CLINICAL RESPONSE TO PEGINTERFERON IN A CASE OF HEPATITIS B VIRUS-ASSOCIATED NEPHROTIC SYNDROME FROM IGA NEPHROPATHY

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Hepatitis B virus (HBV) is most commonly associated with membranous nephropathy but it has also been seen with membranoproliferative glomerulonephritis, minimal change disease and IgA nephropathy. We report a patient with chronic HBV infection who presented with atypical clinical features of IgA nephropathy with management.

A 47-year-old Taiwanese man presented with a 1-week history of generalized body swelling. He noted "foamy urine" approximately 2 months ago. He was diagnosed with HBV infection several years ago in Taiwan. His BP was 120/80 mm Hg. He had pitting edema of his lower extremities. At the time of presentation, serum creatinine was 0.8 mg/dl, serum albumin 2.0 g/dl, AST 36 u/l, ALT 32 u/l, alkaline phosphatase 99 u/l, and cholesterol 589 mg/dl. Urinalysis showed 3+ proteinuria and 2+ blood. Spot urine total protein to creatinine ratio was 8.8. C3 and C4 were normal. HBsAb and Hep C Ab were negative. However, HBsAg was positive. HBeAg was negative and HBeAb was positive. Quantitative HBV PCR assay was greater than 200,000 DNA copies/ml. He was started on daily furosemide, ramipril and atorvastatin. Renal biopsy results were consistent with IgA nephropathy. Liver biopsy showed grade I, stage 0 chronic hepatitis. The patient was started on peginterferon alfa-2b 150 μg subcutaneous weekly for 6 months. At follow-up after 4 months of therapy, the patient had a complete clinical remission of nephrotic syndrome. Serum creatinine was 0.7 mg/dl, serum albumin 3.9 g/dl, cholesterol 138 mg/dl, random urine protein/creatinine ratio 0.1 and quantitative HBV PCR assay was less than 200 DNA copies/ml.

In conclusion, treatment with peginterferon alfa-2b induced complete clinical remission of our patient's nephrotic syndrome from HBV associated IgA nephropathy as well as a dramatic decrease in HBV viral load. Our findings suggest that hepatitis B virus antigenemia, particularly HBsAg, have a pathogenic role in the development of some cases of IgA nephropathy.

SAFETY AND EFFICACY OF PEGINESATIDE FOR TREATMENT OF ANEMIA IN HEMODIALYSIS PATIENTS PREVIOUSLY ON EPOETIN ALFA OR BETA

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Peginesatide is an investigational, PEGylated, peptide-based erythropoiesis-stimulating agent in development for treatment of anemia in dialysis patients due to chronic renal failure. EMERALD 2 was a Phase 3 randomized active controlled open-label trial to evaluate safety and efficacy of peginesatide in hemodialysis (HD) patients previously treated with epoetin alfa or beta. The primary endpoint was a mean change of hemoglobin (Hb) from baseline to the evaluation period.

EMERALD 2 enrolled 823 US and EU patients who had received HD for ≥3 months and IV or SC epoetin for ≥8 wks. Patients were randomized 2:1 to receive IV or SC peginesatide once monthly or epoetin 1-3 times weekly. Peginesatide starting dose was determined based on the epoetin dose during the last week of screening prior to randomization, and titrated to maintain target hemoglobin (Hb) levels of 10-12 g/dL. Patients were to be dosed for ≥52 weeks.

Peginesatide demonstrated noninferiority for the primary efficacy endpoint in maintaining Hb; other efficacy endpoints were similar between treatment groups, including transfusions and proportion in the target range. A comparison of dose requirements and achieved Hb was similar for subjects receiving peginesatide IV and SC. Hb excursions above the target range were similar. The frequency of overall AEs and SAEs were similar between treatment groups, including events of interest such as hypertension, venous thrombotic events, and cancer. For adjudicated deaths and CV events, frequency of events was similar while deaths occurred in 12.5% of epoetin and 10.5% of peginesatide treated subjects.

In this study, peginesatide was noninferior to epoetin in the maintenance of hemoglobin levels in dialysis patients and its overall safety profile appeared to be consistent with that of epoetin.

EFFICACY OF AN ANEMIA MANAGEMENT STRATEGY TARGETING HIGHER TSAT AND FERRITIN IN INCIDENT HEMODIALYSIS PATIENTS

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The optimal treatment of anemia in ESRD remains unclear. An anemia management strategy recommending two 510 mg doses of ferumoxytol for patients with Hb <13 g/dL and TSAT ≤30% or Ferritin ≤500 ng/mL was implemented at a regional chain of for-profit dialysis facilities. Lab values and erythropoietin alfa (EPO) and ferumoxytol doses were recorded at baseline and 3- months. The study cohort consisted of 495 in-center dialysis patients who were dosed with ferumoxytol in the 3- months after implementation of the strategy. Subgroup analysis of 58 incident patients (patients were <90 days on dialysis; 38% female; 40% black; 26% catheter access) showed significant increases in mean Hb, TSAT and ferritin.

	Baseline	3 months
Hb (g/dL)	10.77	11.58*
TSAT (%)	17.14	31.22*
Ferritin (ng/mL)	187.0	406.7*

*p<0.005 with reference to baseline. N=58

Mean EPO dose per treatment was reduced from 9.792 units at baseline to 7,878, 6,605, and 6,520 units at 1-, 2-, and 3-months, respectively). Average cumulative 3-month iron dose was 1,213 mg (2.38 doses ferumoxytol). In conclusion, targeting and achieving higher TSAT and ferritin with increased use of IV iron resulted in increased mean Hb and reduction of EPO use in incident dialysis patients.

TARGETING HIGHER TSAT AND FERRITIN DOES NOT REDUCE ERYTHROPOETIN ALFA (EPO) DOSE IN A COHORT OF HEMODIALYSIS PATIENTS WITH CENTRAL VENOUS CATHETERS (CVC's)

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Targeting higher levels of TSAT and Ferritin with increased use of IV iron is associated with reduced EPO use in dialysis patients. It is unknown whether iron therapy is effective in treatment of anemia in dialysis patients with CVC's An anemia management strategy recommending two 510 mg doses of ferumoxytol for patients with Hb <13 g/dL and TSAT ≤30% or Ferritin ≤500 ng/mL was implemented at a regional chain of for-profit dialysis facilities. Lab values, EPO and ferumoxytol doses were measured at baseline and 3-months for patients receiving ferumoxytol. The study cohort consisted of 495 in-center dialysis patients who were dosed with ferumoxytol in the 3-months after implementation of the strategy. Subgroup analysis of 111 patients with CVC's as primary dialysis access showed increase in mean Hb (10.8 vs. 11.2 g/dL, p=0.01), TSAT (23.5 vs. 27.3%, p=0.02) and ferritin (308 vs. 475 ng/ml, p<0.005). 3% vs. 19% of patients had ferritin above 800 ng/mL after implementation of the strategy. Mean EPO dose was unchanged (9,183 vs 9,413 units per treatment for 90 days before and after conversion, respectively) while IV iron use increased (566 vs. 1,233 mg average cumulative 3-month iron dose). In conclusion, targeting and achieving higher TSAT and ferritin with increased use of IV iron resulted in higher mean Hb without concomitant reduction in EPO dose. Further studies are needed to determine optimal iron dosing strategies for dialysis patients with CVC's.

MAINTENANCE IV IRON: ONE FACILITY'S EXPERIENCE

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There have been a number of studies suggesting the benefits of using maintenance IV iron dosing to reach and maintain adequate anemia outcomes in the chronic hemodialysis patient population. The purpose of this quality assurance (QA) project was to evaluate the benefits of maintenance IV iron protocols (using sodium ferric gluconate) in relation to anemia outcomes and operational expense. The QA project consisted of the trending of three different maintenance IV iron protocols over the first 6 months of 2008, 2009, and 2010. A small independent chronic hemodialysis unit, with patient population varying from 34-32 patients was the location of the QA project. The first protocol, used in 2008, used either a 1 Gm or 250 mg loading dose, dependent upon patient ferritin and transferrin saturation (tsat%) values, with no maintenance dosing indicated. The second protocol, used in 2009, still utilized loading doses (either 1 Gm or 250mg) for patients with iron stores below KDOQI guidelines; but added a 62.5mg maintenance dose given weekly, bi-monthly, or monthly to maintain these values. The most recent protocol increased the frequency of IV iron administration, doing away with the bi-monthly and monthly dosing using loading and/or weekly iron dosing. Data comparison showed facility average hemoglobins (hgb) consistently remained within target ranges throughout the QA project. Facility average ferritins remained below the KDOQI suggestion of 800mg/dL. It was noted that the third protocol, which was more liberal with IV iron administration, showed maintenance of anemia outcomes and a substantial drop in the amount of epoetin alpha (EPO) needed to maintain adequate hgb levels. The QA project provides a snap-shot of the benefits to optimal anemia management. Learning to efficiently use a combination of EPO with IV iron can lead to cost-effective improvement of patient anemia outcomes.

EFFECT OF MAINTENANCE IRON PROTOCOLS ON ESA DOSING AND ANEMIA OUTCOMES

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Although intravenous (IV) iron was initially for use as a bolus, over half of the hemodialysis population receives IV iron for maintenance dosing. We determined the association between various maintenance iron protocols and anemia management outcomes by constructing a facility level analysis for maintenance iron use. IV iron sucrose dosing patterns were assessed in facilities with ≥10 prevalent (≤90 days) patients in 01/10. Facilities were categorized to a dosing pattern if >40% of patients received the same dose [25 mg 1x/wk (n=234), 50 mg 1x/wk (n=180) or 100 mg 1x/wk (n=285)]. Medication and laboratory values were then summarized across all patients in those clinics in each category. Reported lab values lagged by one month to allow for the effect of iron dosing patterns from the previous month.

The anemia management outcomes are listed by pattern (Table). Median ESA dose was significantly lower in facilities dosing 100 mg than 25 mg/wk (P = 0.002). Hb levels did not differ.

Dosing Pattern/ wk	**Median ESA Dose** (U/month)	**Mean Iron Dose** (mg/month)	**TSAT** (%) *mean±SD*	**Ferritin** (ng/ml) *mean±SD*
25 mg	reference	reference	30.0 ± 13.0	531 ± 320
50 mg	-1,100	+66	30.6 ± 13.4	606 ± 352
100 mg	-2,200	+123	32.4 ± 15.1	728 ± 429

This retrospective analysis suggests that monthly ESA requirements to maintain target hemoglobin may be lower with larger doses of maintenance iron. More detailed analyses and prospective studies are indicated to explore this possibility.

EVALUATION OF FG-4592, A NOVEL ORAL HYPOXIA-INDUCIBLE FACTOR PROLYL HYDROXYLASE INHIBITOR, TO TREAT ANEMIA IN HEMODIALYSIS PATIENTS

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FG-4592, a novel hypoxia-inducible factor prolyl hydroxylase inhibitor (HIF-PHI), has been shown to increase Hb with transient modest increases in erythropoietin levels in anemic Stage 3-4 CKD patients. We are now evaluating FG-4592 in an ongoing randomized, open-label, active-controlled phase 2 study of hemodialysis patients. At entry, Hb had been maintained at 10.5-13.0 g/dL with IV epoetin alfa thrice-weekly. Iron repletion was not required at baseline. 48 patients were randomized (12:4; FG-4592:epoetin IV) into 3 dose cohorts after stopping epoetin for at least 5 days: 36 to FG-4592 (1.0, 1.5, or 2.0 mg/kg) and 12 to epoetin (at pre-randomization dose) thrice-weekly for 6 weeks. IV iron supplementation, RBC transfusion, and use of erythropoiesis-stimulating agents (unless randomized to epoetin) are not allowed. At abstract submission, 25 protocol-adherent patients treated with 1.0 or 1.5 mg/kg FG-4592 or epoetin have completed ≥4 weeks of treatment with Hb monitoring. The safety and capacity for FG-4592 to maintain corrected Hb in hemodialysis pts will be assessed. Effects of FG-4592 on plasma levels of endogenous EPO, hepcidin, and reticulocyte Hb content will also be assessed. Results of all cohorts will be presented at the scientific congress.

PHARMACOKINETICS OF ORAL FG-4592 TO TREAT ANEMIA IN HEMODIALYSIS (HD) PATIENTS (PTS)

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FG-4592, a novel hypoxia-inducible factor (HIF) prolyl hydroxylase inhibitor (PHI), has been shown to increase Hb with transient modest increases in EPO levels in anemic Stage 3-4 CKD patients. Here, we report results of a Phase 1b, randomized, double-blind, placebo-controlled study examining PK, HD clearance, and safety of FG-4592 in HD pts who were randomized 3:1 (FG-4592: placebo) into 2 escalating dose cohorts (1 and 2 mg/kg FG-4592). FG-4592 or placebo was orally administered to 17 subjects on Day 1 (1h post-HD) and on Day 8 (2h pre-HD). HD clearance of FG-4592 was 3-5%.

FG-4592 Dose Level	Pre/Post HD	FG-4592 Cmax (µg/mL) ±SD	AUCinf (hr*µg/mL) ±SD	Cl/F (mL/hr/kg) ±SD
1.0 mg/kg	Pre	5.2±2.2	50.2±23.7	24.9±13.6
	Post	5.5±2.0	54.1±28.3	24.7±16.7
2.0 mg/kg	Pre	11.0±2.5	117.0±42.7	20.3±11.2
	Post	10.6±4.5	116.4±47.2	27.8±28.2

In pts treated with FG-4592 1 mg/kg (n=6) or 2 mg/kg (n=6), plasma EPO levels began to rise after 4h post-dose with median peak concentration of 99.6 and 267.5 mIU/mL, respectively, measured at 8 to 12h post-dose, followed by a decline to baseline levels by 24 to 48h. FG-4592 was well-tolerated; no SAEs and only one AE reported (nausea). Intradialytic or immediate post-dialytic blood pressure was not significantly different between cohorts treated with FG-4592 or placebo whether prior to, or after, HD. These data support FG-4592 as a conveniently dosed novel oral anemia therapy as it is not impacted by HD. In addition, administration of 1 or 2 mg/kg FG 4592 produces increases in plasma EPO levels that appear to be within the range of physiologic effects seen in healthy subjects exposed to high altitude (200-300 mIU/mL Abbrecht, 1972) or to phlebotomy, or hypoxemia (200-300 mIU/mL, Kato 1994).

A CASE OF THYROTOXIC PERIODIC PARALYSIS

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Thyrotoxic periodic paralysis is an uncommon disease affecting mostly young Asian males. It is usually associated with hyperthyroidism, mostly Grave's disease. We present a case of thyrotoxic periodic paralysis in a young African American male with no significant past medical history.

A 19 year old African American male with no significant past medical history presented to the emergency room with a history of significant weakness. He went to bed the night prior without any problems after a family dinner. He was however unable to get out of bed next morning and had to crawl out of bed. He denied any fever, diarrhea, URI, sick contacts, recent travel and insect or tick bites. His physical examination was significant for proximal muscle weakness more in lower extremities. Labs were significant for potassium of 2.6. meq/L, TSH 0.011 μIU/mL and fT4 2.71 ng/dL. His EKG showed U waves. Patient was diagnosed with thyrotoxic periodic paralysis, given 20 meq of potassium chloride and monitored in the hospital. His strength and potassium levels normalized within 24 hours. He was also started on propranolol and a thyroid scan confirmed Grave's disease.

Thyrotoxic periodic paralysis is an uncommon condition associated with hyperthyroidism. It usually presents in early morning and patients have significant hypokalemia on presentation. However the condition is usually self limited and potassium supplementation can lead to dangerous hyperkalemia. Propranolol has been shown to help abort the attack.

SAFETY AND EFFICACY OF PEGINESATIDE FOR TREATMENT OF ANEMIA IN HEMODIALYSIS PATIENTS PREVIOUSLY ON EPOETIN ALFA

Brigitte Schiller[1], Steven Zeig[1], Claudia Hura[1], Nathan Levin[1], Mark Kaplan[1], Hong Tang[2], Martha Mayo[2], Krishna Polu[2], Anne-Marie Duliege[2]; [1]AFX01-12 Peginesatide Study Group; [2]Affymax, Inc., Palo Alto, CA

Peginesatide is an investigational, PEGylated, peptide-based erythropoiesis-stimulating agent in development for treatment of anemia in dialysis patients due to chronic renal failure (CRF). EMERALD 1 was a Phase 3 randomized active controlled open-label trial to evaluate safety and efficacy of peginesatide in hemodialysis (HD) patients previously treated with epoetin alfa. The primary endpoint was a mean change of hemoglobin (Hb) from baseline to the evaluation period.

EMERALD 1 enrolled 803 US patients who had been on HD for ≥3 months and were treated with IV epoetin alfa for ≥8 wks. Patients were randomized 2:1 to receive IV peginesatide once monthly or epoetin alfa 1-3 times weekly for ≥52 weeks. Peginesatide starting dose was determined based on last week of screening epoetin dose prior to randomization, with doses titrated to maintain target hemoglobin (Hb) levels of 10-12 g/dL.

Peginesatide demonstrated noninferiority for the primary efficacy endpoint in maintaining Hb; other efficacy endpoints were similar between treatment groups except for proportion in the target range in weeks 29-36 (63% for peginesatide, 72% for epoetin alfa). Hb excursions above the target range were similar between treatment groups. The frequency of overall AEs and SAEs were similar between treatment groups, including events of interest: hypertension, venous thrombotic events, and cancer. For adjudicated deaths and CV events, frequency of events was similar while stroke occurred in 4.5% of epoetin and 2.3% of peginesatide treated subjects.

In this study, peginesatide was noninferior to epoetin in the maintenance of hemoglobin levels in dialysis patients, and its overall safety profile appeared to be consistent with that of epoetin.

STABILITY OF HEMOGLOBIN WITH ONCE-MONTHLY C.E.R.A INJECTIONS IN OLD DIALYSIS PATIENTS, HB DAY STUDY

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Methoxy polyethylene glycol-epoetin beta is a continuous erythropoietin receptor activator (C.E.R.A.) and provides the maintenance of stable hemoglobin (Hb) levels in dialysis patients with once-monthly administration. CKD patients with anemia undergoing treatment with an erythropoiesis stimulating agent (ESA) should be given supplementary iron to maintain the Hb target. The HbDay study evaluates the maintenance of Hb levels with an intravenous supplementary iron (iron hydroxy/dextran), on the same day as the subcutaneous administration of C.E.R.A. every 4 weeks. This “real life” observational study is based on a 9 month period in one unit. The data on Hb level, iron status and ESA treatment was collected retrospectively for a 3 month period prior to the once-monthly anemia management and during the next 6 months. 125 hemodialysis patients were evaluated (48 % female), the mean duration on dialysis is 5 years and the mean age is 73 years. Age distribution is: < 65 years, 25%, and >65, 75%. Our results show the Hb level and iron status are stable during the study. The mean Hb level is 11.1 ±1.33 g/dl in baseline (one week before the start of C.E.R.A.) and 10.9 ±1.21 g/dL, during the evaluation at W24 (p=0,242) of the patients are between 10-12 g/dL in baseline; and 66% during the evaluation. During the evaluation at W24, the mean serum ferritin is 363 µg/L, the mean transferrin saturation is 26%, the median dose of iron hydroxyl/dextran is 200mg/month and the median dose of C.E.R.A. is 150µg/month (45% patients same dose as the baseline, 33% decrease and 22% increase).The Hb levels can be maintained in hemodialysis patients with both administrations of iron supplementation and C.E.R.A. on the same day every 4 weeks. In conclusion**,** this “real life” study in a intensive dialysis center shows that the once-monthly anemia management can be effective. This is an opportunity to simplify the organization of dialysis units and as a result make them more cost effective.

INVESTIGATION OF THE EFFICACY OF SUBCUTANEOUS VERSUS INTRAVENOUS ERYTHROPOIETIN IN OBESE AFRICAN AMERICAN PATIENTS

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To correct renal anemia, the subcutaneous (SC) route of erythropoietin (EP) administration has been associated with increased efficacy and decreased dose requirements, when compared with intravenous (IV) route. The effect of obesity as potential modifier to date is little explored. This study aims to answer the question of whether BMI influences the decrease in dose of EP when switching from IV to SC route.

We performed IV to SC conversion of EP for 83 in-center dialysis patients and monitored outcomes over a 9 month period. Patients were divided into three categories based on BMI [<25 (n=25), 25-35 (n=38), >35 (n=20)]. We obtained baseline demographic parameters, calculated BMI, and monitored iron saturation, ferritin, hemoglobin (Hg) along with EP requirements. Statistical analysis has been performed with SPSS v.18 with results reported either percents or means with standard deviations (SD).

The cohort was all African American, 48% male with a mean age of 54 (13.3), and BMI 29.9 (7.5). Baseline iron saturation was 24.1 (10.7)%, ferritin 642.5 (280.4)ng/mL. Hg remained unchanged: 11.19 (1.32) vs. 11.33 (1.35)g/dL. Initial EP weekly dose for the entire cohort was 20, 658 (17,398) units (U): final dose 18,400 (16,426)U, with close correlation between initial and final doses (r 0.627; $p<0.001$). Weekly EP dose remained virtually unchanged in BMI category 1 and 2 [(15,880(14,339) vs. 14,695(13,858); 20,891(13,574) vs. 20,364(15,112)] but decreased in the category 3: 26,200(24,883) vs. 19,057(21,243). However, BMI had no independent effect in linear regression modeling with multiple covariates (age, BMI; age, BMI, iron saturation, ferritin) included (p=ns).

In conclusion, obesity may affect relative efficacy of EP conversion; additional studies may be needed.

REDUCTION OF ERYTHROPOIETIN USAGE ASSOCIATED WITH THE INSATALLATION OF A DUAL-STAGE ULTRAFILTER ON THE INCOMING WATER LINE TO THE DIALYSIS MACHINE

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Previous studies have shown that the use of ultrapure dialysate reduces erythropoietin (EPO) dosage presumably by reducing EPO resistance. EPO resistance is thought to be mediated by inflammatory cytokines. Ultrapure dialysate (< 0.1 CFU/ml and < 0.03 EU/ml) can decrease the inflammatory stimuli that blunt EPO responsiveness.

We report the data from an observational study in which a new dual-stage ultrafilter (Nephros DSU) that produces ultrapure water was installed on the RO water line feeding individual dialysis machines. The machines already had in place a commercially available dialysate ultrafilter. Twenty patients were monitored for 6 months following the DSU filter installations. The dialysate prescription and standard treatment variables were unchanged during the observation period. Hemoglobin levels were targeted to 11-12 g/dL.

Results: The average per treatment EPO dose decreased over the 6 months from 7040 units to 4020 units, a 43% decrease ($p = 0.008$).

Conclusion: The mechanism for the reduction in EPO dosage is unknown, but may represent a reduction or an elimination of inflammatory molecules by the DSU in the redundant circuit before the ultrapure water entered the dialysate. Further investigations are necessary to test this hypothesis.

EVALUATION OF OXIDATIVE STRESS AND NITROSITIVE STRESS IN LUNG OF RATS TREATED WITH DIFFERENT INTRAVENOUS IRON COMPOUNDS

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Intravenous iron (i.v.) iron is recognized today as a useful tool for treating patients with anemia related to CKD. Iron sucrose (IS) is an iv iron compound with highly tested safety profile worldwide. Nevertheless, lastly a number of IS similar substance (ISS) has appeared in the therapeutic scenario. Since lung is a target organ concerning potential toxicity the identification of possible differences regarding safety profile between the original IS (Venofer®) versus ISSs from diverse sources is essential with the purpose of preserving occasionally damage in lung. This study evaluates oxidative stress, nitrosative stress and inflammatory markers in lung of normal rats receiving weekly iv iron administration by one month. IS (G1); ISS-Portugal (G2); ISS-Colombia (G3); ISS-Argentine (G4) and Control with saline solution (G5). Lung homogenates and histology samples were processed for oxidative stress, nitrosative stress and inflammatory markers respectively after the last i.v. dose. Results: Hb presented no significant differences between groups. Serum Iron (μg/dl) G1= 371.3±17.7†; G2= 431.4±14.1; G3= 426.4±10.6; G4= 455.0±21.9#; G5= 317.1±14.8*. TSAT (%) G1= 68.5±5.7†; G2= 85.0±3.5; G3= 82.00±6.4; G4= 83.1±7.1; G5= 44.4±4.0* Oxidative stress in lung homogenates: TBARS (nmol MDA/mg prot) G1= 32.7± 2.0†; G2= 57.3±4.2; G3= 48.8±2.6; G4= 50.1±4.3; G5= 28.5±1.3†. GSH/GSSG ratio G1= 8.5±1.6†; G2= 4.2±0.4; G3= 6.2±1.1; G4= 5.8±1.5; G5= 9.9±1.3†. Histology: Nitrotyrosine (%/area) G1= 2.9±0.8†; G2= 12.8±1.4**; G3=6.8±1.1; G4= 6.4±1.3; G5=2.1±0.7†. Prussian blue (%/area) G1= 0.5±0.2†; G2= 4.2±0.6**; G3= 3.0±0.8; G4= 3.1±0.5; G5=0.3±0.1†. VEGF (%/area) G1= 1.2±0.4†; G2= 15.4±2.7**; G3=12.1±1.5; G4= 13.8±2.2; G5=0.8±0.6†. IL6 (%/area) G1= 3.3±0.7†; G2= 18.9±2.5**; G3=14.8±1.9; G4= 16.0±2.2; G5=2.1±0.5†. TNFα (%/area) G1=1.9±0.6†; G2= 13.7±3.2**; G3=9.3±1.8; G4= 11.4±1.2; G5=1.1±0.3†. ED1 (cells/area) G1= 2.2±0.5†; G2= 10.7±0.6**; G3=7.3±0.8; G4= 8.7±1.0; G5=1.4±0.7†.

*p< 0.01 vs. all groups; **p<0.01 vs Group 3 and 4; † p< 0.01 vs. Group 2. 3 and 4; # p<0.05 vs Group 3. In conclusion, these findings suggest that there are significant differences between IS versus the ISS regarding lung toxicity.

ADHERENCE TO STABLE HEMOGLOBIN ANEMIA PROTOCOL INCREASES ACHIEVEMENT OF TARGET HEMOGLOBIN LEVELS

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SHAPE (Stable Hemoglobin Anemia Program Effort) is a 4-year quality improvement program at a large dialysis organization (LDO) to optimize anemia management. The goals are to provide a protocol that, with greater than 95% adherence to protocol orders, achieves a high percentage of hemodialysis patients with Hb in the 10-12 g/dL target range, and minimizes percentage of patients below and above-target.

To assess potential design elements, we evaluated 6 new protocols in over 7,000 patients undergoing treatment in over 100 in-center hemodialysis facilities at the LDO. We accumulated over 3,000 patient-years experience by September, 2010, when patients in the 6th and final pilot, which incorporated the most successful elements of previous pilots, had accumulated up to 4 months of experience. At that time, we compared Month 1 results in patients who were enrolled in the final SHAPE pilot protocol for at least 3 months based on adherence rate. All performance goals were met (Table).

Cohort	**Rate of Adherence**	**Mean Hb (g/dL)**	**Hb <10 g/dL (%)**	**Hb 10-12 g/dL (%)**	**Hb >12 g/dL (%)**
All participating pilot facilities	> 60%	11.1	11.0	71.3	17.7
Highest-adherence pilot facilities	> 95%	11.1	8.8	77.7	13.5

Anemia management using the newest version of SHAPE produces excellent Hb outcomes. High levels of adherence to the new protocol further improve outcomes and ensure successful anemia management performance under the proposed CMS Quality Improvement Program.

PEGINESATIDE PHASE 3 TRIAL SUBJECTS VS A RANDOM SAMPLE OF UNITED STATES HEMODIALYSIS PATIENTS

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Peginesatide, a PEGylated, investigational, peptide-based ESA in development for anemia of chronic renal failure, was studied in hemodialysis patients (vs. epoetin alfa) in EMERALD 1, a US-only Phase 3 randomized active-controlled trial. To determine if the trial population was similar to the general US hemodialysis population we compared their baseline characteristics to a random stratified sample of the US adult prevalent in-center hemodialysis population (Medicare Clinical Performance Measures (CPM), 10-12/2006).

Characteristic	Medicare CPM	EMERALD 1
N	8,743	793
Age (years)	62 (51-73)	58 (49-67)
Gender (% male)	56%[1]	55.1%
Race (%White/Afr- Amer)	55%/38%[1]	48%/47%
Weight (kg)	74.5 (62.7-89.0) [1]	80.3 (69.0-95.5)
Diabetes	57.2%[1,2]	56.6%
Myocardial Infarction	8.4%[1,2]	14.9%
Congestive Heart Failure	34.7%[1,2]	46.0%
Cerebrovascular Disease	13.6%[1,2]	19.3%
Peripheral Vascular Disease	31.1%[1,2]	27.1%
Hemoglobin (g/dL)	11.9 (11.0-12.9)	11.4 (10.9-11.7)
Ferritin <100 ng/mL +TSAT < 20%	3.4%	1.0%
Epoetin alfa dose (U/kg/week)	171 (83-334)[2]	131 (70-228)[3]
Data presented as weighted [1] % or median (25^{th} - 75^{th} percentile); [2]Medicare 2006 claims data; [3]Last weekly dose prior to randomization		

EMERALD 1 enrolled a large number of patients from epidemiologically-relevant demographic groups and with diabetes, higher body weights, and cardiovascular conditions typical for the US hemodialysis population.

EFFECTIVENESS OF 25 HYDROXY VITAMIN D ON SECONDARY HYPERPARATHYROIDISM IN HEMDIALYSIS PATIENTS

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Among Hemodialysis (HD) patients, Secondary hyperparathyroidism (SHPT) is a common finding. According to KDOQI guidelines, the recommended targets for dialysis patients have been set between 150 and 300 pg/mL using intact parathyroid hormone (iPTH). However, it does not recommend any native vitamin D supplementation. It has been shown that non-renal tissue will process the 25 hydroxy Vitamin D into 1,25 hydroxy Vitamin D.

Objective is to study if replacing 25 Hydroxy Vitamin D levels in HD patients with SHPT would decrease the iPTH to the desired rang according the K-DOQI guidelines.

We included 43 HD patients in this study from our local dialysis facility. Inclusion criteria were:

1) 25 hydroxy Vitamin D deficiency identified as: 25 hydroxy Vitamin D was less than 30 ng per milliliter.
2) SHPT identified as: PTH intact level was more than 300 pg per milliliter.

The study was open-labeled in two groups. Group one (Vitamin D group) was given Ergocalciferol, whereas, group two was the control one (no Vitamin D2 or D3 was given).

15 patients were enrolled in the Vitamin D group, and 28 were considered in the control group.

A response to Vitamin D was identified as a patient who, at the end of the study period, met one of the following criteria: I PTH less or equal to 300 pg per milliliter, Phosphate less or equal 5.5 mg/dl, or corrected Calcium less or equal to 10.5 mg/dl.

We found that no significant difference was noticed in the PTH level, Calcium, or phosphate in the Vitamin D group comparing to the control group.

In Conclusion, replacing Vitamin D2 in HD patients with 25 hydroxy Vitamin D deficiency and secondary hyperparathyroidism does not have a significant decrease in the Intact PTH level.

PREVALENCE OF 25 HYDROXYVITAMIN D DEFICIENCY IN A SINGLE DIALYSIS UNIT

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It has been reported that 25 hydroxyvitamin D (25-OHvitD) deficiency is common in chronic dialysis patients. Deficiency of 25-OHvitD has been associated with increased cardiovascular events and mortality in some studies. We undertook to determine the prevalence of 25-OHvitD deficiency in our dialysis unit. Mid August levels of 25-OHvitD were obtained in all patients. Patients who were taking oral vitamin D supplements were excluded from analysis. We also explored the demographics of age, sex, race and place of domicile. To further characterize the 25-OHvitD levels, we used the definitions: severe deficiency =<5 ng/ml; mild deficiency (MD) =5-15 ng/ml and insufficient (I) =>15-30 ng/ml. None of our patients had severe deficiency. We also found that 3 patients lived in a skilled nursing facility; 1 of the 3 had MD. Race was recorded as Black (B) (including Black Hispanic) or Other (O) (Caucasian and Asian) as declared by the patient.

Table 1 Results Overall

Total # of Pts	Age(s.d.)	25-OHvitD (s.d.)	MD	I
48	62.4 (16.1)	28.1 (12.8)	14.3%	44.9%

Table 2 Results Female vs. Male

	#	Age (s.d.)	25-OHvitD (s.d.)	MD	I
Female	24	63 (14)	21.9 (11.5)	25%	54%
Male	24	68 (18)	33.5 (11.1)	4.2%	37.5%

Table 3 Results Black vs. Other

	#	Age(s.d.)	25-OHvitD (s.d.)	MD	I
Black	20	58 (14)	23.1 (11.0)	20%	65%
Other	28	65 (17)	30.9(12.6)	10.7%	32.1%

Our analysis showed that while none of our patients had severe deficiency, over half had either mild deficiency or insufficiency. Females were more likely to have both mild deficiency and insufficiency compared to males (p=0.005). Blacks were much more likely to have both mild deficiency and insufficiency compared to Other (p=0.004).

LANTHANUM CARBONATE (LC) VS SEVELAMER FOR TREATING HYPERPHOSPHATEMIA IN CKD

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Phosphate (P)-binding efficacy and impact on vitamin D of LC and sevelamer (hydrochloride [SH] or carbonate [SC]) were evaluated in 3 trials. Study 1: healthy volunteers (HV) received a standard meal alone, or with LC (1000 mg) or SC (2400 mg), in a random order followed by a fasting period, with stool P measured 10 hours later. Study 2: serum P was measured in dialysis patients receiving LC (2250–3000 mg/day) then SH (4800–6400 mg/day), or vice versa, for 4 weeks each. Study 3: serum calcitriol was measured in HV taking calcitriol (1 μg) alone, and with LC (3000 mg/day) or SC (7200 mg/day), in random order.

Study 1: P absorption (n=18) was: meal alone, 281.7 ± 14.1 mg; meal + LC, 156.0 ± 14.2 mg; meal + SC, 221.8 ± 14.1 mg ($p<0.001$; LC vs SC). Bound P was 135.1 ± 12.3 mg with LC and 63.2 ± 12.3 mg with SC ($p<0.001$), or 135 mg/tablet with LC and 21 mg/tablet with SC. Study 2: P reductions (n = 174) were 1.7 ± 0.1 mg/dL with LC and 1.4 ± 0.1 mg/dL with SH ($p=0.113$). In study completers (n=119), between-group difference was 0.5 mg/dL in favor of LC ($p=0.007$). A higher percentage of patients had ≥25% reduction in serum P with LC (51.8%) than with SH (38.5%; $p=0.022$). Study 3: LC did not affect calcitriol exposure (n=41). SC reduced calcitriol adjusted mean area under the curve (137 pg.h/mL vs 318 pg.h/mL; $p=0.024$) and maximum serum concentration (40.1 pg/mL vs 49.7 pg/mL; $p<0.001$) vs calcitriol alone.

In conclusion, LC binds dietary phosphorus more effectively than SH or SC and, unlike SC, does not reduce exposure to oral calcitriol.

EFFECT OF MEDICARE PART D COVERAGE GAP ON PHOSPHATE BINDER UTILIZATION IN U.S. DIALYSIS PATIENTS IN 2007

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Management of hyperphosphatemia with phosphate binders in dialysis patients (pts) has been associated with lower mortality risk. The objectives were 1) to describe the effect of the Medicare Part D coverage gap on phosphate binder utilization, and 2) examine the effect of low-income subsidy (LIS) status on utilization. Data from the United States Renal Data System were used to assess the usage of selected phosphate binders in 2007. All patients alive on December 31, 2007, with Part D coverage during all of 2007, and having entered the Part D coverage gap (CG) prior to October 1, 2007 and stayed in CG through end of 2007 were included (n = 22,693). Estimates for entry into the coverage gap were based on gross drug costs (Medicare plus patient) of >$2,400.

86% of pts included in the cohort had at least one claim for a phosphate binder and 52%, 45%, and 13% had at least one claim for sevelamer, calcium acetate, and lanthanum, respectively. Of all pts receiving sevelamer, 69% had claims in the initial coverage (IC) phase and CG and 19% had a claim during the IC but not the CG; non-LIS patients were less likely to have claims during the CG (71%) versus LIS patients (85%). About 67% of pts receiving calcium acetate had claims in both phases and 79% of both LIS and non-LIS patients had claims during CG. Only 44% of pts using lanthanum had claims in both coverage phases and 67% of LIS pts and 56% of non-LIS pts had claims during the CG.

In conclusion, Part D data from 2007 indicate that a lower percentage of dialysis patients entering the CG have claims for high cost phosphate binders (sevelamer and lanthanum) and non-LIS pts are less likely to have claims for high cost binders in the CG compared to LIS pts.

COMPARISON OF PHOSPHATE BINDING BY RENVELA® (SEVELAMER CARBONATE) FOR ORAL SUSPENSION AFTER EXPOSURE TO VARIOUS FOODS

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Background: Clinicians have inquired about mixing sevelamer carbonate powder with foods and beverages other than water. These *in vitro* experiments were designed to investigate if there was a difference in the amount of phosphate bound by sevelamer carbonate powder when mixed with food or beverages prior to ingestion.

Methods: A 2.4 g sevelamer carbonate powder packet was either mixed with a serving of a selected food and allowed to sit for 30 minutes (pre-exposed, PE) prior to the mock digestive conditions or was introduced to the food during the mock digestive conditions (not pre-exposed; NPE). The amount of phosphate bound (mmol/g) by PE and NPE samples was measured indirectly by quantifying the unbound phosphate in each sample by ion chromatography.

Results: In all cases, the difference in the amount of bound phosphate between PE and NPE samples was less than 3%.

	Applesauce		**Oatmeal**		**Ginger Ale**		**Scrambled Eggs**		**Chicken**	
	PE	NPE	PE	NPE	PE	NPE	PE	NPE	PE	NPE
Ave (mmol/g)	3.79	3.68	4.39	4.45	4.33	4.30	4.20	4.17	4.30	4.41
% Diff	2.9		1.4		0.7		0.7		2.5	

There were slight discolorations in the applesauce and oatmeal possibly due to prolonged exposure of these foods to air. There was no significant change in the odor profile of any of the samples beyond the added "citrus note" imparted by the flavoring added to the powder formulation.

Conclusion: Premixing sevelamer carbonate powder with selected food or beverages prior to ingestion had no effect on the ability to bind phosphate based on these *in vitro* tests. While this study suggests an alternative way to administer sevelamer carbonate powder, clinical testing is needed to corroborate this *in vitro* finding.

CALCIPHYLAXIS AS AN EMERGING MALIGNANT ENTITY: CASE SERIES OF CALCIPHYLAXIS WITH GOOD RESPONSE TO SODIUM THIOSULFATE.

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Background: Calciphylaxis is a poorly understood syndrome of vascular calcification and skin necrosis. It occurs in many conditions including ESRD where the mortality rate is as high as 60-80%. Aim: To report three cases of calciphylaxis well treated with sodium thiosulfate. Clinical Vignettes: We describe series of three cases of females (mean age 40years) with ESRD who had painful erythematous patches that progressed to necrotic ulcers on their extremities leading to the diagnosis of calciphylaxis. PTH level was normal in two cases (as well as phosphorus and calcium levels) and both patients responded very well to 3-week-regimen of sodium thiosulfate. The third case had elevated PTH level and was diagnosed with secondary hyper-parathyroidism that required parathyroidectomy followed by 6-weeks of sodium thiosulfate for total healing of her ulcers. Discussion: While calciphylaxis is a rare entity, it remains an important cause of morbidity and mortality in patients with ESRD, affecting 1-4% of CKD population. It's characterized by progressive vascular calcification and ischemic necrosis of the skin and soft tissue. Although, it has a poor prognosis, IV sodium thiosulfate has recently emerged as a new treatment due to multiple positive outcomes shared in the form of case reports and reviews. Conclusion: Calciphylaxis is a uniquely challenging problem in ESRD population. Pending evidence-based treatment on sodium thiosulfate, the main management is still dialysis, nutritional supports as well as early recognition and control of risk factors and other possible etiologies.

BASELINE CHARACTERISTICS OF SUBJECTS IN IMPACT-SHPT: A STUDY TO EVALUATE THE EFFICACY AND SAFETY OF PARICALCITOL AND CINACALCET IN HEMODIALYSIS PATIENTS WITH SECONDARY HYPERPARATHYROIDISM

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Paricalcitol and the combination therapy of cinacalcet with low-dose vitamin D are used to treat SHPT in dialysis patients. IMPACT SHPT is an ongoing, randomized, 28 week open-label trial that compares the efficacy and safety of paricalcitol vs. cinacalcet-centered therapies in hemodialysis patients. The primary endpoint is the proportion of subjects achieving a mean iPTH between 150-300 pg/mL during weeks 21 to 28. Baseline characteristics (Table 1) were similar in both groups except for diabetes (p=0.02) and diastolic BP (p=0.027). Results will allow evaluation of the effectiveness and safety of paricalcitol vs. cinacalcet and low-dose vitamin D therapies in treatment of SHPT.

Table 1.

Demographics and Mean Baseline Characteristics (±SD)	**Paricalcitol**	**Cinacalcet**
	(n=136)	**(n=136)**
Age (years)	63.4 ± 13.3	62.4 ± 12.4
Female (%)	35.3	39.7
Comorbid Conditions: (%)		
Diabetes	47.8	33.1
Cardiovascular	97.1	95.6
Gastrointestinal	79.4	70.6
Neurological/psychiatric	57.4	53.7
iPTH (pg/mL)	501.4 ± 153.2	516.7 ± 142.1
Albumin corrected serum calcium (mg/dL)	9.0 ± 0.6	9.0 ± 0.7
Serum phosphorus (mg/dL)	4.9 ± 1.1	4.7 ± 1.1
Systolic blood pressure (mm Hg)	139.6 ± 22.4	141.3 ± 24.1
Diastolic blood pressure (mm Hg)	71.6 ± 12.7	75.2 ± 14.2

PREVALENCE OF VITAMIN D DEFICIENCY AMONG HEMODIALYSIS PATIENTS AND RESPONSE TO CHOLECALCIFEROL

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The purpose of this study was to determine the prevalence of 25OH Vitamin D deficiency in hemodialysis patients, identify associated factors, and assess response to repletion with cholecalciferol (D3).

We consented 52 outpatients at the Mount Sinai Dialysis unit between August and November 2010 for Vitamin D testing. Those patients found to have 25OH Vit D levels < 25 ng/mL were eligible for randomization to treatment with D3 (50,000 IU weekly) or control (standard of care). 25OH Vitamin D levels were measured in a subset of patients (n = 14) after six weeks of follow-up.

The prevalence of Vit D deficiency was 94.2%, as defined by a 25OH Vit D level < 30ng/mL, and 26.9% of patients had Vit D levels < 10ng/mL. Mean and median Vit D levels were 16.1 and 14.1 ng/mL, respectively. Selected clinical characteristics of the patient cohort are given in the table below. There was no association between Vit D level and age, gender, race, or dialysis vintage, but Vit D levels negatively correlated with BMI (Spearman's $\rho = -0.355$, $p = 0.011$). After six weeks of D3 repletion (n = 9), 25OH Vit D increased from a mean of 13.7 ng/mL to 36.6 ng/mL ($p = 0.001$), with no change in serum Ca or 1,25OH Vit D requirements. No change was noted in the Vit D level of control patients (13.3 ng/mL to 13.1 ng/mL, $p = 0.943$, n = 5).

We demonstrate a higher prevalence of Vit D deficiency among hemodialysis patients than previously reported, and an ability to correct this deficiency with oral D3. A study of the effects of D3 repletion on the immune system in these patients is ongoing.

Age, years (mean +/- SD)	57 +/- 12
Gender: Male (%)	28 (53.8%)
Race: Black (%)	29 (55.8%)

THE ASSOCIATION BETWEEN CINACALCET ADHERENCE AND INPATIENT COSTS IN CHRONIC DIALYSIS PATIENTS

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Cinacalcet is used to treat secondary hyperparathyroidism in dialysis patients, but the consequences of non-adherence have not been established. This retrospective cohort analysis of the MarketScan® commercial claims data (2004-2010) examined the association of cinacalcet adherence and inpatient (IP) costs in patients on dialysis. Included subjects were on chronic dialysis with ≥ 1 claim for cinacalcet who survived ≥ 12 mo. after the first cinacalcet prescription claim (index date), and had ≥ 6 mo. of pre-index data. Cinacalcet adherence was assessed based on the medication possession ratio (MPR) over 12 mo. Patients were grouped into 3 categories: non-adherers (NA) (≥180 d. refill gap [RG]), low adherers (LA) (<0.8 MPR and RG<180 d.), and high adherers (HA) (≥0.8 MPR and RG<180 d.). IP costs were summed over 12 mo. We used a generalized linear model (GLM) to examine the association between adherence and IP costs, controlling for patient characteristics, co-morbidities and concomitant medication MPR, but did not control for discontinuation reasons due to data limitations.

A total of 4,936 patients met the study criteria (mean age=61.8 years; men= 53.2%), similar to the Medicare dialysis population. Non-adherers had a slightly higher Charlson co-morbidity index than adherers. Unadjusted (UA) and GLM results are presented (Table 1).

Table 1	Non Adherers	Low Adherers	High Adherers
UA Mean Cinacalcet Cost (SD)	$1,427 (1228)	$3,244 (1762)	$5,266 (2298)
UA Mean IP Cost (SD)	$20,979 (53848)	$14,869 (37950)	$9,604 (27519)
GLM Δ IP Cost (95% CI)	Comparison Group	-$4,178 (-6106, -2250)	-$8,484 (-10270, -6697)

Cardiovascular-related hospitalizations accounted for 41% of IP costs.

With the general caveats of observational research, our results suggest that IP cost savings may offset increased cinacalcet adherence's costs.

STATIN USE IN NON-DIABETIC ESRD PAIENTS MAY DECREASE PARICALCITOL USE

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Statin has been proposed to be a vitamin D analogue. Our aim is to test the potential clinical benefit of Statin treatment on mineral metabolism as achieved by activity of Vitamin D in ESRD

The study was conducted retrospectively final sample had 1894 patients, where 923 were diabetics. The outcome measure was weekly usage of Paricalcitol and intact PTH (iPTH) between patients who were on statin therapy versus those who were not. SPSS version 17 was used for statistical analysis.

Intact PTH and weekly use of paricalcitol was significantly lower in non-diabetic patients using statin versus those who were not. This significance remained after controlling for race, serum calcium, weekly dose of paricalcitol and BMI. The results are suggestive of possible favorable effect of statin on iPTH and vitamin D profile in non diabetic patients on hemodialysis.

Diabetic (N=971)	**iPTH (std)**	**Sig.**	**Par***	**Sig.**
On statin (N=520)	378.6 (315)	0.17	1.12 (5.9)	0.09
No Statin (N=451)	408.5 (377)		1.05 (6.3)	
Non Diabetic (N=923)				
On Statin (N= 297)	388.7 (359)	0.001	1.04 (6.4)	0.001
Not Statin (N=626)	511.2 (557)		1.21 (7.9)	

- Paricalcitol mcg/week(STD)

SEVERE HYPOCALCEMIA IN A HEMODIALYSIS PATIENT WITH TERTIARY HYPERPARATHYROIDISM

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Spontaneous parathyroid autoinfarction has been described in primary hyperparathyroidism and in extremely rare cases of secondary hyperparathyroidism in dialysis patients. The mechanism of action has yet to be determined; however previous case reports demonstrate marked falls in serum calcium and PTH values. We present a unique case of life threatening hypocalcemia from spontaneous parathyroid autoinfarction in a patient with tertiary hyperparathyroidism.

A 46 year old male with history of ESRD on hemodialysis and tertiary hyperparathyroidism was admitted for new onset seizure along with perioral numbness and tingling. He also presented with recent onset of left sided neck pain with tender 2x2 cm mass on exam. Prior to admission patient had elevated PTH and serum calcium despite lack of vitamin D administration supporting the diagnosis of tertiary hyperparathyroidism. On admission patient was noted to have serum calcium of 5.1 mEq/dL and ionized calcium of 0.48 mmol/L. His labs also demonstrated an abrupt drop in PTH from 1770 pg/ml to108 pg/ml within one month. Patient's symptoms resolved after being treated with intravenous calcium gluconate, calcitriol, and increased calcium in dialysis bath. His hypocalcemia was felt to be secondary to infarction of his dominant parathyroid gland as evidenced by the new tender left sided neck mass. The remaining 3 parathyroid glands recovered post hospitalization and became hyperfunctional creating a secondary hyperparathyroidism with an elevated PTH, elevated phosphorus, and decreased alkaline phosphatase confirming resolution of hungry bone syndrome. To our knowledge this is the first documented case of autoinfarction in a dialysis patient with tertiary hyperparathyroidism leading to acute severe hypocalcemia.

Date	PTH (pg/ml)	Serum Calcium (mEq/dL)	Serum Phosphorus (mEq/dL)	Ionized Calcium (mmol/L)	ALP (U/L)
Pre-hospitalization	1770	11.5	7.3	1.29	471
Hospitalization	108	5.1	3.7	0.48	1024
Post-hospitalization	927	9.2	5.3	1.12	105

PHYSICIAN DRIVEN VISUAL TRACKING SYSTEM IMPROVES PHOSPHORUS CONTROL IN DIALYSIS PATIENTS

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Hyperphosphatemia is associated with increased morbidity and mortality in ESRD patients but it remains challenging to achieve levels within the acceptable range. Repeated education and motivational tools may help. We studied the impact of a physician-driven visual tracking system (VTS) on phosphorus control in 62 patients on chronic hemodialysis with hyperphosphatemia (phosphorus>5). For a period of three months, we implemented a VTS that represented phosphorus levels on an analog scale with visual cartoon symbols depicting "good and bad" levels, followed by a detailed review of potential complications, patient's diet and use of phosphorus binders by a physician on a one to one basis. Calcium, phosphorus, albumin and parathyroid hormone (PTH) levels were collected before and after the intervention. Paired t-test was used for statistical analysis. Mean P levels fell from 6.55± 0.16 to 5.93± 0.18 (pre vs post VTS, p-value of 0.0002), and mean PTH levels fell from 382.7± 34.5 and 319.7± 26.2, respectively (p-value = 0.02). There was no significant difference between albumin or calcium levels before and after the intervention. 74% of patients were on calcium based phosphate binders, 40% were on non-calcium based binders, 91% were on Vitamin D analogues and 21% were on calcimimetics. We conclude that the use of an attention grabbing, easy to understand visual tracking system, when implemented on a one to one basis by the physicians, helps in improving phosphorus control in ESRD.

A DOSE-RANGING AND EFFICACY PHASE 3 TRIAL OF FERRIC CITRATE (FC) AS A PHOSPHATE BINDER IN DIALYSIS PATIENTS

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The purpose of this study is to determine the dose-response relationship and the efficacy of fixed doses 1, 6, or 8 gm/d of FC as a dietary phosphate binder in dialysis patients. Patients (n=151) were randomized 1:1:1 to 1, 6, or 8gm/d of FC and were treated for 4 weeks. The baseline values for all parameters analyzed were comparable among the 3 groups. Serum Phosphorus (SP) decreased by 23% and 27% from baseline in the 6 and 8 gm/d groups, respectively, and increased by 2% in the 1 gm/d group. The regression between dose and day 28 SP change from baseline is -0.33 mg/dl/gm (P<0.001). Serum bicarbonate (SB) increased by 1.1%, 8.3%, and 9.0% in the 1, 6, and 8gm/d groups, respectively. The regression between dose and day 28 SB change from baseline is 0.24 mg/dl/gm (p=0.017). Serum Ferritin (SF) increased by 4.8%, 25.2%, and 28.1% in the 1, 6, and 8gm/d groups, respectively. The regression between dose and day 28 SF change from baseline is 14.7 ng/mL/gm (p=0.031). There were no significant changes in serum calcium or TSAT. FC was well tolerated with few treatment related-adverse events. FC appears to be a safe, dose-dependent, and efficacious phosphate binder with added benefits to patients.

CINACALCET IN PRACTICE: IMPROVING MINERAL OUTCOMES

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Achievement of PTH, phosphorus, and calcium targets remains challenging in ESRD. Vit-D analogues have been a mainstay of therapy but are known to produce hypercalcemia and hyperphosphatemia. We hypothesized that converting to a computer driven algorithm incorporating both cinacalcet and low dose vitamin D analogues as potential initial therapy from a vit-D analogue-centric approach would improve outcomes. 85 pts who enrolled in a one year open labeled study were available for analysis at 6 months. Primary endpoints were: PTH ≤ 300 pg/ml, Phos ≤ 5.5 mg/dL. Secondary endpoints were: Phos 3.0-4.5 mg/dL, Ca 7.5-10.1 mg/dl, PTH 150-450 pg/ml, and all 3 targets. The McNemar's test for matched case-controls was used to compare the average of the 3 months pre-algorithm use to the average of months 4, 5, and 6. The percent of pts on doxercalciferol decreased from 81 to 54% while the average dose decreased from 9.4±5.3 to 5.0±1.7 mcg/wk. The percent of pts on cinacalcet increased from 40 to 72% while the average dose increased from 53±32.4 to 65±44.9 mg/day. The percent of pts achieving each endpoint are shown in the table.

Target	PTH ≤ 300	Phos ≤ 5.5	PTH 150-450	Ca 7.5-10.1	Phos 3.0-4.5	All 3
Baseline (%)	18.8	41.2	50.6	94.1	16.5	11.8
6 Month (%)	16.5	75.3	37.7	98.8	37.7	15.3
P value	0.845	0.0001	0.118	0.221	0.005	0.663

Switching to a computer algorithm and incorporating cinacalcet as first line therapy significantly improves phosphorus control in ESRD pts. Final results will be reported at 1 year.

EFFECTS OF VITAMIN D REPLETION ON HEMOGLOBIN AND THE DOSE OF AN ERYTHROPOIESIS STIMULATING AGENT

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A high incidence of vitamin D [25(OH)D] deficiency, up to 75%, has been reported in patients with end stage renal disease (ESRD) on hemodialysis (HD). Studies postulate that adequate supplementation of 25(OH)D may enhance erythropoiesis by acting synergistically with erythropoietin on erythroid burst-forming units. Clinical studies using cholecalciferol or ergocalciferol for 25(OH)D repletion demonstrated erythropoiesis stimulating agents (ESA) dose reductions with stable hemoglobin (Hgb) levels, suggesting 25(OH)D repletion may have an epoetin-sparing effect. The goal of this retrospective, observational study was to examine the stability of Hgb and doses of darbepoetin (DARB) in HD patients treated with ergocalciferol.

A total of 98 patients with baseline serum 25(OH)D levels $\leq$ 30 ng/mL were included in the study. The ergocalciferol dosing guideline recommended by the National Kidney Foundation Kidney Disease Outcomes Quality Initiative for stage 3 and 4 chronic kidney disease were implemented as dosing guidelines are not yet established for ESRD. Laboratory parameters and DARB doses expressed as the weekly weight-adjusted dose divided by the Hgb level were reported from September 2009 to September 2010.

Patients had a mean age of 57 $\pm$ 15.9 years old; most were male (53%) and African-American (67%). Compliance with ergocalciferol was 64%. The serum 25(OH)D levels increased significantly in the compliant group compared with non/partially-compliant group ($p = 0.002$). A significantly greater percentage of patients (36.5%) in the compliant group achieved 25(OH) D serum levels > 30 ng/mL when compared to 17.1% in non/ partially-compliant group ($p = 0.004$). There was no significant difference in Hgb levels between groups ($p = 0.473$). The DARB doses were significantly decreased in the compliant group ($p = 0.024$), but unchanged in the non/partially non-compliant group ($p = 0.319$). In conclusion, ergocalciferol repletion resulted in improved serum 25(OH) D levels, maintained Hgb levels, and decreased DARB doses. Further studies may be warranted.

NOVEL USE OF A SERUM FRACTIONATION CENTRIFUGE TUBES IN MEASURING INORGANIC PYROPHOSPHATE IN DIALYSIS PATIENTS

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Vascular calcification (VC) is a strong prognostic marker of mortality due to cardiovascular disease in chronic kidney disease (CKD) patients. Plasma inhibitors of calcification such as pyrophosphate (PPi) are important in inhibiting VC. Measurement of PPi in blood can be cumbersome or technically difficult. One of the problems in measuring plasma PPi is its release from platelets. Since platelets are a rich source of PPi, standard methods for measuring plasma PPi require removal of platelets by ultracentrifugation. The purpose of this study was to devise a simple method to prepare platelet-free plasma that can be used for the measurement of *in vivo* PPi levels in circulation. Approximately 2 – 2.5 ml of the plasma was placed into a pre-cooled Centrisart I® tube (13279-E ,Sartorius AG, Germany) and prepared according to manufacturer instructions. The Centrisart I filtration tube contains a polyethersulfone (PES) filter with a 300,000 molecular weight cutoff. The tubes were centrifuged at 2000g for 20 min at 4^{o}C. Absence of platelets was confirmed by fluorescent flow cytometry (Sysmex XE 5000). PPi was measured by an enzymatic assay using uridine-disphosphoglucose (UDPG) pyrophosphate. PPi was measured in plasma from 20 subjects requiring hemodialysis. Subjects were 59 $\pm$7.3 years of age (mean $\pm$SEM) range 48 -75 yrs, 75% male, 70% diabetic, and 90% Hispanic. Platelet free PPi was significantly lower than traditional plasma samples; 1.39 $\pm$0.68 vs 2.74 $\pm$0.27 μM (mean $\pm$SEM), $p < 0.01$, paired *t*-test. This data supports the assertion that a significant pool of PPi exists in platelets and presents a practical method of measuring PPi in plasma without platelets.

PROLONGED SYMPTOMATIC HYPOCALCEMIA FROM HUNGRY BONE SYNDROME (HBS) AFTER PARATHYROIDECTOMY (PTX)

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It has been reported that 1% to 28% of patients who have hemodialysis develop significant secondary hyperparathyroidism (HPT). Parathyroidectomy (PTX) improves bone mineral density scores and reduces the incidence of fractures by 30% in patients receiving dialysis. Post-operative hypocalcemia complicates up to 95% of "renal" PTX requiring intravenous calcium and Vitamin D treatment. HBS is characterized by severe and prolonged, sometimes life-threatening hypocalcemia. The incidence of HBS is approximately 12%. It is related to a sudden decrease in PTH release and attenuation of its effect on bone's contribution to serum calcium concentration.

A 40 year old, AA male, with a history of ADPKD on hemodialysis presented, after long standing history of dietary and pharmacological noncompliance, with tertiary HPT Patient was dialyzed for 5 hours TIW with Kt/V of 1.4. He was treated with calcium acetate, sevelamer, calcitriol, paracalcitriol and cinacalcet. The patient had peak intact PTH level of 4225 pg/mL. His ionized calcium was in the 1.09-1.27 mmol/L range with total calcium of 8.6-9.3 mg/dL and 25 OH vitamin D levels of 18-20. Parathyroid scan suggested increased metabolic activity within the medial upper pole of the right thyroid gland without evident adenoma. Ultrasound showed an ill-defined hypoechoic mass inferior to the lower pole measuring 1.4 x 1.2 x 1.1 cm. Patient underwent 3.5 gland PTX with ½ gland auto-transplantation in sternocleidomastoid. Twelve hours after surgery he developed perioral paresthesia and spontaneous Chvostek's sign and critical low ionized calcium of 0.7 mmol/L. He required intravenous calcium, high dose calcitriol, high dose oral calcium and hemodialysis with 3-3.5 mEq/L calcium bath for 30 days after surgery. Two months after PTX patient continued to have symptoms of hypocalcemia with ionized calcium of 0.9-1.03, increasing iPTH up to 80-85 and elevated alkaline phosphatase of about 400, on 3 mcg of calcitriol, 4200mg of calcium citrate and 3.0 calcium dialysate. HBS in post "renal" PTX can be prolonged, requiring aggressive calcium replacement therapy.

SUCCESSFUL TREATMENT OF SEVERE CUTANEOUS CALCIPHYLAXIS WITH HIGH-DOSE SODIUM THIOSULFATE

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Calciphylaxis is a rare but life threatening disorder of systemic medial arteriolar calcification associated with decreased renal function. It has a one-year mortality of about 50%. We present the case of a 40 year old female who developed acute renal failure due to a thrombotic microangiopathy and complicated by severe calciphylaxis. She required dialysis for approximately 1 month. During this time she developed painful necrotic lesions on her thighs, which progressed to her buttocks, abdomen, and breasts despite complete renal recovery. Skin grafting was unsuccessful. After 4 months the patient presented to our institution for a second opinion. Prednisone and warfarin were stopped and she underwent surgical debridement. We initiated sodium thiosulfate at an initial dose of 200 mg daily by continuous intravenous infusion. This dose was considerably greater than the 25 mg, 3 times weekly dose that has been used for dialysis patients. She developed an anion-gap acidosis resulting in a reduction in the dose to 50 mg daily on day 4. Her pain improved substantially within a few days of initiating sodium thiosulfate. On the 50 mg dose, she required supplemental bicarbonate, potassium, phosphate and magnesium. Two weeks after initiating sodium thiosulfate, she received a single, 3 mg dose of zoledronic acid. She required multiple, additional surgical debridements. Her wounds began to granulate and she returned home 24 days after initiating sodium thiosulfate. After 2 ½ months of sodium thiosulfate, her pain has resolved almost completely, her skin lesions have healed, without grafting, and she is no longer bed-bound. This case illustrates that high-dose sodium thiosulfate can be given to patients with normal renal function and demonstrates the efficacy of combination therapy, including high-dose sodium thiosulfate, for severe calciphylaxis.

ASSOCIATION OF FREQUENCY OF LAB TESTING ON MBD OUTCOMES

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Very little is known about the optimal lab testing frequency required to achieve target mineral and bone disease (MBD) outcomes. Frequency of lab testing ordered varies widely between health care professionals. However, increased lab testing consumes valuable medical resources, an important consideration with the impending implementation of capitation in US ESRD reimbursement. We sought to understand the facility-level impact of this practice pattern on MBD outcomes and medication utilization.

A large US dialysis provider's database was reviewed in March 2010 to categorize dialysis facility lab testing patterns. We categorized facilities by the mean number of reported lab tests per patient dialyzing in that facility per quarter in 2009. We then correlated these facilities with achievement of MBD outcomes from the last reading for each quarter for 2009 to normalize for varying numbers of lab results between categories using the KDIGO MBD ranges.

Frequency of PTH testing based on physician ordering preference varied significantly. Most facilities tested calcium (Ca) and phosphorus (P) monthly on average, but some facilities appeared to test more frequently. Despite this, mean MBD values for PTH, Ca, P did not vary significantly with greater lab testing frequency, nor did the percentage of patients within a given range.

Tests Per Pt Per Quarter	Facilities	Mean Facility PTH (ng/ml)	Mean Facility % Pts with PTH 150-600 ng/ml
1.5	39	344.23	75.3%
2	207	313.40	77.8%
2.5	375	341.83	76.8%
3	575	348.75	77.1%
3.5	170	346.94	78.1%
4	97	322.26	79.6%
4.5	48	327.11	78.8%

More frequent MBD testing was not associated with significant improvements in MBD outcomes although future clinical trials may be warranted to establish the causality of this association.

SHORT TERM ORAL PROTEIN SUPPLEMENT FAILED TO IMPROVE ALBUMINE IN HEMODIALYSIS PATIENTS

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Low albumin level is a strong predictor of mortality and morbidity among hemodialysis patients. The mortality risks associated with low albumin were not an always a consequence of malnutrition, it is in part explained by the inflammatory pathway. Few interventions are available to improve albumin levels and also it is unknown whether correcting hypoalbuminemia is beneficial or not

We have initiated a commercial oral protein supplement given after each dialysis three times a week before the patient leave the dialysis clinic to those patients who has serum albumin less than 3.5g/dl. The patients with acute illness, Active infection, terminal illness, post operative period were excluded. 31 patients were identified but 5 patients refused to continue due to diarrhea and or unpleasant taste. Twenty six patients continued 30 ml of Pro-stat 101 (Medical nutrition USA Inc, Englewood, NJ) which contains 15gm of concentrated high value protein and amino acid. The observation was done after 6 weeks of therapy. Eight of 26 patients (30.7%) showed some improvement but none reached 3.5 mg/dl level. Eleven of 26 (42.3%) patient showed worsening of serum albumin level and 7 of 26 (26.9%) patients showed no change from baseline after 6 weeks of therapy.

Short term supplement of commercially available high value protein supplement did not show any improvement in serum albumin of dialysis patients. Controlled trial with higher amount and longer duration may be needed.

CLINICAL PRESENTATION OF INFECTION IN CATHETER-DEPENDENT HEMODIALYSIS PATIENTS

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We evaluated prospectively the clinical presentation, microbiology, and outcomes of all cases of suspected infection in catheter-dependent HD pts during a 1.5-year period. Of 312 cases of suspected infection, an infection was confirmed in 271 cases (87%). Among those patients with confirmed infection, 34 (12%) had a non-access-related infection (including pneumonia, UTI, skin abscess, foot infection, etc), whereas the remainder had an access-related infection. The 237 access-related infections included 19 AVG infections, 8 AVF infections, 4 with Tenckhoff-related peritonitis, 21 with HD catheter exit site infections, and 186 episodes of catheter-related bacteremia (CRB). The infecting organism in CRB was Staph aureus (29%), Staph epi (38%), Enterococcus (22%), GNR (20%). Polymicrobial CRB occurred in 8% of episodes. Only 74 of 186 pts (40%) with CRB presented with fever (temp > 38^{o}C). The remainder presented with rigors (N=67), "low grade" fever (temp 37.5-37.9^{o}C)(N=25), exit site infection, or altered mental status. Hospitalization was required in 34% of CRB episodes, and 66% were treated as outpatients. The likelihood of hospitalization varied by organism (51% for Staph aureus, 28% for Staph epi, 30% for Enterococcus, and 17% for GNR, $p<0.001$). In summary, the vast majority of catheter-dependent HD patients have some type of infection, but only 59% have CRB. The majority of patients with documented CRB present without fever. Finally, the ikelihood of hospitalization for CRB varies by infecting organism, being highest for Staph aureus, and lowest for GNR.

DIALYSIS CATHETER TO PERMANENT VASCULAR ACCESS IN INCIDENT HEMODIALYSIS INPATIENTS WHO TRANSITION TO OUTPATIENT HEMODIALYSIS

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Mortality peaks in the first 90-120 days (d) after starting hemodialysis (HD) when over 80% of incident U.S. HD patients use tunneled dialysis catheters (TDCs). Lowering TDC use is a national priority, depending in part on earlier referral for permanent vascular access. 83% of incident HD patients at our 18 affiliated outpatient units begin outpatient dialysis via a TDC. And 85% of our faculty practice incident HD patients begin HD as inpatients. We describe how incident HD inpatients discharged from the hospital to outpatient HD units convert from a TDC to permanent vascular access.

Of 88 tertiary care adult inpatients (median age 57) newly initiated on HD and discharged to 8 outpatient dialysis units between 4/08-6/10, 91% began HD via a TDC; 14% had a preexisting AVF/AVG. 57% of those without an AVF at HD initiation eventually had one created within our health system, with a median time from TDC to AVF placement of 101d. 93% of those who had an AVF placed also had vein mapping (VM) 24d (median) prior to AVF creation. Unexpectedly, VM took 60d median (mean=86d) from TDC placement, with 12% of VM done pre- and 88% post-discharge. Median times to VM pre- and post-hospital discharge were 7d and 68d, respectively. A minority of patients, 12%, received an AVF/AVG prior to discharge; median time to AVF/AVG post-discharge was 105 d. We found no relationship between patient discharge to home, rehab hospital, or skilled nursing facility and time to AVF placement. Median times from hospital discharge to AVF placement were 113 d (home), 135 d (rehab), and 93 d (SNF) ($p=0.28$). Unlike higher recovery rates for acute kidney injury requiring acute inpatient dialysis, only 8% of incident HD patients discharged to outpatient units recovered renal function at 6 months - the remainder transitioned to ESRD or died. These data suggest that delays in VM and referral for AVF/AVG contribute to prolonged TDC use. We have started an inpatient vascular access planning QI intervention to lower time from TDC placement to AVF/AVG creation.

LOW PROTEIN DIET PREVENTS HYPOPROTEINEMIA, HYPOALBUMINEMIA AND HYPERPHOSPHATEMIA AS WELL AS SECONDARY HYPERPARATHYROIDISM IN DIABETIC END STAGE RENAL DISEASE

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End stage renal disease caused by diabetes mellitus (DM-ESRD) is characterized by hypoproteinemia, hypoalbuminemia and consequent nephrotic syndrome. The purpose of this study is to elucidate a favorable effect of low protein diet (LPD) therapy on hypoproteinemia, hypoalbuminemia, hyperphosphatemia and hyperparathyroidism in DM-ESRD compared with ESRD caused by chronic glomerulonephritis (CGN-ESRD) for each 6-month period prior to and after starting hemodialysis (HD). Twenty patients (average age; 60.9 years, male; 12 cases, female; 8 cases) were subjected to this study; DM-ESRD on LPD or on normal protein diet (NPD), CGN-ESRD on LPD or on NPD, 5 patients each. All subjects had intensive dietary instruction by a registered dietitian. Serum concentrations of total protein (TP), albumin (Alb), creatinine (Cr), blood urea nitrogen (BUN) and electrolytes together with lipid profile and liver function were measured every month (-6M ~ +6M). Daily oral protein intake (g/kg/day) showed 0.55 and 0.83 in DM-ESRD on LPD and on NPD, 0.46 and 0.92 in CGN-ESRD on LPD and on NPD, respectively.

patients	diet	- 6 M	starting HD (0 M)	+ 6 M
DM-ESRD	NPD	6.35/3.14	4.75*/2.73**	6.66/3.88
	LPD	6.23/3.57	6.05/3.55	6.64/3.88
CGN-ESRD	NPD	6.85/4.02	5.87*/3.51*	6.57/4.09
	LPD	6.87/4.03	6.50/3.60	6.72/3.94

Data represent TP/Alb values (g/dl). *; $p<0.05$ vs. -6M and vs. +6M, **; $p<0.05$ vs. +6M Both DM- and CGN- ESRD on NPD showed nephrotic syndrome, while DM- and CGN- ESRD on LPD showed little decrease in serum TP and Alb. Starting HD significantly improved hyperphosphatemia (6.43 mg/dl vs. 4.44 mg/dl, $p<0.05$) in DM-ESRD on LPD and hyperparathyroidism (i-PTH; 382.8 pg/ml vs. 110.0 pg/ml, $p<0.05$) in DM-ESRD on NPD. In conclusion, LPD is of great benefit to DM-ESRD preventing hypoproteinemia, hypoalbuminemia and nephrotic syndrome as well as hyperparathyroidism.

PSEUDO BLOOD-LEAK? A HEMODIALYSIS MYSTERY

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Hydroxocobalamin is used as a treatment for cyanide toxicity. We discovered its use in patients with ESRD on hemodialysis can result in a false blood leak detection leading to an inability to dialyze the patient.

A 59 year old male ESRD patient received sodium nitroprusside for blood pressure management in the setting of an acute aortic dissection. Within 36 hours, a change in mental status occurred and sodium nitroprusside was stopped. Cyanide toxicity was confirmed and hydroxocobalamin therapy initiated. Subsequent attempts at hemodialysis with a Fresenius 2008K machine could not be completed due to activation of the dialysate blood leak alarm, despite changing dialyzer membranes and machines. Investigation revealed that the dialysate, although pink in color, did not contain blood by dipstick test for hemoglobin or microscopy. An attempt was made to dialyze using a NxStage machine which was successful. Daily treatment with a NxStage machine was done for 4 days after which the dialysate cleared. Hemodialysis with a Fresenius 2008K was then successfully resumed.

Investigation revealed that a similar experience occurred in a case of acute cyanide poisoning. Prior to this case, hydroxocobalamin was shown to cause chromaturia and pseudo-hematuria. It can also cause laboratory test errors when colorimetric assays are performed. It is not surprising that a dialysate blood leak detector using photometric detection, as does the Fresenius 2008K, might misinterpret the presence of this compound as a blood leak. The 2008K uses a dual diode system that compares a green wavelength (562nm-575nm) to an orange-red wavelength (612nm-625nm). Hydroxocobalamin wavelength includes a peak of 525nm. The NxStage uses a different blood leak detection scheme that utilizes a single 880nm emitter and detects light scatter as would occur with intact RBC’s which accounts for ability to dialyze our patient using this modality. This case report emphasizes the potential dangers of sodium nitroprusside use in patients with ESRD and that an alternative antidote for cyanide should be considered in these patients. Hydroxocobalamin should only be considered in hemodialysis-dependent patients contingent upon the existence of other modalities for dialysis that obviate the blood leak detection issue.

GDS-15 AS A PREDICTOR OF MORTALITY IN ELDERLY HEMODIALYSIS PATIENTS.

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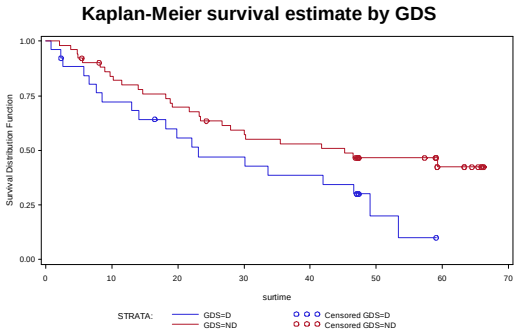
Depression is common and associated with increased morbidity and mortality in elderly (≥65yrs) hemodialysis (HD) patients. We recently validated the use of the 15-item Geriatric Depression scale (GDS-15) as a screening test for depression in elderly HD patients. (Nephron, in press, NKF SCM10).

Question: Can GDS-15 assess mortality risk related to depression?

Methods: 77 elderly HD patients were divided into 2 groups by results of their GDS-15, Depressed, score ≥ 5: D (n=26), Non-Depressed score ≤ 4: ND (n=51). Outcome is 5-yr survival.

Results: (Figure): There is a significant difference in Kaplan-Meier survival (log-rank p=0.042), with 84% increased risk of death for depressed patients (hazard ratio=1.84, 95% CI (1.01, 3.33)). Median survival time is 23.15 months with 95% CI (13.02, 46.59) for D, and is 45.18 months with 95% CI (23.38, 66.29) for ND.

Conclusion: GDS-15 can be used as a tool to identify elderly HD patients with increased mortality risk related to depression.



ELEVATED PLASM BRAIN NATRIURETIC PEPTIDE (BNP) LEVELS IN HEMO-DIALYSIS PATIENTS AND IT'S LACK OF CORRELATION WITH VOLUME STATUS.

Robert Benz, Robert Mathews, Mark Pressman, Michael Chernick, Albert Keskgegian, Omar Mushfiq.
Lankenau Hospital Medical Center/Lankenau Institute of Medical Research

In HD patients, BNP can be elevated in the absence of overt circulatory overload. We evaluated the presence of elevated BNP levels and it's correlation with pre/post HD volume status in ESRD patients.

22 patients on maintenance high-flux HD without evidence of overt circulatory overload were studied. Volume status was assessed by history, clinical exam, and weight measurements. Pre/post-HD (1st of week) and pre- next HD (mid-week) measurements of BNP were collected and compared to patients' interdialytic weight gains (IDWG), weights pre/post/pre-HD, volume ultra-filtered (U.F.), and HD treatment variables.

19/22 HD patients had elevated BNP levels. Mean (1st of week) pre-HD BNP was 846.2pgm/ml; mean post-HD BNP was 895.4 pgm/ml; and mean pre mid-week BNP level was 755.2 pg/ml (nl<100pgm/ml). Mean group post-HD weights matched mean group EDW goal. Mean U.F. was 2.65 L and 2.55 respectively. Mean KT/V was 1.66. There was no significant change in pre/post/pre-BNP. There was no correlation with BNP and U.F. [p=0.615, 0.682, and 0.646 (pre/post/pre) respectively]. Post-HD BNP levels did not correlate with KT/V (p =0.927).

BNP is elevated in HD patients. Despite patients achieving EDW, BNP did not change significantly pre/post-HD and did not correlate with total U.F. or KT/V. These results suggest volume may not be the causative factor for BNP elevation and that BNP is not cleared effectively with high-flux HD. Measuring BNP in HD patients may be misleading in assessing for circulatory overload states

DIALYZER REUSE WITH PERACETIC ACID DOES NOT IMPACT PATIENT MORTALITY

T. Christopher Bond[1], Allen R. Nissenson[2], Mahesh Krishnan[1], Steve Wilson[1], Tracy Mayne[1] (1)DaVita Clinical Research, Minneapolis, MN, USA; (2) DaVita Inc., Denver, CO, USA

Numerous observational studies have demonstrated that dialyzer reuse decreases medical waste without negatively affecting patient outcomes. However, advances in statistical modeling allow us to better control for confounding than in the past. Our objective was to determine the effect of dialyzer reprocessing with peracetic acid on patient mortality using techniques to control for potential confounding: instrumentation variables and propensity-score matching. The instrumental variable was defined as "single-use" (centers where 100% of dialysis sessions were conducted using single-use filters during the study period, n=183) and the comparator "reuse" (centers with ≥ 95% of patients utilizing a reused filter over the study period, n=301). Prevalent patients (>120 days) as of January 1, 2009 were followed for one year, and days at risk were counted as the time from the beginning of the period through either: 1) the last day of the period, 2) the last date of dialysis at the LDO, or 3) the date of death. We conducted a propensity-score matched patient-level analysis of likelihood of death by single-use versus high reuse across all of the LDO's clinics in prevalent (>120 days) in-center HD patients as of 1/1/09. In the propensity-score matched analysis, patients with reuse had a lower death rate per 100 patient-years than those without reuse (15.2 versus 15.5).I n the instrumental variables analysis, patients at high reuse centers had 16.2 deaths/100 patient-years versus 15.9 in non reuse centers. Using statistical techniques to control for confounding, we found no association between dialyzer reuse and mortality.

TIME-DEPENDENT SURVIVAL IS NOT IMPACTED BY DIALYZER REUSE WITH PERACETIC ACID

T. Christopher Bond[1], Allen R. Nissenson[2], Mahesh Krishnan[1], Steve Wilson[1], Tracy Mayne[1]
1 DaVita Clinical Research, Minneapolis, MN, USA; 2 DaVita Inc., Denver, CO, USA

Determining whether or not reusing dialysis filters is associated with increased morbidity and mortality has important patient and environmental implications. We conducted two time-dependent survival analyses of hemodialysis patients to test two competing hypotheses: 1) reuse has a cumulative effect, i.e., the greater percent of sessions utilizing a reused filter, the greater the risk; and 2) reuse has an acute effect, i.e., a filter that is used more often will have a proximal effect on health outcomes. Analyses were limited to prevalent HD patients (>120 days) over two years (July 1, 2008 through June 30, 2010). Any death that occurred within 30 days of the last treatment with the LDO was counted. The models were adjusted for patient characteristics at baseline, including: age, vintage, race, gender, primary cause of ESRD, primary insurance type, comorbidities (cardiovascular disease, COPD, diabetes, liver disease, gastrointestinal bleeding, cancer) and Charlson index. Data for the three months preceding the observation period were used to establish the baseline exposure level in the cumulative analysis. Over the 2-year period, the percentage of sessions with reuse was marginally related to improved survival, with an adjusted odds ratio of 0.993 (0.992, 0.995) for mortality with each increasing percentage point. However, the range of percentages was narrow, with a mean of 91.8% and an interquartile range of 89.4% to 96.9%. The adjusted OR per increased unit of last filter reuse was 0.995 (95% CI: 0.994, 0.996), showing a marginal protective effect of increased reuse. Over the study period, 13.8 million dialyzers were saved due to reuse, representing 10,000 metric tons of medical waste. Given the large sample size (able to detect very small effects) we take a conservative approach and interpret the findings to indicate reuse does not impact mortality. These data are consistent with the preponderance of published studies. Reuse significantly decreases medical waste without impacting mortality.

HAS ANYTHING CHANGED SINCE THE IMPLEMENTATION OF THE 2008 CONDITIONS FOR COVERAGE? 2010 NEPHROLOGY SOCIAL WORK CASELOADS, SALARIES AND IMPLICATIONS FOR CKD CARE IN THE UNITED STATES

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In 2010, The Council of Nephrology Social Workers conducted a confidential online survey of United States social workers in all settings, i.e., chronic kidney disease (CKD), dialysis, transplantation and administration. The study findings explicate the current salaries, benefits, licensure status, education level, number of dialysis units covered, scope of social work services provided and caseloads of nephrology social workers, and provide important guidance to improve CKD patient care. The 2010 study outcomes are compared to the results of a similar 2007 survey to examine trends with regard to work roles and responsibilities. Each wave of the survey had more than 1,000 respondents. In 2010, annual full-time salaries ranged from $29,994–97,760 (median $54,829) for dialysis social workers and $44,658–84,864 (median $61,006) for transplant social workers. Caseloads for full-time dialysis social workers in 2010 were as high as 711 patients (median 125), which represents an 8% increase since 2007. We conclude that caseloads for social workers have increased since the implementation of the 2008 Conditions for Coverage for End-Stage Renal Disease Facilities. We posit that social workers who have high caseloads, cover more than one dialysis unit, and have to drive great distances to their workplaces are less able to provide adequate assistance to CKD patients and their families in ameliorating psychosocial barriers to optimal care and outcomes.

VIDEO EDUCATION INCREASES PATIENT ATTAINMENT OF TARGET PHOSPHORUS LEVELS

Shaun Boyd[1], T. Christopher Bond[1], Tonya Zimmerman[1], Kathy Parker[1], Karen Spach[1], Duane Dunn[1]

(1) DaVita Inc., Denver, CO, USA

The value of video education in the dialysis setting has not been reported in the literature. We assessed the acceptance of a video education project and its effectiveness in improving the percent of patients with phosphorous (P) levels within the recommended range (≤ 5.5 mg/dL).

Eleven of 13 dialysis centers in one region of a large dialysis organization (LDO) participated in the video education project. Center census ranged from 13 to 141 patients. A mixed linear model was employed to assess changes in percent of patients who had P levels within range (≤ 5.5 mg/dL) before and after the program.

The percent of patients within P range is shown.

Center-level mean	Mean pts/center	Before program 08/09-01/10	After program 04/-06/10
Participating (11)	49	69.9	72.8

Of the over 300 patients who completed a post-video questionnaire, 79% indicated videos increased their overall knowledge of dialysis and 80% want more video education in the future.

The 2.9% increase in the % of patients within range for P after a video education program was marginally significant (p=0.059), indicating a larger controlled evaluation might provide useful information.

VANCOMYCIN DOSING IN MORBIDLY OBESE PATIENTS UNDER GOING CVVHD –A CASE REPORT

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We prospectively evaluated serum vancomycin removal and dosing requirements in 3 morbidly obese patients in intensive care unit requiring vancomycin therapy and continuous venovenous hemodialysis (CVVHD). All 3 patients were properly loaded to achieve a serum concentration above 25mg/L 2hrs prior to the initiation of dialysis. CVVHD was continued for at least 8hrs in all patients, while blood flow rate, dialysate flow rate and ultrafiltration rate were individualized by the renal service. Serum vancomycin levels were measured at time 0, 2, 4, 8hrs.

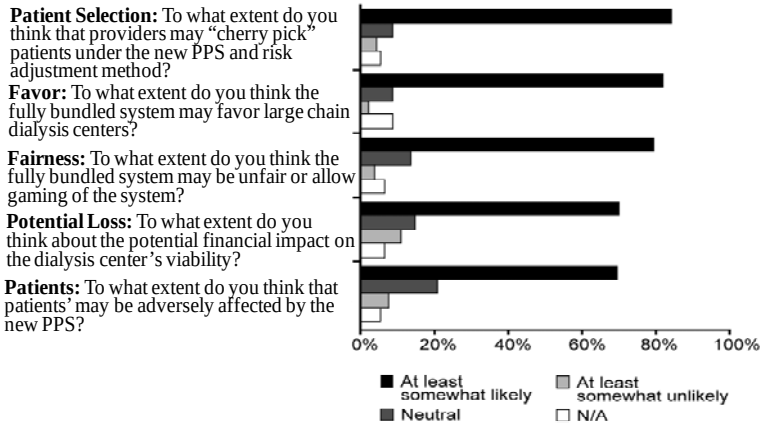
All patients were oliguric. Their body mass indices were 45, 70 and 36kg/m^2. The dialysate flow rate was 2L/hr for all patients, but blood flow rate and ultrafiltration rates varied within a limited range. All 3 patients achieved target vancomycin level at time 0 (28.2, 28.7 and 32mg/L). The volumes of distribution (Vd) were 0.61, 0.62 and 0.86L/kg (adjusted weight). Vancomycin levels fell by 40.4%, 32.8% and 37.7%, respectively, after 8hrs of CVVHD. When the data is extrapolated to 24hrs, vancomycin levels fell to 6.0, 8.7 and 7.8mg/L without maintenance dose. Using a simplified first-order, one-compartment pharmacokinetic model, the estimated serum vancomycin half-lives were 10.7, 14 and 11.7hrs, and the clearance were 4.3, 3.7, and 4.4L/hr during CVVHD for the 3 patients, respectively.

Proper drug dosing in morbidly obese patients undergoing CVVHD has been challenging. This case report shows that vancomycin is effectively cleared by CVVHD in morbidly obese patients with a large Vd, consistent with data obtained from previous studies. To avoid under-dosing (target 15-20mg/L), a more aggressive vancomycin dosing approach should be followed in these patients with severe Gram-positive infections. Based on the limited data derived from this report, we recommend administering 20mg/kg (adjusted weight) as a loading dose followed by 1gm every 12hrs during CVVHD in morbidly obese, oliguric patients. A level may be checked before the dose to allow for proper dose adjustment in these patients.

SURVEYING THE IMPACT OF THE END-STAGE RENAL DISEASE (ESRD) PROSPECTIVE PAYMENT SYSTEM (PPS) ON HOSPITAL BASED DIALYSIS CENTERS (HBDCS)

George Coritsidis[1], Anjali Acharya[1], Ross Miller[2], Kelly Ko[2], Akhtar Ashfaq[3], Irene Agodoa[3]; [1]NYC Health and Hospitals Corporation (HHC), New York, NY, USA; [2]Cerner Life Sciences, Beverly Hills, CA, USA; [3]Amgen Inc, Thousand Oaks, CA, USA;

The ESRD PPS will begin on January 1, 2011 and has the potential to impact HBDC financial stability, quality and patient access to care. This survey was designed to collect data related to HBDC's perceptions of the PPS. Between Oct 2009 and Feb 2010, an online baseline questionnaire was sent to all HBDCs in the US (N=910) using the 2006 CMS provider file. Of the 910 HBDCs included in the CMS provider file, 669 were successfully contacted and 128 (19%) of facilities completed the survey. Respondents from dialysis centers affiliated with smaller hospitals (<200 beds) were more concerned that the new PPS may create financial risk (85.0% vs. 75.0%) compared to those affiliated with larger hospitals (≥200 beds). The figure provides an overview of HBDC perceptions around the consequences of the PPS.



HBDCs have an unfavorable impression of the PPS and they believe it could adversely affect patient care. These potential consequences will be monitored throughout the PPS implementation period.

COMPARISON OF HEPATITIS C SEROCONVERSION IN TWO CENTERS AND REUSE PRACTICES

Maria de Jesus, Vivek Soi, Sancar Eke, Yahya Osman Malik, Jerry Yee, Roque Diaz. Henry Ford Hospital, Detroit, Michigan, USA.

Several mechanisms could potentially contribute to nosocomial HCV transmission between hemodialysis patients. These include internal contamination of hemodialysis machines, contamination of the hands of staff members, item sharing and dialyzer reuse. The relationship between dialyzer reuse and anti-HCV positivity has been confirmed in some but not all studies. The purpose of this retrospective study was to compare the incidence of Hepatitis C seroconversion in two urban centers which differed with respect to dialyzer reuse. The incidence of Hepatitis C seroconversion was calculated for the two urban centers. Data between 2001 and 2006 from 339 patients from Center A and 356 from Center B was analyzed. During this time, dialyzer reuse occurred at Center B but did not occur at Center A. Because seroconversion was expected to occur at very low rates, a Poisson regression model was used to compare rates between centers as well as to estimate the relative risk of developing a seroconversion .

Association between Dialyser Reuse (Center) and Seroconversion Rate

Center	Incidence	Relative Risk (95% CI)	P-value
Center B (Reuse)	0.011	5.52 (1.93, 15.78)	0.002
Center A	0.062		

The incidence of seroconversion was higher at Center A (0.062) where hemodialyzers were not reused than at Center B (0.011) where hemodialyzers were reused. The ratio of incidence of seroconversion for Center A relative to Center B was 5.52. There was between a 1.93 and 15.78 greater probability of seroconversion if a patient had hemodialysis at a center that did not reuse hemodialyzers relative to a center that did participate in reuse.This study illustrates that a non-reuse strategy does not significantly lower the risk of seroconversion when compared to the alternative. Other variables including the number of surgeries, transfusion load, race, and sex, were not significant predictors of seroconversion in the Poisson regression model. Intensification of other infection control procedures should be emphasized to prevent the spread of the Hepatitis C virus.

USING QUALITY PROCESSES (SIX-SIGMA) TO INCREASE A-V FISTULA RATES

Margaret d'Uscio, Bonnie Jenson, Jessica Stewart, Yeewan Kao, Nancy Driscoll, Jerilyn Wilson, Ashley Anderson, Sarah Curry, Robert Albright, Stephen Gudgell, Sandra Taler. Mayo Clinic, Rochester, MN

Centers for Medicare and Medicaid Services (CMS) guidelines established a best practice goal of 66% fistula usage for hemodialysis patients. We sought to increase our A-V fistula prevalence rate by 5% per year for the next 3 years to achieve that target without negatively impacting mortality, morbidity, or patient satisfaction using quality improvement processes.

A multidisciplinary team representing all stakeholders utilized institutional quality coursework and support to determine top barriers using root cause analysis, SIPOC and fishbone techniques. Four areas were targeted for special attention and intervention by assigning responsible team members, using a timeline and tracking process.

Areas targeted for improvements were patient concerns, staff accountability, maintenance of fistulas, and ESRD/access education. Interventions included nurse scripts, mandatory patient education, streaming videos in dialysis waiting areas, enhanced written materials and providing save your veins armbands. Nursing staff were empowered to order education at appropriate time points. Maintenance of fistulas was addressed using super users for difficult cannulations, added training to standardize cannulation and early referrals for intervention.

The team will continue to implement improvements, monitor mortality, infection, and hospitalization rates, and patient satisfaction scores. Although early in the process, preliminary results are positive with an increase in fistula usage rates.

DOPPS PRACTICE MONITOR FACILITY SAMPLE REPRESENTS OVERALL US HEMODIALYSIS POPULATION

DS Fuller, RL Pisoni, DM Dykstra, JM Albert, BW Gillespie, F Tentori, M Turenne, FK Port, and BM Robinson. Arbor Research Collaborative for Health, Ann Arbor, MI USA.

In Nov 2010, the Dialysis Outcomes and Practice Patterns Study (DOPPS) launched the DOPPS Practice Monitor (DPM) as a public website (www.dopps.org/DPM) for reporting up-to-date statistics and trends for US dialysis practice, prior to and following implementation of the new CMS ESRD Prospective Payment System (PPS) in Jan 2011. Data are reported within 3-4 mo of collection and updated 3x yearly. DPM study sites were randomly selected to represent a wide breadth of US facility types (dialysis organization size; rural/non-rural; hospital/free-standing). Here, we present data evaluating the representativeness of the recruited DPM sample.

Measure	DPM (n=137)	CMS (n=4206)
URR >65%	95.5%	95.7%
Hgb 10-12 g/dL	55.0%	53.5%
Catheter >90d	11.7%	11.5%
Age >65 yr	45.6%	45.1%
Black	26.1%	*35.8%
Medicaid	21.1%	23.8%
PD use	5.9%	5.0%
SMR	0.89	0.95

*p<0.01, DPM vs CMS; otherwise p>0.05; facility stratum weights applied to DPM sample.

CMS facility-level data from 2007 were used to compare the mean and distribution of 8 measures in 137 DPM facilities vs. remaining CMS facilities (N=4206) treating ≥20 adult chronic HD patients (Table).

The DPM sample did not significantly differ from CMS overall ($p>0.10$) for 7 of 8 tested measures (except lower % black patients). Additional analyses illustrate the capacity of the DPM to report trends in care not only for average facilities, but also among facilities at the tails of the distribution for the patient characteristics and practices in the table (e.g., nearly 25% of DPM facilities have >50% black patients).

In sum, the DPM sample is generally representative of the US HD population, and can serve as an early warning system for monitoring trends in dialysis care with implementation of the PPS and other policy changes.

PROVEN STRATEGIES TO IMPROVE VASCULAR ACCESS OUTCOMES IN AN INNER CITY HOSPITAL BASED HEMODIALYSIS UNIT SERVING MINORITY POPULATION

Gnanasekaran, I., Kashyap, R, Gunduz, Y., Arampulikan, J., Shergill.S, Lincoln Medical and Mental Health Center, Bronx, New York, USA

Low Socioeconomic Status and lack of health insurance negatively influence pre-ESRD care resulting in a higher prevalence and prolonged use of tunneled catheter (TC) and lower incidence / prevalence of AV fistula (AVF).

Our objective is to decrease TC use and to improve AVF prevalence rate as per NKF –KDOQI guidelines and CMS goals by implementing an effective strategic planning even in the disadvantaged population presenting without pre-ESRD care.

We utilized "Plan Design Study Act" (PDSA) as a Performance Improvement (PI) tool to improve our outcome.

Interventions: The emphasis was placed on: interdisciplinary approach; recruitment of fulltime interventional radiologist (IR) and vascular surgeon (VS); fast tracking for AVF scheduling during hospitalization/renal clinic/dialysis visits rather than VS and IR clinic visits; utilizing vascular surgery PA as a liaison; prompt IR referral for poor maturation and other complications for AV access salvation; staff education for early referral to nephrology, pre or intra operative vascular mapping, close monitoring of URR/Kt/V trends, dynamic arterial/venous pressure monitoring during dialysis; and restriction of venipuncture to dominant arm; comprehensive PI reporting and patient education.

Results:

Year	Overall TC Use	TC ≥90days	AVF
2008	23.3%	16%	53%
2009	15%	9%	63.7%
2010	7.3%	1.6%	73%

In conclusion, effective communication between various disciplines and effective patient navigation by circumventing clinic appointments contributed to successful outcome regardless of the status of pre-ESRD care, socioeconomics, education, insurance and race/ethnicity.

THE IMMUNOGENICITY AND SAFETY OF A NOVEL *STAPHYLOCOCCUS AUREUS* VACCINE (V710) IN ADULTS WITH END-STAGE RENAL DISEASE RECEIVING HEMODIALYSIS -A PHASE IIA STUDY

Moustafa Moustafa, John Buerkert, Tarek Sobeih, Claude Galphin, Gaspar Barreto-Torrella, George Aronoff, Jonathan Hartzel, Elizabeth Brown, Steven Smugar, Nicholas Kartsonis, Dalya Guris

South Carolina Nephrology & Hypertension Center, Orangeburg, SC; Columbia Nephrology Associates, PA, Columbia, SC; Nephrology Associates, Chattanooga, TN; Nephrology Associates of South Miami PA, Miami, FL; University of Louisville, Louisville, KY; Merck Sharp & Dohme Corp., Whitehouse Station, NJ

Patients with ESRD on hemodialysis are at increased risk for severe *S. aureus* infections, including septicemia. In Phase I studies, V710, a vaccine containing a surface protein (IsdB) was immunogenic after a single dose in healthy adults. This Phase II study was a randomized, double-blind, placebo-controlled study in adults aged 18-80 years with ESRD on hemodialysis (N=206 randomized, 201 vaccinated). Patients were randomized to receive V710 as a 60-µg dose (with or without adjuvant) or a 90-µg dose (with adjuvant) or placebo. Patients received two doses 28 days apart (V710/V710; V710/placebo; placebo/placebo), and a third dose at Day 180. Blood samples were collected at different intervals through Day 360. The primary hypothesis was that at least 1 of the 3 groups receiving 2 doses of V710 would have a ≥2.5-fold rise in anti-IsdB IgG titers 28 days after the second dose (i.e., Day 56) compared to baseline. All 3 groups receiving 2 doses of V710 had significant increases of anti-IsdB titers (15.1-18.9-fold) from baseline ($p<0.001$) and also had titers at Day 180 significantly higher (5.7-8.5-fold) than baseline ($p<0.001$). A single dose of all three V710 formulations resulted in significant increases (11.9-12.9-fold) in anti-IsdB titers 28 days after vaccination ($p<0.001$). No vaccine-related serious adverse experiences (AE) were reported. The most common AE was injection site pain (<48% after any dose in any V710 group vs. 11% in placebo group), the majority with mild or moderate intensity. In conclusion, V710 was immunogenic and generally well tolerated among ESRD patients receiving hemodialysis.

CARDIAC ARREST SECONDARY TO BILATERAL PULMONARY EMBOLISM FOLLOWING ARTERIOVENOUS FISTULA THROMBECTOMY.

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Thrombectomy is a common procedure done to declot thrombosed dialysis Arteriovenous Fistula (AVF) or Arteriovenous Graft (AVG). Subclinical pulmonary embolism (PE) occurs commonly during this procedure but symptomatic PE is extremely rare. We report a case of cardiac arrest secondary to massive bilateral pulmonary embolism following thrombectomy of clotted AVF. A 25 years old male with history ESRD was sent to an outpatient vascular access center for declotting of his right forearm AVF. 6mg of Alteplase was injected into the clotted fistula and mechanical thromboaspiration of the clots followed by balloon angioplasty was performed. Once the flow was restored patient was noted to be bradycardic and hypotensive. Advanced cardiac life support protocol was initiated for Ventricular Tachycardia with return to sinus rhythm. He was sent to the emergency room where a chest CT with IV contrast was done and revealed multiple pulmonary emboli (Fig 1) with negative lower extremity Doppler. Laboratory results showed normal electrolytes.

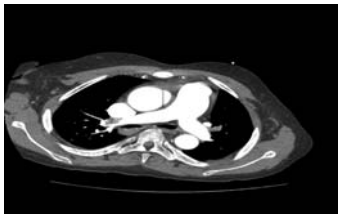

Figure 1

Massive PE and Cardiac arrest are rare but possible complications after Thrombectomy. Clinicians should be alert of those possible complications after Hemodialysis access manipulation.

INFLAMMATORY AND HYPERCOAGULATORY STATUS IS A RISK OF DEATH IN DIABETIC HEMIDIALYSIS (HD) PATIENTS

Michi Inoue, Emi Kihara, Yumiko Asada, Miho Kando, Kazuko Arita, Katsutoshi Maeda, Hiroaki Oda. Oda Medical Clinic. Hiroshima, Japan.

Life prognosis of patients on hemodialysis primary due to diabetic nephropathy still remains poor. The purpose of this study is to investigate the features which contribute to death in diabetic HD patients. Forty-four diabetic HD patients, 22 dead and 22 alive, were subjected to this study. The average age and HD duration in dead vs. alive were 67.5 vs. 68.0 years old and 54.0 vs. 51.2 months, respectively. Serum concentrations of total protein (TP), albumin (Alb), creatitine (Cr), blood urea nitrogen (BUN), electrolytes, β2 microglobulin (β2-m), liver enzymes, C-reactive protein (CRP), intact parathyroid hormone (i-PTH) and alminium (Al) were measured and inflammatory markers using protein electrophoresis as well as coagulatory markers were also evaluated. Compared with the survivors, the dead patients showed significantly higher serum concentrations of potassium, β2-m, alkaline phosphatase (ALP), lactate dehydrogenase (LDH), CRP, Al and fibrinogen together with a lower percentage of Alb and higher percentages of α1 globulin (α1-gl), α2 globulin (α2-gl) and β globulin (β-gl) by electrophoresis suggesting inflammatory status, while there were no significant differences in serum levels of TP, Alb, Cr, BUN, calcium, phosphorus and liver enzymes. The dead patients showed significantly lower prothrombin time (PT) activities than survivors. There were no differences in equibrated Kt/V and cardio-thoracic ratio (CTR) values. No specific electrocardiogram findings directly related to death were found in the dead patients.

	CRP (mg/dl)	fibrinogen (mg/dl)	Alb (%)	α1-gl (%)	α2-gl (%)	β-gl (%)
Dead	1.47	356	57.8	3.3	9.9	8.7
Alive	0.30	283	60.7	2.7	8.0	7.8
p value	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05

In conclusion, inflammatory and hypercoagulatory status is a risk of death in diabetic HD patients.

SYSTEMATIC REVIEW OF THE IMPACT OF ERYYTHROPOIESIS STIMULATING AGENTS (ESAs) ON FATIGUE IN DIALYSIS PATIENTS

Kirsten L. Johansen,[1] Dennis A. Revicki,[2] Fredric O. Finkelstein, [3] Christopher Evans[4] Shaowei Wan,[5] Matthew Gitlin,[5] Irene Agodoa,[5]
[1]The University of California, San Francisco, CA; [2]United BioSource Corp, Bethesda, MD; [3]Hospital of St. Raphael, Yale University, New Haven, CT; [4]MapiValues, Boston, MA; [5]Amgen, Thousand Oaks, CA

The purpose of the study was to review the literature on the effect of ESAs on dialysis patients' perception of fatigue given this is a common symptom of anemia. A systematic literature review was conducted using MEDLINE and EMBASE. Articles included were published in English with fatigue scores pre- and post- ESA treatment. In addition, reference lists of identified papers were searched. 90 articles were identified and 15 (11 distinct studies) met criteria for inclusion: 1 randomized placebo controlled trial (RCT), and extension study, 5 single arm, 3 high vs low, 1 IV vs SC and one switch from epoetin alfa to darbepoetin alfa. Results exclude arms with no Hb change. The only RCT found a 22.0-26.2% improvement in fatigue using the Kidney Disease Questionnaire (KDQ) which were confirmed by other studies that used the KDQ (n=5), with improvements of 3.4-18.6%. Studies that utilized the SF-36 vitality score (n=5) found a 4.0-24.8% improvement. Other studies that utilized the Nottingham Health Profile Energy (n=2) and the Profile of Mood States (n=1) also demonstrated improvement in fatigue. Studies with a baseline Hb of 6 to<8g/dL and 8 to<10g/dL with partial correction to a minimum Hb_10g/dL showed an average 36% and 21.7% improvement in fatigue, respectively. Studies with a baseline Hb_11g/dL and full correction to a minimum Hb_12.9g/dL showed an average 3.9% improvement in fatigue outcomes. Partial correction of anemia with ESAs results in substantial improvement of fatigue. Additional research is needed to examine the benefit of treating anemia to current Hb targets on other anemia-associated symptoms among dialysis patients.

HYPOALBUMINEMIA IN HEMODIALYZED ESRD PATIENTS: RISK FACTORS AND RELATIONSHIPS

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Kaleida Health (Buffalo General Hospital), Buffalo, NY USA

A serum albumin (alb) level of <3.8g/dl is associated with a higher mortality in ESRD. A retrospective study was performed to identify risk factors for alb<3.8g/dl and their temporal relationships before intervention. 14 demographic, nutritional, & inflammation-related variables on 57 patients for 24 sequential months were analyzed. 3 monthly means were used as continuous variables. Relationships at months 0, 1, 2, and 3 of alb with the normalized protein catabolic rate (nPCR) of the index month were also studied. Results are summarized:

	Pearson	*p*	Cox	*p*	SC	*p*	BLR	*p*
Age(y)	-.25	.00	10.19	.00	.21	.00	3.82	.05
Sex(f)	.24	.00	11.20	.00	.22	.00	8.92	.00
DM +	.25	.00	04.90	.03	.29	.00	14.5	.00
V	.05	.35	02.82	.09	.16	.00	2.65	.11
nPCR*	.31	.00	05.86	.02	.15	.00	3.62	.06
(P)	.22	.00	01.00	.00	.16	.00	0.41	.52
%wt ^	.23	.00	00.43	.84	.04	.49	2.43	.12
Fever	.11	.02	01.46	.23	.09	.09	0.38	.54
WBC	-.09	.07	01.43	.23	.11	.03	0.17	.68
ferritin	.02	.64	01.61	.20	.01	.91	3.42	.06
+BC	-.27	.00	06.88	.01	.09	.10	0.00	.08
Hos(d)	.13	.01	22.07	.00	-.02	.73	0.47	.49
URR%	.03	.55	03.26	.07	.03	.55	0.02	.88

SC=Spearman correlation; Hos(d)=hospital days; Cox=Proportional hazards model. BLR =Binary Logistic Regression. $p<.05$= significant. * $p=0.04$ if demographic variables removed from BLR model & $p=.05$ by Multinomial Regression. P=Serum Phosphate. V=Vintage (months). BC=Blood culture. nPCR had significant, equivalent, and robust correlations with serum albumin of the index and 3 subsequent months regardless of inflammation. Low alb is associated with older age, female sex, diabetes, & a low nPCR. Supplements to augment nPCR may reduce long term mortality in HD.

STAPHYLOCOCCUS SCHLEIFERI SUBSP. COAGULANS BACTEREMIA IN A IMMUNOCOMPROMISED HEMODIALYSIS PATIENT

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We report a 54 year old male with end stage renal disease due to hypertensive nephrosclerosis on maintainence hemodialysis. He also had liver transplant 6 years ago for end stage alcoholic liver disease. Of note, the patient was on Tacrolimus 2 mg twice a day orally. Internal jugular cuffed tunneled catheter was used for dialysis access because his left forearm fistula clotted 3 months ago. He presented with fever of 39 degree centigrade and chills without localizing symptoms. Blood cultures (2 out of 2) were positive for Staphylococcus intermedius. He was treated with intravenous Cefazolin for 3 weeks and the catheter was salvaged. Three months later, the patient developed high fever and chills again. Peripheral blood cultures grew Staphylococcous schleiferi subsp. coagulans in 2 out of 2 cultures. The organism was resistant to oxacillin and ampicillin but susceptible to clindamycin, tertracycline and linezolid. The hemodialysis catheter was removed and replaced. He was started on intravenous Linezolid for 2 weeks. Repeat blood cultures 2 weeks later showed no growth.

Staphylococcus schleiferi sp coagulans has been described very rarely with human pathogenicity. Case reports on infection with this organism are usually described in dogs causing otitis externa. Our patient did not have pet at home, however he often visited his daughter who has a pet dog. To our knowledge, staphylococcus schleiferi subsp. coagulans bacteremia in hemodialysis patients has hardly ever been described. Of note, these organisms are closely related phenotypically to S. intermedius than other staphylococcus. Similarities in phenotypic and microbiological characteristics between S. schleiferi subsp. coagulans and S. aureus have resulted in frequent misidentification. It is also possible that we confused with S. intermedius in our case for the first episode of bacteremia.

A NEW HIGH FLUX POLYSULFONE DIALYZER WITH WAVED FIBERS POSESSING LARGER PORES PACKED IN LOWER FIBER DENSITY (APS-EA) IS SUPERIOR IN ELIMINATING LOW MOLECULAR-WEIGHT PROTEINS AS WELL AS SMALL TOXINS IN COMPARISON TO A CONVENTIONAL POLYSULFONE DIALYZER WITH STRAIGHT FIBERS POSSESING CONVENTIONAL PORES IN POPULAR FIBER DENSITY (APS-EL)

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Advanced progress of a high flux polysulfone dialyzer has improved the prognosis of long-term hemodialysis (HD) patients in Japan. The purpose of this study is to elucidate beneficial effects of APS-EA compared to APS-EL in eliminating uremic toxins taking account of the differences in the shape of fibers (waved vs. straight), shape of baffles (extended vs. partial), average pore diameters (8.5 nm vs. 8.3 nm) and hallow fiber packed densities (58% vs. 71%). Elimination rates of low molecular-weight proteins (β2 microglobulin; β2-m and α1 microglobulin; α1-m) as well as small toxins (BUN, creatinine, uric acid) were estimated in 49 maintenance HD patients using APS-EL followed by APS-EA. Paired Student's *t*-test was applied to the statistical analysis and $p<0.05$ was considered significant. Elimination rates are shown in the following table (mean±SD).

	β2-m	α1-m	BUN	creatinine	uric acid
APS-EL	66.3±6.6	14.4±4.2	65.2±7.5	59.3±6.8	67.7±7.1
APS-EA	69.1±6.3	25.5±5.0	67.1±7.8	60.4±7.1	69.1±7.7
p value	<0.01	<0.01	<0.01	<0.01	<0.01

APS-EA showed significantly higher elimination rates of low molecular-weight proteins and small toxins than APS-EL. An average value of Kt/V in APS-EA (1.35±0.30) was significantly higher than that in APS-EL (1.28±0.27), while serum albumin concentration in APS-EA (3.75 g/dl) showed slight decrease compared with that in APS-EL (3.87 g/dl). In conclusion, APS-EA, waved fibers with larger pores in less fiber packed density in an extended baffle, further developed the better performance of high flux polysulfone membrane.

CANNULATION OF A SUBCUTANEOUS DIALYSIS ACCESS IN THE KELOID-PRONE PATIENT

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Keloids are benign overgrowths of scar tissue composed of overproduction of cellular matrix and dermal fibroblasts, and can form large overgrowths following any skin insult. In addition to cosmetic concerns and disfigurement, keloids can also be painful. Recurrence is common following both medical therapy and surgical removal.

Scant literature exists advising the preferred approach to the necessary repeated cannulating of an AV Fistula or AV Graft in a keloid-prone patient. In our centers' diverse patient population, the incidence of keloids is approximately 1 in 200. We report our experiences with two different approaches to cannuating patients with keloids involving four patients in an attempt to identify a preferred method of subcutaneous dialysis access.

With Patient 1, a keloid formed at the tunneled catheter site. Once the AVF matured, the same two sites were repeatedly cannulated, with continued cannulation through the two subsequently formed small keloids, now on HD x3yrs. With Patient 2, once keloids formed at the puncture sites, they were repeatedly traversed when accessing her AVF. Following fistula failure and secondary AV Graft placement, the AVG, too, was exclusively cannulated at the two sites with keloids, now on HD x5yrs. With Patient 3, the AVF has been repeatedly cannulated at the two keloid sites for 11 years. With Patient 4, the AVF cannulation repeatedly avoided the patient's keloids, with the subsequent development of multiple keloids disfiguring a large region of the patient's arm and forearm over an 8 year period. Pseudoaneurysms did not form in any of the patients with keloids.

In conclusion, repeated same-site cannulation of the AVF or AVG in keloid-prone patients is well tolerated, minimizes additional keloid formation and the associated disfigurement, with minimal pain/patient discomfort, and may prevent pseudoaneruysm formation. We recommend same-skin-site manipulation for all AVF related activities (including fistuloplasties) in patients prone to keloid formation.

DIALYSIS IS NOT INDICATED IMMEDIATELY AFTER CONTRAST IN END STAGE RENAL DISEASE PATIENTS ON HEMODIALYSIS

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Contrast agents can cause renal injury and is associated with other complications, such as intravascular volume expansion and pulmonary edema. Contrast is removed efficiently by hemodialysis. Many radiologists encourage immediate dialysis after a procedure with contrast media because it may precipitate fluid overload, but when this risk becomes clinically significant is poorly understood.

We undertook a retrospective chart review to determine if dialysis was required for pulmonary edema in patients with end stage renal disease on maintenance dialysis after administration of contrast media. We studied all patients who were on dialysis three times a week and received contrast procedures from January 2008 to November 2010. Only procedures requiring at least 50 ml of contrast were included. There were 104 radiographic studies (60 unique patients) that used intravascular contrast media. Five studies used ionic contrast medium (hypaque) and the remaining studies used non-ionic contrast media (omnipaque, visipaque). The studies were: two CT head, seven CT neck, 18 CT chest, 43 CT abdomen/pelvis, seven CT chest/abdomen/pelvis, one upper extremity CT, 11 angiographies of the lower extremities, eight cardiac catheterizations, and seven fistulograms. Average volume of contrast used was 117.2 ml (range 50 to 260 ml). After seven studies (6.7%), seven different patients were dialyzed for fluid overload earlier than their next scheduled dialysis; however, these patients were already in pulmonary edema prior to contrast administration. After three studies (2.9%), three different patients were dialyzed earlier because of hyperkalemia.

None of the patients had post-procedural side effect of pulmonary edema that warranted dialysis before the next routinely scheduled session. The results of this study suggest that contrast agents may be given safely to patients with end stage renal disease on maintenance hemodialysis without the additional cost or inconvenience of emergent post-procedural dialysis.

HEPARIN LOCK DOSE & HD CATHETER DYSFUNCTION

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We investigated whether thrombosis rates differ between heparin lock concentrations of 5000 vs. 1000 units/ml in hemodialysis (HD) central venous catheters. Permanent in-center HD patients with their first newly placed catheter in 2009 treated by Fresenius Medical Care North America, locked exclusively with either hi-dose heparin 5000 or low-dose heparin 1000 units/ml were studied. Case-mix (age, gender, race, diabetes mellitus, vintage) were identified at Day 1 of catheter use. TPA use and catheter replacement for dysfunction (i.e. non-infection-related) were recorded. Cox models were constructed as unadjusted and with adjustment for case-mix plus TPA use in a catheter in the past year and a history of clotted catheter within 3 days or prior hospitalization within 7 days of current catheter placement). Due to variances in TPA use between HD facilities, a sensitivity analysis was performed in 171 facilities without TPA use during the year.

Among 29,901 patients, 15,488 (51.8%) locked with heparin 5000 units and 14,413 (48.2%) with 1000 units. Hi dose patients had more white race and DM although age, gender & vintage were similar. The hazard ratio (HR) for TPA use favored hi-dose lock with unadjusted HR =0.94 (p=0.01) but lost statistical significance after adjustment, HR=0.95 (p=0.06). However, catheter replacement was more likely in the hi-dose group with unadjusted HR=1.09 (p=0.05), remaining at HR=1.09 albeit not significant after adjustment (p=0.08). A total of 27.8% vs. 28.3% (p=0.4) of patients had either TPA use or catheter replacement performed, for hi and low dose heparin lock, respectively. The sensitivity analysis showed no significant difference in catheter replacement (5.6% vs. 5.5%, p=0.9) between hi (N=805) and low (N=641) dose heparin locked catheters, absent TPA use.

Preliminary data indicated that hi dose heparin locks (5000 units/ml) had no significant overall benefit compared to low doses (1000 units/ml) in this large national HD population. Separately, there was slightly less TPA use in the hi-dose group (that was offset by higher catheter replacement rates). However, when no TPA was used, hi and low dose heparin locked catheters had no difference in replacement rates due to thrombosis.

NEW ONSET HEMOPTYSIS IN ESRD PATIENTS SECONDARY TO ANTI-GBM DISEASE

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Pulmonary renal syndromes typically present as rapidly progressive glomerulonephritis with some degree of pulmonary involvement. The rarity of primary vasculitis in the dialysis patient contributes to delay in diagnosis. We present two ESRD patients who were admitted several times in a 6 month period with pulmonary issues attributed to pneumonia, COPD, and/or bronchitis prior to the development of frank hemoptysis. The presence of clinical hemoptysis prompted a thorough evaluation. They were found to have positive anti-GBM antibodies. Treatment with plasmapheresis and immunomodulator therapy resulted in temporary clinical and radiological remission. Both patients expired from adverse events of the therapy and comorbid illnesses. To our knowledge, this is the first report of hemoptysis secondary to anti-GBM vasculitis in patients already receiving hemodialysis. It remains important to investigate promptly primary pulmonary vasculitic processes in ESRD patients who present with the associated symptomatology to better decrease morbidity and improve survival.

SIGNIFICANCE OF HIGH SERUM FERRITIN LEVELS ON MORTALITY IN PATIENTS ON MAINTENANCE HEMODIALYSIS

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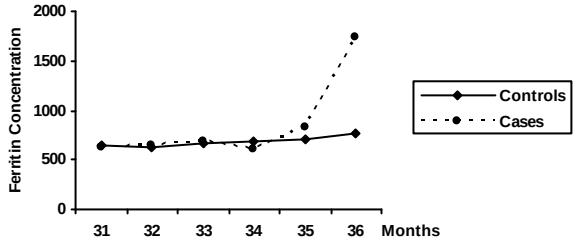
Low serum ferritin levels are reported to be highly specific in diagnosing iron deficiency. However, a high serum ferritin level does not always suggest iron overload, due to the fact that serum ferritin is also an acute phase reactant and increases with inflammation, which is common in patients on maintenance hemodialysis (MHD).

We retrospectively evaluated the significance of high serum ferritin levels on mortality in patients who are on MHD. We identified patients who died at our outpatient hemodialysis unit during a three-year period (10 cases), and compared a three-year data against patients who did not die (25 controls) during the same period, trying to identify risk factors associated with their deaths, but specifically looking into the significance of the ferritin levels. Patient demographics (age, sex), serum iron, serum ferritin, serum albumin, and urea reduction ratio (URR) were collected for all the patients. There were no differences in age, sex, serum iron, serum ferritin, and URR between cases and the control group at the beginning of the observation period. However, at the moment of death, serum ferritin levels were significantly higher among the cases (1897 ng/ml vs. 760 ng/ml, p= 0.045) (Figure). Patients who died also had lower serum albumin levels and higher pre-dialysis BUN levels, both at the beginning and at the end of the observation period.

High serum ferritin levels may be associated with higher mortality in patients who are on MHD.



ECONOMIC CHANGES AND DECREASING NUMBER OF UNDOCUMENTED INCIDENT HEMODIALYSIS PATIENTS IN NEW YORK CITY.

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We noted a decrease in the number of undocumented incident patients starting HD in New York City for 3 years.

Retrospective review of the past 3 years analyzing physician notes, social worker notes, billing data and lack of social security numbers for incident HD patients.

We are a tertiary hospital center in NYC and refer patients to 22 community HD centers. Our HD population is largely made of minority patients, who start HD emergently during hospitalization, without prior medical care and are discharged to local out patient HD units.

In 2007, we had 138 incident patients on HD of which 58 (42%) were undocumented patients with no insurance, in 2008, 115 patients on HD with 39 (34%) were undocumented aliens and in 2009, 105 patients on HD of which 27 (26%) were undocumented. The p values for the decrease, in number of undocumented immigrant patient for the three years is significant at 0.01. The average creatinine of patients starting HD in 2007 was 9.5mg/dL and in 2009 is 9.9mg/dL which was not different.

We still have a large number of undocumented immigrant patients starting HD. The decreasing trend parallels the decrease in illegal immigrant population reported by the center of immigration studies and data from Homeland Security from 2007 to 2009 due to economic reasons and increased immigration enforcement.

DEMOGRAPHIC AND CLINICAL PROFILE OF PATIENTS INITIATED ON HEMODIALYSIS IN LEBANON

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The launch of a national kidney registry in Lebanon is underway and is set for March 2011. Data will be entered on site into a web-based database and deposited into a central file, with the goal of generating a public annual report and a confidential facility report that can be used for internal quality improvement by the facility.

Complete demographic and dialysis initiation data will be captured for the first time for all incident patients during a 12-month period, and for over 2600 prevalent patients undergoing hemodialysis (HD) at 56 hospital-based dialysis centers in Lebanon. The initiation data include history of specific chronic kidney disease (CKD) management prior to dialysis, vaccinations, existing comorbidities, ongoing medications, laboratory values and history of vascular access creation. The collection of this data started in November 2010 and will be completed by end of February 2011 for all patients starting dialysis in the past 6 months and will continue routinely after the launch of the registry.

The planning and development of the national kidney registry comprehensive database was based on the experience gained from a pilot study conducted during 2007-09 at 18 dialysis centers. There were 1164 prevalent HD patients included in the study, of which 113 had initiated dialysis during the 6 months prior to the conduct of the study at the facility. The mean age of these incident patients was 60.9 years (± 14.6, median = 63.5 years), consisted of 58 males (51.3%), 57% had elementary education or lower and only 14% were working. About 40% initiated dialysis using a fistula, 1% using a synthetic graft and 49% using a temporary or permanent catheter (data missing for 11%). Mean hemoglobin was 9.8 g/dL (± 1.45), ferritin 371 mg/dl (± 332, median 205), transferrin saturation 44%, calcium 8.5 mg/ml (± 0.94), phosphorus 5.6 mg/ml (± 1.9), iPTH 462 pg/ml (± 493, median 264) and albumin 3.4 mg/ml (± 0.9, median 3.7).

Comprehensive real-time incident data for patients initiating HD can prove to be of great value in informing a prevention plan in CKD patients prior to renal replacement therapy.

DESCRIBING COMMUNICATION BETWEEN INPATIENT AND OUTPATIENT DIALYSIS PROVIDERS AT DISCHARGE

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Patients with end stage renal disease (ESRD) on hemodialysis are known to be at increased risk for adverse events such as medication errors, hospital admissions and preventable readmissions. Poor communication during transitions of care is a well known and frequent cause of medical errors. Studies standardizing discharge communication in medical patients have shown improvements in outcomes. However, no studies describing practices or standards of dialysis-specific discharge communication between inpatient and outpatient dialysis units have been published to date. We aimed to characterize communication during these critical transitions in care using qualitative methods.

Thirty-six semi-structured interviews were conducted with nephrologists, nurses and social workers who care for hemodialysis patients, both in inpatient and outpatient settings. Interviews were recorded, transcribed verbatim and analyzed for content with NVivo software. Major themes were identified by two independent trained raters. Inter-rater reliability was assessed with Cohen's Kappa.

Quality of discharge communication was reported to be extremely variable by the majority of participants. Barriers to adequate communication included workload, discharge timing (e.g. in the evening or on weekends), incompatible medical information systems, and lack of accepted standards. Overall, good communication was described as including a standardized summary of dialysis treatments and major events of the hospitalization, a medication list (including antibiotics) and a follow up plan. It should occur before the patient's first post-discharge dialysis treatment. Among commonly reported consequences of poor or absent communication were infections from missed antibiotics, loss of followup plans, readmission, and loss of patient trust. We propose that establishing a standard process of communication between dialysis units at discharge will serve to reduce these adverse consequences.

LECLERCIA ADECARBOXYLATA - AN UNUSUAL HEMODIALYSIS CATHETER RELATED INFECTION AND BACTEREMIA

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Intravenous catheter related infections and bacteremia are associated with an increase in morbidity and mortality. L. adecarboxylata is a gram-negative bacillus, which shares many biochemical features of Escherichia coli (E.coli). L. adecarboxylata is rarely associated with catheter infections and may be occasionally isolated as a part of polymicrobial growth in post-traumatic wound infections. We report a case of L. adecarboxylata related tunneled catheter infection resulting in bacteremia.

A 58 year old African American male with a past medical history of End stage renal disease (ESRD) secondary to diabetic nephrosclerosis on maintenance hemodialysis via left internal jugular tunneled catheter was admitted to the hospital with low grade fever after his hemodialysis treatment. Medical history was significant for diabetes with complications, hepatitis C and hypertension. No evidence of exit site infection was noted and physical examination was unremarkable. Blood cultures obtained from the central catheter and by peripheral venipuncture yielded growth of L. adecarboxylata. The organism was susceptible to all antimicrobials tested. Fever subsided with initiation of antibiotics. Since the patient had a maturing AV access (PTFE graft) in the arm, the catheter was removed.

A review of the literature has shown five reported cases of L. adecarboxylata in individuals on dialysis therapy (3 peritoneal dialysis and 2 hemodialysis). In each of these cases the catheter was salvaged with antibiotic therapy. This organism is usually susceptible to commonly utilized antibiotics. It should be noted that there has been a report of an extended spectrum beta-lactamase (ESBL) producing strain in a non-dialysis patient. It is possible that this organism is rarely reported to be present by the laboratory due to its similarity to E. coli. We believe due to the susceptibility of this organism, the laboratory should make efforts to distinguish this organism from E. coli, and if necessary the dialysis catheters may be salvaged with therapy.

INADEQUATE INPATIENT ESRD CARE IN TEACHING HOSPITAL

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Dialysis therapy only can replace the filtration function of ESRD patients. But to replace endocrine, metabolic and other functions of the kidneys supplemental therapies are routinely prescribed. Dialysis patients when admitted should have continued on certain routine medications. Like Erythropoietin, Multivitamins, Phosphate binders, IV iron, and Vitamin D since the admission.

A survey was done in 13 hospitalized HD patients in teaching institution 2 years ago and it was found that the routine medications and tests were inadequately performed by the house staff. Intense education was instituted to the house staff regarding appropriate management of hemodialysis patients was during bedside rounds and in noon lectures.

A follow up review was done after a year in 12 hospitalized HD patients but no improvement was noted.

Renal fellows were then instructed to take responsibilities and carry out orders of such parameters.10 charts were reviewed by the Nephrology Fellow after 6 months and the result was noted;

Medications	Before in-service to house staff	After in-service to house staff	After Renal fellow Took over
Erythropoietin given	53.8%	58.3%	90%
Renal Vitamin given	76.92%	50%	100%
Phosphate binders	30.4%	58.32%	90%
Vitamin D therapy	23.4%	33.4%	100%
Tests (Recorded)			
Iron studies	30.2%	26.7%	100%
PTH	30.2%	26.7%	100%

It seems the standard teaching method of house-staff in a teaching institution may not provide enough education for ESRD care. Alternative method may be adopted including computer based reminder to improve inpatient ESRD care in teaching institution.

CHARACTERIZING SODIUM THIOSULFATE TREATMENT PATTERNS

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In the past 6 years, sodium thiosulfate (STS) is becoming an increasingly common off-label treatment for calciphylaxis in end-stage renal disease. Despite this, there is a paucity of data on physician prescribing patterns and patient characteristics. The goal of this analysis was to characterize patients receiving STS and how physicians prescribe this medication. We conducted a retrospective analysis of 203 hemodialysis patients treated with STS between 01/01/09 and 12/31/09 at a large U.S. dialysis organization (LDO). Patient demographics were compared to the population of 150k patients during this same period. Dosing intervals were characterized by number of doses and timing between doses. Compared to the general dialysis population, patients receiving STS were disproportionately young (mean age = 58.2±12.8), obese (mean BMI=30.9±9.3); white (53.2%); female (75.9%) from the south (39%), and long term dialysis survivors (10% > 10 yr). Censoring occurred in 67 (30%) of patients: 50 (23%) died, 16 (7%) stopped being treated at an LDO clinic, and 1 (<1%) received a kidney transplant. An additional 21 patients died and 4 were transplanted from 1/1 to 5/31/10. The majority of patients (86%) received $\leq$ 3 months of STS therapy (usually 1 STS dose/session) over the course of the year: 47% 1 month, 21% 2 month, 18% 3 month. Among patients who completed a 1-month course of therapy, 11% initiated a second course within 2 weeks, 27% within 3-4 weeks; and an additional 35% within 2 months. Patients prescribed STS differ significantly from the general dialysis population. Although the majority of patients receive $\leq$ 12 weeks of STS therapy, duration of treatment remains highly variable. A small percentage of patients receive longer term dosing at longer intervals. Censoring occurred at rates consistent with the general population.

KIDNEY DISEASE QUALITY OF LIFE QUESTIONNAIRE (KDQOL)-36 ITEMS ASSOCIATED WITH ANEMIA SEVERITY

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Recently, CMS adopted 26 new clinical performance measures to assess quality of patient care, including the KDQOL. We conducted item analysis to determine which items are associated with anemia severity. KDQOLs were completed by 32,926 dialysis patients between 10/09 and 9/10. We conducted two linear regressions: forced entry (FE), and stepwise (SW) with entry tolerance set at 0.15 and exit tolerance set at 0.20 using hemoglobin as the outcome and the 36 KDQOL items as predictor variables. The items in the table below were statistically significant ($P<0.05$) in each analysis. Items in white were consistent with literature in the predicted direction; light grey no clear evidence; dark grey was inconsistent with the suggested direction.

Item	Item direction	Response valence	FE beta	SW beta
1. General health	Neutral	- (1=excellent, 5=poor)	-.036	-.038
8. Pain interferes	-	+ (1=not, 5=extremely)	NS	-.020
10. Lot of energy	+	- (1=all time, 6=none)	-.022	-.024
17. Soreness of	-	+ (1=no bother, 5=bother)	-.017	-.018
22. Shortness of	-	+ (1=no bother, 5=bother)	-.045	-.045
24. Lack of appetite	-	+ (1=no bother, 5=bother)	-.025	-.025
6. Accomplish less	-	- (1=yes, 2=no)	-.021	NS
14. Too much time on	-	- (1=true, 5=false)	-.017	NS
28. Access site prob	-	+ (1=no bother, 5=bother)	-.018	-.018
32. ESRD affects	Neutral	+ (1=no bother, 5=bother)	.020	.023
13. Interferes with life	-	- (1=true, 5=false)	-.026	-.028
19. Cramps	-	+ (1=no bother, 5=bother)	.052	.052

Items identified above are largely consistent with existing anemia guidelines (NKDKTS; US NHLBI, NKF, RSN). These items will be combined and subjected to psychometric validation to assess their internal and external validity with the potential for a scoring algorithm to assess anemia severity in dialysis patients.

PREDICTORS OF PRE-DIALYSIS SERUM SODIUM IN AN OUTPATIENT HAEMODIALYSIS POPULATION

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Hyponatraemia associates with increased mortality in the general and hospitalized populations. We have recently shown that hyponatraemia associates with increased mortality in oligo-anuric haemodialysis subjects, who are unique in lacking vasopressin-mediated control of tonicity. We sought to discover the clinical determinants of the pre-dialysis serum sodium concentration in ambulatory haemodialysis subjects, hypothesizing that higher dialysate sodium concentration would predict a higher pre-dialysis serum sodium concentration.

We studied a cohort of 2487 subjects receiving thrice-weekly maintenance haemodialysis from Satellite Dialysis. Available data included routine demographics, laboratory measures, co-morbid conditions, blood pressure, inter-dialytic weight gain (IDWG) and details of the dialysis prescription. We used linear regression models to identify statistically significant predictors of the pre-dialysis serum sodium. Residual normality and equality of variance were verified. Statistical analysis was performed using SAS, version 9.1.

Mean pre-dialysis serum sodium was 136.1 mmol/L (SD 3.3). Significant univariate predictors of pre-dialysis serum sodium were male sex, age, diabetes, dry weight, dialysate potassium, albumin, IDWG and serum potassium. In the multivariate model, the following remained significantly associated with pre-dialysis serum sodium (Beta co-efficient; 95% CI): dialysis vintage in years (0.05; 0.01,0.08), male sex (0.46; 0.19,0.72), age per 10 years (0.14; 0.05,0.23), diabetes (-0.88; -1.15,-0.61), dry weight in Kg (0.02; 0.01,0.03), albumin (1.26; 0.9,1.6), IDWG in Kg (-0.32; -0.41,-0.22) and plasma potassium (-0.66; -0.87,-0.46).

In conclusion, we have identified significant predictors of pre-dialysis serum sodium concentration, with IDWG being the major modifiable factor. Dialysate sodium did not appear to associate with pre-dialysis serum sodium, suggesting that individuals may regulate water intake to achieve a preferred individual setpoint for osmolality. It remains to be determined if interventions to avoid a low pre-dialysis serum sodium concentration will alter mortality.

SERUM FRUCTOSAMINE (SF), BUT NOT GLYCOSYLATED HEMOGLOBIN (HbA1C), PREDICTS LONG-TERM SURVIVAL IN NONDIABETIC (NDM) HEMODIALYSIS (HD) PATIENTS (PTS)

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We and others have reported that the level of SF, an alternative index of glycemic control, is elevated in NDM HD pts. Elevated levels of SF have been associated with increased cardiovascular mortality in elderly non-uremic, NDM women. We have previously reported that SF, but not HbA1c, predicts morbidity (infection and hospitalization) in NDM HD pts. The objective of this study was to investigate the prognostic importance of enrollment SF on long-term survival in NDM HD pts. We enrolled 72 NDM HD pts from February 2005 and followed them to November 2010. SF level was corrected for serum albumin (AlbF) as previously reported. Mean age was 54±16 (SD) yrs, fifty-four percent were women and the majority were African-Americans (81%). Mean values for enrollment SF, AlbF and HbA1c were 286µmol/l (range: 187-378µmol/l) and 742µmol/g (range:468-1076µmol/g) and 5.19% (range: 4.4-5.5%) respectively. During the study period, 21 pts (29%) expired. Pts who died during the study had significantly higher AlbF (810 vs. 721, p=0.004) compared to those who survived. Using Cox's multivariate regression analysis, adjusting for age, race, gender and dialysis vintage, AlbF was a significant independent predictor of mortality (Relative Risk=1.008, p=0.015) in these NDM HD pts. In contrast, HbA1c did not predict mortality (p=0.53) in this population.

Variable	Relative Risk	p
Age (years)	1.014	0.61
Gender (Male vs. Female)	2.17	0.25
Race (Others vs. AA)	1.14	0.91
Months on dialysis	1.004	0.37
AlbF (µmol/g)	1.008	0.015

AA= African American

In conclusion, AlbF, but not HbA1c, the most commonly utilized measure of glycemic control, predicts long-term survival up to 6 years in these non-diabetic HD pts.

COMPARING MORTALITY OF NON-DIABETIC MAINTENANCE HEMODIALYSIS (MHD) PATIENTS WITH AND WITHOUT POLYCYSTIC KIDNEY DISEASE (PKD)

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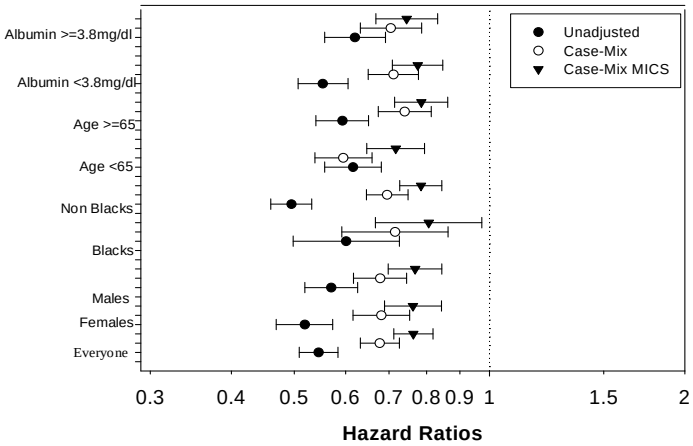
MHD patients with PKD are generally younger and healthier comparing to other MHD patients. In 79,002 MHD patients, who were followed for up to 5 years, we examined survival within several subgroups of MHD patients and compared PKD and non-PKD non-diabetic patients. Patients were classified into subgroups of gender, race (Blacks vs. others), age (>=65 years vs. younger), serum albumin (>=3.8g/dl vs. lower). Survival models were adjusted for case-mix and surrogates of malnutrition-inflammation complex syndrome (MICS). There were 3,565 patient with PKD (mean age: 59±18 years, 47% female, 14% Blacks) and 75,435 non-diabetic patients without PKD (mean age: 60±17 years, 43% female, 31% Blacks). Death hazard Ratios (and 95% confidence intervals) were calculated in each category comparing PKD to non-PKD patients (see Figure).



Hence, in non-diabetic MHD patients, diagnosis of PKD vs. other causes of ESRD is associated with 20-30% lower death risk.

REDUCTION OF CATHETER-RELATED BACTEREMIA (CRB) AND HEALTHCARE UTILIZATION BY USE OF A PROPHYLACTIC GENTAMICIN-CITRATE LOCK SOLUTION

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Infections in hemodialysis (HD) patients are common, associated with significant morbidity, and are the second leading cause of death. The purpose of this observational study was to evaluate the impact of a prophylactic antibiotic lock (Gentamicin 0.320mg/ml + Trisodium Citrate 4%) on the incidence of CRB and measures of healthcare utilization in a chronic HD population dialyzing with tunneled HD catheters. Comparisons were made between the 3 months prior to initiation of the lock (control) and the initial 3 months of using the lock (lock). Statistical analysis was conducted using SPSS, version 14.0. Use of prophylactic antibiotic lock reduced CRB from 3.1/1000 catheter days to 0.8/1000 catheter days, $p<0.001$. The average rate for the first 12 months of the lock was 0.7/1000 catheter days. Use of a prophylactic antibiotic lock significantly reduced catheter-related infections and healthcare utilization.

	Control n=115	Lock n=122	P
Catheter-Related Bacteremia	25%	6%	<0.001
Infection-Related Hospitalization	28%	12%	0.001
Vascular Access Procedure	42%	16%	<0.001
Infection-Related Vascular Access Procedure	35%	8%	<0.001
Death	8%	4%	0.217

MAGNESIUM, PARATHYROID HORMONE AND MUSCLE CRAMPS IN CHRONIC HEMODIALYSIS PATIENTS.

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We reported an inverse relationship between predialysis serum magnesium (Mg) and muscle cramps in chronic hemodialysis (HD) patients (JASN 21:436A, 2010). The interaction between serum Mg, parathyroid hormone (PTH) and muscle cramps is not known. The present study evaluated the effect of dialysate Mg on PTH and muscle cramps in HD. 62 ESRD patients (Mean age 60, range 25-87 years; 36 males, 26 females) on HD were studied. The patients were hemodialyzed initially with a dialysate Mg of 0.75mEq/L and then with a dialysate Mg of 1.00mEq/L. The patients received HD with each dialysate for at least 3 months. Monthly pre-HD laboratory data, before and after the change in dialysate Mg, were used for analysis. A single nephrology fellow conducted an in-person questionnaire on 62 patients twice. The severity of cramps was evaluated on a 0-10 scale, with 10 rated as maximal severity. Data are summarized below (mean ± SD):

Variable	**0.75 mEq/L**	**1.0 mEq/L**	**P value**
Mg mg/dL	1.89±0.26	2.15±0.31	0.002
PTH pcg/mL	308±206	274±195	NS
Calcium mg/dL	8.9±0.26	2.15±0.31	0.005
Phoshorus mg/dL	5.3±1.7	5.45±1.17	NS
Hectoral mcg/wk	15.32±42.8	10.2±7.9	NS
Cramp severity	5.36±3.6	3.95±3.93	0.004

No significant correlation of serum Mg between PTH, hectoral and sensipar was observed with increased dialysate Mg. In patients with PTH<150 pcg/mL, number of patients with cramps decreased significantly with higher dialysate Mg (x^2 10.5, p=0.002). In conclusion, data suggest that serum Mg may affect PTH and muscle cramps in HD patients.

DIAGNOSTIC AND PROGNOSTIC ROLE OF ENDOTHELIAL AND PLATELET-DERIVED MICROPARTICLES IN HEMODIALYSIS ACCESS STENOSIS AND THROMBOSIS

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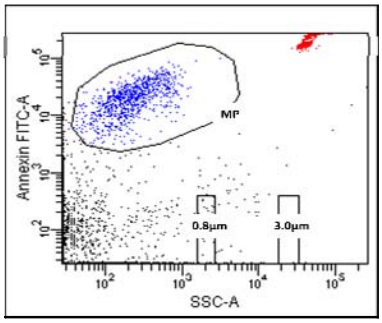
Failure of the hemodialysis vascular access (HVA) is the most common cause of hospitalization and a main cause of morbidity among individuals with end stage renal disease (ESRD). The annual cost associated with HVA malfunction in the United States exceeds $1 billion. Neointimal hyperplasia associated with active recruitment and proliferation of vascular smooth muscle cells is detected in stenotic HVA lesions. Many factors, including inflammation and growth factors such as platelet-derived growth factor appear to play a role in the development of access stenosis and thrombosis. At present, there is no efficient tool for identification of those at high risk for HVA complications. Microparticles (MP) are intact vesicles derived from eukaryotic cell membrane. They constitute markers of cell activation, injury and apoptosis. MPs have functional roles as mediators of inflammation, suggesting that they may play a role in thrombosis in several vascular disorders.



In this context, we designed a study to compare the number and activity of endothelial and platelet-derived MP in two groups of hemodialysis patients; one without any HVA complications and the other with recurrent access stenosis or thrombosis. We hypothesize that endothelial and platelet derived MPs are increased in number and activated in the latter group and therefore, they can serve as biomarkers to better diagnose and treat HVA complications.

We have established the method of measuring MP using flow cytometry. The above figure shows MP gate set according to annexinV binding and size; particle size was determined by 0.8 µm and 3.0 µm latex beads. In this pilot study we will enroll 15 patients in each group.

METABOLIC ALKALOSIS IN DIALYSIS PATIENTS AND ITS EFFECT ON SERUM POTASSIUM LEVELS

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The purpose of the study was to determine the effect of metabolic alkalosis in dialysis patients on serum potassium levels. The Alkali used for HD has come full circle, from HCO3 in the 1950's to acetate from the 1960s, and back to HCO3 in the 1990s. Dialysates currently used presently combine a 35-meq/L HCO3 alkali solution with an 8 meq/L of acetate bath (Granuflo). Assuming the acetate is completely metabolized, this combination equals a 43 meq/L alkali concentration.

This was a retrospective study of 50 HD patients receiving dialysis three times a week admitted to Albert Einstein Medical Center, Philadelphia in October 2010. Serum (Se) HCO3 & Se Potassium were collected on admission and 2 categories were stratified.

Serum HCO3 (meq/L)	**No. of Patients (%)**	
21-29(normal range)	23 (46%)	
>30(alkalosis)	27 (54%)	
K Range Group	**Mean K in group**	**Mean HC03 in group**
3-4	3.6	34.5
> 4	4.9	29.1

In conclusion, our study found that the majority of HD patients (54%) had a HCO3 in the higher than normal range. Metabolic alkalosis is almost always associated with hypokalemia due toTrans cellular shift of potassium, which can cause neuromuscular weakness and arrhythmias and may increase ammonia production. Our results revealed that a higher mean Se bicarbonate level co-related well with hypokalemia. Assuming the acetate is completely metabolized to HCO3 by the liver, current HD units are dialyzing against a HCO3 bath of 43 meq/L (35+ 8). We recommend that attention be paid in lowering this gradient by either lowering the acetate or a reduction in the 35 meq/L HCO3 alkali solution to avoid complications resulting from hypokalemia induced by a metabolic alkalosis.

HCV SEROPOSITIVITY IS ASSOCIATED WITH LOW SERUM C-REACTIVE PROTEIN (CRP) IN HEMODIALYSIS (HD)

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CRP level is a sensitive indicator of inflammation and mortality risk. A lower CRP has been reported in HCV patients (pts), but this remains to be shown in HD (Nascimento et al, 2005). In a prevalent cohort of 69 HD pts, we examined the relationship of high sensitivity-CRP to HCV, adjusting for markers of inflammation derived from routine monthly bloodwork, and other potential confounders. Excluding pts admitted or diagnosed with an inflammatory condition in the prior month (n=16), left 53 pts. Samples with CRP below the detectable limit (<0.01 mg/dL) were assigned a value of 0.01 mg/dL (n=4). HCV pts comprised 26% of the cohort (14/53). They tended to be younger than non-HCV pts and more often HIV+ (both $p<0.01$) but the groups were similar in diabetes, race, albumin (alb), ferritin, WBC, and HD access. CRP ranged from 0.01 to 9.22 mg/dL (median: 0.50 mg/dL). CRP was lower in pts with HCV (median values: 0.09 mg/dL *vs*. 0.55 mg/dL; $p<0.01$). HCV pts comprised 73% (8/11) of the lowest CRP quintile (≤0.1 mg/dL) but ≤ 20% of each of the higher quintiles ($p<0.01$ for quintile × HCV). Log (CRP) correlated with alb ($r = -0.31$, $p<0.03$), log (ferritin) ($r=0.35$, $P<0.02$), and WBC ($r=0.25$, $P<0.07$). In a multi-variate model, that adjusted for alb, WBC, log (ferritin), and age, the strongest predictor of log (CRP) remained HCV both in the entire cohort ($P<0.01$) and in a subset without HIV+ pts ($p<0.05$). Eight pts died over 12 months. They differed from survivors in age ($P<0.02$), but not in HCV or CRP. The mortality rate was 0% in the lowest CRP quintile and 19% (HCV+: 17%; non-HCV: 19%) in the other quintiles combined ($p=0.18$). In summary, among prevalent HD pts, HCV was associated with a lower CRP in both univariate and multivariate analyses. A high proportion of such pts had very low CRP. Possible explanations include reduced synthesis, increased clearance, assay interference, and survivor bias. This association may affect the clinical and epidemiologic utility of CRP.

THE ROLE OF ACUTE HEMODIALYSIS DURING HYPERKALEMIA-INDUCED CARDIAC ARREST

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47-year-old woman with chronic kidney disease stage 5 secondary to hypertensive nephrosclerosis presented to the emergency department with symptoms of uremia and fluid overload. Her initial rhythm of a wide complex tachycardia degenerated to a sine wave appearance and then to junctional bradycardia. Serum potassium was 9.4mmol/L and she received calcium, insulin, dextrose, and bicarbonate. She subsequently became pulseless. Cardiopulmonary resuscitation (CPR) was initiated as per BCLS and ACLS protocol. Hemodialysis (HD) was also initiated. Within 15 minutes of combined CPR and HD at blood flow rate of 250ml. per minute, normal sinus rhythm was restored. She did not have residual neurological abnormalities.

English –written case reports (reported in pubmed from 1981 to 2001) of dialysis during a hyperkalemic cardiac arrest were analyzed. A total of 11 patients (including ours) were reviewed. Duration of cardiac arrest with concomitant dialysis ranged from 15 to 135 minutes. All patients survived the cardiac arrest and converted to sinus rhythm. 10 out of 11 patients did not have neurological sequelae. 77.8% of patients with documented follow up survived to hospital discharge.

This review suggests that external cardiac compression during CPR can sustain adequate blood flow for HD. HD is an effective adjuvant to treat life-threatening hyperkalemia even in the setting of hemodynamic instability and cardiac arrest.

SUCCESSFUL PREGNANCY OUTCOMES IN END STAGE RENAL DISEASE-A SINGLE CENTER EXPERIENCE

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The optimal management of pregnant dialysis patients remains a great challenge for nephrologists, end stage renal disease being a predictor of adverse outcomes in this condition. We report a single-center experience of 5 patients requiring dialysis during pregnancy, all of which resulted in successful outcomes.

Case	1	2	3	4	5
Age(yr)	39	34	38	25	39
Race	AA	AA	AA	AA	AA
HD (hr/wk)	24	24	24	20	24
HTN	Controlled	Controlled	Controlled	Controlled	Controlled
Epo	yes	yes	yes	yes	no
GA*	34	27	33	24	29
Mode	c-section	c-section	c-section	c-section	c-section
BW(g)	1580	730	1877	550	1340
APGAR	9/9	6/9	0/4/7	0	8/9

*GA-gestational age

Our success rate may reflect an overall improvement in management of this population, with special attention paid to multiple risk factors. These include blood pressure and volume control, anemia management with erythropoietin analogues, nutritional intake and total dose of dialysis.

RENAL REPLACEMENT THERAPY (RRT) PATIENT CHOICE STUDY

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In United States, majority (>90%) of end stage renal disease patients are on Hemodialysis (HD) as compared to a very few (~6%) on peritoneal dialysis (PD). There is very limited data regarding the factors influencing patient's choice of one modality over the other.

We conducted a telephonic survey on PD (N=20) and HD (N=20) patients. The survey consisted of 12 questions aimed at enquiring the level of patient education, living circumstances, employment status, current choice and the reason for the dialysis modality selection. We found that Caucasians predominated in both the groups (PD 70%, HD 65%), PD patients were younger as compared to those on HD,45% of PD patients had completed college education as compared to 30% of those on HD, 5 % PD patients lived by themselves compared to 20% on HD. Majority of patients on PD chose it due to their nephrologists suggestion (40%), with about 15% due to suggestion from friends (15%), and about 10% due to fear of Needles. This was in stark contrast to patients on HD who also in majority of cases(40%) chose it due to their nephrologists suggestion,20% responded that they were more comfortable with the dialysis staff handling blood and needles and close to 20% reported that they were not given any other options. When we asked these patients if they would like to switch to the other modality, 25 % of PD patients said they would rather die than switch as compared to 30 % of those on HD. When asked about transplant, all PD patients wanted to undergo renal transplant as compared to only 75% of HD patients. Satisfaction for choosing PD was 100% compared 95% satisfaction for choosing HD.

These results clearly demonstrate that the choice of RRT in dialysis patients is influenced by multiple factors however it is also apparent that we as nephrologists can play an instrumental role in influencing the modality selection and recommending home therapy.

ORAL SUPPLEMENTATION OF 15 GRAMS OF AMINO ACIDS ADMINISTERED THRICE WEEKLY INCREASES SERUM ALBUMIN LEVELS IN CHRONIC HEMODIALYSIS PATIENTS

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We report on the results of providing an oral supplementation of 15 gms of amino acids to chronic hemodialysis patients for a maximum of 6 months. Oral supplementation was in the form of Pro Stat 101 ™ containing 15 gms of amino acids and 101 kcal per ounce. The supplement was given thrice weekly at the initiation of each hemodialysis session. Doses provided in 1 ounce cups were checked at the end of each treatment for compliance.

Sixteen patients received at least 75% of prescribed supplements for a period of between 2 to 6 months. The total number of doses per patient ranged from 13 to 59, with a mean of 35 $\pm$14 doses (X $\pm$sd). Percent compliance with ingestion of doses provided was between 75 and 100%, with a mean of 91 $\pm$8%.

Initial mean serum albumin levels and protein catabolic rate (PCR) determinations were taken prior to the initiation of the supplement and at the end of the first 6 months. Mean serum albumin levels prior to initiation of supplements was 3.1 $\pm$0.3 gm/dL. Mean serurm albumin at the end of 6 months was 3.5 $\pm$0.3 gm/dL. (paired t-test: $p<0.01$). Mean PCR values taken prior to initiation of supplements was 0.86 $\pm$0.18 gm/kg/day and 0.97 $\pm$0.20 gm/kg/day at the end of 6 months ($p<0.05$).

We conclude that oral supplementation of 15 grams of amino acids in the form of Pro Stat 101 ™ administered thrice weekly is associated with an increase in PCR and results in a significant increase in serum albumin levels in chronic hemodialysis patients.

REGIONAL HEPARINIZATION FOR AQUADEX™ ULTAFILTRATION SYSTEM IN VOLUME OVERLOADED PATIENTS USING HEPARIN AND PROTAMINE

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Regional anticoagulation with heparin-protamine or citrate has been successfully employed during CRRT. Citrate use is limited by the patient's capacity to metabolize citrate, which is decreased if liver function or tissue perfusion is compromised. Citrate accumulation causes metabolic acidosis and resultant hypocalcemia can cause myocardial depression. We have previously described using regional heparinization with protamine during CRRT (Kaplan & Petrillo. Trans ASAIO 33:312, 1987). We now describe 2 patients with successful regional heparinization using the Aquadex™ ultrafiltration system. This system uses smaller, 6F dual lumen antecubital catheters with blood flows to 40 mL/min and ultrafiltration potential of 10-240 mL/hr.

A 65 year old female with advance alcoholic cirrhosis and pulmonary hypertension presented with rapid onset edema, ascites and 25 Kg wt. gain. Low dose diuretic therapy resulted in rapid worsening of azotemia and creatinine. Patient was placed on ultrafiltration using Aquadex™ system with pre-filter heparinization at 800 IU/hr. and post-filter protamine at 8 mg/hr. Systemic PTT was monitored every 6 hours with operator modification of heparin and protamine dosage to keep systemic PTT <40. During 5 days of treatment, patient achieved wt loss of 26.4 kg (117.8 to 91.4) and decrease in abdominal girth of 1.5 inch (55 to 53.5). Serum creatinine and the fractional excretion of urea remained stable.

A 51 y/o male with HIV cardiomyopathy, CKD stage 2, pulmonary hypertension & Hep C liver disease presented with volume overload. Wt loss of 17.3Kg (92.9-75.6) was achieved with near normal systemic PTT (36.5 - 44.0) and filter PTT>150 sec (166-200). Filter remained patent for 3 days. Renal function remained stable.

These cases demonstrate that regional heparinization with protamine reversal in low flow ultrafiltration system is effective and safe with near normal systemic PTT and can be used in patients with cirrhosis where citrate based anticoagulation has significant potential toxicity.

ARTERIO-VENOUS GRAFT INFECTIONS: A COMPARISON OF THIGH AND UPPER EXTREMITY GRAFTS

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Arterio-venous graft (AVG) infection is a serious adverse event in hemodialysis patients, but there is limited literature describing its clinical presentation and complications. The present study compares the features of infection in thigh AVG vs. upper extremity (UE) AVGs.

We retrospectively queried our institutional computerized vascular access database, and identified all AVG infections requiring surgical excision at our institution during a 9-year period (2001 to 2009). If a patient had more than one AVG removed due to infection, only the first case was analyzed.

Of 132 patients having an infected AVG removed, 40(30.3%) had a thigh AVG and 92(69.7%) an upper extremity AVG. The median AVG age at the time of AVG infection was similar between the 2 groups (162 for thigh grafts vs. 168 days for UE grafts, p=0.35). The wound cultures were positive for 65% of thigh grafts and 52% of UE grafts, likely reflecting antibiotic therapy prior to graft excision. Among those patients with positive wound cultures, thigh AVG infections were more likely than UE graft infections to be caused by a Gram-negative rods (31% vs. 4%, p=0.003 by Fisher's exact test) (Odds ratio 10.22; 95% CI, 1.98 to 52.8). A metastatic infection occurred in 15% of patients with a thigh graft infection (3 with endocarditis, 2 with septic pulmonary emboli, and 1 with peripheral emboli), as compared with 3% of those with an UE graft infection (2 with endocarditis and 1 with peripheral emboli) (p=0.02 by Fisher's exact test) (Odds ratio 5.24; 95% CI, 1.24 to 22.1). The duration of hospitalization associated with the AVG graft infection was similar for both groups (10.8 ± 5.4 days vs. 8.7 ± 6.3 days, p=0.09).

In conclusion, thigh AVG infection occurs approximately at a similar time after graft creation in both locations. Thigh AVG infections are more likely to be due to a Gram-negative organism and result in metastatic infection, as compared to UE graft infection. Finally, the duration of hospitalization for AVG infection is comparable for both groups.

PROPOSED DIALYSIS PRESCRIPTION FOR ANURIC PATIENTS WITH SEVERE HYPONATREMIA

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Anuric hyponatremic patients present a therapeutic dilemma, as hemodialysis [HD] may expose them to rapid sodium [Na] and osmotic demyelination. Theoretically uremic toxins, which are slow to cross the blood brain barrier, may prevent CNS water loss to dialyzed, relatively hypertonic serum. However, a case of osmotic demyelination in a uremic patient has been reported despite Na correction rate of 3mmol/L/hr during HD (Huang, 2007).

An anuric 72 year old female presented to our institution with 1 week of emesis and lethargy. Her labs revealed BUN 97mg/dL, Cr 12.7mg/dL, HCO3 13 mmol/L, ionized Ca 1.00 mmol/L, Phos 11.6 mg/dL, Na 114 mmol/L. The lowest Na setting on our dialysis machines is 130 mmol/L. We started with a dialysis time of 3 hours (180 min). To avoid overly rapid correction, we attempted to limit the rise in serum Na to 2 mmol/L/hr, multiplied by 3 hours, to a total change of 6 mmol/L. Since the patient's estimated total body water [TBW] was 25 L, 6 mmol x 25 L would equal a maximum of 150 mmol Na added to the patients TBW for the entire HD treatment. Assuming that a slow blood flow would allow 100% equilibration between the patient's blood (114 mmol/L) and dialysate (130 mmol/L), the patient would have 16 mmol Na added to the blood for every L of clearance. We desired a maximum Na addition of 150 mmol in 3 hrs, and 16 mmol were added for every L, so we limited total clearance to 9 L. Holding clearance to only 9000 ml in 180 min required a reduction on blood flow to approximately 50 ml/min.

Using this approach, we were able to raise the patient's serum Na from 114 mmol/L to 119 mmol/L during her first HD treatment and from 119mmol/L to 123 mmol/L during HD the next day. Her serum Na did not change between dialysis treatments. She did not develop new neurologic symptoms. Her single pool urea reduction rate was 43%, and her uremic symptoms resolved. We believe this approach could be applied to other severely hyponatremic anuric/ESKD patients.

GERIATRIC ESRD: COMPARISON BY AGE GROUP AND DEMOGRAPHICS

Abdullah Quddus, Sravan Jasti. (Joslin Diabetes Center) Gurprataap Singh Sandhu, Jalaj Garg, Alexander S Goldfarb-Rumyantzev, Mark Williams (Beth Israel Deaconess Medical Ctr) Boston, MA. USA.

Geriatric patients comprise the fastest growing ESRD segment in the US but limited data on the population exists. Using USRDS data of all incident ESRD patients >70 yr old from 2003-2007 (N=176,156), we compared the patients by age groups (70-80 years, 80-90 years, 90-100 years) and demographics (Metropolitan, Micropolitan, Rural).

Age Group	70-80	80-90	90-100	P
Percent	62.11	35.07	2.82	
Metropolitan	61.55	35.51	2.95	
Rural	64.91	32.86	2.23	
Diabetes Prevalence	59.23	43.12	26	<0.0001
Primary disease DM	46.05	30.42	16.69	<0.0001
Primary disease HTN	32.68	46.67	58.29	<0.0001
Vascular Access AVF	14.07	12.09	7.96	<0.0001
Vascular Access Graft	4.97	4.57	3.42	<0.0001
Catheter	79.06	81.56	86.75	<0.0001

Racial distribution (%W,B) varied by location = Metropolitan (74,21), Micropolitan (83,15) and Rural (81,15). AVF as a vascular access (HR: 70-80=0.54, 80-90=0.5, 90-100= 0.64.), presence of diabetes (HR: 70-80 = 0.927, 80-90= 0.993, 90-100= 0.849), Black race (HR: 70-80= 0.83, 80-90=0.86, 90- 100 = 0.86) were associated with improved survival (all p<0.0001) regardless of demographic location. Age of ESRD onset (HR: 70-80=1.04, 80-90=1.044, 90-100=1.049) and Charlson index (HR: 70-8-=1.179, 80-90=1.25, 90-100=1.127) were associated with increased mortality (both p <0.0001). Geriatric ESRD patients differ by age groups(Primary Disease, AVF frequency) and demographics(Race).

RACIAL DISPARITIES IN MORTALITY OF ESRD ON HEMODIALYSIS PATIENTS FROM USRDS

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Relative Incidence of ESRD is approximately 4 times greater in African Americans(AA) than in Whites(W) and the mortality is approximately 45 percent lower in AA. Because less is known about ESRD racial disparities than for CKD, we explored the mortality outcomes using the USRDS database. We analyzed multiple determinants of dialysis outcomes in 163,658 patients from JAN 2006 to SEP 2007 using SAS for Statistical analysis.

For Incident dialysis patients , AA had a lower mean age (AA=59.1 VS W=65.9) and more were <70yrs (AA=74.13% VS W=55.18%).Hazard Ratios for death were lower in AA regardless of age group (<70= 0.875,70-80=0.820,80-90=0.83,>90=0.78). Prevalent AA had lower Charlson Index score(AA=6.1 VS W=7.07),higher BMI(AA=28.99 VS W=28.44), and more hypertension (AA=35.37%VS W=25.66%). Causes of death with greater prevalence in Whites included MI(W=6.4% VS AA=5.29%),CHF(W=4.61% VS AA=2.82%),pnemonia(W=2.57 %VS AA=1.87%) ,cirrhosis(W=1.05% VS AA=0.5%),COPD(W=1.01% VS AA=0.30%),malignancy(W=8.78 VS AA=7.35).Whites also had higher withdrawal from dialysis leading to death(W=13.17%VS AA=6.21%). (For all variables P <0.0001)

Early onset of ESRD, higher BMI,lower Charlson index,and higher prevalence of hypertension may be significant factors for better survival differences in AA . Withdrawal from dialysis, malignancy, COPD, cirrhosis, and cardiovascular disease may play an important role in higher ESRD mortality rates in Whites.

USE OF ELECTROLYTICALLY-PRODUCED SODIUM HYPOCHLORITE REDUCES INFECTIONS IN DIALYSIS FACILITIES

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USRDS estimates that 30% of dialysis patients receive antibiotics in a 6-month period. We used episodes of antibiotic administration as a measure of effectiveness of topical disinfection with sodium hypochlorite (ESH) solution in preventing CVC-related infections. We surveyed 226 facilities (n >20 patients each), recorded the CVC-preparation procedure (ESH vs iodine-based solution), determined episodes of antibiotic use as a surrogate to all-cause infection rates from 5/09 through 10/09, then compared the results by use or non-use of ESH. While exit-site infections could not be identified directly, to the extent antibiotic use systematically differed between ESH- and iodine-using facilities that were otherwise similar, a difference in exit-site infections was inferred. Of the facilities, 78.4% reported use of ESH. A total of 18.1% of patients in ESH facilities and 19.2% of patients in the iodine facilities used antibiotics at least once in 6 months ($p=0.09$). The observed rate of antibiotic use was lower in ESH facilities for most months of the study, but differences were not significant. Expressed in terms of antibiotic use per 1000 patient days, the overall inferred infection rate among patients with CVCs did not differ between facilities that used ESH and those that used an iodine-based solution (7.21 ±0.12 episodes per 1000 patient days versus 7.57 ±0.26 per 1000 patient days). We conclude that ESH use for CVC preparation is higher than expected, and that use of antibiotics is lower than that expected from USRDS estimates. Despite observed equivalence on a number of facility characteristics, unobserved confounding may still exist in this retrospective sample. Accordingly, prospective examination of the relationship between ESH use and access related infection is planned.

COLLABORATIVE OUTPATIENT MANAGEMENT OF RECURRENT MERKEL CELL CARCINOMA IN A HEMODIALYSIS PATIENT

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Merkel cell carcinoma is a rare but aggressive neuroendocrine skin tumor predominantly seen in Caucasians and immunocompromised patients. Being such a rarity, the therapeutic guidelines are far from defined, posing a great challenge in population subgroups such as those on dialysis. Local disease is usually managed by surgical resection. However, disease with extensive skin involvement is not amenable to such therapy. This has led to experimental use of platinum based chemotherapy with agents like carboplatin in combination with etoposide. These combination therapies are derived from experiences from small cell lung cancer treatment. Carboplatin is well known to cause cytotoxicity via direct DNA damage. This can be prevented by timely elimination of the drug by modality like hemodialysis.

We report a 68-year-old morbidly obese Caucasian male with history of DM, ESRD on hemodialysis who was diagnosed with Merkel cell carcinoma of left leg approximately 2 yrs ago. At that time, patient underwent surgical resection of the tumor followed by radiation. He remained in remission until recently when he presented with recurrence manifesting as multiple coin sized skin lesions involving his left leg. This time, the carcinoma was deemed to be far too extensive for any surgical intervention (Stage IIIbT2N2M0). Patient was initiated on chemotherapy regimen with carboplatin and etoposide for a total of six cycles. Carboplatin infusion was followed by outpatient hemodialysis within 1 hour of chemotherapy administration. Following six cycles of above chemotherapy, patient remains in remission with resolution of his skin lesions. He has had no adverse cytotoxic effects following chemotherapy.

Based on our experience, combination chemotherapy with platinum based drug for Merkel cell carcinoma can be safely used in patients with ESRD. However, a collaborative approach in ensuring almost immediate hemodialysis to prevent cytotoxicity without limiting therapeutic effectiveness is needed.

HEALTH-CARE PROFESSIONALS DIALYSIS MODALITY SELECTION SURVEY.

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In US >93% of the patients are treated with in -center hemodialysis(HD) about 7% undergo peritoneal dialysis(PD) and less than 1% are on home HD. Above fact depicts the choice trends among patients but also reveals that home dialysis therapies are clearly underutilized. There is scarce data on what a heathcare professional would choose for themselves.

We conducted an anonymous survey via link from a survey generating website accessible through the internet. The survey consisted of seven questions aimed at assessing choice a health care provider would make for themselves. We posed these questions to physicians, nephrologists,nurses,dialysis nurses and nephrology fellows in training. Preliminary results suggest that 51.2% of health care professionals chose PD to be their choice of therapy. Among those who chose HD 87% chose one of Home HD modality with only 13% choosing in-center HD; far from evident in our current US statistics for ESRD patients. 45.7% chose Nocturnal Long HD(6-8 hr,3 times/wk) ,31.5% Daily Short Home HD(2-3 hr,5-6 times/wk), 9.8% Home HD (3 hr 3times/wk).70.5 % chose a modality based on a belief of better outcomes of one over the modality.57.3% responders reported the quality of life to be the specific outcome which was better for the modality they opted for with 35.4% choosing the modality based on better morbidity, mortality and survival data. In center HD was the modality most health care providers were comfortable discussing with their patients with only 18.7 % being comfortable in discussing PD.

There is an urgent need for research in this area to explore the preferences of the physicians and health care providers for themselves which might have bearing on what their patients might opt for. Health care professionals perceptions about choice of modality are surprisingly not reflected in the choice their patients are making.

HEPATIC CYST RUPTURE AS A PRESENTING FEATURE OF ADPKD

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Although the PKD gene mutation has a 100% penetrance of kidney cyst formation, a majority of the affected individuals are asymptomatic or symptoms are mild at the early stages of ADPKD. To our knowledge, acute abdomen due to liver cyst rupture as a presenting feature of ADPKD has not been previously described.

A 45-year-old Caucasian female, previously healthy, developed acute onset upper abdominal pain associated with nausea, vomiting and abdominal distension. Apart from taking oral contraceptive pills, she was not on any other medication. She had four pregnancies in the past and had delivered 5 full term babies. She denied a known family history of ADPKD. The physical examination was remarkable for tenderness in right upper quadrant, guarding and increase in abdominal girth. Laboratory studies revealed normal blood counts, renal function, and liver enzymes. Abdominal and pelvic computed tomography showed perihepatic ascites along with multiple cysts in the liver and bilateral kidneys, consistent with ADPKD. No other abnormality was identified. She received antiemetic and analgesics and her symptoms subsided within 24 hours. On three months follow-up, she remained asymptomatic, and the ascites had resolved completely.

This case indicates that sudden rupture of hepatic cyst can occur and be an initial presenting feature of ADPKD. High level of estrogen exposure because of multiparity and oral contraceptive use might have contributed to the liver cyst growth and rupture in this patient.

ASYMMETRIC DIMETHYL L-ARGININE IN HEMODIALYSIS PATIENTS WITH AND WITHOUT PULMONARY HYPERTENSION

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End stage renal disease (ESRD) patients are at increased risk for developing pulmonary hypertension and those with pulmonary hypertension are at increased risk for mortality. Asymmetric dimethyl L-arginine (ADMA), an inhibitor of endogenous nitric oxide synthase, is associated with primary pulmonary hypertension and has previously been found to be elevated in some patients with renal failure. The purpose of this study was to determine if there is a difference in serum ADMA levels amongst ESRD patients with and without pulmonary hypertension.

We studied 20 subjects with ESRD that had available echocardiogram data from a single outpatient hemodialysis center. Serum ADMA levels were measured using a commercial ELISA kit in 11subjects with PASP > 35mm Hg, 9 subjects with PASP < 35 mm Hg, and 10 control subjects without renal disease.

Patients with ESRD had significantly higher levels of ADMA than normal controls (0.72 vs. 0.48 μM/L respectively; $p<0.001$). ADMA plasma levels in ESRD patients with and without pulmonary hypertension were similar (0.77 vs. 0.684 μM/L respectively; $p=0.21$) . The 2 ESRD groups were similar in regards to sex, age, PTH, calcium, phosphorous, and hemoglobin. The mean Kt/V was > 1.20 in both groups.

In conclusion**,** ADMA levels are increased in patients with ESRD as compared to normal controls without renal failure. However, we were unable to detect a significant difference in plasma ADMA levels in ESRD patients with and without pulmonary hypertension.

PSYCHOSOCIAL BARRIERS TO HOME DIALYSIS: A LITERATURE REVIEW

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Home dialysis has been a viable treatment option for ERSD since the 1960's for hemodialysis and the mid-70's for peritoneal dialysis. The current rate of home dialysis is 12.9% in Canada, whereas worldwide rates reach as high as 40%. In Ontario, Canada, the goal is to increase the use of peritoneal dialysis to 30%. The psychosocial barriers facing home dialysis patients can easily be taken for granted. Social work has a key role to play in supporting the success of home dialysis programs.

This review explores the challenges and successes of home dialysis. The literature identified multiple psychosocial barriers: physical and cognitive ability, mental health, patient attitudes and personality, emotional impact on the patient and family, presence of helper for treatments, patient's adherence with procedures, cultural issues, suitability of patient's home, support from the medical team, time constraints, cost to patient, patient education on the benefits of home dialysis, staff support for expanding home dialysis, learned helplessness of in-centre dialysis patients, and loss of relationships with peers.

Assessment tools addressing potential barriers to home dialysis already exist (MATCH-D, JPat). However, the need for a more comprehensive tool assessing both practical and social issues is indicated. To this end, the authors have developed and are testing a new tool; the PATH-D (Psychosocial Assessment Tool for Home Dialysis).

RELATIVE MORTALITY IN DAILY HOME AND MATCHED, THRICE-WEEKLY IN-CENTER HEMODIALYSIS PATIENTS

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Alternatives to thrice-weekly in-center hemodialysis (3xIHD) may improve patient survival. Frequent hemodialysis was associated with significant improvement in the composite endpoint of death or increase in left ventricular mass in a randomized clinical trial, but the trial was too small to precisely measure the effect of frequent hemodialysis on mortality alone (10.1056/NEJMoa1001593). We compared mortality in daily home hemodialysis (DHHD) and matched 3xIHD patients in a retrospective cohort study. Exposed patients included those initiating DHHD (NxStage System One) in 2005-2007, as indicated by provider registry data. We linked patient data to the United States Renal Data System (USRDS) registry, and retained those who either had Medicare as the primary payer for ≥ 3 mo before DHHD initiation or began renal replacement therapy (RRT) ≤ 6 mo before initiation. For each DHHD patient, we selected 5 controls from the USRDS registry. Each control underwent 3xIHD on the exposed patient's DHHD initiation date. Controls were matched according to an ordered set of covariates: age, prior hospitalization days, prior epoetin alfa dose, body mass index, transplant waiting list status, congestive heart failure, RRT duration, race, cancer, primary end-stage renal disease cause, stroke, peripheral vascular disease, other cardiac disease, diabetes, ischemic heart disease, gender, and dual eligibility for Medicare and Medicaid. We conducted an intent-to-treat analysis, with follow-up to the earlier of death or Jun 30, 2008. The cohort included 1957 DHHD patients and 9785 controls. All measured covariates except dual eligibility were balanced. Mean follow-up was 1.3 yr in both DHHD patients and controls. Estimated survival for DHHD vs. 3xIHD patients was 89 vs. 87% and 79 vs. 77%, at 1 and 2 yr, respectively. In a Cox model, the hazard ratio for DHHD vs. 3xIHD was 0.87 (95% CI, 0.76-0.97, $P = 0.01$). Over a relatively brief follow-up interval, DHHD was associated with significantly lower risk of death. The estimated effect was smaller than previously reported (Blagg, *HDI*; Kjellstrand, *NDT*; Miller, *JASN*), likely owing to superior control of confounding. Further studies are needed to assess the effects of DHHD on morbidity, including cardiovascular disease and infection.

PREVALENCE AND SEVERITY OF HYPERTENSION AND ASSOCIATED LIFESTYLE FACTORS IN A RURAL COMMUNITY IN WEST AFRICA.

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Rates of hypertension may be on the rise in Sub Saharan Africa. Establishing the burden of disease and community needs is essential to planning and implementation of public health practice. The purpose of the present study was to establish the prevalence and severity of hypertension in the rural community of Ouesse, Benin and to identify any modifiable risk factors. 154 persons presented for screening. Of these, 101 had a known history of hypertension. 53 individuals were without known history of hypertension and were used to determine prevalence. The other 101 were evaluated for control and medication use. All were interviewed for other CV and lifestyle risks. The prevalence of hypertension was 28.3%, in those with no known history. Other cardiovascular risk factors were low, obesity <10%, smoking 7%, reported diabetes 4% and physical activity high. (90% walk more than 30 min/ day). However, 27% reported no daily fruit/ vegetable intake and 85% salted food. In those with known HTN, control was poor with only 24.8% with a BP of < 140/90 and 54% stage 2 HTN. Only 56.5% were on BP meds. 67% were not aware of consequences of HTN. In summary, the prevalence of HTN is high and control is poor even in this remote rural community with a non sedentary lifestyle. Salt intake is high, fruit/ vegetable intake low. Potential areas for intervention include education about salt, diet, HTN consequences, need for screening and continued regular physical activity. As urbanization occurs with a more sedentary lifestyle, hypertension rates may rise further as may obesity and diabetes.

TAKAYASU'S ARTERITIS: THREE PRESENTATIONS IN HISPANIC PATIENTS AND COMPARISONS WITH OTHER POPULATIONS.

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Takayasu's arteritis (TA) is a medium and large vessel vasculitis, it is defined as a non-specific aortitis that usually involves the aorta and its branches. Its etiology is still unclear and its complications are diverse and severe and include stenosis of the thoracic and abdominal aorta, aortic valve damage and regurgitation, and stenosis of the branches of the aorta. Carotid stenosis, coronary artery aneurysms, and renal artery stenosis resulting in renovascular hypertension are reported sequellae of Takayasu's arteritis.

The disease was first described in Japan but has also been noted to be commonly encountered in India and Mexico. Its incidence in the United States has been quoted as 2.6 patients per 1,000,000 people/year. In Japan its incidence is 3.6 patients per 1,000,000 patients per year and prevalence is 7.85 patients per 100,000 per year. The natural history of this disease, which is commonly present in Asian populations, has only recently been studied in Hispanic patients despite the notable incidence and prevalence of Takayasu's aortitis in Mexican, South American, and Indian populations. Here we present three cases of Hispanic patients who presented with Takayasu's arteritis at Olive-view-UCLA medical center (OVMC).

We compare and contrast their clinical and radiographic presentations with non-Hispanic patients who presented with this disease. Finally we review the literature to compare and contrast the clinical features of our three patients with data from more traditional Takayasu's arteritis populations.

MAGNITUDE OF INTERARM BLOOD PRESSURE DIFFERENCE IN INPATIENTS WITH HYPERTENSION AND CKD

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Hypertension guidelines, such as JNC 7, recommend that blood pressure (BP) be assessed in both arms at the initial visit. The goal of our study was to determine if there is a significant difference in interarm BP in hospitalized patients with history of hypertension at our institution, and if this difference was greater in those with CKD, as defined in this study by GFR less than 60ml/min by the MDRD formula. Charts of 94 hospitalized patients with history of hypertension were reviewed from a University Hospital. Data obtained included age, race, gender, GFR by MDRD formula, and BP measurements from both arms. BP was measured in a seated position with arm at heart level using DINAMAP blood pressure monitor.

40 patients (43%) had interarm SBP difference > 10mmHg, with mean 13.2± 2.0. Of these patients, 21(55%) had SBP greater in left arm and 17 patients (45%) had SBP greater in their right arm.

Of the 94 patients, 34 patients (36%) had CKD and 21 of those patients (62%) had interarm SBP difference > 10mmHg ($p < 0.01$). Overall, DBP interarm difference >5mmHg was only noted in 27 patients (29%), mean 6.2±1.2. There was not a significant difference in interarm DBP in patients with and without CKD.

In conclusion, our study shows that there is a difference in interarm SBP in patients with hypertension and the difference is significant in patients with CKD. It is not known which arm BP should used for continued assessment. More studies are needed to evaluate the cause and prognostic significance of such variation.

INTRADIALYTIC HYPERTENSION IMPROVES WITH MAXIMIZED ULTRAFILTRATION AND THE USE OF NONDIALYZABLE ANTIHYPERTENSIVE AGENTS

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Intradialytic hypertension (IDH) has been described as an increase in systolic blood pressure (SBP) ≥10 mm Hg during or immediately after hemodialysis. This study sought to determine whether IDH in hemodialysis patients is associated with volume excess, changes in electrolytes, lack of use of nondialyzable antihypertensives or timing of erythropoietin (EPO) injection.

Twelve patients, 18 years of age or older, with IDH were included. Six treatments were performed with maximized ultrafiltration by sequential decrease in dry weight until patients experienced symptomatic hypotension or need for saline infusion. Serum sodium, potassium, calcium, glucose and albumin were measured pre and post treatment. Antihypertensive usage as well as timing of EPO were recorded. Nondialyzable antihypertensives such as calcium channel blockers or angiotension II receptor antagonists were added if SBP did not respond to volume removal.

Ten patients completed the study. Two patients were removed because of inability to reach estimated dry weight (EDW). Six participants had a decrease in IDH after maximized ultrafiltration. The mean intradialytic increase in SBP pre ultrafiltration in those 6 patients was 38.1 mm Hg ± 5.25 which decreased to 26.3 mm Hg ± 3.72 ($p=0.011$) post ultrafiltration with one patient cured of IDH. The other four patients were placed on a nondialyzable medication. IDH resolved in three of those four patients. Serum potassium levels decreased by 1.2 mEq/L ± 0.4 ($p=0.001$), glucose levels decreased by 33.5 mg/dL ± 25.5 ($p=0.023$) and serum albumin levels increased by 0.4 g/dL ± 0.2 ($p=0.01$). Improvement in IDH with ultrafiltration and nondialyzable antihypertensives occurred despite these electrolyte changes. Sodium and calcium levels did not change. EPO administration did not influence SBP changes.

IDH can be improved by maximized ultrafiltration and nondialyzable antihypertensives. Ninety percent of patients improved, while forty percent were cured of IDH by the use of these maneuvers.

EXPRESSION, DISTRIBUTION, AND CELLULAR LOCALIZATION OF THE NOVEL PLASMINOGEN RECEPTOR, PLG-R_{KT}, IN MURINE KIDNEY

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Recent work suggests a key role for the plasminogen activation system in the proteolytic processing and activation of the epithelial sodium channel (ENaC), providing an important mechanism for the sodium retention associated with nephrotic syndrome, in which increased plasminogen concentrations are present in urine. We recently identified a novel transmembrane plasminogen receptor, PLG-R_{KT}, which markedly enhances cell surface activation of plasminogen to the active protease plasmin. We also recently demonstrated that PLG-R_{KT} is expressed as a membrane component in renal epithelial cell lines. Here, we investigated the expression, distribution, and cellular localization of PLG-R_{KT} in murine kidney. C57Bl6 mice were perfused *in situ* with 4% paraformaldehyde. Kidneys were dissected, removed, and fixed in 4% paraformaldehyde, placed through a sucrose gradient and then frozen in OCT medium. Sections (10 μM thick) were immunostained with antisera specific for PLG-R_{KT}, as well as the urokinase receptor (uPAR, another key component of the plasminogen activation pathway), and γENaC, followed by fluorescent labeled secondary antibody, and examined using high resolution laser scanning confocal microscopy. PLG-R_{KT} was prominently expressed in proximal and distal nephron segments, particularly in the distal tubule and collecting duct. PLG-R_{KT} was observed primarily on the apical surface, with some labeling also in a punctate distribution in the cytoplasm, in a pattern that was similar to that observed for γENaC. uPAR (a GPI-linked membrane protein) was primarily observed in the distal nephron, and was almost exclusively on the apical surface. PLG-R_{KT}, uPAR, and ENaC, all co-localized at the apical surface in the distal nephron. These results demonstrate that PLG-R_{KT}, uPAR, and ENaC are co-localized on the apical surface in the distal nephron *in vivo*, and are present in an orientation to promote plasminogen activation and ENaC processing.

HYPERTENSION CONTROL IN RESIDENTS' CLINIC: HOW WELL ARE WE DOING AT THE POINT OF CARE?

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Hypertension control in the residents' panels at the Mayo Clinic Rochester, MN is about 55%. Information gathered from clinical audit sessions indicate that providers feel that elevated blood pressure may not rank highly on the priority list in the limited times provided for acute visits. Furthermore, some providers indicated not being aware of instances of elevated blood pressure until the end of an office visit as physicians do not measure patient's vitals themselves because this is done prior as part of the rooming process. We hypothesized that failure to acknowledge and address cases of elevated office blood pressures may be playing a role in the low control rates. A review of the charts of all patients seen on two days in the residents' clinic at the Primary Care Internal Medicine Clinic at Mayo Clinic Rochester was done. Charts were reviewed for systolic and diastolic blood pressures above 140 and 90 mm Hg respectively and the provider's plan assessed for acknowledgment of such and documentation of a plan to address this. 7 out of 93 charts reviewed (7.5%) had elevation of either systolic or diastolic blood pressures or both. 3 of the 7 (43%) of these were not acknowledged and did not have a documented plan to address the elevated blood pressure. These results suggest that certain instances of blood pressure elevation at office visits may be going unnoticed and alert systems may be necessary for providers in settings where blood pressure measurements have been uncoupled from physical examinations.

QUALITY ASSESSMENT STUDY FOR THE MANAGEMENT OF HYPERTENSION (HTN) IN AN OUTPATIENT CLINIC.

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The purpose of this study is to analyze physician adherence to JNC 7 guidelines and factors affecting the same. A cross-sectional study was done on patients who had established history of hypertension.

A total of 558 patients (mean age=62 years, M:F=1:1.2), on an average, had 2 cardiovascular risk factors per patient and 2 anti-hypertensive agents prescribed per patient (ACE I or ARB in 49.2%, thiazide diuretic in 44% and beta-blocker in 29.3%). Blood pressure (BP) was controlled in 54.4% of patients but adherence to guidelines was seen in only 36% of visits. Less than a third of total patients had documented lifestyle modification counseling, one-fifth of those with uncontrolled hypertension were given appointment for BP recheck within 4 weeks, and 7.8% of them had their medications altered. Compelling indications for appropriate drug therapy were found in 41% of patients and 76% of those were prescribed with at least one of the recommended drugs. Either ACE I or ARB was given to 54.2% of CKD patients, 79.8% of diabetics, 51.2% of TIA/stroke and 59.3% of heart failure patients. Beta-blocker was used in 61.1% of patients with CAD and 40.7% with heart failure. Regression analysis revealed adherence to be significant only in relation to sex (M>F, $p=0.03$). Chi-square test results showed adherence not affected by age ($p=0.2$), number of risk factors ($p=0.56$), presence of compelling indication ($p=0.20$) or visit with the primary care physician ($p=0.50$); physician adherence affected BP control significantly ($p<0.0001$).

Physician adherence to guidelines in HTN management in outpatient setting is less than optimal. Achieving numerical BP target may be misleading, as that might be asynchronous with adherence. Physician adherence is more in male patients and affects BP control significantly.

EVALUATION OF MEDICATION USAGE AND RESISTANT HYPERTENSION RATES BY PLASMA RENIN ACTIVITY (PRA) WITHIN A LARGE ETHNICALLY DIVERSE POPULATION

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We sought to examine antihypertensive medication usage patterns and rate of resistant hypertension within hypertensive patients who had workup with plasma rennin activity (PRA) levels. In the period 01/01/1998 - 12/31/2009, patients who had documented hypertension and measured PRA levels were identified and then categorized into population quartiles based on PRA levels. Patients were considered to be on concurrent antihypertensive medications if there was greater than 30days of overlap in medication dispensation. Resistant hypertension was defined as any patient on 4 or more concurrent medications.

A total of 7,887 patients were identified for inclusion in the analysis and ranges of PRA by quartile were (ng/ml) <0.51, 0.5-1.4, 1.4-3.7, and >3.7. Within the cohort, 91% of the patients were on a minimum of 1 antihypertensive medication and 45% required 3 or more medications. 25% of the cohort had resistant hypertension as defined by need for 4 or more medications. The lowest quartile of PRA had the greatest number of resistant hypertension with 9% (739) followed by the 2nd lowest quartile with 6% (492).

Resistant hypertension and antihypertensive needs were most prevalent in the lowest quartile of PRA in hypertensives tested within a large ethnically diverse hypertensive population. Our results suggest that lower PRA and thus volume associated hypertension significantly impacts hypertension control.

PREVALENCE OF RECURRENT INTRADIALYTIC HYPERTENSION

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Intradialytic hypertension (IH), defined as an increase in systolic blood pressure (SBP) from pre to post hemodialysis (HD), is associated with increased mortality. The prevalence of IH is estimated to be 15% in the HD population based on brief study periods lasting less than 2 weeks, but its prevalence over longer time periods and how consistently individual patients have IH remain unknown. The purpose of this study is to determine the prevalence of IH over 6 months and assess the accuracy of the criteria used to define recurrent IH.

We analyzed pre and post-HD SBP measurements obtained by automated sphygmomanometers for every HD session among all prevalent HD patients in our academic practice from January 25 to August 10, 2010. We defined IH as an SBP increase $\geq$ 10 mmHg from pre to post-HD, and defined recurrent IH as IH occurring in $\geq$4 out of any 6 consecutive treatments at on at least 2 separate occasions. We identified the prevalence of single and recurrent episodes of IH, and determined the sensitivity and specificity of our diagnostic criteria.

Of 363 subjects, the mean age was 54.2 years (±12.3), 60% were male, 59% African American, and 34% Hispanic. IH occurred in 21.3% of 22,865 treatments and occurred at least once in 98.1% of subjects during 6 months. Subjects had IH in 0-89.9% of their treatments (median 17.7%, 25^{th}-75^{th} percentile 8.9-31.4%). Recurrent IH occurred in 104 subjects (28.9%). The sensitivity, specificity, and likelihood ratio in identifying subjects with IH in at least 50% of treatments was 100%, 77.6%, and 4.47 for the recurrent IH criteria.

Intradialytic hypertension intermittently occurs in most HD patients, and is a recurrent event in almost 30% of patients. Our criteria for recurrent IH has high diagnostic accuracy for identifying subjects with this BP pattern in more than 50% of their treatments over 6 months. Differences in clinical outcomes between patients with different frequencies of IH remain to be determined.

SEX STEROID HORMONE LEVELS ARE NOT ASSOCIATED WITH NEPHROLITHIASIS RISK IN MEN

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Sex steroid hormone (SSH) levels have been hypothesized to play a role in the higher nephrolithiasis (NL) prevalence in men, but this has not been extensively studied. The purpose of this study was to determine if baseline SSH levels or annual rate of change of these hormones were associated with an increased risk of NL.

A randomly selected cohort of white men, aged 40-79 years in 1990, from Olmsted County, MN was enrolled in the study. A sub-sample of the participants contributed a blood draw, and men reported whether they had ever had a kidney stone. All assessments were repeated biennially through 2007. Testosterone and bioavailable testosterone levels were measured on serum samples from six rounds of follow-up. Estradiol levels were measured on samples from four rounds of follow-up. Rates of change over time in the SSH levels were assessed using multivariable mixed models. Associations between baseline levels and rates of change in the SSH levels and incident NL were estimated with Cox proportional hazard models.

In this cohort of 648 men, 102 (15.7%) reported ever having a kidney stone, and 41 (6.3%) developed a first stone during a median of 12.8 years (Q1, Q3: 5.4, 14.2) follow-up (incident cases). In multivariate analyses, baseline levels of testosterone, bioavailable testosterone and estradiol were not associated with risk of NL during follow-up (p= 0.98, 0.70, and 0.17, respectively). Furthermore, annual rates of change in SSH levels were not associated with incident NL risk (p=0.34, 0.34, and 0.31, respectively).

Therefore, baseline levels and rates of change in SSH levels were not associated with NL in men. Factors other than SSH levels may explain gender differences in NL risk.

PREDISPOSITION FOR NEPHROLITHIASIS BASED ON WATER SOURCE

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The effect of water calcium content on the risk of nephrolithiasis remains uncertain. Earlier studies suggested that increased water calcium content had no association or an inverse association with the risk of renal stone formation, despite the fact that increased water calcium content can be associated with an increase in urinary calcium content by as much as 50%. A subsequent study showed that consumption of well water was associated with a 1.5 increased risk for renal stones, although no quantitation of urinary calcium was performed.

We present a case of a 32 year-old female followed in the Nephrology Stone clinic for nephrolithiasis of uncertain type. In May 2007 urinary calcium was 420 mg/day, tested while using her home well water. In November 2007 and February 2009 urinary calcium dropped to 259 mg/day and 173 mg/day, respectively, while drinking bottled water. In December 2009 she went back to her own well water supply and her 24 hour urinary calcium was 409 mg/day. Again, the 24h urinary calcium dropped to 180 mg/day on her parents water supply in September 2010. Urinary oxalate remained low, with urinary citrate maintained greater than 300 mg/day, which was especially elevated when on her home water source. The urinary pH and volume did not vary significantly and under collection was ruled out by history.

The disparity in 24 hour urinary calcium was associated with water source in this case, with episodes of significant hypercalciuria occurring on home well water. Hyperparathyroidism, vitamin D excess, and sarcoidosis were not present. Hypercalciuria has been shown to increase the risk of nephrolithiasis, but no association between water calcium content or water source has been found. Clearly supersaturation, oxalate, citrate, pH, and volume are involved in this multi-factorial problem, but urinary calcium itself was the most pronounced finding on the 24 hour collections in this case. Our case would suggest that well water may be independent risk factor for nephrolithiasis and deserves further investigation in individual cases.

VITAMIN D STATUS AND CALCIUIRIA IN CALCIUM OXALATE NEPHROLITHIASIS

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Idiopathic hypercalciuria is the most common cause of calcium containing kidney stones. The pathophysiology of hypercalciuria appears to be related to dysregulation of calcium transport and may be related to calcitriol and interaction with vitamin D receptor. Vit D deficiency is highly prevalent in the adult population. The recent Institute of Medicine report raises concern about administration of high doses of vit D as a risk for hypercalciuria and kidney stones. The purpose of this study was to assess whether there is an association with vit D status and calciuria in a cohort of calcium oxalate stone formers.

Between 2005 and 2009, 136 subjects (60 males) with history of calcium oxalate nephrolithiasis who met the criteria of having obtained a calcidiol level within 90 days of obtaining a metabolic urine evaluation consisting of 2 sequentially obtained 24 hr urine collections. Subjects undergoing treatment for hypercalciuria or with documented hyperparathyroidism were excluded. Calcidiol concentration was significantly correlated with the magnitude of calciuria ($p<0.05$). Low calcidiol level defined as < 30 ng/ml. Sixty seven (24 male) subjects had low calcidiol levels (21+6) compared to 69 (36 male) subjects who had adequate calcidiol levels (43+10). Median urine calcium was slightly higher in those with adequate calcidiol (195 v 163; $p=0.06$). The positive association of urine calcium with calcidiol was a function of subjects with low vit D as once calcidiol levels were > 30 ng/ml there was a negative, however nonsignificant association with magnitude of calciuria.

Thus, in calcium oxalate stone formers, there is a direct correlation between calcidiol level and magnitude of calciuria. However, in those who are vit D sufficient, this correlation no longer exists. This preliminary cohort analysis suggests that in calcium stone formers who are vit D replete, there is no association between calcidiol level and magnitude of calciuria.

ASSESSMENT OF PATIENT EDUCATION MATERIALS FOR NUTRITIONAL COUNSELING IN CHRONIC KIDNEY DISEASE (CKD)

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Patient education materials (PEM) are an important but variable component of dietary counseling in kidney disease. The objective of this study was to evaluate visual, formatting, and content characteristics of available nutrition materials for patients with CKD.

PEMs written in English, addressing nutrition in CKD were obtained from organization websites or by direct solicitation including international sources. Two independent experts reviewed each PEM and scored them on 135 different criteria describing medical content, literacy demand, behavioral activation, and format. SMOG and Flesch Kincaid formulas were used to assess readability.

A total of 41 PEMs, written in English, addressing nutrition in CKD, were identified. The nutritional counseling content varied and included: methods of assessment, nutrient details, therapies, and self management recommendations. The format of the PEMs included 56% booklets/pamphlets and 44% fact sheets. The majority of PEMs included information about sodium (54%), dietary protein (46%), limiting fluid (34%), phosphorus (25%), and potassium (48%) intake. The mean readability grade of the materials by Flesch Kincaid formula was 7.2 (3.5-13.7) and by SMOG formula was 9.1 (7.3-15.8). Further, 29% of PEMs by Flesh Kincaid, and 70% by SMOG, required a reading level $>8^{th}$ grade. Fifteen materials were updated recently. Usage of tables and illustrations in PEMs was 45%, appropriateness of images was 43%, and emphasized benefits of adopting the desired behaviors were 37%. Only 9 (22%) of the PEMs included interactive sections to promote goal setting and shared decision making between patients and providers. Overall 20 (49%) of the PEMs were nutrient specific and 10 (23%) of the PEMs were comprehensive.

CKD care is complicated and many nutritional patient education materials may be challenging for vulnerable patients to understand and apply. Standardization and optimization of content and interactivity of PEMs in chronic kidney disease may improve participation and success of self-care behaviors.

IS NUTRITIONAL STATUS ASSOCIATED WITH SELF-REPORTED SLEEP DURATION OR SLEEP QUALITY IN THE HEMO STUDY COHORT?

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There is limited research on the effects of nutritional status on sleep duration (SD) or sleep quality (SQ) in hemodialysis patients. We explored the relationship between SD and SQ, and common nutrition indices in 1846 subjects in the HEMO Study, a randomized, prospective, multicenter clinical trial. Self-reported SD (hrs) in the last 24 hrs and SQ in the past 4 weeks (1 = poor quality; 10 = high quality) were assessed annually using questions from the KDQOL instrument. Repeated measures of analysis were used to analyze the relationship between SD and SQ and independent measures. The model included case-mix, biochemical, anthropometric, dietary intake, comorbidity and functional status variables, and Kt/V and flux randomized assignments.

Mean SD and SQ were 7.8 ± 2.4 hrs and 6.1 ± 2.4, respectively. SD decreased by -0.246 (P=0.019) and -0.154 hrs (P=0.001) for each 1 unit increase in serum albumin and appetite rating on dialysis days (DD), respectively. Demographic and case-mix multivariate predictors for SQ were (Estimate, P value): age (0.025, <0.0001); presence of diabetes (-0.58, 0.0038); primary cause of ESRD (diabetic nephropathy vs. hypertension) (-0.53, 0.01); race (Black vs. White) (0.35, 0.012); and non-smoker (0.205, 0.05). Other significant predictors of SQ were:

Variable	β coefficient	*P* value
Serum creatinine	0.0037	0.03
Appetite rating (on DD)	-0.1735	<0.0001
Appetite rating (on non-DD)	-0.2709	<0.0001
ICED score	-0.1303	0.0099
Karnofsky score	0.0088	0.0008

Older age, Black race, non-smoker, higher serum creatinine and higher functional ability were associated with high SQ, whereas presence of diabetes, diabetic nephropathy, poor appetite on both DD and non-DD and more severe comorbid disease were associated with poor SQ. These findings support the position that SQ is associated with nutritional status. Further work should be done to understand whether improving SQ would positively impact nutritional status in patients undergoing maintenance hemodialysis.

NUTRITIONAL STATUS INDICATORS AND HEALTH-RELATED QUALITY OF LIFE AMONG PARTICIPANTS IN THE DIALYSIS OUTCOMES AND PRACTICE PATTERNS STUDY (DOPPS)

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Using data from the international DOPPS cohort, we explored the relationship between HR-QoL and nutritional status indicators, specifically serum albumin (ALB), phosphorus (PHOS), normalized protein catabolic rate (nPCR), and body mass index (BMI). DOPPS participants (N=12,420) from the first three phases of DOPPS (1996-2008) in 12 countries were included. HR-QoL was assessed using the patient self-administered Kidney Disease Quality of Life Short Form (KDQOL-SF^{TM}) and summarized as the physical component summary (PCS) and the mental component summary (MCS) scores. A Center for Epidemiological Studies Depression Screening Index (CES-D) score ≥10 was considered indicative of possible clinical depression. Generalized estimating equations and linear mixed models were used to identify nutritional status indicators s associated with HR-QoL in models adjusted for demographics and accounting for facility clustering effects.

Lower ALB ($p<0.0001$), lower nPCR ($p<0.0001$), very low (≤ 18 kg/m^2) ($p=0.006$) and very high (> 30 kg/m^2) BMI ($p<0.0001$) were associated with poorer PCS scores. Lower ALB ($p<0.0001$), lower nPCR ($p=0.003$), and very low BMI ≤ 18 ($p=0.004$) were also associated with lower MCS scores. Lower ALB ($p<0.0001$) and lower nPCR ($p=0.042$) were the only two indicators predictive of a high CESD score.

Routine nutritional status indicators, namely ALB, nPCR and BMI, are strong predictors of HR-QoL, and may be assistive in the early identification of problems in HR-QoL and its subsequent management.

PATIENT EXPERIENCE WITH AN INTERACTIVE WEB-BASED PHOSPHORUS EDUCATION TOOL

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On-line education tools are becoming increasingly popular yet the level of patient participation and the utility of these tools is unclear. The 30-day Phosphorus Challenge, a web-based tool open to the general public, is designed to educate kidney patients, family members, caregivers, and health care teams through phosphorus-related emails, games, educational content (articles, recipes, handouts, videos) and community board-based social interaction. We evaluated the effectiveness of this interactive tool in increasing phosphorus knowledge and improving phosphorus control in dialysis patients.

Forty-three dialysis patients from 22 dialysis centers geographically spread across the US, enrolled in the Phosphorus Challenge Evaluation and 24 (56%) completed the pre and post tests and had phosphorus lab values available for each time point. On a test of 6 knowledge questions, these 24 patients got an average of 0.8 more questions right after the intervention: 14 patients improved their scores while only 2 declined. The mean phosphorus level change of -0.20 was not statistically significant in a paired t-test (p=0.44, 95% CI: -0.72, 0.32). Twelve patients experienced declines in phosphorus levels, while 11 experienced an increase, and 1 was unchanged.

	Mean Questions Answered Correctly	**Phosphorus (mg/dL)** mean ± SD
Pre-challenge	4.2	5.93 ± 1.39
Post-challenge	5.0	5.73 ± 1.51

In the post survey, over 75% felt they learned something about phosphorus and greater than 90% felt more confident about making lower phosphorus food choices after taking the challenge.

The Phosphorus Challenge had a positive impact on phosphorus levels and knowledge for approximately half of those who completed it, suggesting the Phosphorus Challenge offers a unique interactive approach to patient education that is readily available for patients and caregivers who have internet access.

SOCIODEMOGRAPHIC PREDICTORS OF HEMODIALYSIS DIETARY PROBLEMS. Maya Clark[1], Mary Ann Sevick[1,2], Ann Steenkiste[2], 1. University of Pittsburgh and 2. VA Pittsburgh Healthcare System; Pittsburgh, PA, USA

Self management of dietary sodium and fluid restrictions is paramount for patients requiring hemodialysis (HD), though not easily achieved. Tailored interventions may be helpful for assisting HD patients in following their diet. The influence of sociodemographic characteristics on HD Dietary Problems was examined using baseline data from 83 participants enrolled in the ongoing BalanceWise-HD Study. A 34-item, 5-point scale (1=not a problem, 5=very important problem) investigator-developed instrument was used to characterize the extent of various potential problems in determining ability to follow the HD diet. Subscales measured physical health, motivation, resources (e.g. time, money, availability of food), social network, and technical aspects of the diet (e.g. portion sizes, sodium content). Forty-nine (59%) participants were male, 49 (59%) Caucasian, 36 (43%) married, and 26 (31%) participants described their annual household income as inadequate for meeting their basic needs. Dietary problems associated with the social network were more important for Caucasians than minorities (p=0.014). Physical health problems were marginally more important for females than males (p=0.067). Technical problems related to diet were marginally more important for those married or living as married than single (p=0.064). Results pertaining to adequacy of income appear below.

Income adequate to meet needs? Subscale:	NO (N=26) Mean(SD)	YES (N=54) Mean(SD)	DK (N=3) Mean(SD)	p
Physical health	2.3(1.3)	1.8(0.9)	3.1(0.8)	0.052
Resource adequacy	2.0(0.8)	1.5(0.6)	2.2(0.6)	0.001
Social network	1.9(0.9)	1.7(0.9)	2.3(0.8)	0.172
Motivation	2.5(1.0)	1.9(0.8)	2.9(0.1)	0.019
Technical aspects	2.5(1.1)	1.8(0.7)	2.2(0.5)	0.025

Adequacy of income was more important than race, sex, or marital status in predicting HD Dietary Problems. Additional research is needed to characterize problems contributing to dietary nonadherence.

PREVALENCE OF METABOLIC SYNDROME (MetS) IN A MAINTENANCE HEMODIALYSIS POPULATION

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Patients with end-stage renal disease (ESRD) have an increased risk for cardiovascular morbidity and mortality. MetS has been implicated in the progression of cardiovascular disease (CVD). This cross-sectional study investigated the prevalence of MetS in 100 maintenance hemodialysis (MHD) patients using a joint definition for MetS. Subjects had to meet at least 3 of the following 5 criteria for MetS: elevated waist circumference, elevated triglyceride levels, low high density lipoprotein cholesterol, elevated blood pressure and elevated fasting serum glucose (FSG). A modified criterion for FSG was used because a FSG was unavailable for many patients. Alternate indicators of abnormal glucose metabolism included drug treatment for elevated serum glucose and a diagnosis of diabetes. Demographics, medical history and anthropometric and laboratory data were obtained from the medical record after obtaining informed consent. Serum chemistries were obtained mid-week and waist circumference was measured twice after a hemodialysis (HD) session and the mean value was recorded.

The study cohort consisted 53% whites and 38% blacks; 59% were male and the mean age was 63±16.1 yrs. Diabetic nephropathy was the leading cause of ESRD (34%) followed by hypertension (26%). Based on the joint definition, MetS was identified in 76% of the cohort, with 32%, 24% and 20% having 3, 4 and 5 risk factors, respectively. The prevalence of MetS was highest amongst patients on HD for >3 yrs (33%). For those patients on HD <6 mths, 6-12 mths and >1 to <3 yrs, MetS was identified in 15%, 6% and 22%, respectively. Whites were more likely to have MetS than blacks (54% vs. 39.5%), respectively.

We conclude that MetS is highly prevalent in this study cohort, which suggests an increased risk of CVD. The criteria used to diagnosis MetS may be a useful clinical tool in health screening and clinical management of metabolic abnormalities associated with CVD. Further research is needed to minimize adverse health outcomes associated with MetS in MHD patients.

A SURVEY ON THE UTILIZATION OF THE NUTRTION CARE PROCESS FOR DOCMENTATION IN OUTPATIENT DIALYSIS CENTERS

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The Nutrition Care Process Model (NCP), a model adopted in 2003 by the American Dietetic Association, provides a consistent structure in the delivery of care given by dietitians. Standardized language for nutrition care will increase the utilization and demand for nutrition services. In addition, it aids with validation of nutrition care and provides measurable data in both quantitative and qualitative forms. A 2005 study on the implementation of the NCP model in acute care settings in Virginia and California, determined that distribution of materials in advance of the implementation, a staff in- service, and training from a knowledgeable source are vital for the success of the new documentation system. The purpose of this study was to determine the current documentation procedures in NCA-ARA dialysis centers and the use of the NCP model. A twenty-question survey was emailed to approximately 80 ARA-NCA dietitians. Nineteen dietitians participated in the study. The survey results indicated that 16% of participants always/sometimes used diagnosis statements –Problem, Etiology and Sign/Symptoms (PES) from the NCP model with 5% always using these statements. Fifty-eight percent rarely/never used diagnosis statements. Sixteen percent believed that it would definitely be beneficial to their facility, 68% were neutral, 11% believed that it would not be beneficial, and 5% were unsure. Eighty-nine percent were not opposed to their method of charting reflecting the language of the NCP (63% definitely yes and 26% neutral). The results of our study show that few dietitians are consistently using the NCP in their documentations. Using this knowledge, a template incorporating the monthly progress note was developed but not implemented.

VITAMIN D DEFICIENCY IN A LARGE URBAN UNDERSERVED POPULATION IN SOUTHERN CALIFORNIA

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We assessed the characteristics of patients having 25(OH)D levels measured at LAC+USC Medical Center from January 1st to mid-August 2010.

All serum 25(OH)D levels from in- and out-patients were retrieved and defined as deficient (<20 ng/dL), insufficient (20 to 29) or sufficient (≥30-100). Demographics, seasonal variation, and levels repeated more than 90 days after initial low values were assessed.

As of mid-August 2010, 1950 patients had 25(OH)D levels measured. The majority were Hispanic, mean age was 52 years, with 30% males and 70% females. Of these, 38% had levels <20, 37% were 20 to 29, and 25% were >30 ng/dL. A seasonal variation was observed with values <20 in 45% during January progressively decreasing to 27% during July. Of 217 in-patients, 72% had values <20 ng/dL compared to 34% of 1733 out-patients. We compared 3 out-patient clinic groups.

Clinic	Number	<20 ng/dL	20-29	>30
Renal	459	39%	26%	35%
Rheumatology	517	32%	40%	28%
Internal Med	487	36%	44%	20%

Of 219 patients with initial values <20 ng/dL, only 37% had values >30 ng/dL after more than 90 days of follow-up.

In summary, 25(OH)D deficiency and insufficiency were common in our primarily Hispanic population. Surprisingly, a marked seasonal variation was seen despite 325 days of sunshine per year. The lower frequency of 25(OH)D values between 20 and 29 ng/dL in our renal clinic patients may relate to more aggressive therapy. Considering the various major health implications of vitamin D deficiency, we plan to confirm and determine reasons for the 63% failure to achieve values >30 ng/dL in our population after >90 days of follow-up and to develop an intervention to ensure adequate detection, treatment and prevention of recurrence of vitamin D deficiency/insufficiency in our population.

THE COMPONENTS OF SUBJECTIVE GLOBAL ASSESSMENT (SGA) AND THEIR ABILITY TO PREDICT OVERALL SGA SCORE IN STAGE FIVE CHRONIC KIDNEY DISEASE PATIENTS ON MAINTENANCE HEMODIALYSIS

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Protein-energy malnutrition in patients diagnosed with chronic kidney disease on maintenance dialysis is an independent risk factor for morbidity and mortality. Early identification of malnutrition using valid nutrition assessment techniques, such as Subjective Global Assessment (SGA), is essential for the improvement of patient outcomes. The purpose of this cross-sectional, retrospective medical record review was to identify what combination of SGA components predicts nutritional status according to the overall SGA score in order to determine those assessment areas that will provide the most accurate and detailed information about nutritional status. Medical records were reviewed for 132 adult, maintenance HD patients at one out-patient dialysis center in Massachusetts from 2001-2009 with SGA performed by one trained registered dietitian (RD). Spearman rank correlation coefficients and binary logistic regression were analyzed using SPSS 17.0 and an a priori alpha level of 0.05.

Fifty-seven percent of the sample were aged 65 or older with 59% male and 93% Caucasian. A model composed of the SGA components of dietary intake, gastrointestinal symptoms, disease state/co-morbidity and physical exam for subcutaneous fat loss and muscle wasting provided the most efficient prediction of overall SGA score (X^2 = 156.472, $p < 0.001$). The SGA components of weight change (Spearman's rho = 0.388, $p < 0.001$) and functional capacity (rho = 0.576, $p < 0.001$) were correlated with overall SGA score in bivariate analysis, however, these factors were not significant in the multivariate model. Dietary intake, gastrointestinal symptoms, disease state/co-morbidity, and physical exam predicted overall SGA score in maintenance HD patients. Further research with a demographically diverse and larger study sample is warranted.

DIETITIAN-SELECTED NUTRITION INTERVENTIONS VARY BETWEEN HEMODIALYSIS (HD) PATIENTS WITH & WITHOUT DIABETES MELLITUS (DM): A PRELIMINARY ANALYSIS

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HD patients (pts) with DM may have poorer outcomes than their non-DM counterparts, including worse nutritional status, which is correlated with a higher risk of mortality. The purpose of this study was to determine if there are significant differences in the most common dietitian-selected nutrition related diagnoses, etiologies and interventions in HD pts at nutritional risk with DM vs. without DM. Data were collected using an online algorithm based on The American Dietetic Association's Nutrition Care Process and Model. RDs were able to select multiple diagnoses, etiologies and interventions for each pt. These data were categorized and analyzed as a % of total selected diagnoses, etiologies and interventions within DM and non-DM pts.

Subjects (n=26, 50% male, 39% DM) had a mean age of 56.3 years, BMI of 28.2 kg/m^2 and serum albumin of 3.7 g/dL (BCG). There were no significant differences in age, BMI or serum albumin between DM and non-DM subjects. The mean HbA1C of the DM pts was 6.8%.

No significant differences were found between the mean number of diagnoses, etiologies and interventions selected between DM and non-DM pts. The most commonly selected diagnosis category was Protein Energy Wasting (>50%) and the most common etiology category was Insufficient Intake (~30%). Interventions differed significantly (Table).

Intervention Category	**DM %**	**Non-DM %**	**p-value**
Health Care Team Referral	21.7	3.2	**0.0003**
Recommend Specific Foods	8.3	22.6	**0.0170**
Specific Education Strategies	21.7	30.1	0.2455
Education in Basic Concepts	31.7	34.4	0.7250
Fluid Restriction Strategies	13.3	6.5	0.1551
Other	3.3	3.2	0.9709

This study shows that RDs select different types of interventions between DM and non-DM pts despite similar types of diagnoses and etiologies. Small sample size is a major limitation of this study.

INTRADIALYTIC PARENTERAL NUTRITION: EFFECT ON ALBUMIN AND NORMALIZED PROTEIN CATABOLIC RATE

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The prevalence of protein energy wasting (PEW) in maintenance hemodialysis patients varies from 18% to 75 % and is reflected by hypoalbuminemia which is a contributor to mortality. A common approach to the management of PEW includes dietary counseling and nutrient supplementation. Intra-dialytic parenteral nutrition (IDPN) is currently gaining acceptance as a therapy for patients not responding to oral supplements. This retrospective study assessed the efficacy of IDPN in improving serum albumin levels and the normalized protein catabolic rate (nPCR) in 28 patients on maintenance hemodialysis. IDPN was started when oral supplements failed to correct hypoalbuminemia. The 3-month means of serum albumin and nPCR before IDPN were compared to the respective means at 1, 3, 6 and 12 months while on IDPN using ANOVA and least significant difference (LSD). $p < 0.05$ = significant.

The average age of patients was 63.5 $\pm$ 2.4 years; 60.7% were female, 46.4% Caucasian, 35.7% African American; and 17.9% belonged to other groups. 96.4% had diabetes mellitus (DM) and 46.4% had a history of congestive heart failure (CHF).

	Mean(s.e)				
	Before IDPN	1 month	3 months	6 months	12 months
Albu-min	2.86(.08) N=28	2.98(.09) N=28	3.15(.11) N=22	3.16(.13) N=15	3.24(.1) N=9
		p= 0.35	*p*=0.038	*p*=0.056	*p*=0.041
nPCR	0.81(.05) N=27	0.81(.06) N=25	1.09(.13) N=21	1.02(.8) N=14	1.21(.94) N=7
		p=0.99	*p*=0.016	*p*=0.104	*p*=0.018

PEW is more common with DM, and possibly, CHF. Serum albumin and nPCR increased progressively over time with IDPN which could be used to correct hypoalbuminemia and thereby possibly decrease mortality. nPCR is useful in assessing the efficacy of IDPN.

COMPOSITE DIETARY PROTEIN AND PHOSPHATEMIA SCORE TO COMBINE COMPETING RISKS IN CKD

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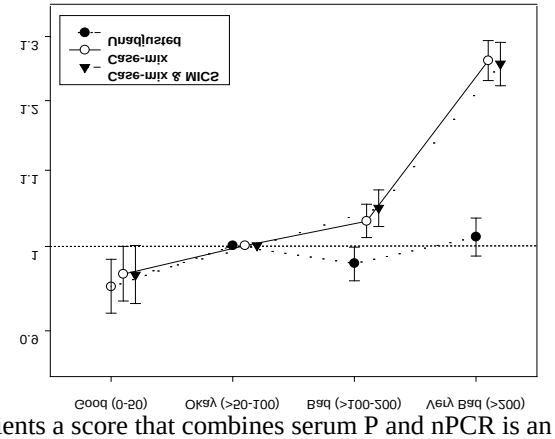
Higher serum phosphorus (P), a mortality predictor in hemodialysis (HD) patients (pts), can be lowered by restricting dietary protein intake (estimated by normalized protein catabolic rate, nPCR), but the latter measure is associated with increased mortality. We hypothesized that combining these 2 competing risks in form of a new score can serve as a more commensurate risk predictor. In 104,628 HD patients, who were followed for up to 6 yrs, we combined the amount of nPCR below 1.5 g/kg/day (1.5-nPCR) and serum P above 3.0 mg/dL (P-3), and created the new metric: (1.5-nPCR)*(Phos-3))*100. Among HD pts with nPCR <1.4 g/kg/day and P>3.5 mg/dL, four *a priori* groups based on the score were compared: 0-<50 "Target" (n=8,311), 50-<100 "Fair" (n=26,347), 100-<200 "Poor" (n=46,200), and >=200 "High-Risk" (n=23,770). Survival models were adjusted for case-mix and surrogates of malnutrition-inflammation complex syndrome (MICS) (see Figure).



In HD patients a score that combines serum P and nPCR is an incremental predictor of death risk. Controlling P while maintaining adequate protein intake to improve survival warrants controlled trials.

EXTRACELLULAR MASS/BODY CELL MASS (ECM/BCM) RATIO, A NUTRITIONAL MARKER, IS AN INDEPENDENT PREDICTOR OF LONG-TERM SURVIVAL IN HEMODIALYSIS (HD) PATIENTS (PTS)

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Nutritional status is one of the most important factors influencing clinical outcomes of HD pts. ECM/BCM ratio, which reflects the proportions of extra versus intracellular spaces, is one of the most sensitive indices of malnutrition. In the present study, we explored the relationship between ECM/BCM ratio and long term survival of HD pts. Sixty-six HD pts were enrolled between April 2000 and March 2010. On enrollment, demographic, clinical and biochemical data were recorded. Bioimpedance analysis (BIA) was used to measure ECM and BCM. Pts were followed through November, 2010. The mean age was 60±14 (SD) years. Fifty-two percent were women, the majority (81%) were African American, and 42% of the pts were diabetic. Mean ECM/BCM ratio was 1.319 ± 0.3 (range: 0.70-2.42). ECM/BCM ratio correlated directly with age ($r=0.38$, $p=0.002$) and inversely with serum albumin ($r=-0.34$, $p=0.034$), serum creatinine (-0.58, $p<0.0001$), total protein ($r=-0.29$, $p=0.07$) and hemoglobin ($r=-0.34$, $p= 0.033$). During the study period, twenty eight (43%) pts died. Pts were stratified by enrollment ECM/BCM ratio >1.35 and ≤1.35 (median value). The cumulative observed survival of pts with enrollment ECM/BCM ratio ≤ 1.35 was significantly better than those of pts with >1.35 ($P=0.03$). In the multivariate Cox proportional hazards model, after adjusting for age, race, gender, diabetes and dialysis vintage, enrollment ECM/BCM ratio remained an independent predictor ($RR=1.023$, $P=0.046$) of mortality. Therefore, for every 0.01increase in the ECM/BCM ratio, the relative risk of death was increased by about 2.3%. In conclusion, enrollment ECM/BCM ratio, a sensitive index of malnutrition, was an independent predictor of long-term survival in these HD pts. BIA is a useful tool in the evaluation of nutritional state and mortality risk in this population. These findings should be confirmed in prospective trials, preferably with nutritional intervention in at-risk individuals.

REVISITING MORTALITY-PREDICTABILITY OF SERUM ALBUMIN MEASUREMENT IN HEMODIALYSIS PATIENTS

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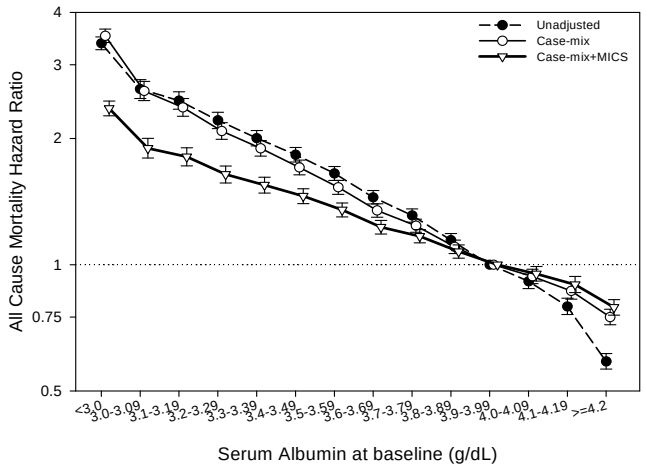
Previous studies have shown that albumin is an independent predictor for mortality in hemodialysis (HD) patients. We reexamined the granularity and linearity of the association between albumin and survival in a large and contemporary cohort of 120,592 HD patients over up to 6 years (2001-2007). HD pts were 62±16 years old and included 46% women, 32% African Americans and 15% Hispanics. Patients were then divided into 14 *a priori* selected groups of albumin <3.0 and ≥4.2g/dL and 0.1 g/dL increments in-between. Taking albumin 3.9-<4.0 g/dL as a reference, we found that patients with albumin levels ≥4.0 g/dL had incrementally better survival whereas patients with albumin levels <3.9 g/dL had a continuously worse survival (See figure).



Hence, a highly granular and strictly linear association exists between higher serum albumin, even by as little as 0.1 g/dL, and greater survival. Trials to examine albumin-increasing interventions are indicated.

A SUPERIOR PROPRIETARY IDPN FORMULATION FOR MALNOURISHED PATIENTS WITH DIABETES

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Traditional Intradialytic Parenteral Nutrition (T-IDPN) formulations provided to malnourished hemodialysis patients are based on widely accepted dextrose ranges per weight and often contain lipid. A proprietary low dextrose IDPN formulation Proplete® was compared to T-IDPN solutions. 3 month mean serum albumin level increases were observed between groups and were sub-analyzed in patients with Diabetes. T-IDPN contained dextrose at: 4-6mg/kg for those requiring CHO control; 6-8mg/kg for those not requiring CHO control and IV lipids: the lower of 4mg/kg/min or 12gms/hr. A retrospective analysis was performed using Pentec Health internal data base. For inclusion, patients must have received either Proplete® or T- IDPN for a minimum of 3 mos. with no change in formulation and have baseline plus 3 months of serum albumin levels. 325 patients were included in the analysis: 200 treated with Proplete and 125 receiving T- IDPN. The Proplete® groups baseline mean serum albumin was 2.9 +/- .46 g/dL, the 3 month mean serum albumin was 3.19 +/-.39, the mean gain in serum albumin was .29+/- .46 g/dL. In the T-IDPN group the baseline mean serum albumin was 2.92 +/-.45g/dL, the 3 month mean serum albumin was 3.17 +/-.51g/dL, the mean gain in serum albumin was .24 +/-.41g/dL. Analysis of mean serum albumin gain between the two groups by T-test resulted in a p= 0.181675. This cohort was further analyzed by diabetic status of patients: 139 in the Proplete® group and 70 in the T-IDPN group. The Proplete® group's baseline mean serum albumin was 2.89 +/-.48g/dL; the 3 month mean serum albumin was 3.21 +/-.37g/dL; and the mean gain in serum albumin was .32 +/-.47 g/dl. In the T-IDPN group, baseline mean serum albumin was 2.92 +/-.40g/dL; the 3 month mean serum albumin was 3.11 +/-.49g/dL; and the mean gain in serum albumin was .20 +/- .35g/dL. Analysis of mean serum albumin gain between these two groups by T-test resulted in a P= 0.017822. Low dextrose Proplete® formulation demonstrated higher increases in s. albumin levels as compared to T- IDPN containing higher dextrose and lipid. Proplete® demonstrates to be a superior IDPN formulation for patients with Diabetes.

DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL OF BIOTIN SUPPLEMENTATION IN CHRONIC DIALYSIS PATIENTS WITH RESTLESS LEGS SYNDROME

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Studies suggest that micronutrient depletion may contribute to neuropathic problems in ESRD patients. Previously, we found that patients receiving chronic dialysis who have Restless Legs Syndrome (RLS) were more likely to have impaired biotin status as judged by significantly increased ($p = 0.012$) activation coefficient of the biotin-dependent enzyme, propionyl CoA carboxylase (PCC AC) in peripheral blood lymphocytes. The prevalence of Restless Legs Syndrome assessed by the International Restless Legs Syndrome scale was 35/61 (57%) in the dialysis group. In the current study, we determined the effect of biotin supplementation on RLS symptoms in patients with ESRD using a randomized, placebo-controlled, double-blind study design. The biotin supplement was 10 mg daily; duration was 8 weeks. All patients (n=29) continued their regularly prescribed multivitamin with 150-300 micrograms of biotin daily. Initial demographic data and severity of ESRD were similar between treatment groups. In the biotin group, RLS score (mean ± 1SD) improved from 19 ± 6 to 10 ±9 ($p=0.002$). However, in the placebo group, RLS score also improved from 16 ± 9 to 11 ±10 ($p=0.03$). In the biotin group, the mean PCC AC normalized, improving from1.38 ± 0.76 to 0.86 ± 0.26 ($p=0.02$) group, and did not change in the placebo group (1.35 ± 1.05 vs. 1.30 ± 0.73; $p=0.94$). Speculation: The surprising improvement in RLS score of the placebo group might reflect more compliance with daily vitamin therapy resulting in increased biotin intake. Our markers of biotin status improved significantly in the biotin treatment group, suggesting that large doses of biotin were necessary to normalize biotin status in dialysis patients.

EFFECT OF A TREATMENT PROTOCOL IN CORRECTING 25-HYDROXYVITAMIN D DEFICIENCY IN PATIENTS ON CHRONIC HEMODIALYSIS: RESULTS FROM A SINGLE CENTER IN HAWAII.

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25(OH) vitamin D (25[OH]D) deficiency is common in patients with end stage renal disease (ESRD). However, treatment has traditionally focused on replacement of 1,25(OH) vitamin D in these patients. Treatment of 25(OH)D deficiency is safe and may be beneficial. There are no professional guidelines for treatment of 25(OH)D deficiency in ESRD patients on chronic hemodialysis.

Our observational study examined the effectiveness of a vitamin D treatment protocol in treating 25(OH)D deficiency over a period of 1 year. Vitamin D replacement was implemented using 50,000 i.u. tablets of ergocalciferol (vitamin D_2), the dosing of which was adjusted at intervals based on a replacement protocol. Patients were informed of their vitamin D status and given dietary advice on intake of vitamin D rich foods and advised on adequate sun exposure.

62 patients were evaluated at baseline. Overall mean 25(OH)D level was 21.8 ng/ml with a range of <7 to 67.1ng/ml. Only 19.3% of patients had sufficient 25(OH)D levels when defined as a level above 30 ng/ml. Of the original 62 patients, 12 died and 4 were transferred to other dialysis centers before end of follow-up. 46 patients were evaluated after 12 months. Mean 25(OH)D level improved to 27.6 ng/ml with a range of 11 to 52.6 ng/ml ($p = 0.005$) and 37% of patients had a level above 30 ng/ml. There was no significant difference in mean 25(OH)D levels in patients who were self described as compliant (34.1ng/ml) and those who were not (22.6ng/ml) ($p = 0.15$).

In conclusion, implementation of a treatment protocol improved mean 25(OH)D levels in ESRD patients on hemodialysis. However, the effect of our intervention was limited by variable compliance.

ASSESSMENT OF NUTRITIONAL STATUS BY SUBJECTIVE GLOBAL ASSESSMENT, MALNUTRITION INFLAMMATION SCORE, AND A COMPREHENSIVE NUTRITION ASSESSMENT: A PROSPECTIVE STUDY

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Nutritional status of maintenance hemodialysis (MHD) patients is often compromised due to protein-energy wasting leading to poorer overall treatment outcomes. The purpose of this prospective, non-randomized study was to determine the level of agreement of nutritional status between Subjective Global Assessment (SGA) and two methods of categorizing the Malnutrition Inflammation Score (MIS) as described by Ho *et al* and Chan *et al* to the gold standard Comprehensive Nutrition Assessment (CNA) performed by a registered dietitian (RD). Two blinded RD reviewers assessed the unscored CNAs to establish the CNA as the comparative measure. Ho et al and Chan et al used cut-off scores (5 and 8, respectively) to distinguish between well-nourished and malnourished patients. Fifty-seven participants were included from one urban MHD center and were assessed simultaneously using all three assessment tools with scoring done one month from assessment to prevent investigator bias. Sixty-eight percent (n = 39) of participants were black; 66% (n = 38) were male; mean age was 54.26 ± 14.72 years; mean dialysis vintage was 7.68 ± 5.37 years; and 90.4% (n = 55) of the participants had one to two comorbidities. SGA (K = .685), MIS-Ho (K = .653), and MIS-Chan (K = .722) were identified as having a good level of agreement with the CNA. SGA and MIS-Chan were able to identify 97% and 100% of well-nourished patients, respectively, but were only able to identify 67% of the malnourished patients. MIS-Ho identified 100% of the malnourished patients and 70% of the well-nourished patients. In conclusion, these findings indicate that all three assessments have a good level of agreement to the CNA but the MIS as described by Ho *et al* was superior to the SGA in the identification of malnourished patients.

VALIDATION OF SUBJECTIVE GLOBAL (NUTRITIONAL) ASSESSMENT (SGNA) IN CHILDREN WITH CKD

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Subjective Global Assessment (SGA), a method of nutritional assessment using clinical judgment, has been widely used to assess the nutritional status of adults with CKD for clinical and research purposes. The 2008 KDOQI CPG for Nutrition in Children with CKD recommended development and validation of SGA for use in children. The purpose of this study was: 1) to assess the nutritional status of children with CKD stages 3-5 and 5D using commonly used anthropometric, biochemical, and functional measures; DEXA; and a newly validated pediatric SGA, and 2) to test if malnutrition was associated with outcomes. In 68 children (0.3-17.7 y), pediatric SGNA showed good association with most objective measures of nutritional status, but not serum albumin. Frequency of infection, frequency and duration of hospitalization, and QOL scores did not differ between well- and mal-nourished children.

	Pediatric SGA Rating		p-value
Parameter	Well-nourished (n=37)	Malnourished (n=31)	
Age (y)	13.1 (0.3, 17.7)	8.4 (0.3, 17.5)	0.090
Weight SDS	-0.5 ± 1.1	-1.5 ± 1.1	0.001
Height (Ht) SDS	-1.3 ± 1.4	-1.3 ± 1.1	0.870
BMI SDS	0.3 (-1.7, 1.8)	-0.8 (-3.5, 1.5)	0.004
MAC SDS	0.0 ± 0.8	-0.7 ± 1.1	0.008
TSF SDS	0.3 ± 1.2	0.1 ± 1.7	0.120
MAMA SDS	-0.2 ± 1.0	-1.9 ± 1.0	0.009
Handgrip SDS	-1.6 ± 1.1	-2.4 ± 1.8	0.070
FFM for Ht SDS	0.1 ± 1.1	-0.7 ± 1.1	0.042
Albumin (g/L)	42.4 ± 5.9	41.9 ± 5.1	0.710
CRP (umol/L)	1.1 (0.6, 24)	0.7 (0.6, 84)	0.180

In conclusion, malnutrition was common yet severe PEM was rare (n=3). Few children had hypoalbuminemia (n=3) or inflammation (n=4). Pediatric SGNA was a valid tool for assessing the nutritional status of children with CKD, whereas serum albumin was not. Larger scale study is required to detect the association of PEM with outcomes.

EFFECTS OF A NOVEL MULTIVITAMIN ANTIOXIDANT NEUTRACEUTICAL IN CHRONIC KIDNEY DISEASE PATIENTS ON HEMODIALYSIS: A PROSPECTIVE TRIAL.

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The severity and extent of cardiovascular complications in patients with CKD is disproportionate to the number and severity of traditional risk factors necessitating attention on nontraditional risk factors that are particularly relevant to patients with CKD. These include decreased erythropoietin levels, increased inflammation, oxidative stress, and abnormalities in bone and mineral metabolism. We hypothesized that daily neutraceutical supplementation (MV-ONE®) with Alpha-Lipoic Acid (600mg), Cholecalciferol (1500IU) and Gamma-Tocopherol (300mg) will improve vitamin D levels, reduce the exogenous erythropoietin (EPO) dose and attenuate overall inflammation, thus, improving outcomes in dialysis patients. The purpose of this 12-week open label, non-randomized, single center study was to evaluate the effects of a novel renal multivitamin on vitamin D levels, EPO dose, inflammatory factors and other biomarkers in a CKD population on hemodialysis. Twenty-five subjects participated in this study and took the experiential multivitamin antioxidant MV-ONE® orally once daily with food for 12 weeks. Baseline and monthly blood analyses for vitamin D dose, 25 OH vitamin D levels and EPO dose were used as primary endpoints with comparison between baseline and week 12 values. Analyses show a 12-week treatment of MV-ONE® caused: 1) the iv vitamin D dose to decrease (mean baseline dose 2.25mcg to week 12 dose 0.5mcg; $p < 0.05$), 2) marginal increases in 25 OH vitamin D levels (mean baseline levels 25ng/mL to week 12 levels 30ng/mL), 3) the EPO dose decreases (mean baseline dose 3500IU to week 12 dose 2200IU), and 4) a significant marked improvement in cholesterol levels (mean baseline levels 50mg/dL to week 12 levels 160mg/dL; $p < 0.001$). These results identify the efficacy of this novel multivitamin antioxidant neutraceutical therapy in this subset of the population, but indicate a potential need for an increased dose of Cholecalciferol. Although continuing studies are needed, it is evident that this MV-ONE® therapy does improve the anemic and abnormal bone metabolism observed in CKD patients on hemodialysis.

ASSOCIATION OF PLATELET COUNTS WITH SURROGATES OF DIETARY PROTEIN INTAKE AND MUSCLE MASS IN HEMODIALYSIS PATIENTS

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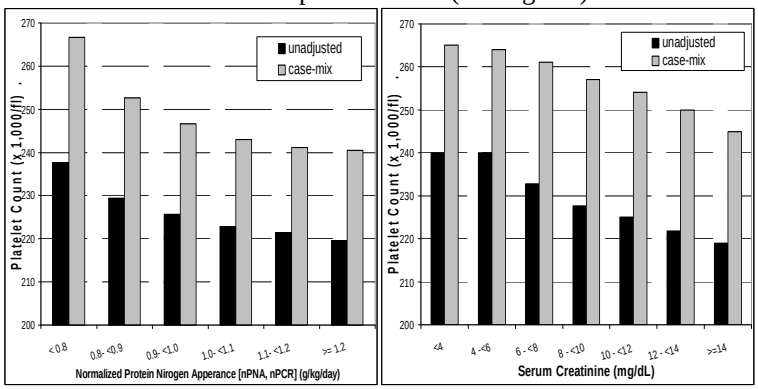
Better nutritional status, as indicated by higher dietary protein intake and/or higher muscle mass, is associated with greater survival in maintenance hemodialysis (MHD) patients. We examined the hypothesis that higher normalized protein nitrogen appearance (nPNA, nPCR) and serum creatinine, measures of protein intake and/or muscle mass, respectively, are associated with favorable platelet activity profile in MHD patients. We separately examined associations of 13-week averaged platelet count with 13-week averaged nPNA (g/kg/day) and serum creatinine (mg/dL) over 6 months in 40,697 MHD patients from DaVita clinics in the USA. Models were also adjusted for case-mix. Patients were 61±15 years old and included 47%women, 46% diabetics and 34% African Americans. The 13-week averaged platelet count was 229±78x10^3. In both unadjusted and case-mix adjusted models, incrementally higher serum creatinine and higher nPNA levels were associated with lower platelet count (see Figures).



Based on these findings we advance the hypothesis that the relationship between malnutrition, inflammation, cardiovascular events and mortality may be mediated in part by thrombocytosis.

PERITONEAL DIALYSIS OUTCOMES IN OVERWEIGHT PATIENTS: ANALYSIS OF A MODERN COHORT

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Whether large patients have good outcomes on peritoneal dialysis, is not very clear. We studied a modern cohort of peritoneal dialysis patients to examine outcomes in large patients. We identified all patients who started peritoneal dialysis at our peritoneal dialysis unit, who weighed more than 90 kg at dialysis initiation, between the period of January 2000 to June 2010. 43 patients and 43 controls matched for age, sex and diabetic status and who weighed < 90 kg were included in the study. The mean age was 56.9 ±13.7 (wt < 90 kg) and 54.1 ± 15.5 (wt ≥ 90 kg) (p = 0.37).

The mean weight and BMI of the wt < 90 kg group was 69.2 ± 11.3 and 25.03 ± 3.8. In the weight ≥ 90 kg, the weight and BMI were 101.5 ± 15.1 and 34.2 ± 5 respectively. The number of peritonitis episodes and time to first peritonitis did not reach statistical significance between the groups. There was no difference in the two groups in transport status. Interestingly, hernias and leaks were more common in the weight < 90 kg group (44 % vs. 18% p = 0.02). Kaplan-Meier analysis of survival on peritoneal dialysis, censored for transplantation and end of study period, showed no differences between the two groups (log rank p = 0.99). Cox regression analysis adjusting for relevant co-variates, did not reveal weight to be an independent predictor of survival on peritoneal dialysis.

Large patients tend to do just as well on peritoneal dialysis, with survival on PD being no different compared to individuals with lower weight and body mass index.

PERITONEAL DIALYSIS IN A CYSTIC FIBROSIS PATIENT

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Cystic fibrosis (CF) is an autosomal recessive disease caused by a mutation in the CFTR gene. While CF is primarily a pulmonary disease, renal disease is beginning to emerge as a cause of morbidity and mortality in this patient population. The spectrum of renal diseases commonly associated with CF includes nephronopthisis, nephrolithiasis, medullary cystic disease as well as aminoglycoside related renal toxicity and interstitial nephritis. Management of end stage renal disease (ESRD) in the CF patient is an area which is not well studied, with minimal data regarding dialysis modalities. This case discusses the successful use of peritoneal dialysis in a CF patient with ESRD.

A 24 yo Caucasian female with a history of CF, gastric feeding tube, and underlying renal insufficiency due to MCD presented with worsening renal failure. Her renal insufficiency progressed as a result of multiple courses of aminoglycosides used to treat her CF exacerbations. Due to progression to ESRD by age 23, hemodialysis was initiated via a tunneled catheter. The concern of potential catheter related infection led to a change in dialysis modality to PD. Despite the existing gastric tube placement a PD catheter was placed laparoscopically. Low volume CCPD was used effectively in this patient achieving a Kt/v of 2.37.

Literature review reveals only 2 other cases of peritoneal dialysis in patients with cystic fibrosis. In both of these cases the patient outcome was poor within the first month of treatment. Our patient is without PD complications for the last 4 months. We conclude PD should be considered a promising dialysis option for CF patients with ESRD.

COMPARING MORTALITY RISK OF MINERALS, PTH AND ALKALINE PHOSPHATASE OVER 6 YEARS IN 12,422 CHRONIC PERITONEAL DIALYSIS (CPD) PATIENTS

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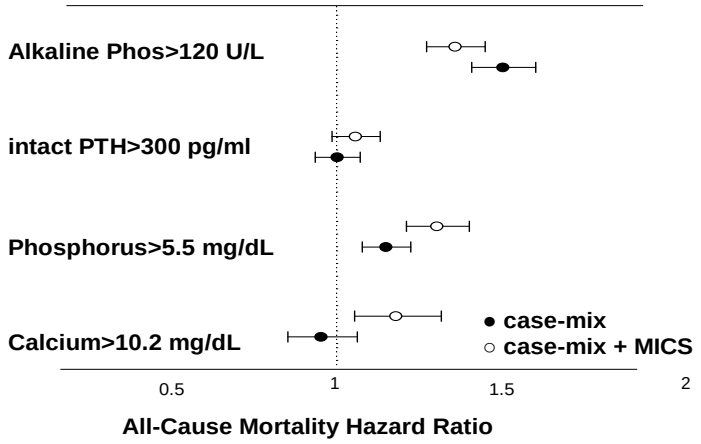
Osteodystrophy is a common complication of CKD and associated with disorders of mineral metabolism, changes in levels of PTH and alkaline phosphatase. We identified 12,422 CPD patients whose serum alkaline phosphatase (AP) was measured at baseline. They were 54±16 years old and included 47% women, 23% African Americans and 13% Hispanics. Each measure was dichotomized according to clinically meaningful cut-off levels: Serum calcium ≥ 10.2 mg/dl; phosphorus ≥ 5.5 mg/dl; PTH ≥300 pg/ml; and AP ≥120 U/L (vs. lower range as the reference). We found that higher levels of these measures were associated with higher death risk after adjusting for case-mix and malnutrition-inflammation-cachexia syndrome (MICS) (see Figure).



In this large national cohort of CPD patients, higher levels of serum calcium (≥10.2 mg/dl), phosphorus (≥5.5 mg/dl), PTH (≥300 pg/m), and AP (≥120U/L) appeared associated with higher all-cause mortality.

FUNGAL EXIT SITE INFECTIONS (ESI) AND FUNGAL PERITONITIS (P) OVER A 30 YEAR PERIOD WITH AND WITHOUT EXIT SITE PROPHYLAXIS

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The use of antibiotics at the exit site (ES) as routine care reduces the risk of bacterial ESI and peritonitis. However, there is concern this might increase the risk of fungal infections. To study this we examined fungal infections in a single PD program over 30 years.

We divided the 30 years into 3 periods: 1) no prophylaxis 1/11/80-7/31/92 2) mupirocin at the ES 8/1/92-6/30/01 3) predominantly gentamicin at the ES 7/1/01-4/30/10. This was a retrospective analysis of prospectively collected data from an IRB approved registry with all patients giving informed consent. Only incident patients and their infections for each period were included. Demographics shown below:

Study period	1980-92	1992-01	2001-10	P value
Incident cases	341	183	150	---
Median age (y)	45.7*	50.9*	52.7	*0.01
Female (%)	181(53)	99(54.1)	77(51.3)	ns
African American (%)	42(12.3)	29(15.8)	41(27.5)	<0.0001
Median PD time (mo)	14.1	13.3	15.9	0.024

Infectious data as % of patients and as rates (episodes/year) shown:

Study period	1980-92	1992-01	2001-10
Years at risk	552	181	198
Bacterial ESI (episodes/y)	0.86[1,2]	0.58[1,3]	0.26[2,3]
Bacterial P (episodes/y)	0.77[4,5]	0.52[4,6]	0.28[5,6]
Fungal ESI (% of patients)	2 (0.58)	0 (0)	3 (2)
Fungal P (% of patients)	4 (1.2)	4 (2.19)	4 (2.7)
Fungal ESI (episodes/y)	0.0036[7]	0[8]	0.015[7,8]
Fungal P (episodes/y)	0.007[9,10]	0.022[9]	0.02[10]

Between periods: [1] p=0.0001; [2] p<0.0001; [3] p<0.0001; [4] p<0.0001; [5] p<0.0001; [6] p=0.0003; [7] p=0.069; [8] p=0.07; [9] p=0.07; [10] p=0.08

In summary, the use of gentamicin for routine ES care was associated with a striking reduction in bacterial ESI and peritonitis and an insignificant difference in the rate of fungal infections. We recommend the use of gentamicin at the exit site for all PD patients.

MYCOBATRIUM WOLINSKYI PERITONITIS IN A CHRONIC PERITONEAL DIALYSIS PATIENT

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Bacterial peritonitis is a major cause of morbidity and modality failure in patients with end-stage renal disease on chronic peritoneal dialysis (PD). Staphylococci (skins organisms) are the most common offending organisms. We present here the first reported case of peritonitis caused by *Mycobacterium wolinskyi*.

A 67 year-old female developed kidney failure from diabetic glomerulosclerosis and was maintained on hemodialysis for 18 months. She desired to try PD for improved quality of life. The placement of her PD catheter was complicated by wound dehiscence and superficial infection, for which she required excision of the infected granulation tissue and a course of oral cephalexin. PD training and chronic PD were started 2 months after her catheter placement. Two weeks later, the patient developed abdominal pain, fever, and cloudy PD fluid, which was sent for cell count and culture; intraperitoneal vancomycin and gentamicin were administered. The initial PD fluid sample was cloudy and contained 160 red blood cells per cubic mm and 17,149 white cells per cubic mm (81% neutrophils). No organism was cultured until 72 hours, when *M. wolinskyi* was identified. The patient was treated orally with moxifloxacin, doxycyclin and linezolid for the next 4 weeks.

Peritonitis with other mycobacterium species (*tuberculosis, kansasii, fortitum*) has been reported previously. *M. wolinskyi*, is a rapidly growing, gram positive, acid and alcohol fast bacillus originally identified as *M.smegmatis* in 1997. Commonly isolated form surgical wounds following traumatic injures. This is the first reported case of M.*wolinskyi*, peritonitis in a PD patient.

CARDIAC SURGERY OUTCOMES IN PERITONEAL DIALYSIS PATIENTS VS. HEMODIALYSIS PATIENTS.

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We sought to compare hospital outcomes and 2 year survival in a cohort of peritoneal dialysis (PD) patients compared to matched hemodialysis (HD) patients who underwent cardiac surgery at our institution. We obtained a list of all dialysis dependent patients who underwent coronary artery bypass grafting and/or valve replacement at our medical center between January 1, 1994 and December 31, 2008. All PD patients who underwent surgery during the study period were included in the analysis. Two HD patients matched for age, diabetes status, and Charleston Comorbidity score (CCS) were obtained for each PD patient. Mean age was 58.8±9.4 for PD patients and 59.4±8.8 for HD patients (p=0.71) and 72% of both patient groups were diabetic. Mean CCS was 6.6±2.0 for PD patients vs. 6.8±2.1 for HD patients (p=0.70). Hospital outcomes and 2 year survival are compared below.

	PD (n=36)	**HD (n=72)**	**p value**
Median CSU LOS in days (IQR)	2 (1.75-5)	4(2-5.25)	0.05
Median hospital LOS in days (IQR)	9.5 (7-13)	10 (7-15)	0.40
Median intubation time in hours (IQR)	24 (24-24)	24(24-48)	0.06
Post-operative infection (%)	2 (6)	14 (19)	0.08
Operative mortality (%)	4 (11)	7 (10)	1.0
Any post-operative complication (%)	10 (28)	36 (50)	0.046
2 year survival (%)	24 (68.6)	44 (65.7)	0.73

(CSU= cardiac surgery unit; LOS=length of stay; IQR=interquartile range; operative mortality was defined as death during hospital stay or within 30 days of surgery)

Our findings suggest that PD patients who undergo cardiac surgery do not experience more early complications or lower 2 year survival than HD patients.

SELF INDUCED PERITONITIS VIA PERITONEAL DIALYSIS

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Comparable outcomes have been shown for both Hemodialysis and Peritoneal dialysis (PD) however fewer patients choose PD. Those that choose PD over Hemodialysis are given training in preventative and management strategies to avoid getting peritonitis. However, this complication continues to be a leading barrier to the good performance of peritoneal dialysis. The purpose of this case report is to exemplify a patients actions leading to severe peritonitis and add to the literature on the relatively rare occurrence of Acinetobacter Baumannii in peritonitis with PD patients. The method used was the study of this case and review of current literature. In this case study, a 60-year-old male with end-stage renal disease developed his first episode of peritonitis 8 weeks after starting continuous ambulatory peritoneal dialysis (CAPD). Approximately 48 hours prior to presenting at the Emergency Department (ED) the patient was having difficulty draining dialysate during peritoneal dialysis (PD). The patient thought the PD catheter was clogged and attempted to clear it by "blowing" into it. The patient presented to the ED about 36 hours after blowing into the catheter with severe abdominal pain, swelling and fevers (T_{max} 100). The peritoneal fluid was cultured and shown to contain 3+ Acinetobacter Baumannii. This is a multiresistant aerobic gram-negative bacillus sensitive to relatively few antibiotics. After the culture and sensitivities came back the patient's antibiotics were changed to once daily Gentamicin in the dialysate. A search of the literature on Pub Med revealed 4 articles with the terms "Acinetobacter Baumannii" and "Peritoneal Dialysis". Most of the literature is case reports and treatment comparisons. Once daily Gentamicin in the dialysate appears both in this case and in other literature to be an effective treatment of Acinetobacter Baumannii in CAPD peritonitis. In conclusion, the importance of good sterile practices and preventative training in peritoneal dialysis is imperative. In addition, the occurrence of Acinetobacter Baumannii in peritonitis with PD is relatively rare. Once-daily IP gentamicin appears to be effective in the treatment of Acinetobacter Baumannii CAPD peritonitis.

SULFA-RESISTANT NOCARDIA PERITONITIS WITH PULMONARY INVOLVEMENT – A CASE REPORT

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Rare causes of peritonitis in patients on peritoneal dialysis (PD) require a heightened awareness as these may imitate routine processes. Failure of early diagnosis and appropriate treatment could reduce the chance of favorable return to PD.

We report a case of 79 year old male on PD for 3 years with one episode of peritonitis in the remote past who presented with abdominal discomfort and nausea. Patient was discharged 2 weeks prior with a diagnosis of community-acquired pneumonia. On physical exam he was afebrile with abdominal tenderness. Lab tests revealed no leukocytosis, but PD fluid WBC count was 9000/UL. Chest CT showed a right upper lobe mass with central cavity and PD fluid cultured out Nocardia pseudobrasiliensis. Blood cultures were negative. After 8 days of intravenous trimethoprim-sulfamethoxazole (TMP-SMX), PD fluid WBC was 3200/UL, prompting removal of the PD catheter. When the sensitivity report revealed Nocardia resistant to TMP-SMX, he was switched to ciprofloxacin with swift and sustained clinical improvement.

Nocardia (gram-positive rod-shaped branching bacteria) is a rare cause of peritonitis. Cultures require 2-4 weeks to grow. Sulfa drugs are first-line and have been used successfully in most reported cases, though pulmonary involvement was not evident as in our patient.

Clinicians should consider the possibility of nocardia peritonitis when the diagnosis is unclear or the response to empiric antibiotics is suboptimal. Interestingly, the pathogen most likely responsible for our patient's recurrent pneumonia was identified only from peritoneal fluid.

INCIDENCE OF BK VIRUS NEPHROPATHY IN HIV POSITIVE RENAL TRANSPLANT PATIENTS

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BK virus has been associated with kidney dysfunction by causing tubulointerstitial nephritis and ureteral stenosis in kidney transplant recipients. BK virus nephropathy has been reported to be seen in about 1-10% in non HIV kidney transplant recipients. Incidence of BK virus nephropathy in HIV positive recipients of kidney transplants has not been well characterized.

To examine the incidence of BK virus nephropathy in HIV renal transplant recipients.

We conducted a retrospective chart review on HIV patients who have received kidney transplant at our institution. A total of 92 HIV patients have received kidney transplants at our institution since 2001. All our HIV positive transplant recipients received induction therapy with basiliximab and were given cyclosporine based immunosuppressive regimen. BK virus urine and plasma BK virus PCRs were checked when there was clinical suspicion of BK nephropathy. SV 40 staining was performed on renal biopsies when there were signs of BK nephropathy.

Mean age of recipients was 47 ± 8 yrs, 87% were males, 88% were African-Americans, 91% kidneys were from deceased donors out of which 14% were from extended criteria donors. Delayed graft function was seen in 39% of patients. 72% patients had acute rejection during the follow up, out of these 14% had humoral rejection. 32 patients had SV 40 staining performed on their renal biopsies and none of them had positive results. 9 patients had BK virus plasma PCR checked of which 1 patient had positive PCR (32743 copies/mL), same patient had positive in situ DNA hybridization test positive on renal biopsy confirming BK nephropathy.

We found an overall incidence of BK nephropathy of 1.08% which is lower than the reported incidence of BK nephropathy in non HIV kidney transplant recipients. This finding in conjunction with high rate of acute rejection (72%) in these patients reflects that these patients received less aggressive immunosuppressive therapy or may have less risk of BK nephropathy.

SHOULD THE DONOR AGE FOR EXPANDED CRITERIA KIDNEYS BE REDUCED?

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To increase deceased donor kidney supply, expanded criteria donors (ECD) were adopted in 2002 with the premise that more kidney transplants would result in shorter waiting times and limit the morbidity and mortality of long-term dialysis. ECD kidneys have worse long-term graft survival (GS) than standard criteria donor (SCD) kidneys. Outcomes of recipients (R) receiving SCD kidneys with risk factors of ECD criteria are unknown and hence studied here.

We studied adult deceased donor kidney R outcomes from UNOS database from 1995 to 2010 and identified those R whose donors were 40-49 years of age and met 2 of the 3 ECD criteria: history of hypertension, serum creatinine of >1.5 mg/dl and who died from stroke (ECD40sR). Kaplan Meier survival and Cox regression analyses for patient survival (PS) and GS were performed to compare ECD40sR with ECD recipients (ECDR). Median follow up was 4 years.

On an unadjusted survival analysis, both PS and GS appeared to be significantly superior for ECD40sR compared to ECDR. However, on Cox regression analysis, there appeared to be no difference in PS (Hazard ratio [HR] 0.996 [95% confidence interval 0.886-1.12]); p=0.94) or GS (HR: 1.02 [CI 0.913-1.114]; p=0.69) between ECD40sR and ECDR. One, three and five year PS and GS for ECD40sR, although higher than for ECDR, were not statistically significant.

In conclusion, there appeared to be no survival benefit for R receiving SCD kidneys from donors aged 40-49 years having at least 2 ECD risks. ECD definition allows an arbitrary binary distinction; perhaps, adopting donor scoring systems may be a viable option to identifying risk of post-transplant outcomes. Whether the same risk is carried by younger donors, less than 40 years of age, with ECD risks is being studied

ACUTE SERUM SICKNESS IN RENAL TRANSPLANT: A CASE SERIES

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Case 1: 21 y/o white male underwent Cadaveric Renal Transplant (CRT). Immunosuppression was with 3 doses of Anti-Thymocyte Globulin (ATG) over 3days post-transplant, Mycophenolate, steroid and Tacrolimus. He received Pentamidine for PCP prophylaxis which caused mild allergic reactive airway disease. Despite excellent graft function, two weeks later patient developed generalized body pain, headache, fever and progressive polyarthralgia. Physical exam was positive for tender and inflamed joints. Case 2: 31 y/o female underwent second living related renal transplant (LRT) from her sister. Immunosuppression was with 3 doses of ATG over 3 days post-transplant, Mycophenolate, steroid and Tacrolimus. Patient received Valcyte and Dapsone (Bactrim allergy) for CMV and PCP prophylaxis. Two weeks post-transplant she developed pain while raising her upper extremities and opening her TM joints. These symptoms resolved with increasing prednisone to 0.5mg/kg/day. Both the above patients had leukocytosis, polyarthralgia and joint aspirate was negative for infective etiology. ANA, RF, and anti-CCP were negative but antibodies against the ATG (ATG-Ab) were positive in both cases. Response to the increased prednisone dose was excellent with complete resolution of symptoms. About 10% of transplant patients who develop fever, leukocytosis and arthralgia have Serum Sickness due to ATG induction. It is therefore important to have a high index of suspicion for early diagnosis and effective management of this condition.

Transplant	Immunosuppression	Symptoms	ATG-Ab
CRT	ATG, MMF, Solumedrol, Tacrolimus.	Fever, polyarthralgia, Myalgia, Headache.	IgG 1:4000, IgM1: 2000.
LRT	ATG, MMF, Solumedrol, Tacrolimus.	Polyarthralgia, multiple fluid collections.	IgG 1:2000, IgM1: 1000.

POST-TRANSPLANT PLASMA CELL MYELOMA AND LYMPHOPROLIFERATIVE DISORDER: SERUM FREE LIGHT CHAIN MEASUREMENT AS A DIAGNOSTIC TOOL IN A RARE CASE

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Post-transplant malignancy is typically associated with Epstein-Barr virus (EBV) associated B cell proliferation. Few case reports describe the occurrence of monoclonal paraproteinemias caused by malignant plasma cells. We report a rare case of simultaneous diffuse large B cell lymphoma and plasma cell myeloma in the early post transplant period and the usefulness of serum free light chain measurement in identifying two different processes. Case Presentation: A 63year old male underwent live donor kidney transplant complicated by acute cellular and antibody mediated rejection, successfully treated with solumedrol, thymoglobulin and intravenous immunoglobulin. Eight months post transplant he was hospitalized, and diffuse lymphadenopathy identified. Excisional lymph node biopsy diagnosed diffuse large B cell lymphoma (DLBCL). Bone marrow biopsy, however, showed monoclonal plasmacytosis and decreased lymphocytes. Measurement of serum free light chains strongly demonstrated the presence of a lambda paraproteinemia (177mg/dL) with a kappa to lambda ratio of 0.02. To further evaluate the paraproteinemia, a subsequent kidney biopsy revealed lambda cast nephropathy and no malignant cell infiltration. The patient refused chemotherapy and died from complications of PTLD. Discussion: Plasma cell myeloma after solid-organ transplant is uncommon, but the occurrence of this paraproteinemia with simultaneous DLBCL has only rarely been described. In our experience, the use of serum free light chain measurement aided in diagnosis.

BOLDO (PEUMUS BOLDUS) AND TACROLIMUS INTERACTION IN A RENAL TRANSPLANT PATIENT

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Boldo (Peumus boldus mol) a Chilean tree whose leaves have been traditionally employed in folk medicine is recognized as an herbal remedy for gastrointestinal ailments among other uses. No interaction has been reported between boldo and tacrolimus. We present a case of undetectable tacrolimus levels in a renal transplant patient taking boldo. This is an 78 year old Hispanic male with history of diabetes mellitus, hypertension and deceased donor renal transplant recipient in 2005. Patient presented to the renal clinic for regular follow up on 09/01/10. No complaints were reported and physical examination was unremarkable. Labs taken on 07/26/10 were significant for tacrolimus level <0.3 ng/ml and serum Creatinine 1.4 mg/dl. Medications included tacrolimus 2mg bid and cellcept 500mg bid. On further inquiry, patient admitted taking an over the counter (OTC) herbal medication, boldo 300 mg bid, for an unknown period of time (several weeks). There was no other change in his medications. He was compliant with medication. He was taking tacrolimus from the same company and pharmacy since 08/2009. Last dose of boldo was on 09/01/2010. One week after he stopped taking boldo, tacrolimus level was 6.1 ng/ml (09/08/2010) on the same tacrolimus dose of 2mg bid. Tacrolimus dose was increased to 3mg bid (09/09/10), awaiting tacrolimus levels. Subsequent levels (ng/ml) were 8.6 and 9.5 which made us resume the prior tacrolimus dose (2mg bid)

In conclusion, we report a case of an allograft renal transplant recipient who presented to the clinic with undetectable levels of tacrolimus, while taking the OTC herbal medication, boldo. The tacrolimus rose to the intended target level after discontinuation of boldo. Although it is a single case report, our observation suggests a possible drug interaction. Hence, careful evaluation of all medications including OTC medications is essential before altering tacrolimus doses for sub therapeutic levels.

EMPHYSEMATOUS PYELONEPHRITIS IN RENAL ALLOGRAFT SUCCESSFULLY TREATED WITH MEDICAL MANAGEMENT

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Emphysematous pyelonephritis (EPN) is rare and life-threatening necrotizing bacterial infection of the kidney caused by gas-forming organism, mostly in diabetic patients and often requires nephrectomy. We report the case of EPN in renal allograft successfully treated with medical therapy.

A 51 year old woman with history of cadaveric kidney transplant 1.5 years back presents to the emergency department with fever, hypotension and vomiting. On admission she appeared acutely ill and dry on physical examination; she had no graft tenderness. She was noted to have diabetic keto-acidosis. Blood urea nitrogen and creatinine level of 67 mg/dl and 4.3 mg/dL respectively from baseline of 20 mg/dl and 1.2 mg/dl. Her white cell count was elevated with bandemia of 16% and her serum tacrolimus level was 5.2 ng/mL. Urine analysis showed numerous WBC and bacteria. Patient was treated with intravenous hydration, insulin infusion and broad spectrum antibiotics. Prograf and Cellcept were held and patient was started on stress dose steroid. Kidney transplant doppler ultrasound showed echogenic foci which likely represented a gas forming infection. CT scan without contrast showed an enlarged and heterogeneous attenuation in right lower quadrant transplant with several pockets of parenchymal gas most consistent with emphysematous pyelonephritis. Two non-obstructive renal calculi in the transplanted kidney were found. Blood and urine cultures grew pan sensitive Escherichia coli responding to intravenous Ceftriaxone. Her general condition improved and sepsis and ketoacidosis resolved. Her allograft function improved and her BUN and creatinine were 27 mg/dl and 1.4 mg/dL at discharge.

This is a rare presentation of EPN in a renal allograft associated with calculi. No real consensus exists on the optimal treatment of EPN in kidney transplant recipients and some debate on need for nephrectomy. In conclusion, this case demonstrates successful non-operative therapy of EPN with aggressive medical management in a kidney transplant recipient who presents with urosepsis, shock and renal failure.

PREVALENCE OF CVD RISK FACTORS AND THEIR TREATMENT IN CHRONIC, STABLE KIDNEY TRANSPLANT RECIPIENTS IN THE FOLIC ACID FOR VASCULAR OUTCOME REDUCTION IN TRANSPLANTATION (FAVORIT) TRIAL

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Kidney transplant recipients (KTRs) are at increased risk for CVD. We describe the baseline prevalence of CVD risk factors and use of CVD risk factor lowering medications in participants of the FAVORIT Study, a randomized double-blind trial of homocysteine (Hcy)-lowering therapy on cardiovascular and renal outcomes. KTRs (n=4110) with elevated Hcy and stable graft function were enrolled in the US (n=3000), Canada (n=498) and Brazil (n=612).

All results are unadjusted. At study entry, 89% of participants were taking a blood pressure- (BP) lowering medication, 54% a lipid-lowering agent, and 29% used medications for diabetes. History of CVD was self-reported by 802 (20%) participants. Among these, the proportion prescribed a BP-lowering drug, a lipid-lowering agent or an anti-platelet medication was 93%, 64% and 69%, respectively. Elevated LDL ($\geq$ 160 mg/dL) was identified in 205 participants, of which only 83 (40%) were taking a lipid-lowering agent. The association between graft vintage and use of CVD risk factor lowering medications appears inconsistent and is *unrelated* to use of BP-lowering medications, whereas lipid-lowering agent use is *less* prevalent and anti-platelet use, particularly aspirin, is *more* prevalent among those with grafts in place less than 2 years than in participants with older vintage grafts. Our results suggest the rate of treatment of CVD risk factors in stable kidney transplant recipients can be increased.

MYELOMA CAST NEPHROPATHY: A RARE CAUSE OF PRIMARY RENAL ALLOGRAFT DYSFUNCTION

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We report a rare cause of primary renal allograft dysfunction (PRAD) due to myeloma cast nephropathy (MCN) in a patient with no prior history of multiple myeloma preceding her transplant.

A 72 yr AA female with ESRD due to presumed hypertensive nephrosclerosis, on hemodialysis (HD) for 4 years, received her 1st SCD renal transplant. Induction immunosuppression (IS) included 3 doses of thymoglobulin and IV methylprednisolone. Maintenance IS consisted of MMF, TAC & prednisone. The patient remained oliguric and HD-dependent while the mate kidney achieved immediate function. Graft biopsy on POD 1 showed patchy acute tubular injury with eosinophilic intra-tubular casts, with no evidence of acute rejection. Subsequent biopsies on POD 13 & 26 showed cellular reaction of neutrophils and macrophages to these casts consistent with MCN. SIEP, UIEP (IgG λ monoclonal gammopathy, free λ chains, Bence Jones proteinuria) and Bone marrow biopsy (40% plasma cells) were diagnostic for myeloma. She received 5 sessions of plasmapheresis and 3-weekly cycles of bortezomib and oral dexamethasone; and attained partial hematologic remission after 4 cycles of chemotherpay. Graft function improved gradually and she was discharged from HD by POD 90, with a serum Cr of 1.1mg/dl at 8 months. Pre-transplant banked sera analyzed retrospectively showed a small monoclonal spike of IgG λ as early as 4 years pre-transplant.

Only 3 cases of PRAD due to MCN have been reported, all with delayed diagnosis and poor graft outcomes. This is only the fourth reported case of PRAD due to MCN and the first reported case of significant allograft function recovery following treatment. Use of bortezomib is associated with significant improvements in response rates, patient survival, as well as renal recovery rates in MCN. This case emphasizes the need for increased awareness for this rare, but serious complication and raises the question for the routine use of IEP as part of the pre-transplant evaluation. Aggressive therapy including bortezomib and prolonged renal supportive therapy before undertaking graft nephrectomy might help to improve the graft outcomes.

MEDICARE IMMUNOSUPPRESSANT COVERAGE AND ACCESS TO KIDNEY TRANSPLANTATION

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In 2001, Medicare eliminated limitations in immunosuppressant coverage for beneficiaries over age 65 or disabled for a reason other than ESRD, but not for beneficiaries whose only entitlement to Medicare is ESRD. We sought to examine access to waitlisting and kidney transplantation before and after this policy change.

We conducted a retrospective cohort analysis of 56,122 Medicare beneficiaries in the United States Renal Data System who initiated chronic dialysis immediately before or after the policy change (calendar year 1996 or 2001). We used Cox proportional hazards modeling to determine access to kidney transplant defined as: (1) waitlisting within 12 months; and (2) transplantation within 35 months of initiating chronic dialysis by age/disability status (age under 65 and non-disabled versus age over 65 or disabled).

The raw percentages of waitlisted beneficiaries decreased after the policy change among those under 65/non-disabled (8.8% to 7.1%, $p<0.001$), but remained stable among those over 65/disabled (2.9% to 3.2%, $p=0.075$). After adjusting for confounders, those under 65/non-disabled were less likely to be waitlisted after the policy change (HR 0.89, 0.79-1.00, $p=0.050$), while those over 65/disabled were more likely to be waitlisted (HR 1.30, 1.13-1.50, $p<0.001$). The raw percentages of transplanted beneficiaries decreased after the policy change among those under 65/non-disabled (6.0% to 4.3%, $p<0.001$), but did not fall among those over 65/disabled ($p=0.841$). After adjusting for confounders, those under 65/non-disabled were less likely to be transplanted after the policy change (HR 0.73, 0.64-0.84, $p<0.001$), but likelihood of being transplanted among those over 65/disabled was not different (HR 1.06, 0.92-1.22, $p=0.449$).

The most recent extension in Medicare immunosuppressant coverage may have adversely impacted access to kidney transplantation for the younger, non-disabled patients who were not eligible for this benefit.

TRENDS IN PREVALENCE OF CHRONIC KIDNEY DISEASE IN KIDNEY TRANSPLANT RECIPIENTS

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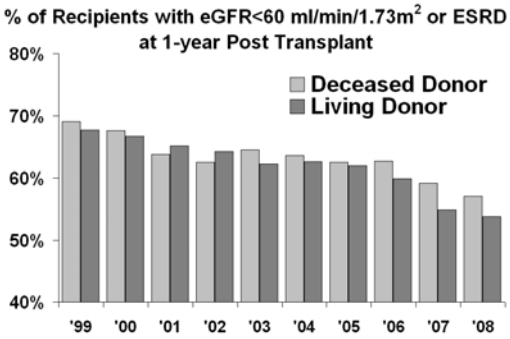
Among kidney transplant recipients, lower estimated GFR (eGFR) at one-year post transplant is associated with eventual graft failure and cardiovascular death. While increased age is associated with higher chronic kidney disease (CKD) risk in general, the impact of the increasing average age of both kidney transplant donors and recipients on post-transplant CKD prevalence is unclear. US adult kidney transplant recipients (age≥20) engrafted between 1999 and 2008 were identified in the Scientific Registry of Transplant Recipients database. GFR was estimated using the MDRD equation for recipients with functioning allograft at one-year post transplant. Logistic regression was used to model the probability of eGFR<60 ml/min/1.73m^2 or ESRD at one year post-transplant adjusted for year of transplant, donor's age and donor's gender. Prevalence of CKD 1 year post-transplant has significantly decreased over time at a rate of 5.0% per year ($p<0.001$, see figure) for both living and deceased donor kidney transplant recipients. Adjustment for donor's age and donor's gender indicated a greater annual decline in CKD risk of 6.7% per year ($p<0.0001$).



Explanations for such overall trends might include changes in immunosuppression practices and require further study.

ACUTE REJECTION IN RENAL ALLOGRAFTS WITH DELAYED GRAFT FUNCTION (DGF) IN THE ERA OF T CELL DEPLETING INDUCTION

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Introduction: DGF is associated with worse long term renal allograft survival. With poor early allograft function there is always concern for undiagnosed acute rejection (AR). We routinely biopsy DGF allografts in the first week. With T cell depleting agents we hypothesized that AR would be unlikely in the first week post transplant

Methods: Between January 2005 and December 2009 we performed 725 kidney alone transplants who were ABO compatible and with negative pre-transplant flow cross match. Sixteen (2.2%) patients had DGF, defined as dialysis within one week of transplant, and had a biopsy.

Results: Age 52.3 ± 13.2 year, Caucasians 15 (93.7 %), male 12 (75 %), deceased donor source 10 (62.5%), re-transplant 4(25%). T cell depleting agents were used in all patients, Alemtuzumab followed by tacrolimus and mycophenolate mofetil in 2 (12.5%) the remainder, rabbit Anti-thymocyte Globulin followed by tacrolimus mycophenolate mofetil, and corticosteroids. DGF was more common in recipients of deceased donor kidneys 20.4 % vs. 0.9 % $p < 0.001$. AR was seen in 2 (12.5%) cases one AR 2A and the second was antibody mediated rejection. Other findings on biopsy included: 11 (68.7%) ATN, 1 (6.25%) normal and 2(12.5%) biopsies showed donor transmitted histological changes.

Conclusion: In this study we confirm that ATN is the commonest histological finding in patients with DGF and more likely to occur in recipients of deceased donor kidneys. AR is uncommon early post transplant with T cell depleting agent induction but can not be excluded without performing early biopsies.

NEW THOUGHTS, OLD PROBLEM: LESSONS FROM DENERVATION AND PHOSPHATE WASTING IN THE TRANSPLANTED KIDNEY

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While phosphate (PO4) homeostasis in CKD has attracted renewed interest, PO4 wasting has been observed for decades in kidney transplant (KT) populations, where hypotheses implicating only preexisting hyperparathyroidism (HPT) and recently FGF 23 have been unsatisfying. “Bench and bedside” observations suggest that persisting KT denervation may largely explain this enduring phenomenon. A normal kidney has a fractional excretion of catechols (FEC, epinephrine [E], and norepinephrine [NE]) of 300%, due to substantial contribution from renal nerves. FEC falls to 100% in KT’s reflecting excretion of only circulating catechols. (Ziegler et al (J. of HTN, 1990). In the longstanding KT’s from our own institution shown below, FEC, urinary E/Cr, and urinary NE/Cr are reduced by approximately 50%.

	E_{plasma}	NE_{plasma}	$U_{E/CR}$	$U_{NE/Cr}$	FE_E	FE_{NE}
C	88±11 pg/mL	516±91 pg/mL	32±3 µg/g	126±13 µg/gm	4.2±.5	3.4±.8
KT	79±9	578±74	17±5	62±13	2.7±.7	1.5±.4
P	NS	NS	.001	.001	.021	.01

In decades past, Mann et al (Miner Elec Metab, 1991) demonstrated a 9-fold increase in PO4 excretion in the unilaterally denervated rat kidney as compared to contralateral control in the setting of PTH infusion. This is consistent with a phosphaturic effect attributable to loss of interstitial catechol activity observed by others.

Conclusions (1) Renal denervation may explain the persistence of PO4 wasting over decades of KT. (2) Better control of HPT in ESRD populations has resulted in some amelioration of this lesion. (3) In addition to PTH, FGF 23, and other circulating agents, studies of PO4 homeostasis in non KT’s must consider the phosphaturic contribution of reduced sympathetic nerve function that has been long been demonstrated in the diseased interstitium of advancing CKD.

OUTCOMES OF KIDNEY TRANSPLANTATION IN HIV ALONE AND HIV-HCV COINFECTED RECIPIENTS

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As the outcomes of transplantation in immunosuppressed HIV-infected individuals are better understood, little is known about allograft survival in HIV and Hepatitis C (HCV) co-infected recipients. We analyzed data from renal allograft recipients who were HCV positive and had CD4+ T-cell counts of at least 200 per cubic millimeter with undetectable plasma HIV type 1 (HIV-1) RNA levels on a stable antiretroviral regimen prior to transplantation.

Between 2002 and 2010, a total of 92 patients underwent kidney transplantation at our institution; over the eight (8) year period, there was no difference in the graft survival between the two groups. Comparing HIV/HCV (-) vs. HIV/HCV (+), graft survival was (983.6 days vs. 897days; p=0.59); One year graft survival was 78% vs. 66.7% (p = 0.49) respectively while at year 3 it was 38% vs. 28.6 %.(p=0.37). Delayed graft function was also similar in both groups HIV/ HCV (-) (60%) vs. HIV/HVC (+) (62%) (p=0.84). Comparing renal function of HIV/ HCV (-) vs. HIV/HCV(+) allograft recipients at 3 months, 1 year and 3 years showed no significant difference in GFR in the allografts which were functioning at that time. Rates of acute cellular rejection were HIV/HCV (-) (30%) vs. HIV/HCV (+) (26%) (p =0.65) and that of antibody mediated rejection was HIV/HCV (-) (17%) vs. HIV/HCV (+) (11%). (p= 0.57). In this study of HIV infected and HIV/HCV co-infected patients, we concluded that rates of graft survival, delayed graft function, acute cellular rejection and antibody mediated rejection were similar overall in both groups.

IMPACT OF EARLY STEROID WITHDRAWAL (ESW) ON PROGRESSION OF CHRONIC BIOPSY SCORES AFTER KIDNEY TRANSPLANTATION

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Long-term effects of ESW on development of chronic pathohistology changes in kidney allograft is unclear. In this study we compared chronic scores on protocol biopsies in Caucasian kidney recipients (N=41) without DGF with ESW vs. continuous steroids on top of CNI and MMF. Induction consisted of IL-2RA or ATG. Protocol biopsies were done on day 0 and 1 year after transplant. Chronic scores (ci, ct, cg, mm, cv and ah) were analyzed by Banff' 97 classification.

	Steroid free N=21	On steroid N=20	p
Recipient gender(m/f)	11/10	9/11	0.64
Recipient age (years)	43.2±12.2	43.4±10.7	0.96
Kidney/SPKT	18/3	8/12	<0.01
Deceased/living donor	5/16	19/1	<0.01
Donor age (years)	47.3±14.3	34±15.5	<0.01

ESW was not associated with changes in ci, ct, cg, mm and cv scores, but slight progression of ah score was noticed in ESW group (0.49±0.51 vs. 0.21±0.41; p=0.02). In multivariate analysis including recipient age and gender, donor age, type of donation (living or deceased) and type of transplant (kidney or kidney/pancreas), ESW was independently associated with progression of ah score (p=0.049). In conclusion, ESW may cause progression of ah score during first 12 months posttransplant, without impact on other chronic scores.

INCIDENCE OF MALIGANCY AFTER KIDNEY TRANSPLANTATION WITH ALEMTUZUMAB AND OTHER INDUCTION AGENTS

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Alemtuzumab is a commonly used induction agent for kidney transplantation. It's getting more popular due to allowance of recipients to be on a steroid-free regimen and low-dose maintenance immunosuppression therapy. The objective of this study is to identify and compare the incidence and outcome of malignancy using alemtuzumab induction and other induction protocols.

Using Organ procurement and Transplantation Network (OPTN database) we evaluated total of 110,903 kidney transplant recipients whom were transplanted from 2003 Jan 1 to Dec 31 2009 nationwide. 10,437 patients received Alemtuzumab induction and 110,903 received other form of induction agent. We used Chi-square test to study difference in proportion, two-sample t-test for difference in mean between two groups, Kaplan Meier analysis for survival and malignancy estimates and cox model hazard ratio for malignancy and graft failure rates in adjusted and non-adjusted models. The mean follow up period was of 3.5 +/-2.5 years. Mean age (SD) was 48.7+/-14.7[<1, 87] in Alemtuzumab group vs 47.6+/-15.9[<1, 96] in non-alemtuzumab group. 4% had reported malignancy in both groups in the past.

60% were male, and were ethnically diverse (55% White, 24% Black, 15% Hispanic, and 5% Asian). Kaplan-Meier estimates for 1-year, 3-year and 5-year malignancy rates were 1.3%, 3.9%, and 6.9%, overall death rates were 2.8%, 7.6%, and 13.5%, and graft failure rates were 6.6%, 15.5%, and 25.4%, respectively. Skin cancer (squamous and basal) were the highest reported malignancy (1570) followed by PTLD (506), lung (271) prostate (230) and renal cancer (220). There was no difference in distribution of tumor type between alemtuzumab group (N=326 with a post transplant tumor) and those with other induction agent (N=4025 with a post transplant tumor) (chi-square p-value = 0.48). When using Cox regression to adjust for age, gender, ethnicity, and prior malignancy, alemtuzumab use was associated with lower malignancies (HR=0.84, 95% CI= [0.75, 0.94], p=0.003) and higher graft failure rate (HR=1.09, 95% CI= [1.04, 1.15], p=0.0004). Alemtuzumab use was not associated with high death rate (HR=1.06, 95% CI=[0.99, 1.14], p=0.11). In conclusion, Alemtuzumab induction protocol clearly has an advantage of lower incidence of post transplant malignancies. (Above information is based on OPTN data as on Sep 10, 2010. website: http://optn.transplant.hrsa.gov)

BK VIRUS NEPHROPATHY AND SUPERIMPOSED ACUTE CELLULAR REJECTION IN A RENAL TRANSPLANT RECIPIENT: A TREATMENT DILEMMA

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The prevalence of BK nephropathy (BKN) in renal transplant recipients is estimated to be 1 to 10 percent. A correlation exists between an increased incidence of BKN and an increased degree of immunosuppression. Management of superimposed acute allograft rejection in the setting of BKN continues to be a challenge.

We describe a case of a 52 year old African American male, who received a deceased donor allograft in August, 2010. His immunosuppressant medications included tacrolimus, mycophenolate mofetil and prednisone. The patient had delayed graft function and tacrolimus levels did not reach a goal level of 8-10 ng/ml until 30 days post transplant. The immunosuppression was intensified further with an increase in tacrolimus dose, and subsequent therapeutic range tacrolimus trough levels obtained. BK viruria and viremia were not detected in screening tests two months post transplant. Ten weeks post transplant the patient was admitted to hospital for deterioration in renal function and an elevated serum creatinine of 2.3 mg/dl (baseline creatinine 1.8 mg/dl). Tacrolimus trough level was 9.9 ng/ml. A renal biopsy at this time was reviewed and showed significant mononuclear interstitial infiltrates with severe tubulitis (Banff 1B acute cellular rejection). SV 40 stains for BK virus were seen only in the medullary area of 3 of 6 biopsy cores. BK virus qPCR showed 4.3x 10(8) DNA copies/ml in urine and 1.41x10(4) DNA copies/ml in plasma.

The patient was treated initially with steroid and IV immunoglobulin. Mycophenolate mofetil was discontinued and subsequent medications included tacrolimus, leflunamide, and tapering doses of steroids. Renal function improved with a return of serum creatinine to baseline. BK viruria and viremia showed decreasing trends. Negative screening tests for BK virus lead to delayed diagnosis of BKN in our case. More frequent monitoring may be necessary if intensity of immunosuppression increases.

GANCICLOVIR RESISTANT CYTOMEGALOVIRUS IN A RENAL TRANSPLANT RECIPIENT: A MEDICAL CHALLENGE

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The PV 16000 study reported ganciclovir resistant cytomegalovirus (CMV) in 1.9% renal transplant recipients. The resistant strain may present amino acid deletions or substitutions in conserved regions of the UL97 protein, point mutation in the DNA polymerase (UL54) or both.

We describe a case of a 54 year old African American female, who received a deceased donor renal allograft in August, 2009. CMV serology status was seronegative for the recipient and seropositive for donor. Patient had intermittent lapses in CMV prophylaxis due to missing medication followed by leucopenia. Her Immunosuppressant medications included Tacrolimus, Mycophenolate Mofetil and prednisone. One month post transplant, patient developed Acute Antibody- Mediated rejection, and received treatment with Plasmapheresis, IV Immunoglobulin and Rituximab. A week later she developed CMV pneumonitis, and was started on Valganciclovir. A viral load of 381,000 was detected that progressively decreased to 44,800 over a period of 4 months. Patient continued to feel lethargic and was admitted again in the hospital. Her viral load had increased to 80,300. A genotypic testing for drug resistance was performed, and patient found to have a UL97 mutation with resistance at site L595S. Treatment was initiated on a combination synergistic regimen of one half dose of ganciclovir and one half dose of Foscarnet, which helped bring the viral load down to 17,300 in 3 weeks. Renal function remained stable with IV hydration.

The intensity of immunosuppression, CMV seronegative status and intermittent CMV prophylactic treatment contributed to the development of ganciclovir resistant CMV infection in our renal transplant patient.

ASSOCIATION BETWEEN LOWER GRAFT SURVIVAL AND KIDNEYS FROM DONORS AGED 40-49 YEARS WITH CO-MORBIDITIES

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Several recipient (R) and donor (D) risk factors are associated with inferior graft survival (GS). Outcomes of recipients (R) receiving kidneys from standard criteria donors (SCD) aged 40-49 years with risk factors of ECD criteria coined compromised SCD donors (CSCD) were compared with SCDR using UNOS data from1995 to 2010. Patient survival (PS) and GS were studied. Median follow up was 4 years. On Kaplan Meier survival analysis, both PS and GS appeared to be significantly superior for SCDR compared to CSCDR. However, on Cox regression analysis, there appeared to be a marginally significant decrease in PS (Hazard ratio [HR] 1.089 [95% confidence interval 1.010-1.174]); p=0.02) in CSCDR. In this group, GS was significantly lower (HR:1.109 [CI 1.031-1.192]; p=0.0053). However, patient survival was not significantly different.

In conclusion, GS appears to be strongly influenced by donor risk factors in age group 40-49 years. It is possible that duration and severity of co-morbidities and effective renal reserve influence graft outcomes in this age group of standard criteria donors. Whether the same influence exists in donors less than 40 years of age or healthy donors over age 50 years is being invested. Influence of other risk factors including components of the metabolic syndrome is also being studied.

UNSUSUAL CASE OF AGRANULOCYTOCIS WITH VALACYCLOVIR IN A KIDNEY TRANSPLANT PATIENT

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Although Valacyclovir (VAL) has been shown to cause leukopenia; agranulocytosis has not been reported. Solid organ transplants may be particularly at risk.

A 55 year-old male with cadaveric renal transplant was maintained on mycophenolate mofetil (MMF), tacrolimus (FK) and prednisone for 12 years without significant complications. Ten days prior to admission he developed painful oral ulcers. Prescribed VAL 1 gm twice daily for a presumed herpes infection but a week later presented with high grade fever and worsening malaise. Denied cough, diarrhea, nausea, vomiting or dysuria. Exam was notable for oral ulcers with erythematous base. Laboratory tests revealed a WBC of 300/µl with no granulocytes, hemoglobin 9.8gm/dl & platelet count of 118K/µl. Chemistries were unremarkable. FK trough was 7.2ng/ml and MMF levels were 0.7mcg/ml. Tests were negative for cytomegalovirus, HIV, BK virus, Parvovirus, mycoplasma, ehrlichia and acute EBV infection. Patient was treated empirically with cefepime, however his blood and urine cultures were negative. FK and prednisone were continued while MMF & VAL held. Agranulocytocis persisted despite 3 doses granulocyte macrophage colony stimulating agent (GM-CSF). Bone marrow biopsy revealed normal cellularity with early myeloid precursors. Studies for myelodysplastic syndrome were negative. After the 5th dose GM-CSF, WBC count rose to 4000/µl & neutrophils rose to 800/µl by day 6. His
out patient follow up revealed normal WBC count and stable allograft function.

This case illustrates a rare but severe complication of VAL. Even though agranulocytocis has not been previously reported, recent literature suggests an interaction between VAL and MMF, leading to marrow suppression. Further studies are needed to determine the mechanism of synergistic toxicities and to suggest possible dose adjustments in transplant patients.

TRANSPLANT CENTER DIFFERENCES: A NEW METHOD TO MEASURE THE GAP IN OUTCOMES

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1-Culmini Inc., 2-Stanford University, 3-UC San Francisco

Standardized patient and graft survival rates across transplant centers aim to predict future performance. We compared the predictive accuracy of standardized rates with the observed-to-expected (O/E) method to an alternative method that is based on generalized mixed effects (ME) method. Data were from the United States Renal Data System. We compared root mean square errors for the difference between the estimates obtained by both methods using past data to estimates obtained from a future time period. The ME method has a lower root mean square error for graft failure and patient mortality. The difference in root mean square error ranged from 1.0% to 3.7%. For the ME method the highest error was for predicting future 3-year graft survival with the O/E method (6.6%) and the lowest was for predicting future 3-year patient survival with the ME method (2.1%). Standardized estimates with the ME method had a much smaller range between the 5th and 95th percentile compared to the O/E method: 7.5% for 3-year graft failure compared to 21.6% for the O/E method; 4.7% for 3-year patient survival compared to 15.4%. This ME range is clinically significant: 20% of all deaths and 25% of all graft failures in the 3 years after transplant could be eliminated if all centers matched the outcomes of the best center. However, this range did not change since the introduction of public reporting indicating that centers do not yet have strong incentives to change their behavior.

DE NOVO AL AMYLOIDOSIS PRESENTING IN A RENAL ALLOGRAFT: A REPORT OF TWO CASES.

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Case One: A 79-year-old Caucasian woman with polycystic kidney disease underwent deceased donor renal transplantation in 1998. In January 2010 she presented with leg swelling and fatigue. 24 hour urine revealed 3.3 grams of protein; serum creatinine (SCr) was 1.4 mg/dL. Serum immunofixation revealed a lambda light chain paraprotein not observed on serum protein electrophoresis (SPEP). Urine electrophoresis showed 74 mg of free lambda light chain per 24 hours. Renal transplant biopsy showed amyloidosis with positive Congo red staining; 10 nM non-branching fibrils were present on electron microscopy (EM); immunofluorescence (IF) was not obtained. Bone marrow (BM) biopsy revealed a mild plasmacytosis. The patient was treated with melphalan and prednisone but expired due to progressive renal and heart failure.

Case Two: A 65-year-old African American woman developed end stage renal disease presumably due to hypertension. Monoclonal gammopathy of unknown significance vs. asymptomatic multiple myeloma was identified prior to renal transplant. SPEP was negative but serum immunofixation revealed an IgA lambda paraprotein. BM biopsy showed 10% plasma cells. She underwent living related renal transplantation in 2004. In 2010 the 24 hour urine protein was 3.5 gm; SCr was 0.94 mg/dL. Serum and urine electrophoreses revealed an IgA lambda paraprotein and abnormal lambda light chains. Renal allograft biopsy revealed amyloidosis with positive Congo red staining; 10 nM non-branching fibrils were present on EM. IF showed preponderant staining for lambda light chains. Multiple myeloma was diagnosed and the patient recently started treatment with Velcade, melphalan and dexamethasone.

AL amyloidosis is a rare cause of proteinuria in renal transplant patients and should be considered particularly in patients with evidence of monoclonal gammopathy. To our knowledge, there are only two other prior reported cases of de novo AL amyloidosis presenting in a renal allograft.

STRONGYLOIDES STERCORALIS INFECTION AFTER SIMULTANEOUS PANCREAS AND KIDNEY TRANSPLANT; A CASE REPORT IN SURVIVAL

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Strongyloides stercoralis hyperinfection has been described rarely in single solid organ transplant patients but never in dual organ transplants to date. It is associated with a very high mortality rate (80-90%).

We present a 50 year old Canadian-born male 4 months status post simultaneous pancreas kidney (SPK) transplant that was maintained on prograf, mycophenolic acid and low dose prednisone. He had several months of indolent symptoms of nausea and diarrhea with no identifiable source and multiple negative stool cultures. He, then, acutely represented with diarrhea, vomiting, larva currens abdominal rash, and acute respiratory failure with no readily identifiable exposures. Mycophenolic acid was discontinued. Extensive *Strongyloides* larval infiltration was detected by duodenal biopsy with massive shedding in nasogastric and respiratory secretions. An initial regimen of enteric Ivermectin 15mg daily and Albendazole 400mg BID was started. His Ivermectin was titrated to three times daily.

The patient improved clinically and was extubated 10 days after initiation of therapy. Ivermectin was discontinued following negative larval samples from stool, tracheal, and gastric aspirates but had to be resumed due to one episode of recurrence of larva. Once the larval samples cleared, the ivermectin dosing was eventually minimized to the lowest possible dose and tapered off along with albendazole. The main concern during his therapeutic course was diminished responsiveness and neurotoxicity from ivermectin. The patient has now begun to make a slow neurologic recovery and long term outcomes remain to be determined. His renal and pancreatic grafts remained fully functional throughout his illness.

This unique case highlights the importance of aggressive, early diagnosis and proposes a potential treatment regimen that can reduce this infection's high mortality.

DRUG-RESISTANT CYTOMEGALOVIRUS IS A BIG DILEMMA IN KIDNEY TRANSPLANTATION-CASE REPORT.

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Background: Cytomegalovirus (CMV) is the most frequent infection occurring in transplant patients. It causes detrimental effects in the recipients with different presentations such as acute infection, exacerbating the systemic immunosuppression, increasing the risk of malignancy, or direct injury of the allograft. Despite potent antiviral drugs, the impact of CMV in kidney transplantation remains a big dilemma especially with the emergence of drug-resistance CMV. Aim: To report a case of drug-resistant CMV in a kidney transplant patient. Clinical Vignette: A 55 y/o AA lady with history of diabetic nephropathy on hemodialysis and HTN. She has had successful deceased donor kidney transplant with expanded criteria donor. Two months after, she was hospitalized for thrombotic microangiopathy where she was diagnosed with CMV infection with viremia of 701.000 copies and humoral rejection confirmed by Kidney biopsy. The patient received two cycles of IV gancyclovir followed by valganciclovir orally. After three weeks of persistent viremia drug-resistance CMV was suspected and forscarnet was started which had no response and complicated by AKI. At that point leflunomide was started as a last resort for both CMV and immunosuppression in addition to CMV genotyping showed UL54 gene mutation. Soon after that, viremia came down gradually to 4300-1700 and then to 123 copies. Now, the patient is doing well on leflunomide 10 mg daily with biweekly follow-up of CMV PCR. Discussion: CMV is one of the most important pathogens impacting on the outcome of the transplantation. Drug resistant virus showed be suspected with any viremia persisted after 3 weeks of therapy while the treatment is based only on clinical practice recommendations pending clear guidelines in the future.

COLCHICINE INDUCED MYOPATHY IN A TACROLIMUS-TREATED RENAL TRANSPLANT RECIPIENT

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Colchicine induced myopathy is well described in literature. Several cases of colchicine toxicity have been reported in cyclosporine-treated patients due to a drug-drug interaction. However, to our knowledge, none have been reported in patients on tacrolimus.

A 62-year-old African American male underwent a deceased donor renal transplant 4 years ago and had been doing well on tacrolimus-based immunosuppression. He presented to the clinic with an episode of gout and was started on colchicine 0.6 mg to be taken twice daily. After a few days, he was noted to have a four fold increase in AST (52 to 209 units/L) and an elevated CPK (9084 units/L). A stable therapeutic concentration of tacrolimus (6.1ng/mL), stable creatinine (1.2 mg/dL) and WBC were documented. His other medications were mycophenolate mofetil, omeprazole, allopurinol, losartan, atenolol, nifedepine, and vardenafil. He was not drinking grapefruit juice, or taking over-the-counter or herbal supplements. Colchicine toxicity was suspected and the drug was discontinued with prompt decrease of CPK to 5204 units/L in 3 days. Muscle and liver enzymes returned to normal in 2 months.

Cyclosporine is a P-glycoprotein and CYP3A4/5 inhibitor causing increased colchicine absorption and decreased elimination. We hypothesize that tacrolimus, a weak inhibitor of P-gp and CYP3A4/5 increased the susceptibility of our patient to colchicine toxicity.

TRANSPLANTATION OF HEPATITIS C POSITIVE KIDNEYS INTO SELECTED HEPATITIS C NEGATIVE RECIPIENTS

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Hepatitis C positive (HCV+) deceased organ donors may offer otherwise ideal organs, but transmission of hepatitis, particularly to hepatitis C negative (HCV-) recipients, may pose risks which some patients and physicians deem prohibitive. Since active and clinically apparent hepatitis C usually evolves over many years, even in the immunosuppressed host, use of HCV+ kidneys may, in selected HCV- patients, be appropriate. This may especially be so in potential recipients with an expected patient survival of 10 years or less. To determine outcome in HCV- recipients of HCV+ kidneys, 17 patients transplanted between October, 1999, to August, 2010 were identified. All deceased donors were HCV+ liver and kidney donors; in some cases additional organs were recovered. Donors averaged 40 years of age (range 22 to 56) and none had a history of liver disease. All recipients were over 60 years of age: range 61 to 74 (mean 66) years at the time of transplant. Of the 17 recipients, 11 were African American and 6 were Caucasian while 12 were male and 5 were female. Two patients (12%) sero-converted to HCV+ detected through polymerase chain reaction although these patients never had any evidence of clinical liver disease or elevation of hepatic enzymes. Over the course of the 10 years, 8 of the patients died at 1 month to 8 years, 2 of whom had required transplant nephrectomy within 2 months of transplantation; the other 6 died with renal function. The 9 living patients transplanted from 2000 to 2010 had median creatinine values at 1, 6, and 12 months posttransplant, respectively, of 1.8, 1.05, and 1.1 mg/dl, and currently have life-sustaining renal function with a mean serum creatinine of 1.35 mg/dl (range 0.9 to 2.63). None of the 17 patients were diagnosed with acute rejection, and none required retransplantation. Patient and graft survival without clinical HCV disease may be a routine occurrence in older recipients receiving kidneys from donors also donating a liver but positive for hepatitis C antibody.

BK NEPHROPATHY (BKVN) IN SIMULTANEOUS KIDNEY-PANCREAS TRANSPLANT (SKPT): POTENTIALLY PREVENTABLE CAUSE OF RENAL ALLOGRAFT LOSS

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Immunosuppression (IS) reduction is the main stay of BKVN management; this approach can put SKPT patients (pts) at a high risk of pancreatic allograft rejection. This fear of pancreatic rejection leads to inadequate BKVN management in SKPT pts. More than 50% of SKPT pts afflicted with BKVN lose their kidneys.

Single center, retrospective case study reviewed the data of 138 SKPT patients from 1/06 to 6/10. BKVN definition was qPCR > 10000 copies/ml of serum and > 30% rise in seurm creatinine from baseline. Induction was with r- ATG and maintenance steroid free IS with Tacrolimus ± Sirolimus or Mycophenolate. Quarterly urine screening for BK virus was done for first two years and once a year thereafter.

6 pts were diagnosed with BKVN. Mean time to diagnosis was 13 months. Median serum creatinine was 2.1 mg/dl at diagnosis. The geometric mean BK serum viral load was 1,758,000 DNA copies/ml. Pts were managed with IS reduction alone with biweekly monitoring of BK viral loads and blood chemistries. Median time to BKVN clearance was 5.6 months. No renal allograft was lost to BKVN. From BKVN diagnosis to clearance there was a 96% reduction of MM dose. 100% reduction in Sirolimus and 40% reduction in 12hr Tac trough level. At a Median 19 month pt follow up post BK clearance, pts had excellent renal function without evidence of pancreatic allograft loss.

Early detection and intervention in BKVN by Immunosuppression reduction alone with close monitoring of renal and pancreatic allograft function can potentially prevent renal allograft loss in SKPT without compromising pancreatic allograft

NURSING IMPLICATIONS FOR IMPLEMENTATION OF A CLINICAL PATHWAY FOR THE DECEASED DONOR RENAL TRANPLANT PATIENT

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Clinical pathways have been used to systematically approach patient care in many acute hospital settings. Nursing staff fill the central role in implementation of clinical pathways in this setting. The purpose of this study was to explore the nursing implications of implementation of a new clinical pathway for deceased donor renal transplant (DDRT) patients.

This descriptive exploratory qualitative study explored staff nurses' perceptions of the clinical pathway's usefulness in assisting patient care and allowing the nurse to be more involved in directing patient care. An open-ended questionnaire was sent to all 8 staff nurses who cared for the DDRT patients regularly and utilized the clinical pathway in a 24 hour acute care setting during a 7 month period.

Six nurses completed the questionnaire, with responses all in favor of use of the clinical pathway as a patient care aid in achieving patient goals. Respondents also felt more involved in directing patient care in interactions with multidisciplinary team members, and felt it would supplement preexisting standardized postoperative nursing care.

In conclusion, staff nurses found the clinical pathway to be useful in keeping patients on target for their postoperative goals. Use of the pathway also empowered staff nurses to become an integral part of the multidisciplinary team and be involved in decision making processes regarding care of the DDRT patient.

PREVELANCE OF BK VIRUS INFECTION AFTER RENAL TRANSPLANTATION.

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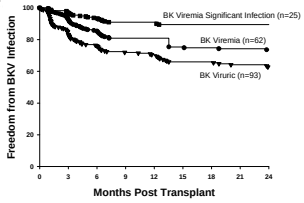
We prospectively evaluated the prevalence of BK Virus(BKV) infection after renal transplantation. 240 ESRD patients were enrolled at renal transplantation at our center from July 2007 – July 2010 and followed until November 2010.Quantitative BKV DNA in plasma and urine were monitored at 1, 3,6,12 and 24 months post-transplantation. Patients with significant BKV infection (plasma DNA ≥10,000 copies/ml were treated with 40-50% reduction of immunosuppresion and subjected to transplant renal biopsy. Univariate analysis of risk factors for BKV infection revealed that Afro-American recipients has a lower incidence of BKV infection (p=0.004). The figure illustrates a Kaplan Meier estimates for freedom from post-transplant BKV infection. A total of 62 (25.8%) patients had BK viremia and viruria; 33(13.8%) patients had BK viruria alone. Significant BK viremia was noted in 25 (10.4%) patients. Reduction of immunosuppression resulted in resolution of BKV infection over time without change in renal function. No grafts were lost due to BKV nephritis or acute rejection following reduction in immunosuppression. In conclusion**,** BKV infection was seen in 39.6% with significant infection in 10% African Americans had lower incidence of BKV infection. Detection of early infection including nephritis without renal dysfunction, prompt therapy with reduction of immunosuppression resulted in successful resolution of infection without graft failure



LEFLUNOMIDE: A NOVEL THERAPEUTIC AGENT FOR GANCICLOVIR-RESISTANT CYTOMEGALOVIRUS IN KIDNEY TRANSPLANT RECIPIENTS

Eram Shahira, Beje Thomas, Manish Talwar, Maria Salazar, Takamitsu Saigusa, Sarat Kuppachi, M. Francesca Egidi
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Cytomegalovirus (CMV) is the most common viral infection in solid organ transplant; 20%-60% of transplanted patients develop symptomatic CMV infection despite specific prophylaxis. First line treatment for CMV reactivation and disease presently includes ganciclovir or valganciclovir. Cidofovir and foscarnet because of their nephrotoxicity should be considered in case of failure of the traditional treatment. Leflunomide is a drug approved for the treatment of rheumatoid arthritis that has been shown to have anti-CMV activity without nephrotoxicity. We report our experience with four patients who developed CMV reactivation and subsequent disease and failed treatment with ganciclovir and immunosuppression (IS) reduction. Leflunomide (LF) was initiated at the dose of 40 mg PO/daily. All of the patients received cadaveric renal transplants, had T-cell depleting agent induction (Thymoglobulin) and maintenance IS consisting in prednisone, cellcept and tacrolimus. The viremia was monitored and detected with routine CMV/PCR screening. The patients' characteristics and results are shown in the table.

	Age at the Transplant	Race/Gender	CMV status (IgG) D/R	Diagnosis from transplant (Months)	Time to response to Leflunomide (Weeks)
Pt.LB	49	C/F	+/-	6	4
Pt.CB	38	AA/M	+/-	2	4
Pt.CH	41	C/M	+/-	6	5
Pt .SA	51	C/M	+/+	24	3

In conclusion our preliminary results show that LF offers an alternative to traditional anti-CMV therapies for the transplant recipient with antiviral resistance.

STREPTOCOCCUS BOVIS (STB) MENINGITIS IN A RENAL ALLOGRAFT PATIENT: A CASE REPORT. Salman Singapuri, Sudha Tata; Emory University School of Medicine, Division of Nephrology and Hypertension, Atlanta, Ga.

Infection is the most common cause of first-year post-transplantation mortality and morbidity with 40-80% of transplant recipients experiencing at least one infection in the first year. We report an interesting and the first case report of a patient who underwent a living donor renal transplant and developed STB meningitis. Case: A 45 yo renal allograft patient, with a past medical history of lymphoma, in remission, and humoral rejection 9 years ago, presented to the ER with fevers and chills. After his admission, blood cultures were positive for STB. 2 days into his hospitalization, he became confused, disoriented with neck rigidity warranting neuro-imaging which was essentially negative. A lumbar puncture was performed revealing an elevated opening pressure. To our surprise CSF cultures were positive for STB. He was immediately started on IV antibiotics which helped resolve symptoms. After a prolonged hospitalization he was discharged in stable condition and got scheduled for a colonoscopy as an outpatient. Due to logistics, he was unable to keep the appointment and for the next 18 months had multiple admissions, despite lowered immune-suppression. Unfortunately, he developed overwhelming sepsis and expired. To the best of our knowledge and after extensive literature review, hitherto, STB meningitis after renal allograft has never been reported. Transplant physicians should be aware of atypical infections in the late post transplant course.

ZINC-N-ACETYLCYSTEINE PROTECTS KIDNEY DURING COLD STORAGE

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Cold storage of kidneys for the purpose of transplantation is the major health problem in the United States because many kidneys obtained from donors or cadavers do not survive and cannot be transplanted. We tested the effect of Zinc-N-acetylcysteine (ZnNAC), which acts as an antioxidant and inhibitor of endogenous apoptotic endonucleases, on cell death in rat kidneys during cold storage.

ZnNAC was synthesized and its antioxidant and anti-endonuclease activities were confirmed by the Trolox equivalent antioxidant capacity and plasmid incision assays, respectively. First, the activity of endogenous endonucleases and the pattern of DNA degradation was examined in male rat kidneys stored in the University of Wisconsin solution (UWS) at ~0ºC (on ice), 22ºC, and 37ºC. Then the effect of ZnNAC was studied by flushing pre-cooled UWS or ZnNAC (0.3-30 mM in UWS) and then storing the kidneys in the same solutions for 24 hrs. At the end of experiment, DNA fragmentation indicating irreversible cell death was measured by quantitative fluorescent TUNEL assay.

Our studies showed that DNA fragmentation (cell death) was significantly inhibited but still present at 0ºC as compared to 22ºC and 37ºC. At 0ºC, mainly renal medulla was affected, while at other temperatures both cortex and medulla were injured. In the cortex, tubules were affected much more than glomeruli. ZnNAC significantly inhibited cell death both in cortex and medulla at concentrations 3-30 mM, with the maximum effect reaching above 50% at 10 mM.

We conclude that adding ZnNAC to UWS can decrease DNA fragmentation and cell death in kidneys during cold storage.

KIDNEY TRANSPLANT IN INCIDENT PD AND HD PATIENTS

Savitree Talhapak, Heena S Sheth, Christine Wu, Renee A Burr, Filitsa H Bender, Beth Piraino University of Pittsburgh, Pittsburgh, PA.

PD patients (pts) are more likely to receive kidney transplant (KT) than HD pts. Reasons for this are not clear. We examined one decade (1/1/99-12/31/09) of incident HD and PD pts. Pts with a history of prior KT were excluded. The initial dialysis modality on day one was used for the analysis regardless of subsequent modality transfer. Those receiving pancreas-KT were excluded. Data were from a prospectively collected IRB approved registry with all pts signing informed consent.

Comparing 154 PD to 192 HD pts: mean ages 53 vs 60 ($p<0.001$), women 52% vs 44% ($p=0.10$), African American (AA) 24% vs 57% ($p<0.0001$), DM 32% vs 48% ($p<0.004$), initial median Charlson co-morbidity score (CCI; includes age, DM and co-morbidity) 5 vs 6 (NS), initial serum albumin 3.5 vs 3.0 mg/dl ($p<0.001$), dialysis related infections 42% vs 46% (NS), % hospitalized for any infection (hosp inf) 30% vs 49% ($p=0.0003$). Thirty-four% of PD pts vs 15% of HD pts ($p<0.001$) received KT; of those receiving KT, 32% PD vs 34.5% HD (NS) received living donor KT. Time to KT in PD vs HD was 571 vs 595 d (NS, Kaplan Meier curves). Two models, one with CCI and other one with age were run with multivariate analysis including all variables with $p<0.05$ on univariate analysis to identify predicting variables for KT. Both models included race (white [control], AA and other), initial modality (PD/HD) and hosp inf and gave similar results but the model with CCI was a better fit ($RR^2=0.21$). Independent variables for decreased KT: hosp inf (OR 0.4, $p=0.006$, CI 0.22-0.77), HD as first modality (OR 0.42, $p=0.005$, CI 0.23-0.77), CCI>5 (OR 0.77, $p<0.0001$, CI 0.16-0.48). White pts compared to other races (non-AA) were less likely to receive KT (OR 0.18, $p=0.041$, CI 0.03-0.93), while AA compared to white were borderline less likely to receive KT (OR 0.58, $p=0.06$, CI 0.28-1.02). For model with age, pts >65 y were less likely to receive KT vs ≤65 y (OR 0.14, $p<0.0001$ [CI 0.06-0.31]).

To summarize, patients started on PD as initial modality were more than twice as likely to be transplanted independent of other variables examined including co-morbidity and age. Hospitalization for any infection was associated with a decrease in KT.

A CASE OF ILIAC- ENTERIC FISTULA IN A PATIENT WITH SIMULTANEOUS KIDNEY PANCREAS TRANSPLANT

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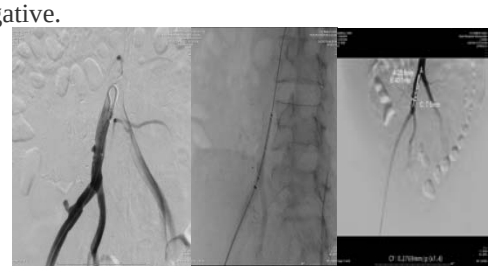
Iliac-enteric fistula formation is an uncommon complication following transplantation. The diagnosis of iliac-enteric fistula requires a high-index of suspicion that may be confounded by negative or equivocal endoscopic and CT imaging studies.

A 41 year old Caucasian male with history of simultaneous kidney and pancreas transplant in December 2005 was admitted as a transfer from an outside hospital for gastrointestinal bleed, diarrhoea, abdominal pain and dizziness on/off over the past 8-10 weeks. Patient had failure of both pancreas and kidney due to non-compliance, and was taken off immunosuppressants in early 2009. His admission hemoglobin was 6. Colonoscopy done in 2009 due to lower GI bleed was negative.



CT scan with IV contrast showed staple line of transplanted pancreas close to iliac artery. CT angiogram showed right common iliac artery pseudo aneurysm with saccular out pouching at the level of previous transplant pancreas anastomoses. Patient was immediately referred to interventional radiology for possible ileal enteric fistula for closed stent graft. Post procedure GI bleed resolved. After 48-72 hours patient again developed hematochezia requiring emergent surgical exploration and management of ileal enteric fistula.

Iliac-enteric fistulas are a rare subgroup of vascular enteric fistulas with a high rate of morbidity and mortality. A high index suspicion, aggressive resuscitation, and prompt management are keys for survival of these patients.

ANCA-VASCULITIS IN IMMEDIATE POST TRANSPLANT PERIOD CAUSING DELAYED GRAFT FUNCTION

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We present a case of 52 year old male with history of hypertension and end stage renal disease on hemodialysis who underwent deceased donor kidney transplant. His kidney biopsy 4 years back had shown chronic interstitial nephritis and focal segmental glomerulosclerosis. He was started on Solumedrol, Tacrolimus and Myfortic acid after an uneventful surgery. Despite initial good urine output, he developed progressive oliguria and hematuria by the end of first postoperative day. He did not have fever, abdominal pain or dysuria and had stable hemodynamics and unremarkable physical examination. Renal function declined over next few days requiring hemodialysis.

Laboratory evaluation revealed normal white count and urinalysis without cast or WBCs. Blood and urine culture were negative. Ultrasound was unremarkable. P-ANCA was strongly positive (titer 1:1280). With rapid decline of his renal function, he underwent biopsy of transplanted kidney on 6^{th} postoperative day .Biopsy revealed interstitial nephritis with abundant neutrophils & eosinophils, interstitial hemorrhage and negative C4D stain. With working diagnosis of ANCA- associated small vessel vasculitis (ANCA – svv), plasmapheresis and IV steroid was initiated resulting in rapid improvement in renal function. He came off hemodialysis after 2 plasmapheresis treatments. On follow up, his renal function continued to improve on steroids and immunosuppressants. ANCA titer decreased to 1:80 post treatment.

Recurrence of ANCA –svv in transplanted kidney is a well known complication. Our case represents a rare case of development of ANCA-svv leading to delayed graft function (DGF) in a recently transplanted kidney in a patient not known to have prior ANCA related disease.

ERRONEOUS TACROLIMUS CONCENTRATION IN BLOOD TAKEN FROM A CATEHTER USED FOR TACROLIMUS ADMINISTRATION

Arshdeep Tindni, Sana Waheed, Prabir Roy-Chaudhary

Purpose: Drawing blood from a line used for tacrolimus administration can lead to misleading level

Case: 57 year old woman with history of orthotropic heart transplant was admitted with cardiogenic shock secondary to biopsy proven myocardial rejection. She developed ATN secondary to shock and was initiated on renal replacement therapy. She was started on aggressive immunosuppressive regimen including intravenous tacrolimus 1.5mg daily which was administered through a triple lumen left subclavian catheter. Her blood tacrolimus level came back as greater than >60mg/dl. Next day, repeat level was again > 60. Simultaneous level from peripheral site was 3.7.Tacrolimus was restarted orally at the dose of 3 mg BID and she attained therapeutic levels in the blood within three days.

Discussion: Although the use of IV tacrolimus is not a widespread practice currently, however, in some cases; it is still employed when oral administration is not possible. When administered intravenously it can be adsorbed on the surface of tubing. Most ICU patients have a central triple lumen catheter for access through which medications are administered and blood samples are drawn through the same line. Personnel drawing these samples mostly do not use different ports for medication administration and blood sample. The importance of drawing blood levels from a different port in case of IV administration of tacrolimus or using a separate site for blood draws cannot be emphasized enough as a falsely elevated level might lead physicians to hold off on administrating tacrolimus in patients with acute rejection and result in worsening rejection.

Conclusion: Blood collection from the catheter used for tacrolimus administration results in a blood concentration which is 10-15 times higher.

DONOR AND ALLOGRAFT HISTOPATHOLOGIC PARAMETERS ASSOCIATED WITH KIDNEY TRANSPLANT OUTCOMES

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Both pre-transplant donor histologic features and injury-related (ischemia-reperfusion, ATN, rejection) post-transplant histologic changes determine the final allograft histologic baseline.

This, is a longitudinal study to assess both pre-transplant and post-transplant renal histologic parameters that may be associated with allograft outcomes. First, we evaluated the histopathologic parameters of 283 kidney donor biopsies and scored the biopsies using a semiquantitative scale of 0-3 according to the severity of each parameter. Secondly, we scored 628 kidney allograft biopsies from 167 patients who underwent at least three consecutive allograft biopsies during the study period.

Donor interstitial fibrosis and small vessel disease, both arteriolosclerosis and hyalinosis strongly impacted the 1-year creatinine levels and e-GFR ($p<0.02$). In contrast to traditional belief, glomerulosclerosis and large vessel arterosclerosis did not predict 1-year allograft function. A cumulative combined donor biopsy score of at least 6 significantly correlated with a 1-year serum creatinine of 2.5 mg/dL or higher and an e-GFR of 30ml/min or less (RR:4.0, $p<0.03$). We found that having a transplant biopsy at any time with any of the following findings was significantly associated with the development of severe chronic allograft injury (CAI): diffuse peritubular capillaritis, diffusely positive C4d, diffuse interstitial inflammation, or arteritis wih fibrinoid necrosis, $p<0.03$. Furthermore, moderate to severe transplant glomerulopathy (TG) was associated with having a biopsy diffusely positive for C4d ($p<0.0001$), capillary margination ($p<0.02$), and acute glomerulitis ($p<0.04$), suggesting that the group of C4d negative TG cases may be related to a cellular rejection process.

In summary, in this large group of kidney biopsies we have identified a group of useful pre-transplant and post-transplant histologic parameters that correlate with early allograft outcomes and long term allograft damage.

CYTOMEGALOVIRUS DISEASE CAUSING GUILLAIN-BARRE' SYNDROME IN LIVING RENAL ALLOGRAFT RECIPIENT: A RARE PRESENTATION

Deepti D Torri ; Madhu Bhaskaran; Ernesto Molmenti; Mala Sachdeva
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Guillain–Barre´ syndrome (GBS) is a rare neurological complication described in renal allograft recipients. To our knowledge; there is only one case report of a patient three months post cadaveric renal transplant who presented with simultaneous Cytomegalovirus (CMV) infection and GBS. We report the first case of GBS presenting after acute CMV infection in a patient who had received a living donor renal transplant.

This is 47 year-old man with medical history significant for hypertension, metastatic melanoma of lung in remission and end stage renal disease. He underwent living unrelated renal transplant in 2008. His donor was CMV positive, and he was CMV negative. He was prophylaxed with valganciclovir for CMV for one and a half year. Two years post transplant he first presented with fever, chills, myalgias, and headache for seven days. His workup revealed mild thrombocytopenia, increase in liver transaminases, and a stable creatinine. Diagnosis of acute CMV infection was made based on positive CMV IgM, negative, CMV IgG and CMVPCR with 4800 copies/ml. Lumbar puncture (LP) and other serologic workup were negative. Patient was started on oral valganciclovir. Five days after initial presentation, he developed numbness and tingling in his hands and feet which ascended to his elbows and knees with decreased temperature sensation in his extremities. Two days later, his neurologic exam had changed significantly and involved tetraparesis with absent deep tendon reflexes bilaterally. Based on these findings, a diagnosis for GBS was made. He again underwent an LP, CSF fluid was typical for albuminocytologic dissociation. The patient was promptly started on plasmapheresis and was continued on oral valganciclovir. He received a total of 12 cycles of plasmapheresis and had complete recovery in 14 days.

Post-transplant GBS in association with CMV has rarely been described. Early recognition and prompt treatment is critical to both proper management and overall outcomes. Plasmapheresis along with oral valganciclovir had significant impact on our patient's clinical course, resulting in full recovery.

RARE PRESENTATION OF TWO CASES OF WEST NILE ENCEPHALITIS IN KIDNEY TRANSPLANT PATIENTS.

Deepti D. Torri , Tamim Naber, Iti Yadav, Madhu Bhaskaran, Ernesto Molmenti, Joseph Mattana, and Mala Sachdeva.
Hofstra North Shore-LIJ School of Medicine, Great Neck, NY

West Nile virus (WNV) is usually asymptomatic or self-limited in the general population. In transplant recipients who are immunosuppressed, it can cause a severe neuroinvasive disease. We report two cases of WNV, which were associated with mortality and morbidity.

29 year old female with a deceased donor kidney transplant in 2006, on tacrolimus, mycophenolate mofetil, and prednisone; presented with low grade fever, diarrhea, mylagias, cough, and neck pain of one week duration. Her physical exam was initially benign. Antibiotics were started for presumptive legionella pneumonia. On day two, patient was noted to have altered mental status and was intubated for respiratory distress. Lumbar puncture (LP) was significant for elevated protein and lymphocyte predominance. WNV was eventually detected by positive CSF polymerase chain reaction (PCR), as serology (IgG and IgM) was negative. Patient remains in vegetative state for 3 months.

56 year old female with a living donor kidney transplant in 2009, on tacrolimus, mycophenolate mofetil, and prednisone, presented with two days of malaise, fever, chills, rigors, and urinary frequency. She was initially started on antibiotics for presumptive urinary tract infection. Two days after presentation, she became intermittently confused, lethargic, and had difficulty finding words. LP was significant for elevated protein with lymphocyte predominance. WNV was eventually detected by positive CSF PCR. Serology was negative for her as well. Patient sustained quadriplegia, then eventually died after 3 months of hospitalization.

West Nile Encephalitis can present atypically in immunosupressed patients. High level of suspicion is imperative as it requires interventions such a decrease in immunosupression to halt the progression of the viremia and lower morbidity. In addition, clinicians must be aware that serology can not make the definitive diagnosis of WNV in immunosupressed patients, and that CSF PCR must be sent to accurately diagnose WNV encephalitis in organ transplant patients.

RARE CASE PRESENTATION OF RENAL TRANSPLANT TORSION: WHEN IMAGING IS NONDIAGNOSTIC

Kim Tran, Samir Nangia, University of California, San Diego, California, USA

Renal transplant torsion is a rare complication of intraperitoneal renal transplantation and has been reported to occur as long as 10 years post transplant. Previous case reports suggest that CT scan is more sensitive than ultrasound in detecting renal transplant torsion by showing changes in orientation, swelling, hydronephrosis, or abnormal enhancement. We report a unique case presentation of renal torsion where imaging becomes non-diagnostic and the delay in diagnosis leads to graft loss.

A 36 year old Hispanic female with history of ESRD secondary to type 1 diabetes with failed deceased donor kidney transplant in 1997 and simultaneous kidney-pancreas transplant (SKPT) in 2005, presents with 3 days of nausea, vomiting, fevers, and abdominal pain. She had decreased urine output over the previous 24 hours along with tenderness over the graft site on exam. She was on myfortic, cyclosporine, and prednisone for immunosuppression with a baseline serum Cr of 1.05 mg/dL noted on labs 2 weeks prior. On admit, she was noted to have serum Cr of 4.35 mg/dL and a trough cyclosporine of 241 mg/dL. Renal ultrasound showed no doppler flow in the renal artery and vein suggesting thrombosis. Abdominal CT showed inflammation and perinephric stranding of the intraperitoneal renal transplant, but otherwise no changes in orientation or hydronephrosis. Given that imaging was non-diagnostic, the patient was taken by radiology for stenting and/or angioplasty of a possible thrombosis. After unsuccessful attempts, she was the taken for an exploratory laporatomy where the intraperitoneal kidney transplant was found to have a dusky appearance with clockwise torsion. Despite surgical correction of the torsion, post operatively renal function did not improve. Biopsy showed necrosis of the kidney, and the patient was reinitiated on chronic hemodialysis. To our knowledge, this is the second documented case of renal torsion in SKPT occurring more than 5 years post transplant. We have also demonstrated a rare case of renal torsion where imaging becomes non-diagnostic and delay in diagnosis leads to graft loss.

MANAGEMENT OF PERSISTENT HYPERPARATHYROIDISM WITH CINACALCET FOLLOWING SUCCESSFUL KIDNEY TRANSPLANTATION: SIXTY MONTHS FOLLOW UP

Diane Triolo, Patrick Lynch, Deep Patel, Mekdess Abebe, Nand K Wadhwa and Edward P Nord. Medicine/Nephrology, SUNY Stony Brook, Stony Brook, NY.

The continued use of cinacalcet over 60 months to optimize persistent hyperparathyroidism (HPT) in patients with a successful kidney transplant was evaluated. Thirty-seven patients with HPT and stable graft function at 3 months were started on cinacalcet 30 mg/day and titrated to a maximum of 120 mg/day. Immunosuppression comprised of alemtuzumab induction (35/37), rapid steroid withdrawal (methylprednisolone 500/250/125 mg/day on days 0/1/2 respectively), followed by maintenance immunotherapy with a calcineurin inhibitor and mycophenolate mofitil 33/37 (89%). Serial serum iPTH, calcium, phosphorus and alkaline phosphatase (AP) levels were measured over 60 months. The data is presented as mean value ± standard deviation. Mean serum iPTH decreased from 230 ± 139 pg/mL (0 months), to 143 ± 229 pg/mL by 12 months ($p<0.001$) and declined further to 128 ± 44 pg/mL at 60 months ($p<0.03$ vs 0 months). Serum calcium decreased from 10.26 ± 0.71 mg/dL (0 months) to 9.5 ±0.74 mg/dL at 3 months ($p<0.001$) and was 9.64 ± 0.73 mg/dL ($p<0.01$ vs 0 months) at the 60 month mark. Serum phosphorus concomitantly increased from 2.55 ± 0.74 mg/dL to 3.69 ± 3.05 mg/dL at 18 months ($p<0.03$) and was 3.12 ± 0.58 mg/dL ($p <0.01$ vs 0 months) at 60 months. Serum AP levels decreased from 110 ± 38.7 U/L (0 months) to 92 ± 33.71 U/L at 24 months ($p<0.04$) and was 77 ± 24.4 U/L ($p<0.01$ vs 0 months) at 60 months. By 60 months 19/37 patients remained on cinacalcet with a mean dosage of 56 ± 30 mg/day, and 13/37 discontinued treatment and maintained an iPTH level appropriate for their CKD stage. Three patients were lost to follow up and 2 discontinued treatment due to side effects. Renal function remained stable throughout: mean serum creatinine and eGFR (MDRD) of 1.55 ± 0.94 mg/dL and 53.3 ± 22.6 ml/min at baseline vs 1.52 ± 0.75 mg/dL and 51.5 ± 21.4 ml/min at 60 months (NS). Conclusion: Cinacalcet is an effective agent in the long term management of persistent post renal transplant HPT with no deleterious impact on renal function.

SUCCESSFUL OUTCOME IN SEVERE ALLOGRAFT FAILURE FROM PSEUDO-TRANSPLANT RENAL ARTERY STENOSIS

Venu Velagapudi, Ashish Verma, Mohammad Eslami, Shimul Shah, Pang-Yen Fan, Jeffrey Stoff, Ashfaq Balla, University of Massachusetts Medical School, Worcester, MA

69 yr old male presented 10 years after deceased donor kidney transplantation with acute renal failure after receiving escalating doses of ace-i and diuretic over two weeks for CHF. He required acute hemodialysis for uremia and severe hyperkalemia. Duplex revealed no stenosis in the transplant renal artery but greater than 50% stenosis in the external iliac artery (EIA) proximal to the anastomosis. Angiography revealed greater than 90% stenosis of proximal EIA and severe stenosis of common iliac artery. Angioplasty of EIA and common iliac was done and two stents were placed with good results. Serum creatinine improved to previous baseline and patient came off dialysis. Stenosis of the iliac artery proximal to the transplant renal artery can present late and is relatively uncommon. It mimics TRAS and is known as pseudo-TRAS. Even with advanced renal failure, timely intervention was successful in this case with renal recovery to baseline.

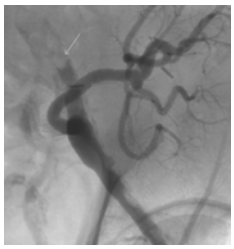


Figure1- Iliac artery stenosis before intervention

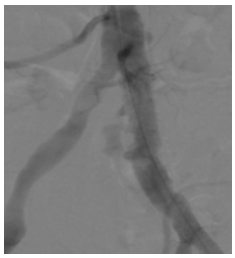
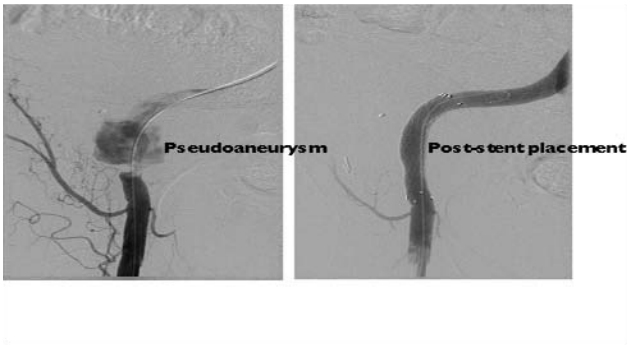


Figure 2-Angiogram after stents

MYCOTIC PSEUDOANEURYSM RELATED RENAL ALLOGRAFT FAILURE

Ashish Verma, Venu Velagapudi, Andrew Schanzer, Pang-Yen Fan, Jeffrey Stoff, Ashfaq Balla. Univ of Massachusetts Medical School, Worcester, MA.

A 66 yr old female presented four months after renal transplantation with doubling of serum creatinine while being treated for CMV viremia. Duplex showed 3.5 cm hypoechoic area in the hilar area with mixed arterial and venous waveforms. Angiography confirmed pseudoaneurysm at the anastomosis to the renal transplant artery with no blood flow past it. A stent graft was placed to exclude flow to the pseudoaneurysm and to prevent ongoing hemorrhage. Patient subsequently underwent transplant nephrectomy. Urine and allograft tissue grew candida albicans requiring treatment with prolonged course of fluconazole. Blood cultures remained negative. Allograft kidney biopsy did not show rejection. Less than 1% of transplant recipients develop pseudoaneurysm usually due to structural anomaly or from infection. Open or endovascular repair may rarely salvage the allograft but transplant nephrectomy is the usual outcome.



HYPERCALCEMIC CRISIS AND NEPHROGENIC DIABETES INSIPIDUS IN A PATIENT WITH PARATHYROID ADENOMA; THE DILEMMAS OF MANAGEMENT

Titilola Adio, Sanket Agarwal, Adrianna Valdez, Wiroon Sangsiraprapha, Mandayam Sreedhar. Baylor College of Medicine, Houston, Texas. U.S.A

Primary parathyroidism can present in a number of clinical forms which indirectly determine management. Hypercalcemic crisis is a rare presentation that can be life threatening if not addressed adequately and promptly. The high calcium burden can lead to concentrating defects in the kidneys resulting in significant disturbances in water and electrolyte metabolism. This is a case report of a 50 year-old Hindu-Arian male, previously in good health, who presented with abdominal pain, nausea and vomiting few days after a long plane ride from India. His pain was initially midepigastric and later concentrated in RUQ. Evaluation for bilary disease was not conclusive. Serological evaluation on arrival was alarming for a serum calcium level of 24mg/dl, ionized calcium of 2.67mmol/L, parathyroid hormone level of 1689pg/ml and serum creatinine of 2.2 mg/dl. He soon became confused with profound hypernatremia with NA as high as 163 mmol/L and neprogenic diabetes insipidus from hypercalcemia. Urine output was up to 25,000 ml daily. A struggle to maintain a balance between free water loss, volume depletion lead to pulmonary edema, requiring mechanical intubation. The pathological evaluation revealed a benign parathyroid adenoma. Early surgical intervention is the only curative option in patients with primary parathyroid crisis. In this patient, surgery was delayed due to the complications of the crises. It is imperative to optimize the patient medically and correct electrolyte derangements prior to surgery. This is an attempt to reveal the dilemma faced by the crisis and suggestions on management.

USE OF HEMODIALYSIS IN HYDROFLUORIC ACID INGESTION

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Hydrofluoric acid (HF) is a highly toxic poison that can be rapidly fatal. Fluoride is a low-molecular-weight anion that is absorbed readily after ingestion or through the skin. It binds readily to the divalent cations calcium and magnesium, lowering the levels of these anions in the blood. This occurs at a rate that exceeds the ability of calcium and magnesium to be mobilized from the bone into the serum. Death usually results from the many systemic effects of dissociated fluoride ions, including hypocalcemia, hypomagnesemia, hyperkalemia, and direct cardiotoxicity.

A patient is described who accidentally ingested a hydrofluoric acid-containing substance. Initially he had significant hypocalcemia, hypomagnesemia, and hyperkalemia, but normal renal function. His hyperkalemia could not be fully treated with conservative medical therapy secondary to his upper gastrointestinal bleed. Further, HF-associated hyperkalemia has been suggested to be unresponsive to conservative therapy. Given the significant morbidity and mortality associated with hydrofluoric acid exposure, the decision was made to hemodialyze the patient. His fluoride level post-dialysis was reduced by approximately 70% from a level drawn three hours prior to the initiation of hemodialysis. However, the single treatment did not reduce the fluoride level to normal. He survived and did well.

A review of the pathophysiology of hydrofluoric acid intoxication and the outcomes of prior exposures suggests that hemodialysis could play a vital role in the management of poisonings with fluoride-containing substances. Despite electrolyte correction, it may still be beneficial in patients because of fluoride's direct myocardial toxicity. A prolonged hemodialysis treatment and perhaps a second hemodialysis treatment are recommended given the known delayed release of fluoride ion from bones and to prevent delayed systemic effects. If hemodialysis is not suitable in the event of hemodynamic instability, continuous renal replacement therapy would be recommended as a potentially life-saving measure.

ANALYSIS OF 2010 ADVANCED PRACTITIONER SALARY AND BENEFIT SURVEY

Martha Bergman, Garrett Smith and Kim Zuber
National Kidney Foundation, Council of Advanced Practitioners.

Nephrology Advanced Practitioner (AP) salary and benefit data for nurse practitioners (NPs) and physician assistants (PAs) is limited. NPs and PAs function similarly in Nephrology. The purpose of this study was to compare and contrast the salaries/benefits of NPs and PAs as well as the responsibilities of their positions.

NKF's Council of Advanced Practitioners (CAP) conducted a salary and benefits survey of NPs, CNSs (clinical nurse specialists), and PAs from January 2010 to June 2010. A Zoomerang link was emailed to CAP members with the request that this link be forwarded to other nephrology APs who were not CAP members. The survey link was emailed monthly for six months. There were 276 responses (CAP membership as of 6/1/10 was 240) for a response rate of 115**%**. Only 2% of respondents were CNSs. Their responses were omitted from NP/PA comparisons; however they were included the overall data set.

Over 85% of the respondents were white females, ages 31 -59 who worked full time; 82% held a Master's degree. APs were most frequently employed in dialysis centers (71%), offices (46%) and hospitals (31%). The average annual salary for all full-time APs was **$83,800**. The most significant difference in NP vs. PA salaries was seen geographically not between NPs and PAs. Experience and salary correlated strongly; degree and salary did not correlate. Most common benefits were malpractice insurance (93%), health insurance (96%), and paid CME (88%). Nonmonetary 'benefits' most important to APs were to feel valued at work and have good working relationships with their physician partners.

In conclusion, the survey showed similar average salary and benefits for nephrology NPs and PAs, with regional variances. NPs and PAs continue to be a cost effective opportunity for the medical community to provide CKD and ESRD patient care. More AP management of home HD and PD patients should be considered. The specialty might also explore ways to grow a more diverse membership with a long term goal of recruiting more practitioners for the next 10 – 15 years when approximately 35% of the respondents reach retirement age.

MORTALITY RISK ASSESSMENT IN THE ELDERLY WITH ESRD

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Accurate prognostic models for use in elderly patients starting dialysis could inform treatment decisions, but are currently lacking. The objective of this study was to develop a simple, generalizable and accurate prognostic model for predicting six month mortality and withdrawal of dialysis for use in elderly patients.

Using data from the United States Renal Data System (USRDS), we identified all individuals aged 80 years or older who initiated dialysis between 1998 and 2005. Co-morbid conditions and lab values at the start of dialysis, date of death, and withdrawal from dialysis were ascertained from USRDS standard analytical files. Using logistic regression, we identified characteristics associated with six month mortality. We then developed a risk score by assigning points for each characteristic proportionate to its parameter estimate. We evaluated the performance of the risk score using receiver operator characteristic (ROC) curves.

The average age was 84 ± 3, 48% were female, 77% were white, and 33% were diabetic. Overall, 31% of the sample died within six months of dialysis initiation and 9% withdrew from dialysis. Based on the results of logistic regression, we assigned each individual a risk score. The risk score successfully separated individuals at low (score <4: <20%), intermediate (score 4-10: 20-40%) and high (score >10: >40%) risk of death within six months of starting dialysis, with excellent calibration (Hosmer-Lemeshow P-value >0.9) and fair discrimination (c-statistic 0.63). The model was equally good at predicting individuals with low, intermediate and high risk of dialysis withdrawal (rates 3%, 4-12%, and >12% for scores <4, 4-10, and >10, respectively).

This score is helpful in predicting mortality and dialysis withdrawal at six months in elderly patients. It is uniquely targeted towards the elderly ESRD population and as such, has the potential to inform clinical decision-making.

TRANSITION: NAVIGATING THE JOURNEY FROM PEDIATRIC TO ADULT RENAL CARE

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Transition and transfer of care from pediatric to adult renal providers is not well researched and best practice methods are not well defined. This results in less than optimal outcomes for patients with chronic kidney disease (CKD) who reach this developmental milestone. To address this important issue, a multidisciplinary group of pediatric and adult renal care providers from multiple institutions came together to identify barriers and solutions to a more successful process. Objectives for the day were: (1) review the stages of young adult development, including the impact of chronic illness on development; (2) describe transition strategies based on published research (3) describe the components of a pediatric transition education program; (4) discuss needs and expectations for successful transition to adult care; and (5) identify barriers and solutions to effective transition of young adults to adult care. The day consisted of a morning education program including lectures titled: *Trials & Tribulations of Working with Teens with Chronic Illness*, *Empowering Young Adults with Chronic Kidney Failure and Barriers to Adherence*. Presentations were also made by recently transitioned young adults. In the afternoon, collaborative roundtable discussions were held to explore the barriers and solutions to the transition/transfer process. There was unanimous consensus that to improve the process, a city wide transition steering committee should be established. In addition, a need for subcommittees to address solutions to specific issues was identified. The issues consisted of the need to create/nurture independence among pediatric patients, to integrate adult care concepts into the pediatric setting, to provide adult provider information to pediatric patients prior to the transfer of care, and to procure funding to support these efforts. The plan going forward is to populate these groups with both pediatric and adult renal care providers and to actively pursue solutions during the next 12 months. The entire group will reconvene in 1 year's time to evaluate outcomes, monitor success and further modify and improve the transition process.

BLOGGING HAS GLOBAL APPEAL AMONGST NEPHROLOGY ON-DEMAND USERS

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An increasing number of health professionals author medical blogs. Although blogging is an alternative way of communicating, little data exists on the popularity of medical blogs.

We measured the usage of our medical blog, Nephrology On-Demand (ISSN 2155-9813) (http://www.nephrologyondemand.org). Eight blogs from national (6) and regional (2) scientific meetings were published online, detailing the key learning points of selected seminars within a specific meeting. We used Google Analytics to measure usage data for each blog during the first 90 days after their publication.

A total of 525 visitors and 871 page views were recorded during the study period (Figure 1). The average number of visitors and page views to blogs of local/regional meetings were 22 and 57, respectively. These numbers increased to 80 and 121, respectively, for the national/international meeting blogs. Of the 2 local/regional scientific meetings, at least 30% of all visitors were from outside the United States, compared to at least 18% of visitors of the 6 national/international meetings.

The medical blogs published in Nephrology On-Demand have broadly attracted readers from around the world. These blogs provide a unique and popular method for sharing medical information. Further research is underway to determine if this new form of communication is also effective in educating blog readers.

LEARNING NEPHROLOGY THROUGH MOBILE DEVICES: THE NEPHROLOGY ON-DEMAND MOBILE EXPERIENCE

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The frequency of medical education accessed via mobile devices is increasing. We examine how HCPs use mobile devices to access a medical education website.

Nephrology-related information was made available to all mobile devices through the website Nephrology On-Demand.org (NOD) --maintained by the Division of Nephrology at East Carolina University. It contains evidence-based teaching material, categorized by topic, date, and target audience. Google Analytics code was included to track visits, pageviews, time on site, bounce rate, location, connection speed, and device and browser types.

638 mobile visits were made from 2/10-10/20 (5.4% of visits). Visits came from 4 regions (USA 91%, Europe 3%, and Asia 4%, Central & South America 2%). 441 (71%) were from Apple iPhones and 16% were from Adobe Flash-compatible devices, and 55% were through a cellular connection. Users spent the most time on the website (264 seconds/visit) when using these connections. Faster connection speeds resulted in less time on-site, but more resource views (97-158 seconds/visit for 2.14-2.65 resources/visit).

Data from NOD guides educators in developing user-friendly teaching tools. Further investigation on mobile user experiences is underway.

PERCEPTIONS OF HEMODIALYSIS PATIENTS AND RENAL PROVIDERS REGARDING ADVANCED CARE PLANNING IN A SINGLE NONPROFIT DIALYSIS UNIT

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The low prevalence of end of life and advanced care planning in end stage renal disease (ESRD) patients is surprising considering the high mortality rates in this population. We simultaneously explored patient and nephrologist attitudes towards advanced care planning and end of life issues in a rural, nonprofit dialysis unit affiliated with a tertiary care center.

Prevalent ESRD patients (68) and their nephrologist (10) were asked to complete separate questionnaires exploring generic knowledge and perceptions of physician–patient communication regarding advanced care planning. We then retrospectively explored the relationship between pre ESRD education and completed advanced directives among the patients in our cohort.

Results indicated that the vast majority (67%) of patients lacked a basic understanding of end of life planning including the meaning and purpose of advanced directives and code status. 58% of patients reported minimal to any communication with their renal provider about end of life planning. 81% of patients and 100% of the renal providers indicate a desire to have an open communication to discuss advanced care planning. The providers unanimously felt that this topic should be incorporated into a multidisciplinary process involving a social worker, dialysis nurse and dietitian. 37% (24 of 65) of patients in the cohort attended a pre-dialysis options dialysis education class. Advanced directives completion rate was higher in the group that attended the class compared with those who did not [9/24 (37.5%), vs. 5/24 (14%) respectively].

Our results suggest that the low rate of advanced directives completion is multifactorial. Pre-ESRD education on advanced care planning may have an important role in increasing advanced directives completion rates. Improving patient and physician education regarding advanced care planning in addition to creating reliable processes of communication between patients and their renal care team are important priorities in order to improve the quality of care delivered to ESRD patients.

LONG TERM OUTCOME OF RENAL FAILURE IN MULTIPLE MYELOMA FOLLOWING AUTOLOGOUS STEM CELL TRANSPLANT

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Autologous stem cell transplant (SCT) following chemotherapy has been shown to improve survival in multiple myeloma. Controversies exist regarding the benefit of SCT in patients with renal failure as overall survival in this group is reduced.

We conducted a retrospective analysis of patients who have undergone SCT for multiple myeloma complicated by renal failure at our institute since 2000. We aimed to characterize the effect of SCT on renal function in patients who had a serum creatinine over 3mg/dL or were dialysis dependent at the time of SCT.

Thirty patients met inclusion criteria. Sixteen patients were dialysis dependent pretransplant with a median duration of 8 months. One patient (6.25%) became dialysis free post transplant after 17 days. This patient had already reduced to twice weekly dialysis prior to SCT and had an iothalamate clearance of 19ml/min of GFR.

	n (30)	%	Mean	Range
Age			61	37-72
Gender (male)	18	60		
Dialysis Pre Transplant	16	53.3		
Preharvest creatinine (mg/dL)			4.9	2.3-10.4
Post SCT creatinine (mg/dL)			3.9	1.8-7.7
Dialysis free post SCT	1	6.25		

In conclusion, previous studies have reported that SCT has a favorable impact on renal outcome in Multiple Myeloma. In our retrospective analysis of 30 patients we have not found this to be the case. Furthermore only one of sixteen patients became dialysis independent following SCT. We propose caution in advising patients prior to SCT that there is likely to be an improvement in renal function

BIOPSY PROVEN NEPHROGENIC SYSTEMIC FIBROSIS WITHOUT DOCUMENTED GADOLINIUM EXPOSURE- A CASE REPORT

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About 200 cases of Nephrogenic Systemic Fibrosis (NSF) have been reported in literature so far, most of which have been associated with exposure to gadolinium. We present a case of NSF with no documented history of exposure to gadolinium. A 45 year old female with history of SLE with ESRD on hemodialysis was seen with complains of skin involvement of bilateral legs with pain and tightness. She had been on lisinopril for hypertension, low dose prednisone and plaquenil for lupus and weekly darbepoetin injections. On examination, her lower extremity skin was shiny, with thickened woody appearance. Apart from elevated creatinine and BUN, she had a normal laboratory work up. Skin biopsy was consistent with a diagnosis of NSF. She denied having undergone a contrast enhanced MRI ever in her life and this was confirmed by checking hospital records. NSF (previously thought to be a “skin disorder”) was recently found to involve multiple organs on autopsy specimens, kidney (54%), heart (46%), dura (46%), and diaphragm (31%). Renal insufficiency is seen in all patients, with most patients having undergone hemodialysis or peritoneal dialysis. Factors which could trigger endothelial damage such as major surgery (renal transplant), placement of dialysis fistulas, central venous lines, hypercoagulable states and thrombotic events may play a role. ACE inhibitors and erythropoietin due to its profibrogenic properties have also been implicated. There are few cases of NSF without a history of gadolinium exposure, although exposure could be excluded with certainty in these patients. We propose that while gadolinium enhanced MRI’s continue to be used judiciously in this patient population, other agents and possible exposures that can lead to this devastating and relentlessly progressing disorder need to be evaluated as well.

ASSOCIATION OF EDUCATION LEVEL WITH DIALYSIS OUTCOME

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The impact of education on health care outcome has been studied in the past but its role in the dialysis population is unclear. The objective of this retrospective study was to evaluate the association of the education level with dialysis outcome. We analyzed USRDS data of patients with ESRD aged ≥18 years. Education level at the time of ESRD onset was the primary variable of interest. The outcome of the study was patient mortality. We used four categories of education level: 0 = less than 12 years of education; 1 = high school graduate; 2 =some college; 3 = college graduate. Subgroups based on age, race, sex, donor type and diabetic status were also analyzed. After adjustments for covariates in Cox model, using individuals with less than 12 years of education as a reference, patients with college education showed decreased mortality with HR of 0.81, p = 0.010.

	Hazard Ratio (95% CI)	p
Education less than 12 years	Reference	
Education: High school graduate	0.99 (0.88-1.11)	0.861
Education: Some college	0.90 (0.78-1.05)	0.193
Education: College graduate	0.81 (0.69-0.95)	0.010

We showed that higher education level is associated with improved survival of patients on dialysis.

USE OF PROPENSITY SCORES IN NEPHROLOGY RESEARCH: A REVIEW OF THE LITERATURE

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With the availability of electronic health records and other observational data the need to measure and control for confounding by indication is essential. Propensity scores (PS), used to construct balanced groups, or taken as covariate, become more and more common in clinical research to minimize bias. A review of the literature was conducted to summarize the implementation of propensity scores in three major nephrological journals.

A total of 44 articles published in JASN, CJASN, and AJKD between 2002-2010 were examined. 18 (41%) used the PS as a control variable in a regression model; 11% use stratification techniques, and 32% created PS-matched pairs. Majority (73%) of the articles evaluated time-to-event outcomes.

Three (7%) of the articles did not present how the PS was used in the analysis. Among the PS-matched studies, the most common matching algorithm was the “greedy” (36%) followed by “nearest neighbor” (21%); 9 (62%) did not report whether the matched sample resulted in balance of baseline characteristics.

Ten (23%) articles did not provide adequate detail on how the PS was used in the analysis thus not allowing for reproducibility and 16 (36%) articles did not use appropriate statistical methods for the analysis of PS. Among the latter, 10 (23%) were from PS-matched studies where the design of matching was not explicitly used to estimate the effect of treatment on outcome, i.e. ignored the correlation between matched-pairs.

In an era of performing timely analysis of large observational studies it is important to control for confounding by indication. PS is a method to minimize this bias, however the description and application in the nephrology literature was variable and inconsistent. Standardized guidelines for using PS in such studies are needed.

THE EFFECT OF TDF ON RENAL CREATININE SECRETION

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Tenofovir DF (TDF) has been associated with an increase in serum creatinine (SCr). It is unclear whether this is due to the inhibition of renal proximal tubular secretion of creatinine and does not reflect a true change in GFR. The purpose of this study is to determine if TDF inhibits tubular secretion of creatinine by evaluating the difference between measured creatinine clearance (CCl) and measured GFR (mGFR) in HIV-infected individuals on and not on TDF.

This is a three center, cross-sectional study, with planned recruitment of 200 HIV-positive patients on stable antiretroviral therapy. Patients were not on trimethoprim or cimetidine at the time of the study visit. We report preliminary results from 123 participants. GFR was measured using plasma clearance of iohexol. CCl was determined from a timed urine collection. SCr was assayed using standardized methods. Differences between CCl and mGFR was classified as >10% and 30% difference between the two. Of the 123 participants, the mean (SD) age was 48 (8) and 72% were men. Mean (SD) mGFR for patients on vs. not on TDF was 84 (25) mL/min/1.73 m^2 vs. 91 (26) mL/min/1.73 m^2 (p 0.200). Mean (SD) CCl on vs. not TDF was 83 (26) mL/min vs. 90 (28) mL/min/1.73 m^2 (p 0.117). There was a similar difference between CCl and mGFR among patients on and not on TDF (Table).

There is no evidence that changes in creatinine secretion account for the rise in creatinine observed for patients on TDF

TDF	**N**	**mGFR-CCl**		**N (%) with CCl > mGFR**	
		Median	**IQR**	**10%**	**30%**
No	42	-0.2	31.2	34 (81)	10 (24)
Yes	81	-0.7	31.1	56 (69)	25 (31)

IQR, Interquartile range

ESTIMATING THE NORMAL RANGE OF KIDNEY LENGTH IN ADULTS BY AUTOMATICALLY EXTRACTING DATA FROM DICTATED REPORTS

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Abnormal kidney size can reflect renal disease. However, normal kidney size is not well-characterized, particularly in the mixed ethnic population in Hawaii. Maximum ultrasound kidney length is the most practical way to estimate kidney size. Ultrasound dictations are unstructured freetext having data that must be extracted manually, and this limits the number of data points available. To analyze the largest possible sample, we create a tool to automatically extract kidney lengths from the ultrasound reports.

Freetext ultrasound reports were extracted by using natural language processing principles. Programs to download and parse the text and extract data were written in SAS and Excel/VBA to extract the longest kidney length from 45,020 renal and abdominal ultrasound reports from 2002-2010. The top 1% of outliers were manually reviewed. To validate the data extracted from the program, we compared computer-extracted maximum kidney lengths from 500 reports to two independent physicians extracting the same data manually. To determine which ultrasounds were eligible to represent “normal” kidneys, we excluded patients <18 years old, diabetes, HIV, polycystic kidneys, serum creatinine >1.3 mg/dl, kidney or other organ transplant, and abnormal echogenic kidneys.

The computer-extracted data was validated, with no significant difference in human vs. computer error rate. Of the 45,020 dictated reports, 5584 qualified for this study. The maximum kidney length was 11.62 cm (SD 1.09) and 11.18 cm (SD 1.11) in male and female adults, respectively. The kidney length peaked in the 30-39 age group and decreased with increased age. Kidney length was positively correlated with both height and weight.

We created a novel technique to collect and analyze a massive amount of data and characterize the normal range of kidney length within Hawaii population. The maximum kidney length depends on age, gender, height, and weight. Ultrasound kidney length can be used as a diagnostic tool for early detection of renal disease. We plan to examine the use of kidney length as a predictor of risk of progressive loss of kidney function in a future study.

ANGIOGRAPHY UNMASKING FIBROMUSCULAR DYSPLASIA IN 18 OF 22 PATIENTS PRESENTING WITH NONEMBOLIC RENAL INFARCTION: A SINGLE-CENTER 16 YEAR EXPERIENCE

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Over a 16 year period we have diagnosed and treated renal infarction (RI) secondary to renal artery stenosis in 22 patients (PTS) (16 women) aged 31-81 years (median age 54 years); 18 patients were diagnosed with hemodynamically significant fibromuscular dysplasia (FMD).

All PTS presented to our Emergency Room with severe flank pain and diagnosed by CT scan with RI. This diagnosis was confirmed by angiogram with intention to treat. PTS were treated with angioplasty alone or stent placement (unsuccessful angioplasty or dissection) and followed for at least 1 year with some PTS followed up to 10 years. None experienced recurrent RI or progressive kidney disease.

PTS undergoing angioplasty or stent placement were treated with clopidogrel for 1 year and either an ACE inhibitor or ARB for BP control. Serial follow up renal Dopplers and renal function labs were performed on all PTS.

In conclusion, although RI is not rare, its association with renal artery FMD has not previously been reported in a series of PTS. This is the 1st series of cases in both men and women who have been treated endovascularly, followed for a long period of time, and fared well after intervention.

IMPACT OF ENDOTHELIN RECEPTOR ANTAGONISTS ON RENAL FUNCTION IN PATIENTS WITH HEART FAILURE

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Diuretics are thought to contribute to deterioration of renal function in patients with heart failure (HF). Renal dysfunction is known to be associated with increased morbidity and mortality in this population. Endothelin receptor antagonists (ERA) represent emerging pharmacological therapies that potentially lack the renal adverse effects of diuretics. This study explores the currently available data on the impact of these agents on renal function.

Articles cited in PubMed database from 1980 to 2010 using key words: “endothelin receptor antagonist” and “heart failure” were searched. Those clinical randomized controlled trials that exclusively included HF population were identified, and relevant articles were selected. The results of these studies were then reviewed and compared with regards to impact on renal function.

A total of 40 relevant articles were identified that used four different ERA (tezosentan, darusentan, erasentan, and bosentan). Twelve randomized, placebo-controlled trials were selected to be included in this study. While 5 studies reported no significant change in renal function, 4 studies did not report it. Surprisingly, one study showed higher incidence of renal failure in study group compared with placebo, and there was a greater rise in serum creatinine level in another study. Urine output decreased significantly in one study with a trend towards renal dysfunction. Hypotension was a common adverse effect of ERA.

While there is a promising theoretical basis for use of ERA in patients with HF, currently available data show only modest beneficial impact on renal function for these agents. Future large-sized trials are needed to further evaluate these effects and their potential impact on morbidity and mortality.

INNER-CITY DIALYSIS CLINICS PERFORM WELL ON QUALITY METRICS

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Recent literature suggests the quality of dialysis care delivered to patients living in poverty is below national standards. However, these studies look at single quality measures rather than a comprehensive suite of metrics. We conducted a facility-level retrospective database analysis at a large dialysis provider, examining March 2010 DaVita Quality Index (DQI) scores. Analysis was limited to facilities with > 20 patients. A dialysis facility was classified as inner-city if they were located in a ZIP code with >20% of households living below the poverty level and a population density of > 10,000 per square mile. We compared the DQI scores of 63 inner-city dialysis facilities with the remaining 1298 non inner-city facilities. There were no differences in overall DQI score. The only component that differed significantly between groups was serum albumin, which was higher in the inner-city group. Sensitivity analysis including > 30% and >40% poverty definitions along with the inclusion of > 40% race/ethnic minority populations did not change results. DQI Scores are reported below (numbers do not represent biomarker values).

Quality Scale	**Inner City**	**Non Inner City**	**p-value**
Overall DQI	68.37	67.35	0.15
PTH Score	2.29	2.42	0.13
Phosphorus Score	13.23	13.00	0.31
Albumin Score	6.40	5.91	<0.01
Calcium Score	6.01	6.00	0.92
Access Score	8.16	7.66	0.29
HCT Score	4.44	4.45	0.92
KT/V Score	18.84	18.96	0.42
Vaccines Score	9.00	9.02	0.81

These results show no differences in patient outcomes between inner city and non inner city units. Future analyses will control for patient-level variables to ensure that inner-city patients are no healthier than other patients and skewing the results.

SAFETY AND EFFICACY OF PERCUTANEOUS RENAL BIOPSY BY PHYSICIAN-IN-TRAINING IN AN ACADEMIC TEACHING SETTING.

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Anecdotal experience suggests that procedural aspects of medical training may be endangered. Safety and efficacy of percutaneous renal biopsy (PKB) have not been well studied in a purely training setting. We performed a retrospective cohort review of our consecutive 3-year renal biopsy experience (01/2007 - 12/2009) at the University of Mississippi Renal Fellowship Program. We collected data on numerous baseline variables, including the number of recovered glomeruli and complication rates. All biopsies were performed exclusively by Renal Fellows under real-time ultrasound (US) visualization within a framework of structured US-PKB training course. Patients were monitored for at least 12 hours thereafter. Data was analyzed with PAWS Statistics 18 and results expressed as either percents or means with standard deviation (SD). The study was reviewed and approved by the University of Mississippi Human Research Office. 70 patients had PKB during the index period: 50 (71.4%) were native kidneys, 35 performed on the left, 15 on the right side. Mean age was 40.4 (13.7) years, 85.7% black, 45.7% male. Self-perceived difficulty was rated as either None (70%), Mild (14.3%), Moderate (8.6%) or Large (4.7%). Specimens were asessed Sufficient in 64 (91.4%), Borderline in 4 (5.7%) at bedside inspection; 2 biopsies (2.8%) remained unsuccessful. We recovered 18.6 (11.4) glomeruli (range: 0-72). The pre-PKB hemoglobin was 10.7 (1.8) g/dL and dropped by 0.5 (0.73) post PKB. On immediate post-procedure US, we observed hematoma in 3 (4.3%) patients and 1 patient experienced persistent urine leakage at the biopsy site. There were no deaths or a need for surgical or radiological intervention; 3 (4.3%) received packed red blood cell transfusions. Our results suggested that percutaneous renal biopsy, under proper US visualization and in a well-structured training environment, remains a safe and effective procedure by relatively inexperienced operators-in-training.

PATIENTS' TRUST IN THEIR PHYSICIAN ASSOCIATED WITH SATISFACTION WITH ESRD PROVIDERS

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Trust is an important part of physician-patient interactions, however empiric measurement and research of trust and its' related factors is scant. We examined trust using the validated Trust in Physician Scale in prevalent hemodialysis patients from three dialysis units. We also assessed patient demographics, knowledge of kidney disease and satisfaction with other care providers in the dialysis unit to identify factors associated with trust in ESRD patients. Trust scores were divided at the median to create higher and lower trust categories.

In 114 patients the average age was 52, 46% male, 79% non-White with the median number of years on dialysis being three. Trust in physician was not significantly affected by any one demographic characteristic although there were more non-White patients with low trust compared to higher trust (87% vs. 70% p=0.04). High trust in physician was associated with high patient satisfaction in ESRD providers: physician (57% vs. 21% p=0.008), dietician (58% vs. 17% p<0.001), and nurses/technicians (46% vs. 21% p=0.008). High trust in physician scores were also associated with patients reporting staff supported them (p<0.001), and were friendly or encouraging (p=0.002 and p=0.005 respectively). Interestingly trust in physician was not related to kidney disease knowledge. Patients with lower trust scores more commonly reported being bothered by their dependence on dialysis staff or their physician (72% vs. 37% p-value 0.001). Patients with lower trust in their physician reported worse scores on diverse patient reported outcomes including sore muscles (p=0.01), anorexia (p=0.01), quality of sleep (p=0.001), problems with dialysis access (p=0.05), poor view of personal appearance (p=0.01) and dissatisfaction with the time they were able to spend with family (p=0.03). Patients who had more trust in their physician were much more likely to rate their physician as excellent even after adjusting for age, gender, race and dialysis vintage (OR 3.31 [1.21-9.00]; p=0.019). Future interventions to build trust between patients and their physicians may improve patient outcomes in the ESRD population.

A CASE OF THYROTOXIC PERIODIC PARALYSIS

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Thyrotoxic periodic paralysis is an uncommon disease affecting mostly young Asian males. It is usually associated with hyperthyroidism, mostly Grave's disease. We present a case of thyrotoxic periodic paralysis in a young African American male with no significant past medical history.

A 19 year old African American male with no significant past medical history presented to the emergency room with a history of significant weakness. He went to bed the night prior without any problems after a family dinner. He was however unable to get out of bed next morning and had to crawl out of bed. He denied any fever, diarrhea, URI, sick contacts, recent travel and insect or tick bites. His physical examination was significant for proximal muscle weakness more in lower extremities. Labs were significant for potassium of 2.6. meq/L, TSH 0.011 μIU/mL and fT4 2.71 ng/dL. His EKG showed U waves. Patient was diagnosed with thyrotoxic periodic paralysis, given 20 meq of potassium chloride and monitored in the hospital. His strength and potassium levels normalized within 24 hours. He was also started on propranolol and a thyroid scan confirmed Grave's disease.

Thyrotoxic periodic paralysis is an uncommon condition associated with hyperthyroidism. It usually presents in early morning and patients have significant hypokalemia on presentation. However the condition is usually self limited and potassium supplementation can lead to dangerous hyperkalemia. Propranolol has been shown to help abort the attack.

SOCIAL ADAPTABILITY INDEX: APPLICATION AND OUTCOMES IN DIALYSIS POPULATION

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Patient groups associated with disparities in health care are usually defined on the basis of race, gender or geographic location. Social Adaptability Index (SAI) calculated based on education, marital status, income, employment and substance abuse has been strongly associated with clinical outcome in other patient populations and may be used to identify individuals at risk. We used data from United States Renal Data System (USRDS) to evaluate the role of SAI in survival of patients on dialysis. We used Cox model analyses to study the association between SAI and patient survival in patients with ESRD on dialysis, as well as in the subgroups based on age, race, sex, comorbidites and diabetic status. We analyzed 3,396 patients (age of ESRD onset 56.9±16.1 years, 54.2% males, 64.2% White, 30.3% African American). Mean SAI of the entire population was 7.1±2.5 (range 0 to 12 points). SAI was higher in Whites (7.4±2.4) than African Americans (6.5±2.5) [ANOVA, $p<0.001$] and greater in men (7.4±2.4) than in women (6.7±2.5) [T-test, $p<0.001$]. In Cox model adjusted for potential confounders SAI was associated with decreased mortality (HR of 0.97, [95% CI 0.95-0.99], $p=0.006$). Subgroup analysis demonstrated association of SAI with survival in most of the subgroups. Potential limitations of the study include reverse causality, possible misclassification and retrospective design. We demonstrated that SAI is significantly associated with mortality in dialysis patients. SAI could be used to identify individuals at risk for inferior clinical outcomes

SERUM PHOSPHOROUS AND RISKOF CARDIOVASCULAR DISEASE IN NON CKD

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The relationship of phosphorous and coronary artery disease(CAD) amongst individuals with normal kidney function has not been well evaluated. The aim of this study was to determine if higher phosphorous in individuals with non CKD increased risk for CAD. Cross sectional study of ≥18yrs with 1 valid serum phosphorous during 01/01/1998 thru 05/31/2010. Cohort restricted to those with normal kidney function defined by eGFR >= 60ml/min and stratified into population based quartiles based on phosphorous. Univariate and multivariate logistic regression analyses to examine the predictive risk of phosphorous on coronary artery disease adjusting for age, gender, race, diabetes and hypertension diagnoses. Subgroup analyses were performed to further adjust for lab values such as calcium, PTH, vitamin D, total cholesterol and LDL levels. Logarithm transformation was applied to PTH and vitamin D due to their skewed distribution. 112,761 of 159,535 patients had a valid serum and eGFR >= 60. Serum phosphorous levels were categorized into four groups by the sample quartiles. After adjusting for age, gender, race, diabetes and hypertension diagnoses, we observed a strong positive association between the phosphorous level and the risk of CAD (OR = 1.09, 1.08, 1.20 for the 2^{nd}, 3^{rd}, and 4^{th} quartiles versus the 1^{st} quartile of the phosphorous, respectively). Older age, white race, male, diabetes, and hypertension also contributed significantly to higher risk of CAD. OR adjusted for total cholesterol and LDL levels showed a increased risk with higher phosphorous. Further subgroup analysis adjusted for calcium, PTH, vitamin D, total cholesterol and LDL levels, demonstrated that OR in 2^{nd}, 3^{rd}, and 4^{th} quartiles versus the 1^{st} quartile of the phosphorous were 1.49, 1.42, and 1.74, respectively. Calcium, vitamin D, total cholesterol and LDL levels were not significant risk factors for CAD, whereas elevated PTH level was associated with higher risk of CAD. Higher serum phosphorous levels were associated with increased risk for CAD in adults with non CKD.

MINIMAL CHANGE DISEASE AS A COMPLICATION FROM WITHDRAWAL OF IMMUNOSUPPRESSION IN A PATIENT WITH CHRONIC GRAFT-VS.-HOST DISEASE

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Kidneys are rare target organs for chronic graft-vs.-host disease (cGVHD) after hematopoietic cell transplant. In those that develop nephrotic syndrome as a complication, histology most often reveals membranous glomerulopathy (MGN). We present a rare case of Minimal change disease (MCD) which developed in a patient with cGVHD after withdrawal of immunosuppression.

A 19 year old female diagnosed with AML – FAB_{M2} received a six out of six antigen-matched allogeneic bone marrow transplant (BMT) from her sibling and was in complete remission. Her course was complicated by cGVHD (hepatic transaminitis, bronchiolitis obliterans, and skin disease) .Treatment with cyclosporine and prednisone was started which she elected to stop on her own 3 years later. Fifteen months after stopping therapy, she presented with nephrotic syndrome (24 hour protein excretion of 17grams and serum albumin of 1.8). Serologies (for HIV, Hep B, Hep C, and Cytomegalovirus), antinuclear antibody and rheumatoid factor were negative. Complement and cryoglobulin levels were normal. Serum and urine electrophoresis did not show any paraproteins. Renal biopsy revealed histology consistent with MCD for which the patient was started on tacrolimus and methylprednisone. Subsequent evaluations revealed improvement in her nephrotic syndrome.

Nephrotic syndrome associated with cGVHD-related immune dysregulation is rare. An activated donor T cell-related immune mechanism is thought to play a central role; nevertheless, the pathogenesis remains unclear. MGN is the usual finding on renal biopsy of these patients: MCD is an uncommon occurrence.

Our case points out the rare presentation of MCD as a complication from withdrawal of immunosuppression in a patient with cGVHD. An appropriate degree of clinical suspicion, careful observation of patients with cGVHD, especially during withdrawal or tapering of immunosuppressants, and renal biopsy are required for diagnosis.

A CASE OF IATROGENIC SPONTANEOUS BLADDER RUPTURE FOLLOWING RENAL BIOPSY

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Spontaneous bladder rupture is uncommon, previously described in cases of undiagnosed bladder tumor, urinary obstruction during catheterization, previous enterocystoplasty, and pelvic radiation. A case of bladder rupture [BR] as a result of continuous bladder irrigation [CBI] has also been described.

We present the case of a 64 year old female who underwent left renal biopsy for possible proliferative lupus nephritis. Her case was complicated by retroperitoneal and bladder hematomas, discovered on ultrasound imaging post-biopsy [PB] day 2. After manual bladder irrigation and 500 ml clot extraction, she was discharged PB day 5. On PB day 7, she was admitted with fever, diarrhea and dysuria. CT scan did not discover any additional pathology, instead revealing persistent bladder hematoma. She was treated empirically for UTI and discharged PB day 9. On PB day 13, our patient was readmitted with abdominopelvic pain and new gross hematuria with clots. This continued despite manual irrigation; she was thus placed on CBI. On post biopsy day 20, abdominal pain increased and she became hypotensive. She was taken to the operating room, where attempts at cystoscopic clot removal were made. Intraoperatively, the cystoscopic irrigation fluid failed to fill the bladder, and her abdomen became distended. A fluoroscopic retrograde cystogram demonstrated peritoneal BR. An open clot evacuation and bladder repair was performed. She recovered well, and discharged to home PB day 27.

Bladder irrigation had been the method of choice for removing the hematoma, which manifested clinically as hematuria and urinary obstruction. Cystoscopy was delayed until PB day 20. By this time, the clot had organized and adhered to the bladder wall, complicating its removal and preventing physiologic bladder expansion. Moreover, the pressure associated with CBI contributed to BR. We advocate awareness of bladder hematoma as a complication of PB renal hemorrhage, as well earlier consideration of cystoscopy for evaluation and removal.

SATISFACTION WITH PROVIDER COMMUNICATION IS ASSOCIATED WITH PERCEIVED DISEASE KNOWLEDGE IN PATIENTS WITH CHRONIC KIDNEY DISEASE (CKD)

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Effective patient-provider communication is a crucial component of high quality patient care. Data are scarce regarding patient views of physician communication skills in the setting of pre-dialysis CKD care.

Adult patients with non-dialysis dependent CKD (Stages 1-5) were enrolled from April-October 2009 during nephrology clinic visits. Patient satisfaction with provider communication was assessed using the Communication Assessment Tool (CAT), a validated scale for measuring patient perception of physician interpersonal and communication skills. Perceived knowledge was assessed by asking patients to rate their CKD knowledge on a scale from 1 (no knowledge) to 4 (a lot of knowledge) in nine areas and averaged to generate an overall perceived knowledge survey (PiKS) score. Associations between CAT and patient characteristics, including PiKS and a validated measure of objective CKD knowledge, were examined.

Of 399 patients enrolled, the mean (SD) age was 57 (16) years. 53% were male, 83% Caucasian, and 77% had CKD Stage 3-5. The mean (SD) CAT and PiKS scores were 4.69 (0.51) and 2.56 (0.61), respectively. CAT was associated only with PiKS (Spearman correlation 0.15, $p<0.0001$) in unadjusted analysis. Patients of older age (OR 1.22 CI [1.11, 1.35]; $p<0.0001$ per 10 years), higher eGFR (1.03 [1.02, 1.04]; $p<0.0001$ per 5 ml/min/1.73m^2), and higher PiKS (2.15 [1.72, 2.68]; $p<0.0001$ per 1.0 increment increase) were likely to have higher odds of satisfaction with provider communication in adjusted analysis that also included sex, race, health literacy (REALM survey), income, number of provider visits, and objective knowledge. Adjusted analysis presented no evidence that objective knowledge was associated with CAT score.

In addition to advancing age and higher eGFR, patients' perception of their disease specific knowledge may be an important component of their satisfaction with CKD care.

CENTROSOMES IN MOUSE DEVELOPMENT AND PKD

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Polycystic kidney disease (PKD) is one of the most prevalent lethal genetic diseases in humans. Many of the proteins disrupted in inherited PKD localize to specific organelles, the centrosomes and primary cilia. It has been proposed that PKD results from defective signaling when cilia proteins malfunction. However, centrosomes are the foundation of cilia and we hypothesize that defects in centrosomes, rather than their derivatives the cilia, underlie PKD.

We are using mouse genetics to disrupt centrosomal proteins in order to test our hypothesis. The centrosome is formed of a core of two centrioles and a surrounding pericentriolar material (PCM). We are analyzing mouse lines that carry mutations in a gene encoding a protein essential for centriole duplication, *Sas4* (also called *Cpap* or *Cenpj*).

A *Sas4* gene trap mutant line causes partial disruption of the gene and the resulting hypomorphic mutants live to adulthood, are fertile, but are smaller than their normal siblings. We modified the gene trap allele to create a null allele of the gene and the resulting mutant embryos die at mid-gestation when they form a heart and other tissues. These embryos have no detectable centrioles and therefore possess no cilia. Because cilia are required for Hedgehog (Hh) signaling, it is not surprising that we found that *Sas4* null mutant embryos have disrupted Hh signaling. It has also been hypothesized that centrosomes are important for Wnt signaling, but canonical Wnt appears to be normal in *Sas4* mutant embryos. Embryos that carry one copy of the gene trap allele and one null allele die before birth with polydactyly on all limbs. This phenotype, along with defects in interneuron specification in the spinal cord, point to defects in centrosomes/cilia that in turn affect the Hh pathway, consistent with our findings with the null mutants.

We are now using mouse genetics to disrupt the *Sas4* gene specifically in developing kidney tissues and we will analyze the resulting kidney phenotypes. We now have at our disposal a spectrum of mutations that can be utilized to study centrosome function in depth during kidney development and cyst formation.

LEFT VENTRICULAR HYPERTROPHY (LVH) AND HEART RATE VARIABILITY (HRV) IN CHRONIC KIDNEY DISEASE (CKD)

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Patients with CKD are at high risk of cardiovascular disease (CVD). Low HRV and left ventricular hypertrophy (LVH) are independently associated with high CVD mortality. Kidney disease is associated with autonomic dysfunction and LVH. We explored the relationship between HRV and LVH as risk factors for CVD outcomes.

The RRI-CKD Study is a 4-center prospective cohort study of CKD stages 3-5 (n=834). A subset underwent both HRV testing by 24-hour Holter and two-dimensional guided M-mode echocardiographic studies (n=204). LVH was defined as LV mass index $\geq$ 110 g/m^2 for males and $\geq$ 134 g/m^2 for females. Multiple linear regression was used to assess predictors of LVH.

Mean age was 60 ± 15, 51% male, 78% white, 31% diabetic (DM), 89% hypertensive and 37% with h/o of CVD. In unadjusted analysis, patients with LVH had significantly lower HRV compared to patients without LVH (see table). In this cohort, high LVMI was associated with older age, male gender, non-white race, history of CVD, higher systolic blood pressure, phosphorus, lower serum albumin and hemoglobin. After adjustment for these variables, the relationship with LVMI remained significant for night SDNN and SDANN.

Altered autonomic dysfunction in patients with CKD may partially explain elevated LVH and increased CVD outcomes with LVH in these patients.

	Presence of LVH		
	Yes (n=54)	**No (n=150)**	**pvalue**
Mean 24 hour Heart Rate (bpm)	72.7 ± 11.2	73.6 ± 10.3	0.5993
Time Domain (ms)			
Standard deviation (SD) of all normal to normal R-R (NN) intervals (SDNN)	**97.5 ± 34.1**	**108.9 ± 36.0**	**0.0455**
SD of 5-min avearage NN intervals (SDANN)	**80.8 ± 27.0**	**92.1 ± 31.1**	**0.0189**
Average 5-minute SDNN over 24 hours (ASDNN)	**35.3 (17.0, 186.9)**	**44.0 (17.5, 194.9)**	**0.0437**
Frequency Domain (ms^2)			
Very Low Frequency	**717.5 (163, 7,532)**	**1111 (36, 6,252)**	**0.0190**
Low Frequency	**181 (16, 7,151)**	**354 (21.0, 11977)**	**0.0028**
High Frequency	92 (11, 11445)	131 (7.0, 15123.0)	0.6398
Low/High Frequency Ratio	**1.8 (0.2, 9.4)**	**2.9 (0.2, 12)**	**0.0006**
Total power	**1148.0 (282, 25436)**	**1699 (256, 30828)**	**0.0283**

IDENTIFICATION OF POTENTIAL BIOMARKER FOR ACUTE REJECTION OF RENAL TRANSPLANT IN URINARY CELL PELLETS.

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BACKGROUND: Urine is an acceptable tool for improved prediction and diagnosis of acute allograft rejection (AR). We identified a gene list specific to AR using microarray gene profile analysis in biopsy and peripheral blood of pediatric kidney transplant patients. In this study, we validated selected candidate genes in urine samples from same patients. 85 human urine samples (36 from patients with AR, 34 from patients with no AR (STA), 15 from stable patients with BK Viruria or Viremia) from 50 pediatric kidney transplant recipients, collected at the time of matched graft biopsies were used for qPCR validation. 19 genes were chosen from microarray data for qPCR validation (10 from blood differentially expressed across 3 microarray platforms and validated in independent blood samples by qPCR and 9 from biopsy array with q<1%, fold >3). RESULTS: 5 of 19 genes were expressed significantly higher in AR as compared to STA samples (FCGR3A p=0.01; PRRX1 p=0.02; PRSS1 p=0.01; RNPS1 p=0.04 and TLR8 p=0.01). A logistic regression model was built using the 5-gene qPCR expression data from *Validation Set 1*, resulting a high specificity and sensitivity with ROC score of 93.8%. The model was fed with another independent set of 34 urine samples (*Validation Set 2*: 18AR, 16STA), and a high AR prediction score was achieved with a sensitivity of 80%, specificity of 89%, positive prediction value (PPV) of 75%, and a negative prediction value (NPV) of 86%. 15 BK samples were included in Validation Set 2. The expression of all 5 genes were also significantly higher AR samples when compared to BK samples (FCGR3A p<0.001, PRRX1 p=0.001, PRSS1 p<0.001; RNPS1 p=0.001 and TLR8 p<0.03), confirming this 5 genes are indeed AR specific. CONCLUSION: Transplant rejection may be non-invasively predicted by qPCR across 5 highly selected genes in urine. Further validation of these genes set across an independent blinded set of rejection and stable samples is necessary to confirm the robustness and applicability of this gene-set for outpatient clinical transplant monitoring.

CELL LINES AND TRANSGENIC MICE MODELS TO STUDY POLYCYSTIC KIDNEY DISEASE

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Polycystic kidney disease (PKD) is a group of genetically inherited disorders that leads to renal failure. The major form of the disease results from mutations in *PKD1* encoding polycystin-1 (PC1) and *PKD2* encoding polycystin-2 (PC2) genes. The molecular basis of cyst formation remains under intensive investigation but the disease is associated in part with abnormalities in cell division in the epithelial cells forming the kidney tubules. Abnormal primary cilia formation and function are associated with the pathogenesis of polycystic kidney disease. PC2, localized to the cilia of tubular epithelial cells, interacts with PC1 and mediates calcium signaling that can be induced by shear stress. To understand PC2 mediated calcium signaling, we went on to develop cell and animal models with a PC2 channel mutation. Due to the embryonic lethality of germline knockout of *Pkd2*, we have developed a *Pkd2* floxed allele in which the lox-P sites flank part of the pore region of PC2. Two transgenic mice models were generated using this allele, the *Col2-cre.Pkd2*$^{f/f}$ and the *Ubc-cre.SV40.Pkd2*$^{f/f}$ mice. Using the mouse line *Ubc-cre.Sv40.Pkd2*$^{f/f}$ mice, we have derived a tamoxifen inducible *Pkd2* floxed kidney cell line from 5 weeks old mice. These cells have been sorted using a collecting tubule epithelial marker *lectin Dolichos biflorus* agglutinin (DBA). DBA positive tubular epithelial cells were purified and expanded to establish tamoxifen inducible *Pkd2* floxed collecting tubule line. Knockout of *Pkd2* after tamoxifen induction is evident by western blot. I isolated 36 human primary cell cultures from individual cyst lining epithelium from human cystic kidneys removed by nephrocotmies. I characterized and immortalized several of those cultures to generate ADPKD human cell lines. These cell lines and kidney sections from the mice models are in use to understand the mechanism leading to centrosome amplification and aberrant cell division observed in PC2 defective cell lines and mice models. Also the cell lines are being used to understand the effect of shear stress induced calcium rise on the observed centrosomal and cell division defects.

DELETION OF NITRIC OXIDE SYNTHASE1β FROM THE COLLECTING DUCT RESULTS IN SALT-SENSITIVE HYPERTENSION

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Clinical epidemiological studies have correlated nitric oxide synthase-1 (NOS1) single nucleotide polymorphisms with hypertension in humans. NOS1 is a complex gene known to express three splice variants (α, β, and γ). Pharmacological studies in rodents demonstrated that regulation of blood pressure involves NOS1, yet the NOS1α knockout (KO) mouse is normotensive. Previously, NOS activity was found to be the highest in the renal collecting duct (CD). Thus, we hypothesized that deletion of all NOS1 splice variants from the CD will result in salt-sensitive hypertension. Wild type and NOS1α KO mice express NOS1β in isolated CD. Deletion of NOS1β in the CD was accomplished by breeding flox (exon 6) NOS1 mice with aquaporin-2-CRE mice. Immunohistochemical and western blot analysis confirmed NOS1 deletion from the CD. Renal histological evaluation failed to detect any overt structural differences between control and CDNOS1KO mice. Protein and albumin excretion rates were similar between the genotypes. CDNOS1KO mice have significantly higher blood pressure (129$\pm$3 mmHg, n=10) than control mice (113$\pm$4 mmHg, $p<0.001$, n=10). Furthermore, a 4% high salt diet increased blood pressure in CDNOS1KO mice while no change was observed in control mice (142$\pm$2 mmHg vs 110$\pm$1 mmHg, respectively, n=5-6, $p<0.001$). Urinary analysis of mice (on 0.4% salt diet) indicated that CD NOS1 KO mice have a blunted NOx excretion (0.29$\pm$0.05 mmol/mg creatinine) compared to control mice (1.43$\pm$0.28 mmol/mg creatinine, $p=0.007$, n=4). In summary, loss of NOS1β from the CD leads to a salt-sensitive hypertensive phenotype representing an excellent genetic model to understand the role of CD NOS1 in regulation of sodium and water balance.

CSF-1 MEDIATES RENAL REPAIR BY DIRECT SIGNALING TO TUBULAR CELLS AND MACROPHAGE DEPENDENT MECHANISMS

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Tubular damage following ischemia is the major cause of acute kidney injury (AKI) and often reversible. Macrophages (Mφ), in the inflammatory response, have been implicated in tissue repair. Colony stimulating factor (CSF)-1 is expressed by tubular epithelial cells (TEC) during inflammation. Thus, we tested the hypothesis that CSF-1 mediates AKI that leads to repair after inflammation. For this purpose, we used a mouse model of ischemia/reperfusion (I/R). Injecting mice with CSF-1 following I/R accelerated healing as compared with control injected mice, as evidenced by decreased tubular pathology, reduced fibrosis, and improved kidney function. Moreover, blocking CSF-1 receptor signaling after I/R suppressed kidney repair. Thus, CSF-1 mediates kidney repair. To determine the contribution of Mφ to CSF-1–dependent kidney repair, we assessed the impact of CSF-1 on I/R in mice in which Mφ were genetically ablated. We determined that Mφ only partially accounted for CSF-1–dependent tubular repair. CSF-1 and CSF-1 receptor were upregulated and coexpressed in TEC after kidney injury in mice and humans. Furthermore, signaling via the CSF-1 receptor by CSF-1 stimulated the replenishment of injured TEC and reduced further TEC death in mice and human. Taken together, these data suggest that CSF-1 mediates renal repair by both a macrophage-dependent mechanism and direct autocrine/paracrine action on TEC.

ERGOCALCIFEROL (ERGO) THERAPY IN CALCIDIOL-DEFICIENT HEMODIALYSIS (HD) PATIENTS ON THERAPEUTIC DOSES OF PARICALCITOL

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Even though, most HD patients receive paricalcitol- an analogue of calcitriol to treat ↑ PTH, it is unclear whether additional therapy with ergo in those with calcidiol deficiency would be beneficial.

The current project has an observational and interventional component. The specific aim of the observational component is to examine in HD patients on therapeutic doses of paricalcitol, the cross-sectional associations of calcidiol deficiency with homeostatic model of assessment of insulin resistance (HOMA-IR) and plasma concentrations of interleukin-6 (IL-6), high sensitivity C-reactive protein (hs-CRP) and tumor necrosis factor-α (TNF-α). We have so far obtained clinical data and blood samples from 58 HD patients who met the study criteria. The median plasma hs-CRP level was 7.0 (IQR 2.1-19.3 mg/dl) and mean ± SD of plasma 25 (OH) D level was 20.5 ± 13.7 ng/mL. We are in the process of performing the cytokine assays.

The specific aim of the interventional component of the study is to conduct, in calcidiol-deficient/insufficient (< 30 ng/mL) HD patients with inflammation (hs-CRP ≥ 3 mg/dL) and treated with therapeutic doses of paricalcitol, a randomized double blind cross-over trial of ergocalciferol versus placebo. The primary end-point is the plasma concentration of IL-6 and the secondary end points are HOMA-IR, plasma concentrations of IL-6 and TNF-α and the lipopolysaccharide (LPS)-stimulated release of IL-6 and TNF-α from peripheral blood mononuclear cells (PBMC). Of the 58 participants in the observational component, 32 met the vitamin D and CRP criteria. Of these, 24 consented for the interventional component and randomly received either ergocalciferol or placebo for 12 weeks, followed by a 4-week wash-out and cross-over for 12 weeks. We have performed the experiments on PBMCs. We are currently measuring the cytokines in the samples frozen at -70.

If indeed, ergo decreases inflammation and insulin resistance in HD patients already treated with therapeutic doses of paricalcitol, a larger clinical trial examining hard endpoints will be warranted.

NANOPARTICLE ENCAPSULATED MYCOPHENOLIC ACID DELAYS MURINE SKIN ALLOGRAFT REJECTION WITHOUT TOXIC DRUG EFFECTS

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Immunosuppressive agents are necessary for preventing acute allograft rejection but their dose-dependent side effects can induce morbidity and reduce long term allograft survival. Using a MHC mismatched murine skin graft model, we tested whether poly [lactide-co-glycolide] nanoparticles (NP), a novel drug delivery platform, can efficaciously deliver mycophenolic acid (MPA) and improve transplant outcomes without the toxicity of soluble (unencapsulated) MPA.

We transplanted C57BL/6 mice with BM12 skin grafts and treated them between 0-14d post-transplant with daily dosed 5mg soluble MPA (dMPA), or intermittently dosed 5 mg soluble MPA (sMPA) or 5 mg NP loaded with 1-10 µg MPA per mg NP (NP-MPA). Control groups received 5 mg empty NP or no treatment. We assessed the impact of NP-MPA treatment on graft survival, RBC indices, and dendritic cell (DC) function.

Compared to mice that received no treatment (MST=19.5d) or mice that received empty NP (MST=20d), mice that received NP-MPA exhibited significantly prolonged allograft survival (MST = 33 days, $p=0.0002$ and $p=0.02$, respectively). sMPA provided marginal survival benefit compared to untreated mice (MST=22d, $p=0.01$) without further benefit with daily dosing (MST=22 d). Significantly, dMPA treatment induced a profound anemia (Fig. 2) which persisted until withdrawal of drug. We found that DCs endocytosed NP and DCs treated with NP-MPA were defective in priming alloimmune T cells.

NP-MPA delay acute allograft rejection with increased efficacy and without toxicity compared to soluble MPA. Despite containing 1000 fold lower total drug burden, NP-MPA achieves maximal graft prolongation via modulation of innate immune function and avoids dose-dependent anemia. Nanoparticles may be a novel delivery system for post-transplant immunosuppressive agents to improve solid organ transplant outcomes and minimize drug toxicities.

RELATIVE PLASMA VOLUME MONITORING DURING HEMODIALYSIS AIDS THE ASSESSMENT OF DRY WEIGHT

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Among hemodialysis (HD) patients, the assessment of dry weight remains a matter of clinical judgment because tests to assess dry weight have not been validated. Relative plasma volume (RPV) monitoring has been suggested as a method of assessing dry weight. RPV monitoring is performed by continuously estimating the relative decrease in plasma volume during HD, which can be described as a slope. We hypothesized that RPV monitoring is a valid marker of dry weight.

We performed a pre-specified secondary analysis of the Dry-Weight Reduction in Hypertensive Hemodialysis Patients Trial. RPV monitoring was performed using the Crit-Line monitor at baseline and at 8 weeks in the 150 patients participating in the trial. The intervention group of 100 patients had their post HD weight progressively reduced, whereas 50 patients served as time controls. In our analysis RPV was modeled using mixed models. RPV slopes were defined as flat when they were less than the median (1.33% per hour) at the baseline visit.

Among predominantly (87%) black HD patients, we found the following relationships: (1) reducing post HD weight led to steeper RPV slopes; (2) those patients with flatter slopes at baseline had greater weight loss; (3) both baseline RPV slopes and the intensity of weight loss were found to be important for subsequent change in RPV slopes; and, most importantly, (4) RPV slopes predicted the reduction in interdialytic ambulatory systolic BP. Those patients with the flattest baseline RPV slopes had the greatest decline in BP on subsequent reduction of post HD weight. Both baseline RPV slopes and the change in RPV slopes were important for subsequent changes in ambulatory systolic BP. We conclude that RPV slope monitoring is a valid method to assess dry weight among hypertensive HD patients.

Future directions include validating RPV monitoring longitudinally over periods greater than the 8 weeks of this study.

Please note that these results have already been published ***(Hypertension*. 2010;55:305-311).** After communicating with Danielle Nathan, I'm submitting this abstract of already published work in order to fulfill my obligation as a previous recipient of a NKF Postdoctoral Research Fellowship Grant, as this abstract reports the results of the work that I did as an NKF Fellow.

Fc-RECEPTORS AND NOVEL IMMUNOGLOBULIN RECEPTORS MEDIATE IMMUNE COMPLEX BINDING TO MESANGIAL CELLS AND RENAL ENDOTHELIAL CELLS

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A critical step in the pathogenesis of lupus nephritis is the formation and deposition of immune complexes (IC) in glomeruli. However, the mechanisms of IC deposition in the glomeruli are not well known. Despite efforts in the past to define the role of classical Fc-receptors (FcRs) on renal parenchymal cells in IC deposition, their expression remains debatable, and it is unclear whether parenchymal IC receptor binding is pro- or anti-inflammatory.

IC receptor expression was systematically measured by quantitative RT-PCR, immunostaining, and Western blotting. In all, 27 genes encoding receptor subunits were tested, including 8 classical FcR, 6 immunoglobulin (Ig) transporter, and 13 candidate IC receptor molecules with highly conserved Ig domains and ITIM/ITAM motifs. Primary cells were isolated from mouse kidneys and cultured for expression analysis: visceral epithelial cells (podocytes), endothelial cells, and pericytes (mesangial cells). In addition, individual cell types were treated with heat aggregated mouse IgG (HA-IgG) and preformed IC to study binding and functional responses.

Mouse glomerular cells express significant numbers of FcRs as well as related proteins which have been considered candidate IC receptors. Classical FcR expression predominates on mesangial cells, while overlapping subsets of candidate IC receptors were identified in each of the three glomerular cell lines. Mesangial cells and renal endothelial cells each bind both HA-IgG and preformed IC, and binding results in the production of cell-specific combinations of cytokines and chemokines. Binding of HA-IgG to renal endothelial cells was not mediated by classical FcRs, and may be mediated by a unique IC receptor that is not expressed on leukocytes.

Past difficulties in identification of IC receptors on resident kidney cells may be due to the predominance of “non-classical” IC receptors, whose expression in some cases appear confined to parenchymal tissues.

PREVALENCE OF CHRONIC ATRIAL FIBRILLATION IN DIALYSIS PATIENTS

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A rigorous claims-based approach for identification of chronic atrial fibrillation (CAF) in dually-eligible (Medicare-Medicaid) chronic dialysis patients has never been undertaken. We performed a retrospective cohort analysis of 96,584 dually-eligible patients undergoing chronic dialysis between January 1, 2001 and December 31, 2002. We examined the 2-year period prevalence of CAF using 4 approaches in a 2 x 2 factorial design. Two of the approaches required 2 AF claims (at least 1 of which was an outpatient claim) at least 30 days apart, while two required 3 AF claims (at least 1 of which was outpatient) 30 days apart. Superimposed on one 2-claim approach and on one 3-claim approach was an "episode of care" paradigm in which any outpatient claim within 7 days before or 30 days after an inpatient AF claim was dismissed. Patients with secondary AF were eliminated. The CMS-2728 form was used to determine comorbidities.

The 2-year period prevalence of CAF was 3.5% (using the most conservative approach of 3 claims and an episode-of-care restriction), 7.9% (using the most liberal approach of 2 claims without an episode-of-care restriction). The 2-claim approach with the episode-of-care restriction yielded 6.4%, and there were 51.1 (49.8-52.6) cases of CAF per 1000 patient-years. Using this approach as the primary model, the mean age of patients with CAF was 69.3 ± 12.0 years. Patients with CAF tended to be significantly older (adjusted rate ratio [ARR]=1.05 per year, $p<0.0001$), more likely to be male (ARR=1.2, $p<0.0001$), to be white (ARR≈2.0, $p<0.0001$), and to have heart failure (ARR=1.4 $p<0.0001$) than patients without CAF. There were no associations of CAF with functional status, cause of ESRD, hypertension, diabetes, coronary artery disease, or mode of dialysis.

In conclusion, the 2-year period prevalence rate of CAF in dually-eligible dialysis patients is likely to be in the range of 4.8–6.4%.