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Automated alert of sustained low-efficiency dialysis (sled) machines

Gerard Zasuwa

Henry Ford Health, gzasuwa1@hfhs.org

Stan Frinak

Henry Ford Health, Sfrinak1@hfhs.org

Junior Uduman

Henry Ford Health, juduman1@hfhs.org

Jerry Yee

Henry Ford Health, JYEE1@hfhs.org

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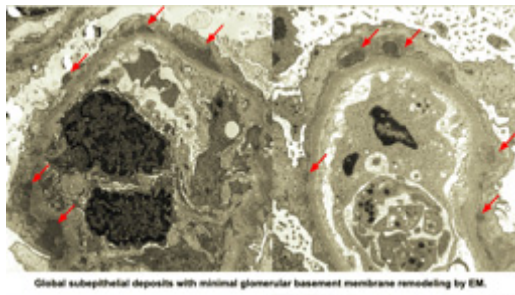
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Labs notable for creatinine 2.2mg/dL,(baseline Cr 1.3 mg/dL), albumin 1.3g/dL, and LDL 329mg/dL. C3 and C4 were normal. Antistreptolysin O titer was normal. CPK 178 IU/L. Urinalysis revealed 3+protein, 1+blood with urine red blood cell 3-5/high-power field and urine white blood cell count 6-10/high-power field. 24-hour urine revealed 20.9g protein. The treponemal enzyme immunoassay antibody was reactive and rapid plasma reagin 1:64.

Kidney biopsy showed diffuse granular staining with IgG, IgA, IgM, C1q, C3, kappa and lambda light chains, negative PLA2R stain and subepithelial immune complex deposits with the diagnosis of early membranous nephropathy secondary to syphilis. He was treated for secondary syphilis with penicillin G Benzathine 2.4mU IM once with improvement in proteinuria.

There is a 71% increase in syphilis cases between 2014 to 2018 in US. Secondary syphilis is associated with nephrotic syndrome due to membranous nephropathy and recovery after treatment with penicillin. With the recent epidemiology of STDs, clinicians must be vigilant of syphilis involvement in nephropathy and should consider it in the differential diagnosis of nephrotic syndrome.



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AUTOMATED ALERT OF SUSTAINED LOW-EFFICIENCY DIALYSIS (SLED) MACHINES:

Gerard Zasuwa¹, Stan Frinak¹, Junior Uduman¹, Jerry Yee¹. ¹Henry Ford Health System, Detroit, MI, United States

SLED machines are used to treat critically ill patients with kidney failure for prolonged intervals. Technicians surveil machines every 2 hours. If alarms occur during therapy, nursing staff mute the alarm and notify dedicated technicians. However, alarms may be ignored, thereby permitting machines to remain in "error" mode for hours, potentially compromising patient care. Targeted alarm-based surveillance of SLED machines would optimize therapy.

In 2017, SLED machines were linked by WIFI to the hospital private phone network (ASCOM) to develop an automated alarm system. When an alarm occurred, the machine computer sent an email to a dedicated Outlook SLED email account for subsequent transmission to ASCOM MailGate. This system next created an "alarm" text message on ASCOM phones provided to technicians.

Response times to machine alarms by technicians decreased significantly after system implementation. No additional training was required to implement the protocol.

Enhanced safety using an automated SLED alarm-based system is feasible with WIFI- and ASCOM-based architectures.



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IMPROVING DETECTION OF SYMPTOMATIC, ASYMPTOMATIC INTRADIALYTIC HYPOTENSION (AIDH), DURING HEMODIALYSIS (HD) WITH GUIDED AUTOMATED BLOOD PRESSURE (BP):

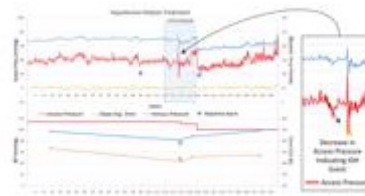
Gerard Zasuwa¹, Stan Frinak¹, Jerry Yee¹. ¹Henry Ford Hospital, Detroit, MI, United States

IDH is an HD complication associated with patient morbidity and mortality. IDH detection enables early intervention that may reduce complications. We explored the hypothesis that that continuous intracorporeal pressure (IAP) measurements using the VascAlert™ algorithm¹ (VA) can detect IDH during HD and initiate a blood pressure (BP) measurement.

Undetected A/IDH was defined as a systolic BP (SBP) decline of 40 mmHg from the predialysis SBP and an intradialytic SBP <100 mmHg. Fresenius™ T2 dialysis machines (n=24) with CLiC™ devices that assess blood volume changes had software (LabVIEW) installed to calculate IAP at 20-sec intervals from DM data. IAP was determined by hematocrit (default value, 0.34) and venous pressure (VP) by VA from 3470 treatments among 291 patients over 36 days. Electronic health records and dialysis machine data were merged. IAP curves and slopes were correlated with A/IDH.

Figure 1 displays an IDH event after 130 min of treatment. SBP declined from 143/77 to 74/44 mmHg, and goal ultrafiltration was reduced from 2.4 L to 1.9 L, blood flow rate from 385 to 350 ml/min. IAP differences during IDH were significant p<.0001. Inset shows an IAP drop that triggers an alarm.

The IAP slope and IAP declines of 30 mm Hg or more correlate with IDH during HD. In Figure 1, episodes of A/IDH revealed by IAP slopes and delta-IAP prior to the event can trigger the BP module. A drop in IAP or IAP slope would enable staff to intercede in a timely fashion to mitigate more severe IDH episodes. Combined analysis of blood volume, IAP, and slope of IAP in an AI algorithm has potential to trigger an IDH alarm. Further research much include larger datasets for validation.



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AN UNUSUAL VINTAGE: A PATIENT WITH WINE-COLORED URINE:

Evan Zeitler¹, Emily Chang¹. ¹University of North Carolina Chapel Hill, Chapel Hill, NC, United States

A variety of drugs discolor the urine. Some associations are well-known, but newer medications and novel uses for old medications, may induce changes which can be disturbing to patients and providers. These may be associated with laboratory abnormalities and dialysis machine dysfunction as presented in this case of wine-colored urine.

A 38 year-old man with chronic kidney disease stage 3 and flank pain was found to have a pheochromocytoma. He presented for left adrenalectomy and nephrectomy, complicated by both intra- and post-operative hypotension requiring pressor support. He received methylene blue (100 mg) and hydroxycobalamin (5 mg, CyanoKit) peri-operatively for vasoplegia. Nephrology was called on the 2nd post-operative day for evaluation of deep purple urine discoloration. Urine sediment revealed muddy brown casts, 25 RBCs/HPF and scattered WBCs, although creatinine remained near baseline of 2.8 mg/dL. The urine discoloration was due to the combination of methylene blue and high dose hydroxycobalamin. It resolved over the ensuing 14 days.

Vasoplegia is an increasingly recognized complication of surgery, characterized by hypotension refractory to pressor support despite a normal cardiac output. There is evidence for the use of 2 agents, methylene blue and hydroxycobalamin, in the treatment of vasoplegia. Methylene blue causes a blue-green urine and is associated with serotonin syndrome in patients on SSRI. Hydroxycobalamin causes a deep red to purple discoloration of both urine and plasma, and is