

2021 ABSTRACT COMPETITION  
THURSDAY, OCT. 7, 2021 via ZOOM



# Student Abstracts

## CATEGORIES ACCEPTED:

Basic Research

Clinical Research

Clinical Vignette

Quality Improvement/Patient Safety

High Value Cost-Conscious Care

## Abstract 1

### **Category Submitting for:** Clinical Vignette

**Abstract Title** Atypical presentation of previously undiagnosed diabetes mellitus in a patient with uncommon risk factors

### **Abstract Text**

#### Case section

A 59 year-old man presented with 2 weeks of abdominal pain and nausea. He also noted diarrhea and loss of appetite with minimal oral intake. The abdominal pain was burning, dull, and unrelated to meals. He had no previous diagnosis of diabetes mellitus and had no pertinent family history. He had autosomal dominant polycystic kidney disease status post bilateral nephrectomy and kidney transplant. Immunosuppressive therapy included sirolimus and tacrolimus. He denied hematemesis, hematochezia, and melena. He was afebrile with blood pressure of 178/98 with otherwise stable vitals. His BMI was 25.5 kg/M<sup>2</sup>. He had tenderness to palpation in his epigastrium and left upper quadrant that was noted to be dull and non-radiating. There was no abdominal distension or hepatosplenomegaly. His glucose was 419 mg/dL, bicarbonate was 15 mmol/L, anion gap was 23 mmol/L, and beta hydroxybutyrate was greater than 8 mmol/L. Urinalysis was positive for ketones greater than 80 mg/dL and glucose greater than 1000 mg/dL. Further testing revealed a hemoglobin A1C of 12.5% and anti-glutamic acid decarboxylase was less than 5.0 IU/mL.

#### Discussion

Diabetes mellitus, hyperosmolar hyperglycemic states (HHS), and diabetic ketoacidosis (DKA) are common problems encountered by internists. A methodological approach to diagnosing diabetes mellitus in a previously undiagnosed patient in the setting of HHS and DKA is important in identifying less common clinical presentations and precipitating factors. Insufficient intracellular glucose after glucose and glycogen stores have been exhausted results in catabolism of fatty acids to ketones. The absence of insulin in type 1 diabetics is responsible for the insufficient intracellular glucose and subsequent ketosis driving the anion gap metabolic acidosis in DKA. Increased anion gap metabolic acidosis is not observed in the setting of HHS due to the presence of insulin in type 2 diabetics. However, type 2 diabetics who are in HHS can experience ketosis and an anion gap metabolic acidosis in the setting of starvation.

Our patient presented with typical clinical symptoms and laboratory values of DKA. He did not have previously diagnosed type 1 diabetes and he also did not have typical familial and dietary risk factors or body habitus associated with type 2 diabetes mellitus. He was subsequently tested for anti-GAD antibodies which were negative. He had been on long term sirolimus and tacrolimus which have been implicated in chronic hyperglycemia, which is thought to be a contributor to his atypical presentation of type 2 diabetes. In the setting of HHS and undiagnosed type 2 diabetes, the patient's poor oral intake is thought to have precipitated a starvation ketoacidosis which is what led to his atypical and fascinating presentation to our service.

## Abstract 2

### **Category Submitting for:** Quality Improvement

**Abstract Title** Racial and Ethnic Differences in Zoster Vaccine Uptake: A Cross-Sectional Study in a Veterans Health Administration Primary Care

### **Abstract Text**

#### Introduction

Zoster vaccine uptake has been disappointing (34.5% of the target population) and marred by racial and ethnic disparities. However, studies of uptake generally have limitations. Most are survey-based (and subject to self-report bias) and based largely on the discontinued live vaccine (not the recombinant vaccine). Furthermore, recent literature describes the situation three years ago when the recombinant vaccine was in shortage.

These limitations raise a question: Is there persistence of racial and ethnic disparities? Insight into that question may be provided by a quality improvement project, which we initiated to improve shingles vaccine uptake. Our baseline data from 2020-2021 is record-based, reflects the recombinant vaccine, and reports current prevalence. Because it comes from a VA clinic (where insurance and access are not barriers), our data may shed light on the question of persistence of disparities even when those barriers are absent.

#### Methods

We queried the electronic records of the Omaha primary care clinic of the Veterans Health Administration Nebraska-Western Iowa Health Care System for receipt of recombinant zoster vaccine since October 1, 2017. Additionally, the query extracted race, ethnicity, gender, and COVID-19 vaccine status. This cross-sectional study included patients at least 50 years old on October 1, 2017 (close to the recombinant vaccine approval date) seen in the clinic on October 1, 2020 (about the time in the pandemic that resumption of face-to-face visits was encouraged)-July 5, 2021. Allergy to the vaccine was an exclusion.

#### Results

Our population of 10,323 veterans was predominantly male (93.8%). 81.2% were Non-Hispanic White, 10.7% were Non-Hispanic Black, and 1.5% were Hispanic White. The prevalence of complete vaccination (two doses) was 39.8% (females 34.7%, males 40.1%). Our analysis of racial and ethnic groups focused on three groups (Non-Hispanic White, Hispanic White, and Non-Hispanic Black) comprising 93.3% of our population, in which complete vaccination was 43.3%, 33.8%, and 24.9%, respectively. Receipt of at least one COVID-19 vaccine dose was 80.1%, 78.2%, and 82.2%, respectively.

#### Conclusion

A 39.8% prevalence of complete vaccination was higher than generally reported for zoster vaccine

uptake. Conceivably, this could reflect our study population: individuals seen in a clinic with vaccine reminders, standing vaccine orders, onsite vaccine, and no charge for vaccine. Racial and ethnic disparities are consistent with most, but not all, of the literature.

The contrast between shingles vaccine disparities and their absence with COVID-19 vaccine (for which awareness was extraordinarily high) supports the hypothesis that shingles vaccine disparities arise from disparities in awareness.

Our baseline data confirm the appropriateness of our choice of zoster vaccine uptake as a quality improvement project, showing an opportunity for improving uptake and an opportunity to address factors other than insurance and access that account for racial and ethnic disparities.

## Abstract 3

### **Category Submitting for:** Clinical Vignette

### **Abstract Title** A Peculiar Case of Iatrogenic Fever and Cough

#### **Abstract Text**

Fever and cough are frequent complaints of which infectious etiologies are most commonly recognized. However, iatrogenic causes must also be considered. A 43-year-old female presented in February with fever/chills and dry cough that developed acutely during her shift as a nurse. She was hospitalized one month prior for similar symptoms and was treated for suspected pneumonia with ampicillin-sulbactam although an infectious workup was non-revealing. She had recovered well until this second episode of fever and dry cough. Additionally, she had nausea and dysuria. She was fully vaccinated for COVID-19 at this time although she did have contact with COVID-19 patients at work. She had no symptomatic family members, recent travel or immobilization, or pets at home. Her only medication was nitrofurantoin as needed for dysuria which was started as an initial seven-day course in January for chronic urinary tract infections. She has no history of asthma, no known allergies, and no cigarette use. On presentation to the emergency department, she was febrile (39 C) and tachycardic (147) but had no supplemental oxygen requirements. Her lungs were clear to auscultation and heart sounds were normal with no murmurs. An initial workup revealed a leukocytosis (14.4), an elevated procalcitonin (2.09), and a negative viral respiratory pathogen panel and COVID-19 PCR. A CT chest with contrast showed diffuse interlobular septal thickening compatible with interstitial pulmonary edema. An exhaustive infectious workup was completed including a bronchoalveolar lavage (BAL) which was negative for acid-fast bacilli, fungus, Aspergillus, CMV, EBV, HSV, HHV-6, and Legionella. Ultimately, after these etiologies were ruled out, the patient was given a diagnosis of nitrofurantoin pulmonary toxicity, as it was discovered that she had taken nitrofurantoin for dysuria about ten hours prior to the development of symptoms and that she had started the initial nitrofurantoin course about one week prior to her hospitalization in January. Nitrofurantoin is an antibacterial agent commonly prescribed for treatment or prophylaxis of urinary tract infections. However, it has been reported to cause an acute and chronic hypersensitivity pneumonitis. The acute type is more common, but the incidence is still relatively rare (1:5000). [1] The most common symptoms of the acute reaction are fever and cough which develop around eight days after first exposure or within the first 24 hours upon subsequent exposures. Symptoms generally resolve over the next few weeks after discontinuing the medication. This case reviews pulmonary injury as a potential adverse effect of nitrofurantoin and also illustrates the importance of a detailed medication history, social history, exam, and comprehensive testing (often including a bronchoscopy/BAL) to rule out possible infectious etiologies.

#### **References**

1. de Zeeuw J, Gillissen AG. Nitrofurantoin-induced pulmonary injury. UpToDate. Feb 24, 2020.

## Abstract 4

**Category Submitting for:** Clinical Vignette

**Abstract Title** The Clot Thickens: Anti-Coagulation and the Unexpected Bleed

### **Abstract Text**

Learning Objectives:

1. Recognize the appropriate treatment for portal vein thrombosis (PVT)
2. Identify the risks of anti-coagulation
3. Understand which patients should receive anti-coagulation in PVT

A 78 year-old man presented with bright red blood per rectum. The patient's past medical history was significant for alcoholic cirrhosis with grade III esophageal varices and stage III distal esophageal cancer, with possible liver metastasis. One week prior, the patient was diagnosed with a main portal vein thrombosis identified on imaging and initiated on rivaroxaban. On exam, he had abdominal distension with no organomegaly and an external hemorrhoid. Labs illustrated a hemoglobin of 7.2 and lactic acidosis. Endoscopy demonstrated the esophageal tumor was bleeding and hemostasis was accomplished with hemospray.

End-stage liver disease is commonly encountered by the internist. A dangerous complication of liver disease is portal vein thrombosis (PVT), which if not treated appropriately can lead to intestinal ischemia, end-organ failure and death. Portal vein thrombosis in cirrhosis is the result of slowing hepatic blood flow and hemostatic changes. The most effective treatment is early anti-coagulation with low-molecular weight heparin or rivaroxaban/apixaban, with a goal to recanalize the portal system and prevent thrombus extension. The greatest risk of anti-coagulation is bleeding. Cirrhotic patients have an increased risk of bleeding secondary to impaired hemostasis from decreased synthesis of coagulation factors, platelet dysfunction, and fibrinolytic system alterations. Data demonstrates anti-coagulation is a safe option. However, in patients with non-occlusive PVT and a high bleeding risk, routine imaging observation is reasonable.

The practitioner must consider the patient's risk of bleeding versus thrombosis and the patient's survival of an adverse event when prescribing anti-coagulation. Our patient's risk of bleeding was high with anti-coagulation, but his risk of death from his PVT leading to intestinal infarction resulting in shock was greater. Bleeding in cirrhotic patients is typically observed as a result of thrombocytopenia, alterations in the coagulation cascade, and portal hypertension leading to varices. Variceal bleeding risk depends on their location, size, and appearance, with superficial and distal varices at the greatest risk. Surprisingly, our patient's varices were not the bleeding source; however, studies illustrate the risk of bleeding in cancers secondary to anti-coagulation is significantly higher with gastrointestinal tumors. Physicians must understand the risk-benefit analysis when anti-coagulating end stage liver disease patients.

## Abstract 5

**Category Submitting for:** Clinical Vignette

**Abstract Title** NAC on the Attack

### **Abstract Text**

#### Case Write-Up:

A 40 year old female with a past medical history significant for alcohol use disorder had been taking acetaminophen daily and drinking alcohol "more than normal" due to social strains. On evaluation she was encephalopathic and had right upper quadrant tenderness. She did not have ascites or asterixis upon examination.

On her initial presentation she was found to have an AST of 28,813 and ALT of 6903 with a total bilirubin of 2.6, INR of 2.7, GGT of 259, ferritin of 3,924, platelets of 122, ammonia of 109, albumin of 3.3, and ceruloplasmin of 18. Acetaminophen and salicylate levels were undetectable. Infectious and autoimmune workup were unremarkable. Her MELD score was 22 and her MDF was 95.6.

N-acetylcysteine (NAC) was immediately given and the patient was treated supportively with glucose boluses for her hypoglycemia and lactulose for her encephalopathy. Glucocorticoids were held per Hepatology's request. The patient's LFTs trended down and she made a recovery without requiring a liver transplant.

#### Discussion:

In this case, we presented a young patient with acute liver failure of unknown etiology. Acute liver failure has a high mortality rate. Therefore, it was important to identify the etiology quickly to properly treat the patient and potentially reverse the underlying cause.

N-acetylcysteine was given to prevent the progression of the liver injury secondary to acetaminophen overdose. Also, this drug has very little side effects and is theorized to be protective in all forms of acute liver injury. The next step is to identify the etiology of the acute liver injury and clinically interpret whether encephalopathy is a sequelae of the liver injury. Table 1 shows a list of appropriate labs that should be ordered to identify the etiology of encephalopathy. In regards to the patient's encephalopathy, a differential diagnosis was formed as seen in table 2, with the leading cause of her encephalopathy theorized to be alcohol induced from her severe withdrawal.

There was concern for the possibility of Wilson's disease as her serum ceruloplasmin was low. A 24-hour urine copper study was collected on ice and was deemed unremarkable. The patient's PEth level returned at 1,323, furthering the likelihood that the patient's acute liver failure was multifactorial from both acetaminophen and alcohol.

#### Conclusion:

Given the common presentation of acute liver injury, it is necessary to have a wide differential.

However, it is of great importance to consider the most common, treatable cause of acute liver failure, acetaminophen toxicity. For this reason, N-acetylcysteine should be given regardless of the offending agent in acute liver failure.

## Abstract 6

**Category Submitting for:** Clinical Vignette

**Abstract Title** Don't get too Salty in Hyponatremia

### **Abstract Text**

Hypovolemic hyponatremia is a condition caused by limited PO intake, GI losses, or diuresis. It is important to differentiate between hypovolemic hyponatremia and euvolemic hyponatremia in the acute setting to initiate the correct treatment.

A 70-year-old female presents to the emergency department because of altered mental status. The patient has a pertinent past medical history of a primary sclerosing cholangitis leading to a liver transplant, ulcerative colitis leading to a colectomy and ileostomy, and a right lower extremity amputation due to osteomyelitis. For the past week, the patient has consumed food intermittently and has not received enteral tube feeds due to nausea. Over the past two days, the patient has become confused and unoriented. Upon arriving to the ER, the patient was found to have a blood pressure of 80/57, a heart rate of 20, a sodium of 112, a serum osmolality of 248, a urine sodium < 10, a urine osmolality of 252, a pH of 7.16, a bicarbonate of 12, and a phosphate of 2.1. On physical exam, the patient's mucous membranes appeared dry, and she was diffusely weak. Treatment was initiated with 1 liter of IV normal saline and her sodium corrected briskly by 7 mEq. Due to her non-anion gap metabolic acidosis and hypophosphatemia, she required sodium bicarbonate daily and PHOS-NaK. The patient's sodium was corrected based on the established recommendations of 4-6 mEq over 24 hours. However, the patient's sodium frequently overcorrected and required boluses of free water. Six days later the patient's sodium was 132 and the patient self-corrected to 137. Following correction of her hyponatremia, her encephalopathy improved, and she did not demonstrate symptoms of osmotic demyelination syndrome.

This case illustrates the need for urine studies in the diagnoses of hypovolemic hyponatremia and close monitoring of the sodium levels to prevent osmotic demyelination syndrome. Evaluation of volume status is imperative in hyponatremia to ensure the initiation of the correct treatment protocol. For the treatment of euvolemic hyponatremia, the treatment is fluid restriction. Whereas the treatment for hypovolemic hyponatremia, is isotonic saline to restore volume status and replete sodium. However, special consideration must be placed regarding the rate of sodium correction to ensure no greater than an 8 mEq change in 24 hours. Risk factors for overcorrection of sodium are alcoholism, malnutrition, liver disease, and hypokalemia (1, 2). Desmopressin is indicated in patients who are at increased risk for over-correction, and when the patient is on the track to over-correct or has already overcorrected. Desmopressin can also be used with hypertonic saline to allow for a rise in sodium at a predetermined rate (3, 4). Of importance, the cause of hypovolemic hyponatremia must be identified to prevent readmission for a recurrence.

## Abstract 7

### Category Submitting for: Clinical Vignette

#### Abstract Title A Fishy Case of Sepsis

#### Abstract Text

A 59-year-old man presented with respiratory distress following one week of vomiting and diarrhea after returning from a fishing trip. Medical history was significant for immunosuppression status post kidney and pancreatic transplant 13 years ago secondary to diabetic nephropathy. He was altered and diaphoretic. Breathing was labored with accessory muscle use; respirations were 40+ and there were coarse crackles in all lung fields. O<sub>2</sub> saturation was 91% and improved to 93% on 4L nasal cannula. The abdomen was tender to palpation in the left lower quadrant without rebound tenderness or guarding. Bowel sounds were active throughout. He was not oriented. He was febrile to 39.5 with rigors. Initial laboratory analysis revealed WBC 3, hemoglobin 12, platelets 154, creatinine 4.2 (baseline 1.5), BUN 60, AST 105, ALT 84, Alkaline phosphatase 280, procalcitonin 4.5, LA 1.6. Chest CT revealed right lower lobe opacity with mild mediastinal lymphadenopathy. Abdominal CT was also notable for hepatosplenomegaly. He was started on empiric antibiotics but continued to be febrile and in respiratory distress on day 2. Sepsis workup was unremarkable including negative GI pathogen panel, pneumonia panel, blood cultures, and multiple viral studies. Antibiotics were adjusted to cover atypical organisms on day 4 but he continued to deteriorate. Chest CT revealed persistent right lower lobe infiltrate and he continued to have diarrhea. Fungitell was 166 and voriconazole was started. The patient became increasingly thrombocytopenic with platelet count of 73 and continued to deteriorate with new altered mental status, increasing oxygenation requirements, fevers, and worsening renal function. On day 5, aspergillus galactomannan antigen was positive. On day 6, histoplasma urine and blood antigens were positive and amphotericin was started. He had a complicated hospitalization but discharged home 3 weeks later on long term itraconazole therapy. Given his presenting symptoms and chest imaging, this patient most likely had pulmonary histoplasmosis which progressed to disseminated disease. Histoplasmosis is a mycosis endemic to the Midwest. While usually asymptomatic, it can cause pulmonary disease and in rare cases disseminated disease. Disseminated histoplasmosis typically presents with fever, fatigue, hepatosplenomegaly, and pancytopenia. Diarrhea and dyspnea are uncommon presenting symptoms, however gastrointestinal involvement is seen in up to 70% of patients on autopsy. There is a high index of suspicion for atypical infection in this patient on long term immunosuppression with unresolving sepsis despite broad spectrum antibiotic coverage. While aspergillus antigen turned positive one day prior to histoplasmosis, galactomannan aspergillus immunoassay is known to cross-react with histoplasmosis. This has been particularly noted in solid organ transplant patients. Solid organ transplant patients and those with AIDS are at the highest risk for disseminated histoplasmosis. Sepsis in these immunosuppressed patient populations warrants early & extensive workup for atypical organisms to prevent complications of untreated infection.

## Abstract 8

### **Category Submitting for:** Clinical Vignette

### **Abstract Title** A "Major" Complication of Pink Eye

#### **Abstract Text**

A 32-year-old man presented with two days of rapidly progressive rash, odynophagia, and cough. His prior history was notable for bilateral conjunctivitis treated a week prior. The rash was vesiculo-papular with some pustular lesions and was located primarily on sun-exposed areas, especially his shoulders and upper arms. He also had blanching, macular lesions on his palms and soles. Other findings included ulceration and sloughing of palatal and labial mucosa. Dermatology evaluated the patient and was initially concerned for disseminated herpes simplex virus (HSV) and empirically started acyclovir. His rash worsened in the next 48 hours, with centripetal extension, progression of mucosal involvement, and development of targetoid lesions. The patient was started on empiric treatment for mycoplasma out of concern for erythema multiforme (EM). His respiratory panel came back positive for adenovirus. Mycoplasma IgM and IgG were positive. HSV serologies were suggestive of prior infection with negative HSV testing from skin biopsies. Given the timing of his eye infection and rash it was determined the etiology was likely adenovirus- and *M. pneumoniae*-related EM. The patient was started on topical and systemic steroids in addition to finishing courses of acyclovir and azithromycin. He gradually improved after five days of supportive therapy and was discharged home.

EM is caused by a cell-mediated immune response, and infections are associated with 90% of cases (1). The term EM major (EMM) is used to describe EM with severe mucosal involvement. Although HSV-1 is the most identified etiology of EM, HSV-2 also has been shown to cause EM. *Mycoplasma pneumoniae* is the second most common etiology, especially in children (1). Medications have been known to cause less than 10% of cases. Our patient had negative serologies for recent HSV infection. EMM secondary to adenovirus, although rare, has been documented in the literature with an initial presentation of keratoconjunctivitis, similar to this patient's presentation (2).

Recognition of EMM and identification of inciting factors can present a diagnostic challenge in patients with atypical presentations. In patients presenting with EMM with prodromal conjunctivitis, physicians should have a low threshold for searching for adenovirus infection in addition to more likely causes such as HSV or *Mycoplasma*. As adenoviruses are highly contagious, early identification of the virus and patient isolation can prevent spread of the virus throughout the community. Additionally, identification of the triggering pathogen(s) allows for more rapid patient support and treatment.

#### References

1. Traves KP, Love G, Studdiford JS. Erythema Multiforme: Recognition and Management. *Am Fam Physician*. 2019 Jul 15;100(2):82-88.
2. Calas A, et al. Adenovirus-induced Erythema Multiforme: Eye and Genital Mucosal Involvement is Specific, Whereas Oral and Cutaneous Involvement is Not. *Acta Derm Venereol*. 2020 Jun 11;100(13). doi: 10.2340/00015555-3547.



## Abstract 9

**Category Submitting for:** Clinical Vignette

**Abstract Title** Characterizing the Uncharted Management of Online Designer Drug Withdrawal

### **Abstract Text**

**Introduction:** There is an increasing prevalence of designer drug use in the United States, with widening availability through online vendors without a prescription. These drugs have the potential for misuse and addiction, but there is limited evidence to guide safe and effective withdrawal.

**Case Description:** A 30-year-old man was admitted to the hospital for monitoring and treatment of withdrawal from Phenibut (synthetic GABA agonist) and bromazolam (designer benzodiazepine) which he bought online for the prior year without a prescription for anxiety and sleep. He attempted to self-wean at home for a week, however, he began experiencing severe generalized pain and tremulousness. His past medical history consisted of alcohol use disorder and gabapentin misuse (in remission). Other active substance use included kratom and cannabis. On exam, he was mildly tachycardic with otherwise normal vital signs. The remainder of his physical exam was normal with the exception of fluctuating anxiety and tiredness. Lab testing, including a CBC and CMP, was within normal limits. A urine drug screen was positive for benzodiazepines and cannabinoids. The team initiated treatment with a baclofen and clonazepam taper based on prior case studies. The addiction psychiatry consult service recommended that the patient be initiated on a phenobarbital taper in the ICU per a typical benzodiazepine withdrawal protocol. This was done in an attempt to more promptly cease his use of dependence-forming medications. After two days on phenobarbital, he began experiencing worsening pain, paranoia, diaphoresis, visual hallucinations, and mild tremors. His pain, anxiety, and sense of dread continued the next day, despite as-needed phenobarbital. The patient requested a taper of baclofen and clonazepam for cessation, but the medical teams felt this option would result in ongoing dependence problems. On day five, the patient expressed frustration with his care and requested discharge. Since he was outside the window of potentially lethal withdrawal, he was discharged with resources to establish with outpatient addiction services.

**Discussion:** This case highlights the challenges internists face in recognizing and managing misuse of non-prescription, designer drugs. The ready access to these substances through online purchase warrants raised awareness within the medical community. Between 2009 and 2019, U.S. Poison Control centers took calls for 1,320 known Phenibut cases with rates increasing in the past few years. Withdrawal from these GABA agonists has familiar features of autonomic changes and neuropsychiatric disturbances. However, symptoms may be more severe and with a predominance of pain and mood effects. Physicians should be cautious of administering phenobarbital tapers too quickly, since breakthrough withdrawal may remain unmitigated. The use of a long-term baclofen and clonazepam taper is another treatment option to consider, although randomized, controlled trials have not yet been performed.

## Abstract 10

### **Category Submitting for:** Clinical Vignette

**Abstract Title** The Management of Diabetic Ketoacidosis in the Setting of Potential Cardiac and Neurological Ischemia

#### **Abstract Text**

A 61-year-old woman with a past medical history significant for hypertension, diabetes mellitus type 2, obstructive sleep apnea and obesity presented to the Emergency Department (ED) with aphasia and altered mental status. Per the patient's husband, she woke up that morning around 10:00 AM and was noted by the husband to be aphasic. Her husband called 911, and paramedics found her stuporous and noted her insulin pump read 0 on the insulin reserve. On presentation to the ED, the patient was hypotensive, tachycardic, tachypneic, and hypoxic with an O<sub>2</sub> sat of 85% on room air. On exam, the patient was obtunded with Kussmaul breathing. She received oxygen through a non-rebreather mask and her oxygen saturation subsequently improved. Labs were drawn and significant results include a glucose of 1542 mg/dl, a CO<sub>2</sub> of 5 mmol/L, anion gap of 42 mmol/L, pH of <6.82, beta-hydroxybutyric acid >60 mmol/L, lactic acid 10 mmol/L, high sensitivity troponin 2320 ng/L, and creatinine of 4.4 mg/dL. EKG initially showed evidence of an anterior myocardial infarction. CT head showed no acute bleed and CTA head/neck showed no occlusion or stenosis. At this time, a diagnosis of a high anion gap metabolic acidosis secondary to diabetic ketoacidosis (DKA) was made. IV fluids and insulin drip were started. Cardiology was consulted and concluded that given her rising troponin and EKG findings that the patient potentially also suffered a NSTEMI. She was started on heparin, a high intensity statin, and aspirin. Beta blockers were held due to hypotension requiring two vasopressors. Tele-Neurology was consulted and were concerned about an MCA stroke given the patient's aphasia. However, the patient was out of the window period for alteplase and did not qualify for mechanical thrombectomy. Neurology recommended an MRI to look for ischemic changes. The patient was transferred to the ICU for continued treatment. With insulin treatment her DKA resolved and with it her altered mental status. Cardiology recommended outpatient ischemic workup given that upon stabilization the patient was not experiencing any chest pain and her subsequent EKGs did not show any acute ischemic changes. Upon stabilization the patient was discharged with recommendations for follow-up.

This case presents a complicated presentation of DKA involving multiple organ system dysfunction all stemming from metabolic derangements. This demonstrates a unique presentation of DKA given the unusually high glucose and the patient's additional symptoms. The complex work-up of concomitant stroke, MI, and DKA can be overwhelming to any provider, but this demonstrates how these problems can be addressed efficiently and concurrently with successful patient outcomes. In hindsight, the patient's accompanying symptoms were due to her metabolic derangement, but at initial presentation these all required further workup. This emphasizes the need for problem management and prioritization.

Abstract 11

**Category Submitting for:** Clinical Vignette

**Abstract Title** Bilateral Endogenous Bacterial Endophthalmitis Secondary to MRSA Bacteremia

**Abstract Text**

Introduction:

Endogenous bacterial endophthalmitis (EBE) is a rare but vision-threatening complication of bacteria spreading contiguously through the blood-ocular border. The condition is associated with poor visual prognosis and has resulted in death 1–3. Endogenous etiology consists of 2-8% of all cases of endophthalmitis<sup>1</sup>, with only 12% of those cases being bilateral<sup>4</sup>. We report a case of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia complicated by bilateral EBE in a diabetic female.

Case Report:

A 48-year-old female with a past medical history of type II diabetes mellitus and diabetic retinopathy presented with sudden vision loss in both eyes. Brain MRI showed multifocal septic emboli, and a transesophageal echocardiograph (TEE) was negative for thrombus or vegetation. Blood cultures were positive for MRSA, and the patient was started on intravenous vancomycin, linezolid and ceftaroline.

Intraocular vancomycin and ceftazidime were administered after obtaining vitreous humor cultures. A bilateral vitrectomy was performed. The patient lost her vision in both eyes except for slight detection of black, white, and shadows, with further improvement unlikely.

Initial labs showed acute kidney injury, thereby contraindicating any contrast imaging. Kidney function continued to deteriorate, so vancomycin was discontinued. Hyperkalemia prompted a discontinuation of linezolid. Ceftaroline was switched to daptomycin due to increasing concern for septic emboli.

After kidney function improved with discontinuation of nephrotoxic agents, a series of contrast scans and a repeat TEE were obtained. TEE was positive for a 1cm vegetation on the posteromedial papillary muscle. CT showed numerous intramuscular abscesses that were positive for MRSA. MRI of the cervical spine showed osteomyelitis at the level of C5-C6.

Following imaging, oxygen requirements drastically increased and chest X-ray demonstrated atelectasis. Due to these changes, another 7-day course of ceftaroline and 12-day course of prednisolone was started. In the following days, pleural effusion was noted, and thoracentesis yielded 1.1 L of serosanguinous transudate. Daptomycin was suspected as the causal agent and discontinued.

Currently, the patient is still admitted for bilateral EBE and MRSA bacteremia with septic emboli. The patient is stable, and has cleared her last two blood cultures.

Discussion:

Bilateral EBE is an exceedingly rare condition with significant long-term consequences. This case

presents bilateral EBE resulting in vision loss as a complication of MRSA bacteremia. The literature reports few cases of bilateral EBE, with even fewer reports of severe systemic infection. One study reports 4 cases of osteomyelitis in association with EBE3. A review of the literature did not identify other cases of bilateral EBE with other significant associations.

Although the patient's outcome has yet to be determined, aggressive antibiotic therapy with appropriate imaging to monitor the infectious course has been key to management. A multidisciplinary approach, especially early ophthalmology intervention, was vital for the stabilization and treatment of this patient.

Abstract 12

**Category Submitting for:** Research

**Abstract Title** Developmental Expression of BMP2-Induced Genes in Fetal Mouse Ovaries

**Abstract Text**

Background: Primordial follicle (PFs) reserve forms due to assembly of granulosa cells (GCs) with the oocytes. Reduced PF reserve leads to premature ovarian failure with consequential infertility and menopause-related disorders. Bone morphogenetic proteins (BMPs) or estradiol-17 $\beta$  (E2) promote PF formation. To understand the molecular mechanisms, we examined if the expression of BMP2-induced genes- Gata2, Gata4, Egr2 and Hepsin- correlated with SC to GC transition and PF formation.

Methods: Ovaries were collected from 16 through 19 (E16-E19) days old fetal, and one- and two days old postnatal (P1 and P2) mice. Total RNA from E16 ovaries cultured with or without BMP2 or E2 for 24 hours were subjected to RNAseq and bioinformatics analyses. In vivo and in vitro expression of selected candidate genes and spatio-temporal expression of corresponding proteins were examined using RT-qPCR and immunofluorescence localization, respectively.

Results: Gata2, Gata4, Egr2 and Hepsin (Hpn) were selected because of their role in cellular differentiation and mesenchymal-epithelial transformation. Remarkable increase in gene expression occurred on E18, the day prior to PF formation. Although protein immunosignal was present in somatic cells (SC), it was higher in FOXL-2 positive GCs by E18 through P1. GATA2 was also presented in germ cells. BMP2 or E2 upregulated gene expression in vivo and in vitro; however, the effect of E2 was less for Gata4 and Egr2. BMP2 significantly upregulated all proteins in GCs, whereas E2 upregulated GATA2 and HPN proteins in SCs additionally. A specific BMP2 receptor blocker completely suppressed BMP2 or E2 effect on gene expression.

Conclusions: In summary, Gata2, Gata4, Egr2 and Hpn mRNA levels increase around PF formation. Correspondingly, intensities of Gata2, Gata4, Egr2 and Hpn immunosignal increase in differentiating GCs. BMP2 shifts Hpn immunosignal from SCs to GCs while E2 upregulates Hpn. BMP2 or E2 may induce differentiation of ovarian SCs into GCs by cell-specific activation of Gata2, Gata4 and/or Egr2. Hpn, which is a metalloproteinase, may participate in ovary remodeling during the initial wave of PF formation. We conclude that BMP2-induced GATA2, GATA4, EGR2 and Hepsin may regulate oocyte development, and SC to GC transition leading to the formation of PFs.

**Category Submitting for:** Research

**Abstract Title** Initial Symptom Burden and Development of Cognitive or Sleep Deficits after COVID-19 Hospitalization

**Abstract Text**

**\*\*INTRODUCTION:\*\*** Adverse neurocognitive effects are common long-term sequelae of SARS-COV-2 infection, however which individuals most at risk is not known. We examined whether initial symptom burden, the number of symptoms at time of COVID-19 presentation, is associated with self-reported cognition and sleep scores 30 days after COVID-19 hospitalization discharge.

**\*\*METHODS:\*\*** Individuals ages 18 years and older who were hospitalized with COVID-19 at the University of Washington, were alive at 30 days after hospital discharge, and who spoke English were eligible. All data, including pre-COVID assessments, were collected by telephone interview at 30 days after hospital discharge. Cognition and sleep were assessed by the PROMIS Cognitive Function-Abilities (CA), Cognitive Function (CF), and Sleep Disturbance (SL) 4a short forms. Raw scores were converted to standardized T-scores for analysis (mean=50, and SD=10). Lower CA and CF T-scores, and higher SL T-score indicate greater impairment. A decrease of 5 T-score points indicates a clinically significant decline. Linear regression analyses modeled the associations between the initial symptom burden and cognition and sleep measure T-scores at 30 days after discharge with and without adjusting for covariates (baseline T-score, age, sex, race, ICU admission, hospital length of stay).

**\*\*RESULTS:\*\*** Thirty-seven individuals are included, with mean age 56 (SD = 16.2) years and mean number of initial symptoms 6 (SD = 2.4). The most common initial symptoms were dyspnea (70%) and cough (65%). Mean CA, CF, SL T-scores were 56.6 (SD=7.8), 54.2 (SD=6.7), and 53.3 (SD=9.2) pre-COVID; and were 48.3 (SD=9.6), 47.5 (SD=10.9), and 58.2 (SD=10.3) at 30-days after discharge, respectively. Twenty five (68%) individuals developed a clinically significant decline in cognition and/or sleep T-scores, and 21 (57%) developed at least mild impairment compared to pre-COVID. In adjusted models, symptom burden was statistically significantly associated with SL (1.92 (95% CI: 0.45, 3.39)) T-score at 30 days.

**\*\*CONCLUSION:\*\*** Cognitive and sleep deficits at 30 days after discharge from COVID-19 hospitalization were common among our cohort. Our findings suggest that initial COVID-19 symptom burden may be an important risk factor for the development of sleep impairment among survivors of COVID-19 hospitalization.

Abstract 14

**Category Submitting for:** Research

**Abstract Title** BMI and Severity of Disease in Patients with Osteogenesis Imperfecta

**Abstract Text**

Osteogenesis Imperfecta (OI) is an inherited connective tissue disorder caused most commonly by mutations in genes that code for type I collagen. Clinical manifestations include multiple or atypical fractures, short stature, scoliosis, blue sclerae, hearing loss, and opalescent teeth.

Increased body weight is a risk factor for loss in motor function, and low body weight can facilitate improved mobility in patients with OI [5]. Body mass index (BMI), which equals weight in kilograms divided by height in meters squared, is a commonly used metric for estimating body composition. However, patients with OI, specifically types III and IV, tend to achieve lower heights compared to the general population.

This study sought to determine if an association exists between BMI and severity of OI as described by patient-reported outcome measures (PROMs) and motor skills assessments performed by physical and occupational therapists. Specifically, the Pediatric Outcomes Data Collection Instrument (PODCI) and the Brief Assessment of Motor Function (BAMF), which assess health-related quality of life and motor skill level, respectively, were analyzed. The PODCI scores analyzed from this age group were parent-reported scores. The data set included patients who had data for both a lower extremity OI surgery and BMI/sex data. Percentiles for BMI-for-age were calculated using the CDC's SAS program for the 2000 CDC growth charts for patients at 5 years of age (+/- 1 year) and 13 years of age (+/- 1 year). For patients with BMI data at both 5 and 13 years, the difference was calculated by subtracting the 5-year BMI-for-age percentile from the 13-year BMI-for-age percentile. In addition, PODCI and BAMF data were linked to BMIs at 5 years or 13 years of age, and associations between these measures and BMI-for-age percentiles were assessed using Spearman correlations. All analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

From this analysis, the only significant association found was between BMI and PODCI upper extremity score at age 13 (+/- 1 year), with higher BMI-for-age percentiles associated with higher PODCI scores ( $\rho = 0.53$ ;  $p = 0.02$ ). Limitations for this study included using a small sample size, only considering a linear relationship between BMI and PODCI and BAMF scores, and using retrospective data. Future investigations should include larger sample sizes and analyze other body composition testing methods, such as air displacement plethysmography (BOD POD®) and bioelectrical impedance analysis (BIA).

## Abstract 15

### **Category Submitting for:** Clinical Vignette

#### **Abstract Title** Mistaken Melanoma: a Presentation of Clear Cell Sarcoma with Cutaneous Metastasis

#### **Abstract Text**

A 26-year-old white woman with no past medical history presented to the emergency department (ED) for a third time with complaints of persistent inguinal lymphadenopathy. She reported having abdominal pain, 15lb weight loss, and anorexia. CT scan revealed bilateral inguinal lymphadenopathy with the largest node measuring 7.4cm, a 9.3cm left flank lesion infiltrating the abdominal muscle, left hydronephrosis, and diffuse osseous lytic lesions. She received urgent oncologic evaluation and underwent bone marrow and inguinal lymph node core biopsy. Pathologic immunostaining was positive for HMB45, Melan-A, SOX10, CD99, consistent with malignant melanoma. Molecular testing was negative for BRAF and other common mutations. A primary skin lesion was never found. She was discharged with plans to initiate treatment in the outpatient setting.

Unfortunately, she returned to the ED with altered mental status prior to starting therapy. Bloodwork was significant for a creatinine of 4.3, sodium of 123, calcium of 16 and uric acid of 14.9. She was diagnosed with acute renal injury from hyperuricemia and hypercalcemia of malignancy, and treated with fluids, calcitonin, pamidronate, rasburicase, and allopurinol. Given that her presentation was caused by her underlying malignancy, she received her first cycle of ipilimumab and nivolumab while inpatient.

An erythematous rash, that was spreading rapidly and coalescing into a firm plaque, was noted across her left inguinal fold and abdomen. Punch biopsy found cutaneous metastatic cells within the mid and deep dermis, consistent with carcinoma en cuirasse (CeC). Given her atypical presentation, a secondary review of all biopsies was performed and eventually led to a diagnosis of clear cell sarcoma (CCS).

#### Discussion:

CCS is a rare neoplasm, accounting for approximately 1% of soft tissue tumors. Most reported cases present as a slowly progressive mass on the lower limbs or within the pelvis of young women. CCS share histological and immunohistochemical characteristics with malignant melanoma and is often positive for melanin, pre-melanosomes, S-100 protein on immunostaining. The characteristic translocation t(12;22) (q13;q12) resulting in EWSR1- ATF1 or EWSR1-CREB1 rearrangement, present in 90% of cases, is considered pathognomonic for CCS, making cytogenetics an essential differentiator between melanoma and CCS. The preferred first-line treatment of localized CCS is wide surgical resection, while chemotherapy has limited efficacy in the metastatic setting.

Our case is unique given the presentation of CeC with CCS. CeC is a rare cutaneous metastatic phenomenon most frequently reported in breast cancer. It first appears as nodules that begin coalescing, as carcinomatous lymphatics result in extensive thickening, edema and fibrosis of

dermis, and subcutis of chest or abdominal wall. CeC is associated with poor prognosis and treatment options are limited and palliative in nature.

Objectives:

Review the similarities and differences between melanoma and clear cell sarcoma.

Discuss the rare presentation of carcinoma en cuirasse.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Stress Cardiomyopathy in the Setting of Delirium and Pulmonary Embolism

**Abstract Text**

Stress cardiomyopathy, also known as Takotsubo cardiomyopathy is a condition most frequently encountered in female patients in their 60s and 70s and is provoked by significant stressors, both physical and mental. The condition is transient, but the diagnosis may require adaptation to the normal care of the precipitating pathology. Additionally, the age group most frequently affected is at increased risk of developing delirium or having existing dementia. Neurologic and psychiatric conditions are associated with increased risk of morbidity and mortality from stress cardiomyopathy.

A 93-year-old female presented to the emergency department with GI complaints. The patient had a past medical history significant for hypertension, hyperlipidemia, heart failure with grade II diastolic dysfunction and depression. There were no cardiovascular complaints on presentation. Work-up revealed new-onset atrial fibrillation (AF) with rapid ventricular response (RvR) and computed tomography (CT) of the chest uncovered segmental and subsegmental pulmonary embolism (PE) of right lower lobe arterial branches. Lab abnormalities included elevated troponin and congestive heart failure peptide. Initial ECG showed AF with RvR, and ST and T wave abnormalities not meeting criteria for new infarction. When she was seen the following morning by the admitting team, the patient was noted to have altered mental status. Work-up, including CT head without contrast, complete metabolic panel and urinalysis, was negative.

Venous duplex revealed chronic deep vein thrombosis in the right peroneal vein, presumed to be the source of the PE. Trans-thoracic echocardiogram was performed, and findings included akinesis of all mid to distal segments of the left ventricle with preserved contractility of the basal segments, consistent with stress cardiomyopathy. Ejection fraction was 25-30%. The left atrium was noted to be moderately dilated. Repeated ECG was unremarkable and not indicative of acute ischemia. Patient underwent trans-esophageal echocardiogram, revealing thrombus in the left atrial appendage. In addition, left heart catheterization was performed. There was non-obstructive coronary artery disease and luminal irregularities were noted in the main coronary arteries. Left ventricular end diastolic pressure was mildly elevated.

The patient's mental status fluctuated throughout her hospitalization and did not resolve with improving medical condition raising a concern for possible underlying dementia. Ultimately, the patient was discharged on oral anticoagulation and was well rate controlled with plans to perform cardioversion as an outpatient.

Recovery of left ventricular function from stress cardiomyopathy can take weeks to months, and the persistent altered mental status of the patient could suggest that stress cardiomyopathy was contributing to her delirium. However, there are few studies that have investigated a causal relationship between neuropsychiatric conditions and stress cardiomyopathy despite an association with increased morbidity and mortality. This case highlights the importance of elaborating the relationship between stress cardiomyopathy and delirium.

## Abstract 17

**Category Submitting for:** Clinical Vignette

**Abstract Title** Crackles, cachexia, and cavitation: a case study

### **Abstract Text**

**Introduction:** The range of etiologies for pulmonary cavitory lesions is vast. Therefore, the discovery of this finding on imaging warrants a thorough diagnostic workup, evaluation, and differential to find a unifying diagnosis.

**Case description:** A 74-year-old man presented with a week of progressively worsening shortness of breath and weakness. He also noted a 60-pound weight loss that had occurred over the past several months. Past medical history included microscopic polyangiitis on prednisone and rituximab, giant cell arteritis on tocilizumab, and positive culture for non-tuberculous mycobacterium during previous admission. Initial physical exam reveals that the patient is afebrile, tachycardic, and tachypneic with BP of 85/64, BMI of 15.5 kg/m<sup>2</sup>, and O<sub>2</sub> saturation of 95% on room air. The patient appeared cachectic but in no acute distress. Heart sounds were normal with no murmurs heard. Crepitus was noted on auscultation of lungs with diffuse crackles throughout; breathing was unlabored on room air. The abdomen was scaphoid, soft, and non-tender with normal bowel sounds.

CBC showed leukocytosis of 35, and procalcitonin was elevated at 6. Chest CT was obtained, which was remarkable for large volume pneumomediastinum and multiple thick-walled bilateral cavitory pulmonary lesions. Empiric treatment with vancomycin and cefepime was started due to high suspicion for bacterial pneumonia; however, after several days of empiric treatment, his symptoms had not significantly improved. On PET scan, active inflammation was seen in lungs as well as diffuse patchy uptake in the colon, but no signs of apparent malignancy were present.

On infectious workup, the Fungitell ( $\beta$ -D-glucan) test yielded a positive result. Sputum culture grew mold, which identification later revealed to be the *Aspergillus fumigatus* species complex. Karius assay further confirmed this finding. Empiric antibiotics were discontinued, and treatment with micafungin and voriconazole was initiated. He tolerated these treatments well, and we were ultimately able to discharge him to a skilled nursing facility.

**Discussion:** Cavitory lung lesions are imaging findings that are commonly encountered by the internist. A typical evaluation of cavitory lesions may include autoimmune markers, blood or sputum cultures, and imaging for malignancy to evaluate for likely culprits. In our case, further infectious evaluation for fungal organisms was crucial to discovering his underlying etiology and initiating prompt treatment.



**Category Submitting for:** Clinical Vignette

**Abstract Title** X linked Dilated Cardiomyopathy associated with DMD Mutation

**Abstract Text**

Introduction: X-linked dilated cardiomyopathy is a dystrophinopathy that is characterized by profound cardiac involvement with minimal skeletal myopathy. It is caused by mutations in the Duchenne muscular dystrophy (DMD) gene which encodes for the sarcolemma protein dystrophin. The DMD gene is located on the human chromosome Xp21 with 79 exons. (1) XLDCM presents in males as dilated cardiomyopathy congestive heart failure between the ages of 20 and 40 along with a rapid progression to death over several years.

Case Description: A 24-year-old man was referred from the HF clinic for AKI with a creatinine of 2.29, five months after receiving a diagnosis of X-linked dilated cardiomyopathy associated with DMD mutation associated with an ejection fraction of 15%. The patient was asymptomatic and hemodynamically stable at the time of admission. He was taking furosemide, spironolactone, sacubitril/valsartan, carvedilol, and atorvastatin. Laboratory tests included elevated creatinine, BUN, CK, and BNP. Echo at the time of admission demonstrated an unchanged, reduced ejection fraction of 15%. All medications were held, and the patient was started on IV fluids. The patient was discharged after AKI had resolved and home medications were resumed. An appointment had been scheduled outpatient for automatic implantable cardioverter-defibrillator (AICD) placement due to the patient's worsening heart failure.

Discussion: There are four major DMD regions that are associated with XLDCM and other dystrophinopathies. The most common region for DMD mutations in dystrophinopathies is from exon 45-55. (1) The treatment of XLDCM is similar to the management of dilated cardiomyopathy. Angiotensin-converting enzyme inhibitors and beta-blockers are the first-line drugs in the management of dilated cardiomyopathy and are associated with improved prognosis in patients with muscular dystrophy. (1) Individuals with dilated cardiomyopathy are predisposed to develop arrhythmias that may be lethal. Furthermore, nonlethal arrhythmias may exacerbate heart failure symptoms by further reducing cardiac output. (2) An implantable cardioverter-defibrillator (ICD) placement is recommended for the prevention of sudden cardiac death in patients who have a nonischemic dilated cardiomyopathy, left ventricular ejection fraction less than or equal to 35%, and associated heart failure with functional Class II or III stat us. (3)

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3 Ramakumar, V., & Naik, N. (2018). Current status of the ICD in nonischemic cardiomyopathy. *Journal of the Practice of Cardiovascular Sciences*, 4(1), 6.

## Abstract 19

**Category Submitting for:** Research

**Abstract Title** Morbidity and Mortality Associated with Medical Management and PCI for NSTEMI in Diabetics

### **Abstract Text**

#### INTRODUCTION

Rising prevalence of diabetes in the United States warrants in depth investigation of disease management in diabetic patients. Such patients are at increased risk for additional conditions, with cardiovascular disease being the leading cause of mortality amongst diabetic patients. While incidences of heart disease rise, mortality rates are falling. Partially due to improvements in acute management of myocardial infarction. Traditionally, two immediate treatment options are available - restoration of perfusion with percutaneous coronary intervention (PCI), or medical therapy. Currently, there is limited and conflicting evidence providing support for which treatment modality is superior. This study uses a sample of diabetic patients who suffered NSTEMI who were subsequently treated with either PCI or medical management. These data provide insight into which treatment is more effective.

#### DESIGN AND METHODS

Patient data from CHI Health Bergan Mercy and Immanuel hospitals were examined retrospectively. Patients were selected from January 2013 to January 2018. Data collected included treatment method, survival (up to 5 years), recurrence of MI, stroke and additional revascularization procedures. Comorbid factors present including a history of CKD defined as GFR between (30-59), history of stroke, peripheral artery disease and revascularization procedures to include CABG or PCI myocardial infarction, heart failure peripheral artery disease and prior revascularization procedures were also collected.

#### RESULTS

A total of 357 patients met exclusion criteria of whom 172 were treated medically and 185 with PCI. A Statistically significant difference between medical management and PCI existed in the following demographic factors: patients with a hx of PCI were more likely to be treated with PCI and were more likely to require additional PCI in the future. Patients with a history of heart failure were more likely to be treated medically.

A total of 78 deaths occurred over the observation period. 48/172 (27.9%) patients who were treated medically died while 30/185 (16.2%) patients treated with PCI died ( $p=0.008$ ). Similar results were obtained after adjusting for facility, age, sex, race and history of comorbid disease. After initial medical management, 9 patients went on to require PCI in the future while 19 patients treated with PCI required additional PCI in the future ( $p=.07$ ). Recurrence of MI was noted in 19.8% in medically managed patients and 18.6% in patients who underwent PCI ( $p=.790$ ). x

#### DISCUSSION

Using patient data from CHI Health Bergan Mercy and Immanuel hospitals, we came to the following conclusions:

- (1) Patients treated with PCI had lower rates of all-cause mortality over the 5-year study period compared to medical management.
- (2) PCI had similar rates of complications including CVA, recurrence of MI or need for further revascularization procedures compared to medical management.
- (3) Patients with a history of heart failure were almost twice as likely to be treated with medical therapy.

Abstract 20

**Category Submitting for:** Clinical Vignette

**Abstract Title** CN III Palsy Secondary to Posterior Communicating Artery Aneurysm

**Abstract Text**

Introduction:

Classically, oculomotor nerve palsy (CN III) presents with diplopia, ptosis and eyeball deviated in the “down and out” position. Most cases of isolated cranial nerve III palsy are due to either ischemic microvascular disease (diabetes, hypertension) or compression secondary to mass effect (aneurysm, tumor, uncal herniation)<sup>2</sup>. Physical exam findings can help differentiate the underlying etiology. Compressive CN III palsy presents with pupillary dilation, whereas, in ischemic CN III palsy, the pupil is spared. Typically, MRA and CTA are the imaging modalities utilized for detecting intracranial abnormalities. Here we present a unique case of compressive CN III palsy that was not detected on CTA or MRA.

Case Presentation:

A 68-year-old Caucasian male presented to the ED with a 5-day history of acute onset, progressively worsening double vision, dizziness, and stroke like symptoms. Stroke work up, including non-contrast CT, MRI and MRA brain were unremarkable. On physical exam, the patient presented with the classic signs of complete CN III palsy including an eye positioned “down and out”, diplopia, and a mydriatic pupil with sluggish reaction. Despite negative CTA and MRA, it was determined that the patient required conventional angiography to definitively rule out diagnosis of aneurysm and suspected 3rd nerve palsy. The patient was transferred to a specialized neurologic center where a conventional digital subtraction angiography (DSA) was performed and ultimately did identify posterior communicating artery (PComm) aneurysm likely causing acute 3rd cranial nerve palsy with pupillary involvement. Patient was subsequently taken for diversion and embolization of right posterior communicating artery aneurysm which was completed successfully.

Discussion:

This case is unique because the aneurysm was not detected on MRA or CTA. While conventional digital subtraction angiography (DSA) remains the gold standard for diagnosing intracranial aneurysms, CTA/MRA are used more frequently due to their high sensitivity, specificity and noninvasive nature<sup>3</sup>. Ideally, CTA/MRA should be able to detect nearly all aneurysms responsible for CN 3 palsy. However, there has been under diagnosis of PComm aneurysms using these non-invasive imaging modalities<sup>1</sup>. Accurate interpretation of cerebral CTA/MRA imaging requires highly trained neuroradiologists and neuro ophthalmologists. Thus, subtle, yet clinically significant findings may be missed. In our case, the CTA/MRA images were initially read by a radiologist before the patient was transferred to a neurology specialty hospital where the catheter angiogram revealed the PComm aneurysm.

Conclusion: In cases of high clinical suspicion and negative noninvasive imaging, DSA imaging should remain the gold standard in diagnosis.

## Abstract 21

### **Category Submitting for:** Clinical Vignette

### **Abstract Title** Subcutaneous Gluteal Abscess with *Trichosporon asahii* in an Immunocompetent Adult

#### **Abstract Text**

##### Introduction:

*Trichosporon asahii* is a rare emerging non-candida basidiomycetous yeast infection that preferentially affects immunocompromised hosts, particularly those with hematologic malignancies and neutropenic states. It has been reported to cause potentially fatal disseminated infections affecting the brain, heart, lungs, liver, kidneys, and skin. *T. asahii* rarely affects immunocompetent hosts, and seldomly occurs as an isolated cutaneous infection. This case is the first report of an isolated *T. asahii* subcutaneous abscess in an immunocompetent host without evidence of predisposing factors or involvement of overlying skin and disseminated disease.

##### Case Description:

A 46-year-old female presented in mild distress to the emergency department due to one week of severe bilateral lower quadrant abdominal pain. A CT abdomen and pelvis was obtained and demonstrated a 9.7 x 2.2 x 6.5 cm subcutaneous abscess in the left gluteal region. At this time vancomycin, ceftriaxone and metronidazole were started empirically. An MRI was obtained which showed the abscess contained entirely within the superficial subcutaneous fat with reactive edema and myositis within the left gluteus maximus. Interventional Radiology was consulted and placed a catheter to drain the abscess. Two days later, the culture began growing yeast. Fluconazole was initiated and the empiric antibiotics were discontinued. The following day, the yeast was identified as *Trichosporon asahii*. Fluconazole was then switched to voriconazole. At outpatient follow-up one week later, the patient reported increased dizziness and fatigue. Voriconazole was switched to terbinafine and the patient experienced complete resolution. The pigtail drain was removed a month later upon verified resolution of the abscess via fistulogram.

##### Discussion:

*Trichosporon asahii* is found in water, soil, vegetation, and is a known colonizer of the skin, respiratory, genitourinary, and gastrointestinal tracts. *T. asahii* rarely causes infection, but when it does, it is often fatal. However, studies demonstrate that localized cutaneous infections identified early can achieve curative outcomes as *T. asahii* is commonly sensitive to voriconazole and amphotericin B. From the known cases, immunocompromised hosts appear to be preferentially affected, especially those who are neutropenic. In the reported cases affecting immunocompetent hosts, inciting factors are typically described, such as recent topical steroid use, injection, surgery, or burn injuries. It is hypothesized that decreased local immunity leads to the susceptibility of cutaneous *T. asahii* infections. To our knowledge, this is the first report describing an exceedingly rare case of an isolated *T. asahii* subcutaneous abscess in an immunocompetent patient with no predisposing factors.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Raoultella Ornithinolytica: A Rare Cause of Ventilator-Associated Pneumonia

**Abstract Text**

Introduction: Hospital-acquired pneumonia is the second most common nosocomial infection. Ventilator-associated pneumonia (VAP) accounts for nearly 250,000 to 300,000 cases per year. VAP is defined as pneumonia that develops in patients on a ventilator for at least 48 hours. Diagnostic evaluation includes new pulmonary infiltrates on imaging, clinical signs of infection, and identifying pathogens on respiratory secretions. Our patient presented with VAP caused by Methicillin Sensitive Staph Aureus (MSSA) and Raoultella Ornithinolytica. This case emphasizes the risks of prolonged ventilator use and a unique, underreported pathogenic cause of pneumonia.

Case: A 48-year-old male with a medical history of alcohol dependence, methamphetamine use disorder, hypertension, and Class I obesity presented to the ER after a witnessed seizure episode and altered mental status. The patient was combative, resulting in administration of IV Ketamine and subsequent intubation to provide airway protection. Drug screen was positive for methamphetamine raising concern for a potential intraparenchymal bleed. CT angiography of the head showed a left temporal hematoma. Approximately 48 hours later, the patient presented with leukocytosis of 12.2 k/ul, tachypnea, tachycardia, and fever of 101.3, placing SIRS at the top of the differential. The patient also had increasing oxygen requirements with a FiO<sub>2</sub> of around 70%. Culture of bronchial washings from initial bronchoscopy was positive for MSSA and the patient was started on Oxacillin. Over the next 5 days, the patient continued to have intermittent fevers but reduced secretions and signs of infection were clearing. On the 9th day of ventilatory support, CT Angiography of the chest showed concern for a multifocal infectious process. Repeat bronchoscopy showed thick secretions and culture was positive for Raoultella Ornithinolytica resistant to ampicillin. Susceptibility report showed sensitivity to piperacillin/tazobactam and levofloxacin. The patient was started on piperacillin/tazobactam. Nearly 12 days after minimal improvement and persisting fevers, the patient was switched to levofloxacin and fevers subsequently stopped. The patient was eventually weaned off ventilatory support and discharged for outpatient follow-up.

Discussion: Raoultella Ornithinolytica is an encapsulated, gram-negative, oxidase-negative, catalase-positive, aerobic rod that belongs to the Enterobacteriaceae spp, although it was previously classified in the genus Klebsiella. Raoultella Ornithinolytica has the ability to convert histidine to histamine and thus has been identified as a cause of histamine poisoning in humans. It is a rare cause of infection in humans, with approximately five previously reported cases of ventilator-associated pneumonia caused by Raoultella Ornithinolytica. In our case, a rare combination of both MSSA and Raoultella Ornithinolytica presented complications in the management of the patient. Better knowledge of its pathogenicity and susceptibilities can enhance the quality and effectiveness of clinical care and improve clinical outcomes.

Abstract 23

**Category Submitting for:** Clinical Vignette

**Abstract Title** Autoimmune Encephalitis, a Diagnosis to Keep in Your Mind

**Abstract Text**

Autoimmune encephalitis can be a rapidly developing inflammation of the brain. Its manifestation includes acute/subacute mood and behavior changes, short term memory loss, seizures, cognitive dysfunction, psychosis, abnormal movements, and coma. It is a detrimental condition that can be difficult to diagnose.

A 63-year-old right-handed man is witnessed to have an episode of aphasia with confusion. He has a past medical history of alcohol use disorder, gout, hypertension, COPD, smoking tobacco, and methamphetamine use. By the time the patient reached the hospital he was at his mental baseline with slight aphasia. His daughter states that he drinks daily, has stayed inside most of the year, and independently performs his own activities of daily living. The last time the patient had used methamphetamine was two days prior to this event. There were absent cranial nerve deficits and normal strength, sensation and reflexes in all extremities. The heart, lung, and abdominal exams were unremarkable. Later in the hospitalization, he had progressive wavering aphasia, confusion, and left gaze preference with right upper and lower extremity drift. Continuous EEG monitoring showed severe generalized encephalopathy and focal cortical hyperexcitability. Brain MRI showed new multifocal cerebral cortical diffusion restriction throughout bilateral cerebral hemispheres with relative sparing of the right anterior frontal lobe. These results are consistent with seizure activity and encephalopathy. Anti-seizure medications valproate and levetiracetam was given but did not stop the pathologic progression. Vascular, neoplastic, nutritional, endocrine, demyelinating, and infectious causes were negative for this patient after CTA, MRI, encephalopathy panel, CSF panel, PET/CT, and abdominal ultrasound workup. The patient also experienced a COPD exacerbation, refeeding syndrome, mild cognitive communication deficit with receptive language, apraxia, and dysphagia. Prednisone, oxygen, and magnesium were given while the other electrolyte abnormalities self-resolved. Valproate, levetiracetam, lacosamide, and clobazam anti-epileptics were also given to control seizures. The patient's mentation began to improve since his admission five weeks ago when methylprednisolone and IVIG were administered a long with multiple anti-epileptic drugs.

The patient was evaluated to have ambulation difficulties, dysphagia, and mild cognitive deficits as a result of his prolonged flare, which eventually resolved with therapy. He was discharged to a skilled nursing facility because it was found that he requires cues and support for activities of daily living.

This case exemplifies the importance of understanding the diagnostic criteria for autoimmune encephalitis. The inciting agent or the antibody do not have to be known to make the diagnosis. It is important to rule out other causes that can look like autoimmune encephalitis, such as seizures, meningitis, vascular disorders, neoplasms, psychiatric disorders, toxins and infectious disorders. For this patient, the clinical presentation, neurologic assessment, conventional labs, and

therapeutic resolution with appropriate treatments directed the diagnosis to be autoimmune encephalitis.

Abstract 24

**Category Submitting for:** Clinical Vignette

**Abstract Title** Vitamin D Deficiency Causing Rhabdomyolysis

**Abstract Text**

A 50 year-old male presented with five days of proximal muscle weakness and dark urine. Past medical history is significant for familial hypercholesterolemia for which he's been taking a statin for about 30 years. He consumes two alcoholic beverages per day. He had decreased proximal muscle strength of his arms and legs that were non-tender to palpation. Sensation and abdominal exam were normal, he had no joint pain, and there were no skin changes nor rash. Upon further questioning, he had a similar episode of muscle weakness three months prior that resolved without intervention. Urinalysis positive for large blood, negative for RBCs. Creatine kinase 26,000. AST 800, ALT 400. Phosphorus 1.2. Calcium 9.0. Albumin 3.7. PTH 110. Vitamin D 25-hydroxy total < 7. Statin was held. Autoimmune testing via autoantibody screens including anti-HMG CoA reductase, anti-SRP, anti-Jo-1, and anti-U1-RNP antibodies returned negative. Treatment was initiated with ergocalciferol 50,000 units weekly for severe vitamin D deficiency-associated myopathy. At one week follow-up, his CK had returned to normal.

Vitamin D deficiency is a ubiquitous condition with over one third of the U.S. population affected. While many general internists are aware of vitamin D deficiency, our case highlights how it can lead to significant sequelae such as rhabdomyolysis. Unexplained, recurrent rhabdomyolysis should inspire the general internist to consider vitamin D deficiency as a potential underlying cause because the diagnosis is easily made, the treatment is cheap, and the condition is reversible with prompt treatment.

Most cases of rhabdomyolysis are multifactorial, and our differential diagnosis for this instance was wide. As the initial work-up returned, we noted hypophosphatemia. In rhabdomyolysis, muscle cell lysis leads to the release of intracellular contents, including phosphorus, which normally results in hyperphosphatemia. Therefore, hypophosphatemia in the context of rhabdomyolysis indicated a profound phosphorus deficit masked by the release of additional phosphorus into the blood. Vitamin D deficiency ultimately led to a secondary hyperparathyroidism, which is consistent with other case reports of vitamin D deficiency-induced myopathy. Thus, normal to low concentrations of blood phosphorus in the context of rhabdomyolysis should clue the general internist into evaluating for an underlying vitamin D deficiency.

Rhabdomyolysis associated with hypophosphatemia should elicit the general internist to consider vitamin D deficiency as the underlying cause. Vitamin D deficiency is highly prevalent, and its presentation is often insidious. The differential diagnosis of rhabdomyolysis is wide, but concurrent hypophosphatemia or normal phosphorus levels should trigger evaluation of vitamin D deficiency. Quick diagnosis of vitamin D deficiency by a general internist can be made, treatment initiated, and the rhabdomyolysis reversed.

Abstract 25

**Category Submitting for:** Clinical Vignette

**Abstract Title** Acute liver failure in a dysarthric patient with multiple systems atrophy

**Abstract Text**

Clinical Vignette:

This paper will discuss the rate of recurrence of breast cancer following primary treatment, understand and enact screening guidelines for breast cancer survivors, and recognize limits of utilizing ultrasound to detect for liver metastases.

A 67 year-old woman presented with a three week history of increasing weakness and new encephalopathy. Past medical history includes multiple systems atrophy type C, breast cancer status post mastectomy in 2012 and chemotherapy, Graves' disease, hypertension, hyperlipidemia, and depression.

At baseline she was able to perform activities of daily living, however since the start of her presenting symptoms, she has been unable to care for herself. She was able to listen to questions and follow simple commands, but was unable to speak audibly and unable to move arms or legs. She had mild jaundice and scleral icterus. Abdomen was soft, non-tender, and non-distended. 2+ pitting edema was present in all extremities. CBC was unremarkable, international normalized ratio 1.5, glucose 64, aspartate transaminase 259, alanine aminotransferase 94, alkaline phosphatase 663. Acetaminophen and blood alcohol levels were within normal limits. Urine drug screen was negative and urinalysis was normal. The liver had normal size and echotexture by ultrasound and no biliary dilation was noted.

Magnetic resonance cholangiopancreatography (MRCP) showed innumerable (100s) of T2 hyperintense, peripherally enhancing, diffusion restricting lesions involving all segments of the liver; appearance was consistent with metastatic disease. There was extensive thrombus within the left and right portal veins. Chest computed tomography revealed small bilateral pulmonary nodules with bilateral effusions, indeterminate for metastatic disease.

Diagnosis of acute liver failure was made secondary to metastases. After discussion with the patient and her husband about liver biopsy to identify the primary source, they elected to discharge home with hospice care.

**Discussion**

Recurrence of breast cancer is a common problem experienced by the internist. In patients treated for breast cancer, recurrence rates vary depending on treatment; mastectomy is associated with recurrence rates of 4%, while breast conserving therapy and radiation is 7% (Yang). If relapse occurs within two years of primary treatment, distant metastatic disease is present in 30% of cases (Kramer). Metastasis is typically located within the chest wall and axillary or supraclavicular lymph nodes, however may occur in any organ. The sensitivity of ultrasound for

liver metastasis detection is variable and can range from 50%-76% (Albrecht, Cosgrove, Glover) whereas the sensitivity of MRCP is 95% (Romagnuolo).

Surveillance guidelines for patients following breast conserving surgery recommend a history and physical exam 1-4 times per year for the first 5 years following primary treatment, then annually. Mammogram should be performed within 6-12 months after primary treatment, then annually.

When recurrent metastatic disease is suspected, shared decision making should occur with the patient throughout the course of care. If further treatment is desired, diagnostic work up should include CBC, CMP, imaging for systemic staging, biomarker testing, and depression screening.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Maintaining Fluid Status in a Euvolemic Heart Failure Patient

**Abstract Text**

A 68-year-old man presented to clinic with a two-month history of a diabetic foot ulcer in his right foot with worsening pain and redness over the past two weeks despite treatment with doxycycline. He has a medical history of type 2 diabetes mellitus controlled with insulin glargine and metformin and heart failure treated with furosemide. He also takes empagliflozin for additional diuresis and blood glucose control. He received an MRI showing osteomyelitis surrounding the right first metatarsophalangeal joint and routine labs showing stage I acute kidney injury. Heart and lungs were unremarkable on examination. A 3-centimeter ulcer was present on the distal right foot with erythema and increased edema up to the mid-calf. He was admitted and started on IV lactated ringers and IV vancomycin, ceftriaxone, and metronidazole. Empagliflozin and furosemide were stopped. Upon repeat lab testing, the patient's acute kidney injury quickly resolved. Resection of the osteomyelitis was scheduled for hospital day 3. Upon receiving the nerve block for his procedure, the patient became acutely hypoxic with oxygen saturations in the 60's. He was placed on 15 liters of oxygen via a non-rebreather mask. Physical exam found diffuse bilateral crackles, and chest x-ray showed bilateral opacities and a right pleural effusion suggestive of pulmonary edema. The patient was determined to have flash pulmonary edema and was given IV furosemide. His procedure was postponed, and he was transferred back to the floor. Further work-up revealed an unremarkable EKG but an elevated troponin level consistent with a type 2 NSTEMI. Transthoracic echocardiogram showed an ejection fraction of 50%-55% and no wall movement abnormalities. The patient was switched to oral metronidazole and a more concentrated solution of vancomycin to limit fluid intake. He received additional doses of IV furosemide over the next 48 hours with improvement in his symptoms and oxygenation. Bone resection was then completed without further complications.

**Discussion:**

Monitoring fluid status is a common task of general internists. Recognizing fluid sensitive patients is important in order to take the necessary precautions to avoid overloading the patient. In this case, the patient likely became acutely hypervolemic due to cessation of empagliflozin and furosemide for his AKI supporting the synergistic effect of empagliflozin and furosemide on the patient's volume status. Limiting IV fluids by switching to oral medications or concentrating doses as well as prompt resumption of a patient's home diuretic management once contraindications are eliminated can help prevent adverse outcomes, postponement of procedures, prolonged hospital stays, and distress to our patients.

**Learning Points:**

1. Recognize signs of pulmonary edema
2. Resume diuretics in a fluid sensitive patient after contraindications have resolved
3. Utilize low fluid alternatives in euvolemic heart failure patients

Abstract 27

**Category Submitting for:** Clinical Vignette

**Abstract Title** Recognizing Chronic HIV/AIDS

**Abstract Text**

Introduction: HIV, while commonly presenting in high-risk populations, can present insidiously emphasizing the importance of thorough history taking and recognizing the clinical signs and symptoms of acute and chronic HIV/AIDS infections.

Case Presentation: A 58-year-old man with a past medical history of normocytic anemia and lower back pain presented to the emergency department for an incidentally discovered left apical pneumothorax during a barium swallowing study investigating dysphagia. Imaging confirmed his pneumothorax resulting in patient admission for further evaluation. The patient endorsed a four-week period of difficulty breathing, episodic chest discomfort on his left chest, and an occasional left sided "popping like popcorn" sensation after a small traumatic accident at work. His swallowing study was investigating two-month progressive dysphagia of swallowing solids and liquids, which identified candida esophagitis. Further questioning revealed a previous episode of treated and resolved candida esophagitis 11 months prior.

Additional history disclosed that in the last 12 months our patient has also suffered from progressive fatigue, recurrent night sweats and unintentional 34-pound weight loss. He denied any fevers, headaches, constipation or diarrhea, abdominal discomfort or other significant pertinent findings during this time. He is in a long-term monogamous relationship with his wife and has one child. Previously, he endorses three children each with a different woman in his 20s. He has not had recent testing for STIs and denied any history of drug use, tattoos, or blood transfusions, but notes a needle stick two years ago that was never properly treated. Physical exam revealed normal vital signs, including an oxygen saturation of 96%, and an unremarkable exam, including pulmonary examination, besides noted as a thin man with temporal and supraclavicular wasting due to his dramatic weight loss.

Based on history and clinical presentation of night sweats, weight loss, and recurrent candida esophagitis, our patient was screened and found to be positive for HIV. At the time of diagnosis, our patient was HIV-1 positive with 370,000 HIV RNA copies/mL and a CD4 count of 196. He was started on Biktarvy and TMP-SMX prophylaxis as well as fluconazole for his candida esophagitis.

Discussion: This case illustrates the importance of recognizing common presentations of HIV/AIDS as well as the significance of complete history acquisition and critical analysis of underlying causes for differential diagnoses. Recurrent candida esophagitis is an opportunistic infection that is frequently present in immunocompromised hosts due to reduced ability to produce immunoprotective cytokines from the decreased amount of CD4, and its subtypes, and thus reduced efficacy of the innate and adaptive immune system. In the right clinical setting, HIV/AIDS should be considered and screened as an underlying culprit for suspected compromised immune function.

Abstract 28

**Category Submitting for:** Research

**Abstract Title** Does Arthroscopic Biceps Tendinosis During Rotator Cuff Repair Improve Clinical Outcomes? A Systematic Review

**Abstract Text**

Rotator cuff tendinopathy is one of the most common debilitating Musculoskeletal pathologies occurring at a rate of 0.5 - 7.4% per year. Clinical cases of biceps tendinosis during rotator cuff repair have long intrigued physicians and researchers. This is because their pathologies are closely related. The biceps tendon has multiple functions that are important in everyday function. One of these functions serves to support the anterosuperior portion of the rotator cuff in the bicipital groove anteriorly and its attachment to the glenoid labrum superiorly (Douglas P Beall, AJR). The rotator cuff can be broken down into 4 muscles: supraspinatus, infraspinatus, teres minor, and subscapularis. It has been well documented that tears of the subscapularis tendon in particular have been associated with biceps tendinopathy. Studies have demonstrated this correlation and have investigated the outcome of having these two pathologies occurring simultaneously. So far, studies have analyzed the effect concomitant biceps tendinosis has on the pace of recovery, frequency of reoperation, and other metrics such as pain and functional recovery of the rotator cuff. However, researchers have been unable to come to a definitive conclusion. There remains a lack of understanding as to whether simultaneous biceps tenodesis improves rotator cuff repair. Studies even demonstrate certain cases of biceps tendinopathy being diagnosed intraoperatively. Given the importance of both the biceps tendon and the rotator cuff in everyday movements and function, proper knowledge of the effects biceps tendinosis can have on rotator cuff repair would help improve current protocols for rotator cuff repair and the rehabilitation process for this patient population. This study aims to compare clinical outcomes of rotator cuff repair with and without biceps tendinosis by performing a systematic review of published literature. Online publications sources of google scholar and pubmed were utilized to extract data for analysis. The results of the literature review show no statistically significant improvement in outcomes when a tenodesis is performed over rotator cuff repair alone. When the tenodesis is performed, literature shows an increase in recovery time therefore we recommend against adding a tenodesis when repairing the rotator cuff.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Diabetic Muscle Infarction Disguised as Idiopathic Myositis

**Abstract Text**

Diabetic muscle infarction (DMI), also called diabetic myonecrosis, is a rare complication of a common disease. Occurring in both types of diabetes mellitus, DMI typically presents as acute pain and swelling in muscles of the lower extremity, especially the thigh and calf.

A 49-year-old female with type 1 diabetes mellitus presented to the emergency department for a 2-day history of atraumatic severe right lateral leg pain, never before experienced, after standing from a chair. She denied any skin redness, fevers, chills, or back pain. Physical exam disclosed a right lower extremity (RLE) with intact strength, soft compartments, no erythema, fluctuation, or induration, but exquisite tenderness over the lateral aspect of the leg. Additionally, the patient exhibited a severely obese body habitus and a left below-knee amputation. Initial laboratory results included WBC 13.7, Sodium 135, Potassium 4.4, Creatinine 4.56, CK 4,937, and Hemoglobin A1c 9.6. Given the pain out of proportion to exam findings, concern for cellulitis, necrotizing fasciitis, or other deep tissue infection prompted a CT RLE without contrast which revealed edema throughout the subcutaneous fat extending from the distal femur to the foot. Questionable pulselessness of the affected extremity also prompted a vascular consult, which identified no significant stenosis or deep vein thrombosis, and radiographs were unremarkable for osseous abnormalities. Given her persistent leukocytosis, an infectious disease consult was pursued to rule out infectious causes, with negative cultures of the blood and peritoneal fluid via dialysis catheter. The clinical course was complicated by acute hypoxic hypercarbic respiratory failure on the fourth hospital day, requiring intubation and mechanical ventilation, which resulted in elevation of CK to >20,000 along with worsening fever and WBC. Further laboratory and imaging studies with CT abdomen/pelvis and CTA chest could identify no infectious source, and rheumatology was consulted for myositis of unclear etiology. A CT RLE with contrast showed amorphous enhancement of the tibialis anterior, without abscess and with improvement of edema. The patient was started on high-dose steroids; however, a subsequent autoimmune panel including Anti-Jo1 was negative. An MRI without contrast of the right leg showed a mild heterogeneous increased T2 signal within the tibialis anterior at the mid tibial level, which in our patient with poorly controlled diabetes likely represented a DMI. Steroids were discontinued and CK and WBC trended downward, with improvement in clinical status and discontinuation of mechanical ventilation.

DMI must be considered in any diabetic patient with a history of poor glycemic control who presents with acute muscle tenderness and swelling. As in our patient, life-threatening causes such as venous thrombosis, necrotizing fasciitis, and pyomyositis must be ruled out. MRI is the diagnostic study of choice for DMI. Treatment is typically supportive with resolution in weeks to months.

Abstract 30

**Category Submitting for:** Clinical Vignette

**Abstract Title** Dementia evaluation: lets fix that memory loss!

**Abstract Text**

Dementia evaluation: let's fix that memory loss!

Donovon Allen, Fourth Year Medical Student, University of Nebraska Medical Center

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An 80-year-old male with a pertinent past medical history of pre-diabetes, hyperlipidemia, gastroesophageal reflux disease, and chronic obstructive pulmonary disease presented to clinic with a chief complaint of short-term memory impairment, decreased concentration, and repeating himself. He had no appreciated motor weakness, sensory, or visual loss. His significant medications include Pantoprazole 40 mg and Metformin 1000 mg daily. His COPD is controlled with Advair use 2x/day and Albuterol use once every 2 weeks. The physical exam demonstrated a well-nourished male, normal gait, normal strength, normal sensation, intact cranial nerves, and normal reflexes. As part of the evaluation, he completed a MOCA scoring 24/30. Because of his lower MOCA score, a secondary dementia workup was completed including thyroid, CBC, CMP, and B12 studies. The patient did not have risk factors for syphilis or HIV, but these were considered. Brain imaging with a CT head was also going to be pursued. The initial plan was to consider a trial of Donepezil, however, upon discovering vitamin B12 deficiency (172 pg/ml), Donepezil was held. Vitamin B12 supplementation was provided, and Metformin stopped in suspicion that it was contributing to the patient's deficiency. The patient was scheduled to follow-up in 2 months for re-evaluation with repeat MOCA.

Changes in cognitive status can be a diagnostic challenge due to a wide differential. As demonstrated in this case, it requires extensive workup influenced by the patient's history. One must consider substance use, sexually transmitted infections, anemia, thyroid disorders, vitamin B12 deficiency, medication side effects, stroke, and dementia. The secondary evaluation was remarkable for low B12 levels which is known for contributing to nonspecific memory loss and neurologic dysfunction. Reviewing the patient's med list, Metformin was thought to be a possible secondary cause of malabsorption of B12 and stopped. He has no history of autoimmune conditions providing evidence against pernicious anemia and no signs of malnutrition. It is well documented that patients on chronic Metformin therapy and proton pump inhibitors can have vitamin B12 deficiency. There are multiple proposed mechanisms of Metformin causing B12 deficiency including small intestinal bacterial overgrowth and impaired secretion of intrinsic factor. The most recent accepted theory is Metformin interferes with calcium-dependent membrane action impairing absorption of intrinsic factor. Given that B12 deficiency is an easily reversible cause of cognitive impairment, it is critical to identify and provide supplementation to improve patient quality of life and decrease the risk of future complications. It is also important to review medications that can cause vitamin B12 deficiency to guide shared decision-making regarding cessation should it be diagnosed.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Impending paradoxical embolism: a case report and review of the literature

**Abstract Text**

Introduction

Impending paradoxical embolism (IPDE) occurs when a thrombus sufficiently larger than a patent foramen ovale (PFO) becomes entrapped in the passage from the right to the left atrium. IPDE is a rare occurrence, and the optimal strategy for management remains controversial due to limited data with small sample sizes and lack of statistical analysis.

Case Description

A 74-year-old female with a PMH significant for GERD, hyperlipidemia, and pulmonary embolus (PE)/deep vein thrombosis (DVT) after a motor vehicle accident in 2006 presented to the ED with chest pain, shortness of breath on exertion, and dizziness. She recently returned from an 18-hour road trip. Her oxygen saturation was 86% on room air which improved with supplemental oxygen. She had an elevated D-dimer but was unable to undergo a CT angiogram due to contrast allergy. EKG revealed mild ST changes in V5 and V6, and a transthoracic echocardiogram (TTE) showed a clot present in the right atrium in transit. She was placed on a therapeutic heparin drip and transferred to a higher level of care hospital for evaluation with cardiothoracic surgery. Venous duplex ultrasound was performed and showed bilateral lower extremity clots. A CT angiogram was then performed with premedication for contrast allergy and revealed an extensive bilateral PE, right heart dilation, and probable early infarction of the right upper lobe. Additional TTE was performed and showed mild right ventricular dilation, slightly decreased right ventricular function, elevated right ventricular systolic pressure, and an echodensity in the right atrium, left atrium, and left ventricle. A TEE was then performed and showed a transversing PFO with right and left atrial thrombus and left ventricular thrombus. She underwent an urgent thrombectomy with PFO closure the next day without complication and was discharged home with Eliquis in stable condition on room air.

Discussion

An IPDE occurs when a thrombus sufficiently larger than the PFO becomes entrapped in the passage from the right atria to the left (2). Diagnosis can be confirmed using TTE or TEE, although TEE is the most sensitive and specific test for diagnosing right atrial masses (3). Management options include surgical thromboembolectomy, thrombolysis, and anticoagulation (1,2,3,4). According to the current literature, neither thromboembolectomy nor thrombolysis showed a significant improvement in patient survival when compared with anticoagulation alone. However, thromboembolectomy provided a nonsignificant trend toward improved patient survival and significantly reduced the odds of systemic embolism after treatment compared to anticoagulation alone (2). Management with thromboembolectomy also provides the added benefit of concomitant closure of the PFO (4).

## Conclusion

Given the reduced odds of systemic embolism after thromboembolectomy and the added benefit of concomitant PFO closure, management with thromboembolectomy could be considered the treatment of choice in patients who are stable enough to undergo surgery.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Into the Trenches of Culture-Negative Infective Endocarditis

**Abstract Text**

While infective endocarditis is a relatively common clinical condition, negative blood cultures can present significant challenges to diagnosis and management of suspected cases. Awareness of the etiologies of culture-negative endocarditis, including some rare pathogens, can guide further evaluation and treatment.

A 68-year-old man presented to the hospital following two days of fatigue, weakness, chills, and anorexia. On day one, ceftriaxone and azithromycin were started for suspected pneumonia and urinary tract infection. Physical exam later revealed systolic and high-pitched diastolic murmurs. A transthoracic echocardiogram on day four demonstrated echodense lesions on the tricuspid and aortic valves with regurgitation across both valves. Antibiotics were adjusted to vancomycin and ceftriaxone on day five for suspected infective endocarditis, based on the echocardiogram findings. Three sets of blood cultures were drawn sequentially on days four through six; each remained negative. Since the patient was intermittently homeless and had a remote history of injection drug use, additional infectious serologies were drawn on day six. These included assays for *Coxiella burnetii*, *Bartonella henselae* and *B. quintana*, *Brucella*, and *Legionella*. A transesophageal echocardiogram on day nine confirmed no bile vegetations on the tricuspid and aortic valves with corresponding valvular regurgitation. Surgical intervention was not pursued. The patient improved clinically with broad-spectrum antibiotics and was discharged on day twelve with a peripherally inserted central catheter in place to complete a total of six weeks of therapy. Ten days after discharge, the previous serologic studies returned and were positive for *Bartonella quintana* infection. The antibiotic regimen was subsequently adjusted to three months of oral doxycycline and two weeks of oral rifampin. The patient remained clinically improved at his most recent outpatient follow up.

Negative blood cultures are clinically challenging in suspected infective endocarditis. Negative cultures can be caused by preceding antimicrobial administration; however, they may reflect true culture-negative infective endocarditis due to unusual or fastidious pathogens. This case illustrates an example of *Bartonella quintana* infection, the pathogen historically responsible for world war 'trench fever'. A thorough assessment of epidemiologic risk factors and an awareness of uncommon pathogens for culture-negative endocarditis can guide diagnostic evaluation and lead to pathogen identification and targeted antimicrobial therapy.

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Abstract 33

**Category Submitting for:** Clinical Vignette

**Abstract Title** Recognizing New Onset Right Heart Failure in a Left Heart Failure Patient

**Abstract Text**

A 62 year-old man presented reporting a twenty pound weight gain over the previous month. His pertinent medical history included heart failure with reduced ejection fraction at 40-45%, mechanical mitral valve replacement, and atrial fibrillation. On auscultatory exam his chest was clear without crackles, his abdomen was significantly distended with pain on palpation of the right upper quadrant, and his legs were indurated with pitting edema up through the thighs bilaterally. His chest x-ray showed cardiomegaly without pleural effusions or pulmonary edema. His abdominal ultrasound showed hepatosplenomegaly and diffuse ascites. His creatinine was at his baseline of 1.6, his pro-BNP was elevated at 2543, and his troponin was negative. The patient responded well to aggressive diuresis with bumetanide and metolazone, losing seventeen pounds during admission. He was discharged on admission day three when he appeared euvolemic and at his baseline weight. The patient returned less than seventy-two hours later with a ten pound weight gain reporting oliguria. Creatinine on admission was 2.6, and he was thought to have a component of cardiorenal syndrome. He responded well again to aggressive diuretics, with his creatinine down-trending to 1.8. Because he failed outpatient therapy, an echocardiogram was obtained, which showed new onset right heart failure demonstrated by right ventricle dilation, dilated inferior vena cava, new onset severe tricuspid regurgitation, and an elevated right ventricle systolic pressure at 30-40 mmHg as well as decompensated left heart failure with ejection fraction of 30-35%. The patient was diagnosed with right heart failure and was transferred to a tertiary care center for definitive treatment.

**Discussion:**

Acute on chronic heart failure is a routine admission for general internists and one of the metrics by which hospitals are evaluated. Recognizing the difference between acute on chronic heart failure and a new diagnosis in a chronic patient is crucial. Patients with left heart failure can progress to right heart failure, but they often will have evidence of pulmonary edema. The patient presented above did not have evidence of pulmonary edema; however, he did have ascites and hepatosplenomegaly. This represented a difference from his prior heart failure exacerbations and should have prompted repeat echocardiogram to evaluate for new onset right heart failure or valvular pathology. In doing so, the second admission would have been prevented, expediting his diagnosis and necessary treatment and ultimately reducing his risk of further morbidity.

**Learning points:**

1. Recognize signs of acute on chronic heart failure
2. Differentiate between left and right heart failure
3. Discern utility of repeat echocardiogram in evaluation of acute on chronic heart failure

**Category Submitting for:** Clinical Vignette

**Abstract Title** Hungry Hungry Macros

**Abstract Text**

A 28-year-old man presented with one week of fever and cough. He had a history of HIV and was off antiretroviral therapy for two months. Vital signs were stable except for a fever of 38.7 C. Physical examination was unremarkable apart from oral lesions. Laboratory findings included WBC 0.9x10<sup>9</sup>/L, hemoglobin 11.3 g/dL, platelets 33,000/ $\mu$ L, absolute neutrophil count 0.6x10<sup>9</sup>/L, AST 83, ALT 29. Cefepime and vancomycin were initiated for neutropenic fever as well as valacyclovir for his oral lesions. Respiratory panel including Covid-19, influenza, and atypical bacteria was negative. An extensive infectious work-up was completed including blood and sputum cultures, microbial antigens, and viral DNA tests. Chest x-ray showed mildly hyperinflated lungs with no acute findings. Chest CT showed multifocal nodular ground-glass opacities. CD4 count was 13/mm<sup>3</sup> and HIV RNA was >10 million copies/mL. Antiretroviral therapy was initiated. Dapsone was given for PCP prophylaxis as the patient had a sulfa allergy. Doxycycline was also started for atypical bacteria coverage. He subsequently became afebrile but had no improvement in blood counts. AST and ALT also continued to rise. Ferritin was noted to be 29,668 ng/mL. He also developed dysphagia and was treated with fluconazole. Over the next days, he developed a headache, therefore head CT was completed which showed white matter attenuation in the left frontal lobe. MRI head then showed T2 high signal in the left frontal white matter. A lumbar puncture was planned, but delayed given thrombocytopenia. Further work-up showed fibrinogen 270 mg/dL, D-dimer 1,517 ng/mL, LDH 872 U/L, triglycerides 144 mg/dL. Abdominal ultrasound revealed hepatosplenomegaly. HScore was calculated at 226 indicating a 96-98% probability of hemophagocytic lymphohistiocytosis. Dexamethasone was considered if worsening pancytopenia or ferritin per HLH 94 protocol but not given due to patient stability, clinical improvement, and likely secondary cause. He was transfused with two units of platelets with an ensuing platelet count of 98,000/ $\mu$ L. He then underwent lumbar puncture with appropriate testing ordered. Bone marrow biopsy was performed and demonstrated hypocellular bone marrow (60%) with polyclonal plasma cells, hemophagocytosis, and megakaryocyte dyspoiesis. This increased his HScore to 261 indicating a >99% probability of hemophagocytic lymphohistiocytosis. With HIV and empiric infection treatments, his ferritin and pancytopenia improved. He was discharged with antiretroviral therapy and dapsone. Despite a thorough and extensive infectious work up, no pathogen was identified. This case describes hemophagocytic lymphohistiocytosis likely induced by HIV. Immunodeficiency is a potential trigger of this disease, leading to hyperactive macrophages which phagocytize platelets and blood cells. This in addition to HIV may have contributed to his neutropenic fever. His thrombocytopenia was crucial to address for work-up of headache in HIV. Hemophagocytic lymphohistiocytosis is a rare life-threatening disease and identifying and treating the trigger is critical to improving patient outcomes.

**Category Submitting for:** Clinical Vignette

**Abstract Title** New Onset Psychosis in a COVID-19 Positive Adolescent

**Abstract Text**

COVID-19, the disease caused by the novel SARS-CoV-2 virus, emerged as a global pandemic in 2020 and is still spreading across the globe today. The symptoms of COVID-19 disease can range from asymptomatic infections, to a mild upper respiratory infection (URI), to an acute hypoxic respiratory failure with hypercoagulability and neurologic dysfunction.

A 14-year-old adolescent female with past medical history of autism, benign rolandic epilepsy, failure to thrive, and speech delay presented to her outpatient clinic with URI symptoms. She was diagnosed with concurrent strep throat and COVID-19 and sent home to quarantine with a prescription for amoxicillin. Two weeks later, she began acting oddly at home. She told her family that she had lost control of her hands, was seeing “demons”, and was hearing voices commanding her to kill her sister and mother.

On admission to the inpatient psychiatric unit two days later, the patient endorsed both auditory and visual hallucinations without self-harm or suicidal thoughts. She was guarded, displayed poor self-care and was observed responding to internal stimuli. She appeared anxious, irritable, labile, and sad with a mood congruent affect that was increased in intensity. Other than completing the course of amoxicillin, she had not taken any other medications or drugs. CMP and CBC were remarkable only for a slightly elevated white count with neutrophilia. On hospital day three the patient was started on ziprasidone. MRI brain with and without contrast, EEG, and EKG were all unremarkable. When no improvement was seen in the first week, she was switched to olanzapine. After another week with only minimal improvement, additional work-up was undertaken. CRP and ESR were found to be elevated. ASO titer, paraneoplastic syndrome antibodies, serology for NMDAR antibodies, and pelvic ultrasound were all negative for acute findings. Three weeks after admission, the patient was able to answer questions with more than one-word responses, though she still demonstrated latency, poor eye contact and response to internal stimuli. Five weeks after admission, the dose of olanzapine was increased and her symptoms remarkably improved. She was discharged home two days later. As an outpatient, olanzapine was slowly tapered over three months and she continued show improvement in eye contact and affect. Four months after the onset of her infection, the patient was fully recovered and off olanzapine.

This case illustrates the potential for even mild COVID-19 disease to cause new-onset psychosis in adolescents, a temporarily debilitating complication of COVID-19 disease that has not been well described in the pediatric population. Awareness of this complication is essential for the timely recognition and treatment of COVID-19 induced psychosis and especially relevant given the recent increase in adolescent COVID-19 infections throughout the United States.

**Category Submitting for:** Clinical Vignette

**Abstract Title** SGLT2-Inhibitor Induced Euglycemic Diabetic Ketoacidosis

**Abstract Text**

Introduction:

Sodium-glucose cotransporter 2-Inhibitor (SGLT2-i) medications are relatively new and promising medications in the management of diabetes and heart failure. One rare and serious potential complication of their usage is euglycemic diabetic ketoacidosis (eDKA). This abstract outlines a case of SGLT2-i induced eDKA and highlights for the general internist the necessity to be able to recognize this serious complication.

Case Description:

A 66-year-old male presented to the emergency department with a three-day history of severe upper abdominal pain, associated with nausea and vomiting. The patient was afebrile and hemodynamically stable on arrival. Initial laboratory evaluation demonstrated a potassium of 4.2 mmol/L, bicarbonate of 15 mmol/L, anion gap of 19 mmol/L, and glucose of 206 mg/dL. VBG showed a pH of 7.28 and pCO<sub>2</sub> of 39, with a lactic acid of 1.3 mmol/L (0.5-2.0 mmol/L) and beta-hydroxybutyric acid of 4.3 mmol/L (<0.3 mmol/L). In addition to above laboratory abnormalities, the patient also had a leukocytosis of 19.3. Imaging, including a hepatobiliary iminodiacetic acid (HIDA) scan, was consistent with acalculous cholecystitis. DKA protocol was started with IV insulin and dextrose-containing fluids while monitoring for closure of the anion gap. Interventional radiology was consulted for percutaneous cholecystostomy tube placement. Further review of the patient's history found that the patient was a type II diabetic managed with metformin, empagliflozin, and insulin glargine. He also reported not taking his insulin for 3 days due to his abdominal pain. It was suspected that the eDKA was caused by a combination of SGLT2-i use and insulin nonadherence in the setting of acute illness. SGLT2-i was discontinued and screening for latent autoimmune diabetes in the adult was conducted and returned negative.

Discussion:

SGLT2-i medications increase glucose excretion in the urine by blocking reabsorption at the proximal tubule. This class of medication have been shown to lower hemoglobin A1c, decrease the incidence of cardiovascular events and mortality, and inhibit the progression of kidney disease in type II diabetics.<sup>2</sup> The most common side effect of these medications is genitourinary infections, but others include dehydration, increased bone fractures, limb amputations, and eDKA.<sup>3</sup> Studies have shown that the risk of eDKA in patients on SGLT2-I is low, around 0.07%. Risk is increased in individuals on insulin therapy or in those with subclinical autoimmune diabetes.<sup>4</sup> The proposed mechanism by which SGLT2-inhibitors induce eDKA is by increasing the ratio of glucagon to insulin, which increases lipolysis and ketone formation.<sup>1</sup> Due to the glucose-lowering mechanism of SGLT2-I, these patients present with eDKA with blood glucose levels typically <250 mg/dL, which can delay the diagnosis.<sup>5</sup> With SGLT 2-I usage increasing, it is important for internists to keep medication-induced adverse effects, including eDKA, on the differential when type II diabetic patients present with acidosis or an acute illness.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Don't miss the Histo

**Abstract Text**

Histoplasma is endemic across a wide range of the Midwest. While commonly thought to involve the Mississippi-Ohio River Valley, it is also seen in several mid-Atlantic states, Canada, and Mexico. Due to the wide variety of presenting symptoms associated with histoplasma infection, this is an important item to include on the differential for patients in endemic areas.

A 38-year-old female with past medical history of pericarditis, anxiety, and methamphetamine use presents with fevers, tachycardia, and chest pain. Preliminary testing demonstrates opioids and amphetamines on urine drug screen, negative respiratory viral pathogen panel, negative troponin, normal CHF-peptide, unremarkable EKG, normal POCUS echocardiogram, and chest x-ray with an unchanged R midlung nodular density. CT characterizing the density as probable prior granulomatous disease with calcified and non-calcified mediastinal lymphadenopathy without evidence of pulmonary nodules or PE. A glance through her history shows recurrent ED visits and hospitalizations for meth use, anxiety, trauma, and chest pain with a pericardial effusion in 2019 that required pericardiocentesis. She had recently undergone extensive rheumatologic work-up for recurrent pericarditis, which was negative. Her current chest pain was characterized as pleuritic, left-sided, occasionally radiating to the left neck, and flaring within the last week alongside shortness of breath (described as “sandbags in my lungs”), subjective fever, and chills. The chest pain waxed and waned for the past two years. The rest of her history was significant for family history of Huntington’s disease, inconsistent compliance to indomethacin/colchicine regimen and medications for anxiety/depression due to her social factors, including homelessness and recent relapse in meth use. She was febrile to 38.1 and physical exam elicited tachycardia and chest wall tenderness. Further labs show CRP trending upward to max of 11.3. Given these findings, she was admitted to the hospital for further evaluation with cardiology consult for recurrent pericarditis which recommended restarting her indomethacin and colchicine.

Following admission, her fever resolved, and her CRP trended down to normal. Four days following, she was discharged on colchicine and indomethacin with plan to follow-up outpatient for cardiac MRI. Several days later, pending infectious work-up from her admission returned positive for Histoplasma urine Ag. She was ultimately evaluated by infectious disease and started on itraconazole for suspected disseminated histoplasmosis.

This case illustrates the importance of including endemic fungal infections (such as histoplasmosis) in the differential for subacute or chronic inflammatory syndromes. Although only 5% of individuals exposed to *H. capsulatum* develop symptomatic disease, it is important to recognize its various presentations because it is treatable. The most common is symptomatic pulmonary histoplasmosis, either acute or chronic, with focal infiltrates and mediastinal/hilar lymphadenopathy. Others include broncholithiasis, mediastinal granulomas, rheumatologic manifestations, or pericarditis, as in this patient.

Abstract 38

**Category Submitting for:** Quality Improvement

**Abstract Title** Quality Improvement Project to Improve Chemotherapy-Induced Nausea and Vomiting among Patients undergoing High-Dose Chemotherapy

**Abstract Text**

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Background: Effective management of chemotherapy-induced nausea and vomiting (CINV) dramatically improves quality of life. Monitoring symptoms and grading severity of CINV are crucial to administering appropriate antiemetic therapy and other supportive treatments. MASCC Anti-Emesis Tool (MASCC-MAT) is a patient-reported questionnaire developed to assess CINV and encourage discussions of symptom management in patients with cancer. In Baxter Retching Faces Visual Analogue Scale (BARF-VAS), patients choose one of the six pictures to indicate their severity of nausea. This quality improvement (QI) project aimed to improve control of CINV symptoms among patients with hematologic malignancies receiving high-dose chemotherapy in the hospital. Our initial goals were to i) explore the extent of uncontrolled emesis and ii) determine whether a discrepancy existed between the severity of patient-experienced nausea as measured by validated measures, versus the severity perceived by providers.

**Methods: We assessed patients' severity of nausea initially with MASCC-MAT (n=50) followed by BARF-VAS because of its brevity (n=27). Each patient was surveyed 2-3 times throughout treatment to determine the duration and severity of nausea. Providers also reported their perception of patients' severity of nausea. We shared patients' survey results with providers and encouraged providers to adjust antiemetics based on the patient-provider differences.**

**Results/Anticipated Results: Our survey demonstrated that patients had moderate to severe nausea on 28% (38/136) of the instances. Compared to patients' responses, providers under-estimated the severity of nausea in 29% (40/136) and overestimated the severity of nausea in 18% (25/136) of cases. Patients were willing to complete the tools as a part of their medical care. Providers valued patients' responses to make clinical decisions and adjusted antiemetics based on the responses. Qualitative results suggested that BARF-VAS was short and easier to adopt including for non-English speaking and somnolent patients. Providers indicated that BARF-VAS may be easier to incorporate into other nursing assessments with multiple measurements at different times to monitor the symptoms.**

**Conclusion and Implications:** Our findings suggest that CINV is a significant problem among patients undergoing high dose chemotherapy. The use of validated tools such as MASCC-MAT and BARF-VAS is feasible in an inpatient setting and can help grade the severity of CINV more accurately. Initial discussions with the team indicated that BARF VAS could be incorporated into electronic medical records as a part of nursing assessment.

**Category Submitting for:** Clinical Vignette

**Abstract Title** Hemolytic anemia due to Rocky Mountain Spotted Fever in a 33-year-old male following an insect bite

**Abstract Text**

Drug-induced immune hemolytic anemia (DIIHA) is a rare phenomenon with an estimated incidence of 1-2 cases per million and is most commonly due to antibiotics, namely cephalosporins or penicillins. TMP-SMX (Bactrim) is an unusual cause. Patients present acutely with fatigue, pallor, weakness, jaundice, and splenomegaly within days to weeks of starting the causative drug. Rocky Mountain Spotted Fever (RMSF) can present similarly and is caused by *Rickettsia rickettsii*, transmitted by the American dog tick notably in Central US. Distinct from DIIHA, RMSF presents with a maculopapular rash on the extremities progressing to the torso. Early detection and treatment are required to prevent life-threatening illness. Here, we present a case of a 33-year-old male found to be infected with RMSF who developed hemolytic anemia while taking Bactrim.

A 33-year-old male without significant past medical history was admitted for acquired hemolytic anemia secondary to Bactrim, presenting with jaundice, fever, chills, rash, malaise, abdominal pain, and nausea and vomiting. He was seen three days prior with the same symptoms with an erythematous insect bite on the left deltoid and treated with Bactrim due to suspicion for cellulitis. At that time, he denied tick bites or recent travel. Upon admission, Bactrim was discontinued. Physical exam was unremarkable aside from scleral icterus, jaundice and improving lesion. Laboratory analysis was remarkable for leukocytosis (18.1 k/uL), anemia (10.6 on admission worsened to 4.6 gm/dL after 1 day) with decreased haptoglobin and reticulocytosis, hyponatremia (133 mmol/L), elevated LFTs (AST 115 u/L, ALT 149 u/L, ALP 167 u/L), elevated direct and indirect bilirubin (7.9 mg/dL and 5.6 mg/dL, respectively), as well as a positive coombs test. Autoimmune workup was negative. Extensive infectious work up was unremarkable aside from positive RMSF IgM (1.64). The patient received four units of pRBCs and was started on a glucocorticoid regimen with rituximab for severe anemia. To treat the RMSF infection, he received doxycycline and piperacillin-tazobactam while admitted. The patient was discharged after 4 days with prednisone, rituximab and atovaquone, then doxycycline was restarted after 2 days following persistent positive RMSF serology.

Hemolytic anemia is a rare adverse effect of RMSF and is associated with acute-onset fatigue, weakness, and jaundice. In severe cases of RMSF without prompt antibiotic initiation, mortality rates can reach 20-30%. Doxycycline is first line and should be started before confirmatory lab testing. Sulfonamides are contraindicated and are associated with increased morbidity and mortality, thus should be avoided when rickettsial disease is suspected even in the absence of an evident tick bite, which can occur in up to 33% of cases. High suspicion after worsening following an initial encounter prompted further workup and determination of etiology. Prompt initiation of supportive cares, glucocorticoids, and proper antibiotics resulted in improvement in this patient's symptoms.

Abstract 40

**Category Submitting for:** Clinical Vignette

**Abstract Title** Liver Abscess Presenting as Sepsis and Associated Endocarditis

**Abstract Text**

Introduction:

*Eikenella corrodens* and *Streptococcus anginosus* are unique bacteria found in oral flora that infrequently cause severe infection. When infection does occur, it is usually in the context of previous human or rarely animal bites since these organisms are commonly found in the oropharynx.

Case Presentation:

A 62-year old male presented with abdominal pain, nausea, anorexia and leukocytosis one month after having a COVID-19 infection. Patient denied any IV drug use and any dental problems. He presented with signs of sepsis and was started on empiric antibiotics. CT scan at the time of admission demonstrated a large liver abscess in the left lobe which was subsequently drained. *Eikenella corrodens* and *Streptococcus anginosus* were grown from the liver aspirate. Blood cultures were negative. Transthoracic echocardiogram demonstrated an echodensity attached to the atrial side of the anterior leaflet of the mitral valve, consistent with vegetation. Further evaluation with transesophageal echocardiogram (TEE) showed mild mitral valve regurgitation and a mobile echodensity noted at the base of the posterior mitral valve leaflet inferiorly. These TEE findings were again consistent with vegetation consistent with endocarditis. With changes in antibiotics and appropriate medical management, the patient's abscess and endocarditis was treated appropriately.

Discussion:

Although the patient described a distant history of three dog bites, it is difficult to determine the source of his infection. Furthermore, a concurrent endocarditis complicates this already uncommon liver infection. The causal bacteria of the endocarditis in this patient is unknown, but likely could have been related to *Eikenella corrodens* or *Streptococcus anginosus* found in the liver abscess. Additionally, the severity of this patient's case could be complicated due to the patient's recent COVID-19 infection. This unique case demonstrates the presence of an *Eikenella corrodens* and *Streptococcus anginosus* hepatic abscess presenting as sepsis with later findings of culture negative endocarditis post COVID-19 infection. COVID-19 is a novel viral infection and could this infection cause an individual to be susceptible to other pathogens has yet to be studied.

Abstract 41

**Category Submitting for:** Clinical Vignette

**Abstract Title** POTluck Induced Abdominal Pain

**Abstract Text**

POTluck Induced Abdominal Pain

Sydney Powers, Medical Student; Dr. Nathan Anderson, Assistant Professor, Internal Medicine  
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**Introduction:**

End-stage renal disease requiring hemodialysis complicates medication choice and administration for internists managing a variety of diagnoses for patients. These decisions become increasingly difficult when treating medical conditions infrequently encountered by hospitalists.

**Case Description:**

A 39 year-old Spanish-speaking woman presented with 10 days of severe continuous abdominal pain that radiated to the back. She also reported breast pain and a feeling of constipation despite recent bowel movement. She had a history of hypertension, anemia, and oliguric end-stage renal disease requiring hemodialysis. She had diffuse abdominal tenderness to palpation and bilateral costovertebral angle tenderness without peritoneal signs. There was a non-obstructive bowel gas pattern on abdominal x-ray, no evidence of free air under the diaphragm on chest x-ray, and no acute pathology seen on CT of the abdomen and pelvis. On further questioning, she revealed she frequently ate dirt and parts of clay pots from Mexico in response to long-standing pica symptoms and anxiety. A serum lead level of 79 was subsequently found on a heavy metal panel. Poison control recommended chelation therapy with ethylenediaminetetraacetic acid (EDTA). Nephrology was consulted regarding dialyzability of chelators. Five doses of IV EDTA were given via a tunneled central line, each followed by hemodialysis one hour after administration. The first repeat lead level was 33 and the second repeat lead level was 41, suggesting mobilization of lead stored in body tissues. Continued outpatient EDTA treatment after discharge was arranged with the eventual goal of a lead level less than five.

**Discussion:**

Patients with end-stage renal disease are frequently admitted to internal medicine for management of a wide range of conditions. Internists are tasked with taking into account renal clearance and hemodialysis requirements when choosing and administering appropriate medications. For toxicology cases, dialyzability of drugs or compounds formed via chelation must be considered. In our patient with lead toxicity, poison control recommended chelation therapy with EDTA. However, rarely used medications may not always be readily available. IV EDTA was initially unavailable, so oral succimer and IV dimercaprol were considered as alternatives. Succimer-lead compounds are not dialyzable, so oral succimer was not a viable treatment option. IV dimercaprol was also unavailable. EDTA was eventually provided by the local children's hospital. The cooperation between internal medicine, nephrology, and poison control as well as between local hospitals allowed for the successful treatment of lead toxicity in our patient with end-stage renal disease.

Abstract 42

**Category Submitting for:** Clinical Vignette

**Abstract Title** Spontaneous Diabetic Myonecrosis: A Differential Necessity

**Abstract Text**

Diabetic muscle infarction, or spontaneous diabetic myonecrosis, is an infrequently diagnosed condition in longstanding, often uncontrolled diabetes mellitus that involves ischemic necrosis of skeletal muscle, commonly of the thigh or calf. This pathology can pose a diagnostic challenge, is often mistaken for other conditions, and may result in superfluous diagnostic exams and interventional procedures.

A 54-year-old man presented to the VA Medical Center emergency department after two weeks of increased swelling and pain in his lower extremity. His history included hypertension, hyperlipidemia, chronic kidney disease stage 3, and poorly controlled type 2 diabetes mellitus with neuropathy and nephropathy. Initial exam showed erythematous changes with intense tenderness to light palpation over the medial right thigh. Distal pulses were intact and the lower leg showed edema and was warm, pink, and appeared well perfused. Imaging studies showed diffuse swelling of the vastus medialis muscle suspicious of musculoskeletal injury versus nonspecific myositis. He was discharged with analgesics and instructed to rest; however, after persistent pain he returned to the ED four days later. Repeat CT showed grossly similar soft tissue changes, but his laboratory workup was remarkable for a creatinine of 8.7 (1.7 prior), bicarb of 12, and CRP of 22. Hospital course was complicated by transfer to ICU for acute respiratory decompensation and altered mental status. Hemodialysis was begun for acute renal failure. Due to the unilateral presentation of the myositis, he was empirically started on heparin for concern of deep venous thrombosis, but vascular studies were negative. Other considerations included rhabdomyolysis (CK returned at 400), statin-induced myopathy (had been taking Atorvastatin 80mg for years), pyomyositis, intramuscular hematoma, calciphylaxis, compartment syndrome, and extraneural cysticercosis. Several services were consulted without definitive diagnosis and general surgery obtained a muscle biopsy. Despite consultation of more than five physicians in over four specialties, it was by happenstance that diabetic myonecrosis was suggested by a consulting radiologist when reviewing a repeat CT of the leg. Had this under-recognized condition been more promptly identified, it could have spared the patient an unnecessary biopsy (from which the results were never released).

This case illustrates the importance of identifying this diabetic complication which is treated by conservative management and does not necessitate biopsy or debridement. Along with well documented micro-and macrovascular consequences of poorly controlled diabetes mellitus, recognizing spontaneous diabetic myonecrosis is critical to initiation of appropriate therapy and prevention of undue intervention, inflated medical bills, and potential emotional duress and physical harm to our patients.

Abstract 43

**Category Submitting for:** Patient Safety

**Abstract Title** The Devastation of a Missed Diagnosis

**Abstract Text**

A 22-year-old woman at 34 weeks gestation presented to the UNMC ED with nausea, vomiting, and increasing oral pain.

Three months prior, this patient noted left sided neck swelling and was seen in her hometown in Wyoming. History was negative for smoking and HPV. She was prescribed oral antibiotics, analgesics, and steroids following ultrasound evaluation. Despite treatment, neck swelling progressed. Several months later, she was visiting family in Nebraska when an ulcerative tongue lesion appeared. She was seen by a second physician and was informed she had likely bitten her tongue. She was instructed to utilize over-the-counter pain relievers and a saline rinse. During the next few weeks the lesion enlarged, and finally, at family insistence, she presented at UNMC.

At this time, she reported severe dysphagia and nearly unintelligible speech. While in the ED, patient underwent multiple tongue biopsies and CT neck with contrast. CT report suggested an infectious or inflammatory process. Biopsy results were pending. The patient was discharged with antibiotics, steroids, and plans to follow-up with ENT.

Two days later, patient returned with nausea, vomiting and increased pain. She tested negative for COVID-19 and was admitted. Three days post-admission, pathology report revealed poorly differentiated squamous cell carcinoma with metastasis to the neck and necrotic lymphadenopathy. On day five, patient was found to be COVID-19 positive.

After discussion with ENT/oncology, labor was induced on day 7 and patient delivered a viable male fetus at 35w0d gestation. On day 12, a G-tube was placed by IR and by day 20, the patient underwent a left subtotal glossectomy, left floor of mouth resection, bilateral neck dissection and tracheostomy with reconstruction. Adjuvant chemoradiation was recommended and patient was referred to Mayo Scottsdale.

This patient visited multiple emergency departments in two states and was assessed by numerous healthcare professionals. Still, it took over three months, a tumor of over 7cm, and metastasis of the neck for a diagnosis to be established. This patient was prescribed unnecessary antibiotics, informed that her ulcerative lesion was the result of biting her tongue, and upon review of initial CT report, the very serious findings of a complex cervical cystic lesion and tongue lesion were downplayed, with the risk of neoplasm briefly posited but quickly and nearly entirely discounted.

A cascade of errors and oversights lead to a significant delay in treatment for this patient. This case illustrates the necessity of maintaining a broad differential, the importance of consulting colleagues when uncertain diagnoses present, and the gravity of achieving early intervention to

reduce the negative outcomes in all cases, especially those with life-altering diagnoses such as for this patient.

## Abstract 44

Category Submitting for: Clinical Vignette

### Abstract Title: Identification and Management of Atypical Retropharyngeal Abscess Unknown Etiology

#### Abstract Text

**Introduction:** Retropharyngeal abscess is an infection of the lymph node tissue within the retropharyngeal space. (1) Typically, these lymph nodes disappear by age 5 and therefore retropharyngeal abscesses are uncommon in adults. (2) They occur mostly in immunocompromised patients or as a complication of foreign body impaction or trauma to the posterior pharynx or after instrumental procedures (laryngoscopy, endotracheal intubation, feeding tube placement, etc.) (3, 4).

**Case description:** A 52-year-old man with no past medical history presented to the ED with fever, chills, shortness of breath, sore throat, and chest pain for ten days. COVID test was negative. He received a five-day dose of prednisone but symptoms continued to worsen, leading him to visit the ED. He was found to have a leukocytosis of 38.7 and CT imaging revealing pneumomediastinum, pneumopericardium, and bilateral pleural effusions, which raised the suspicion for esophago-pleural fistula. Gastrografin study, CT chest with contrast and EGD showed no evidence of an esophageal leak. However, CT soft tissue neck without contrast showed 1.3 x 1.2 x 10 cm retropharyngeal fluid collection. Other work up which included HIV, influenza A/B, hepatitis, and rapid strep were negative.

The patient's condition continued to deteriorate; he developed septic shock leading to multi organ failure and was intubated on mechanical ventilation. Bilateral chest tubes were inserted that yielded frank pus, cultures grew **Streptococcus anginosus** and antibiotics were switched to Unasyn. The patient condition was not improving, incision and drainage of retropharyngeal abscess was performed as well as right posterolateral thoracotomy. Cultures were sent and revealed normal flora growth from the retropharyngeal abscess culture and **peptostreptococcus** spp from the pleural fluid.

After the surgical drainage, he improved and was extubated; however, he was re-intubated 5 days later due to rising respiratory demand. CT chest revealed no change in left-sided collections. Therefore, intrapleural thrombolytic was infused but patient couldn't tolerate this as his hemoglobin was declining. CT A/P was obtained to evaluate for signs of bleed. Incidental finding of calcified cholelithiasis measuring 4.3 cm filling the whole diameter of gallbladder was found. This patient continues to be intubated and will most likely need tracheostomy and may need repeated surgical intervention for the empyema.

**Discussion:** Retropharyngeal abscess is a rare condition in adults that is usually associated with immunocompromised state or foreign body trauma (5, 6). This patient presented with atypical signs of retropharyngeal abscess including pneumomediastinum, pneumopericardium and empyema complicated with septic shock and multiorgan failure. His particular etiology of the retropharyngeal abscess is still unknown as there were no inciting factors such as foreign body aspiration or instrumental procedures. Therefore, it is very important to diagnose and treat retropharyngeal abscess early in the course before it can lead to fatal complications.

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**Category Submitting for:** Clinical Vignette

**Abstract Title** Treatment of a Heavily Calcified Right Coronary Artery with Intravascular Lithotripsy

**Abstract Text**

Coronary artery calcification (CAC) hinders percutaneous coronary intervention (PCI) and can prevent proper stent placement. Coronary Intravascular Lithotripsy (IVL) is a novel technique that uses sonic pressure waves to circumferentially disrupt CAC, increase luminal area, and allow for effective stent placement in heavily calcified coronary arteries, not initially amenable to stent placement.

**Case Description**

A 73-year-old man presented to the emergency department with chest pain of one day duration. He was found to have a high-sensitivity troponin of 2800 and an EKG that showed no ischemic changes compared to prior EKGs. The patient was treated for a non ST elevated myocardial infarction, however, his high-sensitivity troponin continued to rise, and repeat EKG demonstrated ST-segment elevation in the inferior leads. The patient underwent catheterization, and was found to have 3-vessel disease with 100% occlusion of the mid/distal right coronary artery (RCA) within the prior stented region, 60% occlusion of the proximal/mid left anterior descending artery, and 70% occlusion of the distal left circumflex artery. Aggressive balloon angioplasty was attempted at the RCA with temporary establishment of TIMI grade 3. However, full balloon expansion was unable to be achieved, leaving several areas of residual stenosis within the stented region. At this time, the patient became progressively uncooperative and had difficulty with sedation, so further PCI was aborted. Coronary artery bypass grafting was discussed with the patient given his 3-vessel disease and multiple risk factors, but he expressed a desire to avoid open heart surgery. Shockwave lithotripsy was recommended to resolve the residual stenosis of his RCA. At hospital day 4, IVL was performed. Following IVL, the stenosis fully resolved with TIMI-3 flow. Three drug-eluting stents were successfully placed along the RCA. The pre-lithotripsy minimal luminal area (MLA) of the mid-RCA was 2.49mm<sup>2</sup> and the MLA of the distal-RCA was 3.10mm<sup>2</sup>. After lithotripsy and subsequent stenting, the MLA of the mid-RCA was 8.01mm<sup>2</sup> and the MLA of the distal-RCA was 7.94mm<sup>2</sup>. The patient was clinically stable, and subsequently discharged the following day on aspirin, ticagrelor, atorvastatin, lisinopril, and carvedilol.

**Discussion**

This case demonstrates that IVL is an effective technique to disrupt CAC and allow stent placement in heavily calcified coronary arteries. Although the patient presented with multivessel disease, the patient's postoperative clinical status combined with his hemodynamic improvements supports use of lithotripsy in severe CAC not initially amenable to stent placement. When CAC is identified and is preventing proper stent placement, IVL should be considered as it can lead to significant hemodynamic improvements without the need for surgery.

Abstract 46

**Category Submitting for:** Research

**Abstract Title** PupilScreen: A Machine Learning-Based Smartphone Application for Assessment of the Pupillary Light Reflex in Healthy Subjects

**Abstract Text**

Introduction

The pupillary light reflex (PLR) is one of the most well-known biomarkers for assessing neurological disease in the pre-hospital and in-hospital settings, and reports of promising applications in cardiovascular and infectious disease are present in the currently nascent literature in this field. Despite this, the current methods of measuring the PLR are inadequate and limiting. Of these methods, the most widely available is the use of traditional manual penlight pupillometry – a method that is qualitative and inaccurate when its use is compared between providers. A quantitative method for measuring the PLR also exists in the form of digital infrared pupillometry, however such devices are seen predominantly in neurological intensive care units due to their fragility and expense.

Methods

In response to the need for a more accessible and affordable pupillometer, our research team has developed PupilScreen, a smartphone application that assesses the PLR utilizing only a standard iPhone and a cloud-based neural network. In this study, the accuracy of the PupilScreen application compared to the clinical gold standard digital infrared pupillometer was assessed via recordings of the PLR in healthy subjects. Accuracy was assessed using both subjective PLR curve morphology comparisons and objective comparisons of the relevant PLR parameter output between PupilScreen and the digital pupillometer.

Results

Healthy subjects included in this study were clinical staff in the neurological intensive care unit at a level 1 trauma center. Preliminary results indicate that between PupilScreen and the digital infrared pupillometer, PLR curve morphologies are comparable and there is significant similarity between the means of key PLR parameters such as percent change in size and latency of the pupil response.

Conclusion

PupilScreen is an accessible, affordable, and accurate alternative to manual penlight and digital infrared pupillometry with the potential to transform both pre-hospital and hospital care of patients with neurological and other medical disease. Future applications and experimental test-cases include neurotrauma, neurovascular, neurocognitive, cardiovascular, non-hospital, and military settings.

Abstract 47

**Category Submitting for:** Clinical Vignette

**Abstract Title** Guillain Barré Syndrome Following Parvovirus B19 Infection

**Abstract Text**

Introduction: Guillain Barré syndrome (GBS) is a relatively uncommon illness with an overall incidence of 1 to 2 cases per 100,000 per year<sup>1</sup>. It typically occurs as a paralyzing disease provoked by a preceding infection, the most common being *Campylobacter jejuni*, HIV, Cytomegalovirus and Epstein-Barr virus. Less commonly, Guillain Barré syndrome has been diagnosed secondary to reactions to vaccines or surgery. Our case report describes a unique case of Guillain Barré syndrome following an upper respiratory tract infection, assumed to be Parvovirus B19, which has only been reported a handful of times<sup>2</sup>.

Case Report: We present a case of a 38 year old Caucasian female with past medical history of hypertension, systemic lupus erythematosus, fibromyalgia, hypothyroidism, bipolar disorder, and drug use. She presented with bilateral numbness, tingling, and weakness in all 4 extremities, in a stocking glove distribution. The patient was recently discharged after treatment for bilateral pneumonia. She began to have bilateral foot numbness, for which she saw her PCP, who treated her with high dose steroids as a potential Lupus flare. Despite the steroids, her numbness ascended up her legs and started to present in her bilateral hands. Gradually her weakness became so severe that she was unable to walk.

Urine drug screen was positive for amphetamines, marijuana and opiates. Full body imaging was unremarkable. CSF analysis showed high protein of 82, glucose of 10, and 10 nucleated cells. Her encephalitis/meningitis PCR was negative. She was ultimately diagnosed with GBS and treated with IVIG 0.4 g/kg/day for five days, with some improvement in her motor function.

Despite proper treatment, the patient developed rapidly ascending paralysis. Respiratory status never declined, but she did begin to show signs of autonomic dysfunction with hyponatremia, small bowel obstruction, blood pressure lability, and tachycardia. She also developed pancytopenia, prompting the testing for Parvovirus B19, which ultimately came back positive. Although not definitive, the etiology for this patient's GBS was likely secondary to Parvovirus B19.

Discussion: Parvovirus B19 may be a more common cause of Guillain Barre Syndrome than currently reported, especially in patients with pancytopenia and more severe GBS. Symptomatic Parvovirus B19 patients typically present with fever, erythema infectiosum, and occasional aplastic crisis<sup>2</sup>. One February 2019 case review by Andrade da Silva et al, suggested that Parvovirus B19 may be an underdiagnosed cause of GBS, especially in severe cases<sup>3</sup>. New studies must be done to define possible prophylactic methods to avoid this clinical outcome from Parvovirus B19 in the future.

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