



**NEW JERSEY CHAPTER  
AMERICAN COLLEGE OF  
PHYSICIANS  
SCIENTIFIC MEETING**

**RESIDENT/FELLOWS  
AND STUDENT  
ABSTRACT COMPETITION**

**MARCH 2022**

## **PARTICIPATING INSTITUTIONS**

Thank you to all the programs who submitted abstracts for this year's abstract competition.

Abstracts were received from the following programs:

AtlantiCare Regional Medical Center (Aileen Hocbo, MD)  
Capital Health Regional Medical Center (Saba Hasan, MD, MACP)  
Cooper University Hospital (Rachel S. Nash, MD)  
HM Mountainside (Bijal, Mehta, MD)  
HM Palisades Internal Medicine Residency (Sameh Elias, MD)  
HM Raritan Bay Medical Center-Perth Amboy (Mayer Ezer, MD)  
Hoboken University Medical Center (John Dedousis, MD)  
Inspira Medical Center (Woodbury) (David Gerber, MD)  
Jersey Shore University Medical Center Program (Christian Kaunzinger, MD)  
Monmouth Medical Center (Margaret Eng, MD, FACP)  
Newark Beth Israel Jersey City Medical Center (Joseph DePasquale, MD)  
NY Medical College St Michael's Medical Center (Theodore DaCosta, MD)  
Overlook Hospital (Karlene Williams, MD)  
Prime Health Care Consortium (Dr. Stanley Walker)  
Rutgers New Jersey Medical School Program (Mirela Feurdean, MD)  
Rutgers Robert Wood Johnson Medical School Program (Ranita Sharma, MD, MACP)  
Seaton Hall/Saint Francis Medical Center (Sara Wallach, MD, MACP)  
St Joseph's Regional Medical Center (Patrick Michael, MD)  
Saint Peter's University Hospital (Nayan Kothari, MD, MACP)  
Trinitas Medical Center (William Farrer, MD, FACP)  
Cooper Medical School of Rowan University  
Rowan University School of Osteopathic Medicine  
Rutgers New Jersey Medical School – Newark  
UMDNJ-RWJ Medical School-New Brunswick

## **ABSTRACT COMMITTEE MEMBERS AND JUDGES**

Tamie Proscia-Lieto, MD, MBA, FACP – Chair

Adam Kaplan, MD – Co-Chair

Angela Adelizzi, MD

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Catherine Chen, MD

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Saba Hasan, MD

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Natasha Rastogi, MD

Ranita Sharma, MD

Sara Wallach, MD

Dominic Zampino, MD

### **DISCLAIMER**

It is assumed that all participants adhered to the rules as stated in the original abstract submission form. It is also assumed that the abstracts submitted were original works, represented by the true authors. Judging was performed in a manner to minimize bias. Judges were unaware of the authors unless they were directly involved with the associate. Although there were many excellent abstracts submitted, those selected to be presented as posters or oral presentations were chosen based on content and quality. This content was felt to be intriguing from a clinical education standpoint, thought provoking, or could stimulate debate regarding our current practice of medicine.

### **Thank You to Our Oral Abstract Presentation Judges**

Saba Hasan, MD, FACP

Kathleen Pergament, MD

Tamie Proscia-Lieto, MD, MBA, FACP

Jon Shammash, MD, FACP

# **ORAL PRESENTATIONS**

## **Automatizing Blood Pressure Holding Parameters to Reduce Antihypertensive-Related Hypotensive Events in the Hospital Setting**

### *Quality Improvement*

William Vasquez-Espinosa, MD

Sotirios Doukas, MD; Suyansh Sharma, MD; Andres Calderon, MD; Janani Mohan, MD

*St Peter's University Hospital - Nayan Kothari, MD, MACP*

**Introduction:** Since the 100000 lives campaign initiative was launched in 2005, the use of rapid response teams (RRT) across the US healthcare system has become a common practice. It has helped to reduce the number of adverse events in hospitals by identifying rapidly declining patients clinically. A previous study at our institution showed that in a two-month period, about 12 % (12 out of 97) of RRTs were called due to hypotension in which antihypertensive use was involved, and in 41% of them ( 5 out of 12) there were no holding parameters for blood pressure medications. Therefore, we hypothesized that the proper use of holding parameters for all the blood pressure medications would decrease the number of RRTs associated with hypotension.

**Methodology:** Following the Plan-Do-Study-Act (PDSA) model, we decided to promote the proper use of holding parameters in blood pressure medications by using the smart phrase "HOLD FOR BLOOD PRESSURE LESS THAN@@ OR HEART RATE LESS THAN@@". This was added to all the antihypertensive prescriptions. We reviewed the RRT calls two months after the introduction of the automated phrase in the EMR. We identified RRT calls related to hypotension and identified cases where medications were involved. Furthermore, we evaluated the timing of medications given and if blood pressure parameters were present or not.

**Results:** A total of 94 RRT charts were reviewed after incorporating the smart phrase in the system. We found that 4% (4 out of 94) were related to hypotension in which an antihypertensive was directly involved. The data shows a 65% statistically significant reduction (chi-square test, one-way  $p=0.0215$ ) in the number of RRTs called for hypotension. Further analysis showed that in 75% of these cases there was no holding parameters. This clearly shows us that the amount of RRT calls related to medication-related hypotension was lower when the automated blood pressure parameters were present. We learned that the limitation to our intervention was that in some cases the providers did not have time to fill up the parameters and even deleted the phrase. As such for the next step and cycle of our PDSA, we are planning to implement EMR automatically generated holding parameters while ordering an antihypertensive. Blood pressure 90mmHg, mean arterial pressure 65mmHg and HR 60 beats per minute. We expect a further reduction in the amount of RRT calls related with hypotension and almost zero cases of hypotension where antihypertensives are involved.

**Conclusion:** Our study supports that smart phrases promoting the insertion of holding parameters for blood pressure medications could decrease the number of hypotension-related RRTs. Further studies will also reveal if similar interventions can positively affect morbidity, mortality, and costs.

# **Risk Factors for Rheumatologic-Related Adverse Effects Associated with Immune Checkpoint Inhibitor Therapy: A Case-Cohort Study**

*Research*

Jacob Zaslavsky, MD

Carol Nasr; Scott T McClure; Nitya Hajela; Xiao-wei Tan; Suma Mallepeddi; Vivien Hsu

*Rutgers-RWJ - Ranita Sharma, MD, MACP*

**Introduction:** Immune checkpoint inhibitors (ICIs) are widely utilized in many cancers worldwide and linked with immune-related rheumatic disorders (1). Risk factors may include the total number of ICI cycles received (2). We performed a case-cohort study in order to identify risk factors associated with incident rheumatic complications after ICI therapy.

**Methods:** Upon IRB approval, we reviewed the charts of 591 patients treated at the Rutgers Cancer Institute of New Jersey and/or the Robert Wood Johnson Rheumatology outpatient programs between 2015 and 2020, who received ICI (including Nivolumab, Ipilimumab, Atezolizumab, Durvalumab, Avelumab, and/or Pembrolizumab) therapy for their malignancy. Cases were defined as patients who developed a newly diagnosed rheumatic or musculoskeletal adverse effect attributed to ICI therapy. Controls were defined as those who did not develop a rheumatic diagnosis during their treatment with ICI. There were 32 patients excluded from the main cohort for rheumatic diagnosis prior to ICI-initiation, or other auto-immune diagnoses. Follow-up was defined as the time between initiation of ICI and the earliest of diagnosis with rheumatic disease, death, loss to follow up, or the end of the study (April 1, 2021). We performed a case-cohort analysis with a sub-cohort of 80 patients using a Cox proportional hazards regression model crude and adjusted for age, sex, BMI, and initial stage of malignancy.

**Results:** We identified 25 cases who developed rheumatic disease after receiving ICI therapy. The rheumatic diagnoses included inflammatory arthritis (17), myositis (2), lupus (1), sicca syndrome (1), polymyalgia rheumatica (1), systemic sclerosis (1), and undifferentiated diffuse myalgias (2). On average, they were diagnosed with rheumatic disease within one year of ICI initiation. Compared to controls, cases had higher BMIs and were less likely to present with Stage 4 malignancy ( $p = 0.044$  and  $0.032$ , respectively). However, we did not find a significant association between the risk of developing rheumatic disease and number of ICI cycles received (all Cox models,  $p > 0.05$ ).

**Conclusion:** The development of rheumatic disease after ICI therapy was not associated with the number of ICI cycles received. Those who developed a rheumatic diagnosis following ICI therapy did so within a year and the risk factor may be due to increased survival time to develop the rheumatic disease. Larger studies are needed to validate our findings.

## **Efficacy of Sews Protocol Implementation – An Institutional Quality Improvement Project**

### *Quality Improvement*

Marlene Marte Furment, MD

A. Santharaman; S. Dewan; U. Bhagat; J. Blanco; S. Jha; A. Santos; G. Thota; S. Vohra; M. Puri; N. Ballam;  
J. Mohan

*St Peter's University Hospital - Nayan Kothari, MD, MACP*

**Introduction:** It is estimated that the cost associated with alcohol-use disorder in the United States was around \$27 billion in 2010. That same year, over 1 million patients were hospitalized with alcohol-related diagnoses. To date, the Clinical Institute Withdrawal Assessment for Alcohol–Revised (CIWA-Ar) protocol is the most common method of treating Alcohol Withdrawal Syndrome (AWS). Beresford et. al. demonstrated in 2017 that the Severity of Ethanol Withdrawal Scale (SEWS) Score helps in having a better assessment on the clinical picture and helps administer earlier treatment when compared to CIWA-Ar. After changing from CIWA-Ar to SEWS protocol in our institution, we hypothesized decline in ICU admission for alcohol withdrawal complications and possibly decreased length of stay. The objective of this quality improvement project is to determine the efficacy of SEWS protocol in managing alcohol withdrawal syndrome when compared to CIWA-Ar.

**Methodology:** We designed a SEWS protocol order set for management of non-ICU severity level of AWS. It was integrated into our electronic health record system and has been used since May 2021. Following approval of our Institutional Review Board (IRB), we obtained a list of patients who were admitted to our hospital with alcohol withdrawal from May 2020 till August 2021. We filtered a total of 53 patients who were placed on CIWA-Ar protocol and 55 patients who were placed on SEWS protocol. Patients who were admitted directly to ICU were excluded. Protocol failure was defined as need for transfer to ICU or need for an additional team's evaluation for an adverse event in the floor related to AWS. A retrospective analysis was performed.

**Results:** Average length of stay (LOS) for patients on CIWA-Ar protocol was 4.04 days while the average length of stay for patients on SEWS protocol was 4.3 days. Protocol failure was observed in 5 out of 53 (9.4%) patients on CIWA-Ar protocol and 3 out of 55 (5.4%) patients in SEWS protocol.

**Conclusion:** Though the average LOS is similar in patients on CIWA-Ar and SEWS, our quality improvement project illustrates the lesser number of protocol failures in SEWS when compared with CIWA-Ar. More effective AWS resolution for patients on SEWS protocol was likely from administration of nearly twice the medication dose in the first 24 hours and over the total AWS episode. Symptom-triggered AWS therapy must be vigorously applied early in the course of AWS to lower the likelihood of serious complications that may include seizures or DTs. We have planned for integration of Richmond Agitation and Sedation Scale (RASS) into the current SEWS protocol as a safety measure for administering benzodiazepines.

## **Quality is Not an Act, It is A Habit: A Quality Improvement Study to Change Our Habit in the Management of Alcohol Use Disorder**

*Quality Improvement*

Sotirios Doukas, MD

Shikha Jha; Abi Watts; Andrea Santos; Aadhithyaraman Santharaman; Marlene Marte; Nayan Kothari;  
Mohan Janani

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**Introduction:** Management of alcohol use disorder (AUD) is a challenge for physicians. Despite evidence that prescription of Naltrexone reduces readmissions, there is a lack of awareness among clinicians. A previous study in our institution showed only a 26% prescription rate of Naltrexone in patients admitted for AUD.

**Method:** A Plan-Do-Study-Act (PDSA) worksheet was created, and lack of education was identified as a primary contributing factor for the low prescription rates. As a result, an education program was conducted from 2/2021 to 5/2021. During this period, we conducted grand rounds and educational sessions in multiple meetings, with more than 200 healthcare professionals attending at least one of the educational sessions. The Naltrexone subscription rates were reassessed after the educational intervention (period 6/2021- 8/2021). Patients with contraindications for naltrexone use, such as elevated liver enzymes, chronic liver disease, recent or current opioid use, and discharge to inpatient psychiatric facilities, were excluded from the study.

**Results:** Our study showed that the educational intervention resulted in a statistically significant increase ( $p=0.0352$ ) in the Naltrexone prescription rate from 26% (6 in 26) to 55% (5 in 9). Also, a remarkable difference in 30-day hospital readmission between the prescription and non-prescription groups was noticed (0% Vs. 31%).

**Conclusion:** This first PDSA cycle showed that proper education of healthcare professionals effectively increased the prescriptions rates of Naltrexone. We plan to continue reinforcing the appropriate use of Naltrexone for AUD by creating a simplified clinical protocol for clinicians and further evaluating the clinical significance on other parameters such as readmission rates and cost of care.

# POSTERS

## Determinants of Survival for Primary Intestinal Non-Hodgkin's Lymphoma

*Research*

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Prakash Amulya; Du Doantrang

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**Introduction:** Gastrointestinal tract is the most common site of extra nodal non-Hodgkin's lymphoma (EN-NHL). Most of the data published so far has been on the gastric NHL and very limited data is available on primary intestinal – Non-Hodgkin's Lymphoma (PI-NHL). Here, we are presenting the epidemiological and survival data for PI-NHL from the SEER 21 database.

**Methods:** Data for all the EN-NHL and Intestinal NHL are collected for the period 2000-2015 from the SEER 21 database based on the WHO ICD-O3 classification. PI-NHL data has been extracted from EN-NHL and intestinal datasets and then cross-matched for accuracy of the desired patient subset selection. A total of 9,290 PI-NHL cases common to both the lists were selected and used for analysis. Patients with incomplete staging and survival data were excluded from the survival analysis. Survival analysis variables include gender (male or female), ethnicity (white or non-white), early age of onset ( $\leq 50$  years), late age of onset ( $>50$  years), location (small or large intestine), the staging of the tumor as early-stage (stage 1 and stage 2) or late-stage tumors (stage 3 and stage 4), and history of prior malignancy (First primary tumor or second/later primary tumor). Survival analysis is done using a cox proportional hazard regression model.

**Results:** The percentage of PI-NHL of all the intestinal cancers and extra nodal non-Hodgkin's lymphoma is 1.42% (1.40 – 1.45, 95% CI) and 10.52% (10.32 – 10.72, 95% CI) respectively. Small intestinal PINHL was significantly more common in the Female (31.92% vs 36.00%, p-value 0.00) and white population (74.48% vs 69.0%, p-value 0.00) with greater share of early onset cancer (67.57% vs 62.20%, p-value - 0.03) compare to Large intestinal PINHL. In the survival analysis, the risk of overall mortality is higher in the late-onset cancers (HR – 1.16, 1.08 -1.24, P-value $<0.001$ ), non-white population (HR- 1.13, 1.05 – 1.22, P-value 0.002) and second or later primary tumors (HR – 1.10, 1.01 – 1.20, P-Value – 0.036). Gender, site, and stage are not significantly related to mortality but the trend towards higher mortality is seen in the late-stage tumor (HR – 1.04, 0.97 – 1.12, P-Value – 0.29).

**Conclusion:** PI-NHL is a rare type of intestinal malignancy. Our study showed that the risk of overall mortality is higher in late-onset cancer, non-white population, and in second or later primary tumors. Gender, site, and stage are not significantly related to mortality. The analysis was done for overall survival and this may have affected the outcome of the survival variables. Therefore, a survival analysis of cause-specific mortality data will give a more elaborate picture of the relationship between the mortality data and these variables.

# Variation in Clinical Characteristics, Outcomes, and Mortality of Hospitalized Patients with COVID-19 During the Second Wave of the Pandemic: A Single-Center Experience

*Research*

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**Introduction:** During the first wave of the COVID-19 pandemic, a high mortality rate (15%–40%) was reported among hospitalized patients with COVID-19. However, data regarding variation in COVID-19-related mortality and severity of illness among hospitalized patients with COVID-19 are heterogeneous.

**Method:** In this retrospective single-center study, we aimed to investigate the demographic characteristics, clinical presentations, disease severity, clinical outcomes, and in-hospital mortality of hospitalized patients with COVID-19 during the second wave of the pandemic. Adults with reverse transcription-PCR-confirmed SARS-CoV-2 infection were included. In-hospital mortality due to COVID-19 was the primary outcome, and intensive care unit admission, acute kidney injury, acute respiratory distress syndrome, respiratory failure requiring intubation, and septic shock were the secondary outcomes.

**Results:** A total of 101 adult patients were hospitalized with COVID-19 during the second wave study period. Of 101 patients, 8 were intubated and 6 died. The median duration of hospital stay was 6 days. Patients in the second wave were more likely to receive dexamethasone and remdesivir and less likely to require invasive mechanical ventilation. In-hospital mortality during the second wave was lower (5.9%) compared with the first wave (15.5%). At the last follow-up date, 86.1% were discharged alive from the hospital, 5.9% died and 7.9% were still in the hospital. Multivariate logistic regression showed higher odds of mortality were associated with higher age and elevated lactate dehydrogenase peak.

**Conclusion:** To our knowledge, this is the first study in the USA, and only study in the state of New Jersey that compares hospitalized patients with COVID-19 between the first and second waves of the pandemic. Inpatient mortality in hospitalized patients with COVID-19 was higher during the first wave at 15.5% vs 5.9% during the second wave. Odds of in-hospital mortality were higher with increased age and elevated LDH peak level per unit (IU/L).

# The Epidemiology and Clinical Presentation of Pancreatic Divisum: A Descriptive Study of 57 Case Reports

*Research*

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**Introduction:** Pancreatic Divisum (PD) is the most common congenital abnormality of the pancreatic duct and affects 5-10% of the population. Most of the population remains asymptomatic but in people who present with symptoms it can be a devastating abnormality and should be recognized.

**Study:** This descriptive study included a total of 57 case reports for PD. Age, gender, initial presentation, laboratory values, diagnostic procedures, and secondary comorbidities for inclusion. The search strategies include systemic search using case reports from PubMed, google scholar, Medline, Medscape, Ovid, Proquest, Scope and from other scholarly search engines. Through the 57 cases the average age of presentation was 42 years, with a 40.4% male and 59.6% female gender distribution. Common presenting signs were abdominal pain in at least 87.72% of the patients, with 21.6% of them reporting radiation to the back. 81% of the case studies reported pancreatitis and out of them 63.2% of these studies had a history of recurrent pancreatitis. Laboratory values were found to have an increased presentation of amylase, lipase, alkaline phosphatase and liver enzymes in 47.4% , 37%, 14% and 21% of patients respectively. Pancreatic divisum was diagnosed while undergoing Magnetic resonance cholangiopancreatography (MRCP, 28.1%), Endoscopic retrograde cholangiopancreatography (ERCP, 57.9% ), Endoscopic ultrasound (EUS, 7%), magnetic resonance imaging (MRI, 3.5%) or computed tomography (CT, 5.3%) scan of the abdomen. Of significance, biliary duct dilation was found in 70.6% of patients diagnosed with pancreatic divisum. Incidental masses found in 66.7% of the patients. Benign masses were found in 55.88% of the patients. While rare malignant lesions such as intraductal papillary mucinous neoplasm (IPMN), solid pseudo-papillary neoplasm, carcinoid tumor and pancreatic intraepithelial neoplasia (PIN) were found at a rate of 26.8%, 5.9%, 8.8%, 3.9% respectively. The most successful treatment was the sphincterotomy with or without stents in at least 47.6% of the patients followed by Pancreatoduodenectomy in 19% of the cases, 10 % with stents and another 10% had a good outcome with pancreaticojejunostomy. PD patients had extra-hepatic duct dilation and revealed dilation of the ventral pancreatic duct and common bile ducts at a frequency greater than that of the dorsal pancreatic duct. We saw cholelithiasis and cholecystectomy in 22.8% of patients.

One major discrepancy in methods of diagnosis we found with the present literature is use of MRCP compared to ERCP. Mainstay of treatment is endoscopic sphincterotomy of the minor papilla preferred over surgical sphincterotomy because it is less intrusive. A Physician managing pancreatitis should be aware of PD to suspect the above mentioned complications and the incidental masses which can be benign or malignant neoplasms.

# Angioedema in the Emergency Department: A Retrospective Cohort Study

*Research*

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**Introduction:** Angioedema is defined as a localized, transient swelling of the deep dermis, subcutaneous, or submucosal tissues and can be life threatening, requiring prompt management when resulting in airway swelling and compromise. Angioedema can be histamine-mediated, such as in anaphylaxis, and treated with epinephrine, histamine blockers, and glucocorticoids. It can also be bradykinin-mediated, which is medication-induced through the use of angiotensin-converting enzyme inhibitors (ACEi), dipeptidyl peptidase 4 inhibitors (DPP-4i), or genetic, such as hereditary angioedema. Bradykinin, a peptide involved in the kallikrein-kinin pathway, is inactivated by peptidase kininase II (ACE) and metabolized by DPP-4. Therefore, ACEi increase bradykinin levels, which lead to vasodilation and increased vascular permeability, and thus the potential for angioedema. Directed treatment for ACEi/DPP-4i induced angioedema is an active area of clinical investigation. Bradykinin-mediated and histamine-mediated angioedema require different management, but they are frequently treated in the same manner. The purpose of this study is to identify how patients admitted for angioedema are triaged and managed in the Emergency Department. A retrospective cohort study was conducted investigating adults admitted to the ED for angioedema at a tertiary care hospital.

**Methods:** A total of 116 patients were included in this study and demographics, medications, documented etiology, management, disposition and readmission rates were studied.

**Results:** 44.8% of patients in this study were taking ACEi and/or DPP-4i. While the admission rate for those on the medications was higher, it was not statistically significant ( $p = 0.17$ ). There was no significant difference in admission to ICU, inpatient ward or observation unit ( $p = 0.81$ ) or in the rate of readmission ( $p = 1$ ). 0% of patients with ACEi and/or DPP-4i induced angioedema received treatment dedicated to bradykinin-mediated angioedema. 25% of patients with suspected medication induced angioedema continued to use their medications after discharge.

**Discussion:** In this population, close to half of the patients were taking ACEi/DPP-4i, and with the average time to a recurrent ACEi angioedema event for those who continue to take the offending agent being 10 months, this demonstrates the necessity of reevaluating the standard management of angioedema in the emergency setting. There is evidence in the literature related to the efficacy of several drugs initially indicated and utilized for hereditary angioedema, for ACEi/DPP-4i induced angioedema as well. These include ecallantide, a recombinant kallikrein inhibitor that acts by preventing kininogen cleavage, thereby decreasing bradykinin production and icatibant, a competitive antagonist of the bradykinin B2 receptor, as well as C1-INH concentrates such as the recombinant Ruconest, and two plasma-derived forms, Berinert and Cinryze, that act by decreasing bradykinin synthesis by modulating Factor XII and kallikrein activity. For patients with suspected or confirmed ACEi/DPP-4i induced angioedema, targeted therapies for bradykinin-mediated angioedema should be considered after emergent stabilization, and it is imperative the medication(s) be discontinued.

# Charlson Comorbidity Index as a Predictor of Mortality in End Stage Renal Disease Inpatients in Rural America

*Research*

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**Background:** In the United States, chronic kidney disease (CKD) and end stage renal disease (ESRD) prevalence continues to increase, constituting 33.8% of total Medicare fee-for-service (FFS) spending and contributing to premature mortality. Our initial hypothesis was that the accumulation of comorbidities has a significant negative impact on the mortality of patients with ESRD in rural America. This study set out to identify the effect of comorbidities among other factors on mortality among ESRD inpatients in rural America.

**Methods:** This is a cross-sectional study that used the 2016-2018 Nationwide Inpatient Survey (NIS). The study included patients aged 18yrs or more with ESRD hospitalized in rural hospitals in America. Independent variables used from the survey include age (categorized into young, middle-aged, and elderly); Charlson Comorbidity Index (CCI) score categorized into mild (CCI of 1-2), moderate (CCI of 3-4), and severe (CCI of  $\geq 5$ ); type of admission (elective vs non-elective); gender; type of hospital control; race; and expected primary payer. The dependent variable was death during hospitalization. Frequencies, Chi-square, and logistic regression analyses were done using SAS studio. Only significant variables ( $P \leq 0.05$ ) on Chi-square analysis were included in the logistic regression analysis.

**Results:** There were 144,575 weighted ESRD hospitalizations. 5.0% of hospitalizations resulted in mortality. In the bivariate analysis, significant variables include age group ( $P < 0.0001$ ), type of hospital admission ( $P < 0.0281$ ), expected primary payer ( $P < 0.0001$ ), race ( $P < 0.0001$ ), and comorbidities ( $P < 0.0001$ ). Type of hospital control ( $P = 0.0963$ ) and gender ( $P = 0.8367$ ) were not significantly associated with mortality during hospitalization. On multivariable logistic regression analysis, middle-aged and elderly patients respectively had 40% (AOR: 1.40, 95% CI: 1.01-1.94) and 202% (AOR: 3.02, 95% CI: 2.22-4.12) more odds of mortality while hospitalized compared to the young. ESRD patients on non-elective hospitalizations had 19% (AOR: 1.19, 95% CI: 1.19-1.41) higher odds of mortality compared to those on elective hospitalization. Compared to whites, blacks had 18% (AOR: 0.82, 95% CI: 0.73-0.92) reduced odds of mortality, Hispanics had 47% (AOR: 0.53, 95% CI: 0.39-0.72) reduced odds of mortality, and Native Americans had 27% (AOR: 0.73, 95% CI: 0.54-0.99) reduced odds of mortality. ESRD patients with severe comorbidities had 38% (AOR: 1.38, 95% CI: 1.09-1.75) more odds of mortality compared to those with mild comorbidities. Compared to patients on Medicare, ESRD hospitalizations on private insurance had 26% (AOR: 1.26, 95% CI: 1.01-1.56) higher odds of mortality, self-pay patients had 100% (AOR: 2.00, 95% CI: 1.27-3.16) higher odds of mortality, and no charge patients had over 1400% (AOR: 15.76, 95% CI: 2.73-90.90) higher odds of mortality. The area under the curve (AUC) for the model was 62.2%.

**Conclusion:** In addition to reinforcing the healthy survivor effect on mortality in ESRD among blacks compared to whites, our study also suggests that strategies aimed at preventing accumulation of comorbidities may help to reduce mortality in ESRD.

# Factors Affecting Failure of First Line Clarithromycin Based Therapy for Helicobacter Pylori Infection

## Research

Aadhithyaraman Santharaman, MD

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**Background:** Helicobacter pylori (H. pylori) is a motile, curved and Gram-negative bacillus that is associated with a wide-array of digestive and extra-gastric disorders. Successful eradication of H. pylori will therefore benefit in improvement of histologic gastritis and prevention of gastric cancer development. The most common reason for treatment failure among these is due to antibiotic resistance, especially to the macrolide Clarithromycin used in the triple therapy. The aim of this study is to determine the prevalence of H. pylori resistance and contributing factors for failure of first-line therapy in patients of our outpatient clinic community.

**Methods:** Following our institutional IRB approval, using ICD-10 code, we obtained a total of 299 patients with H. pylori gastritis from 10/2014 till 01/2021 who presented to our outpatient clinic located in New Brunswick, NJ. Patients who did not have a second line diagnostic method were excluded from analysis. Among those treated with Clarithromycin based triple therapy (C3), subjects were categorized into treatment success and failure groups. Patient demographics and other factors including smoking, alcohol history, recent NSAID or PPI or antibiotic use, medication compliance were compared between the two groups.

**Results:** Clarithromycin based triple therapy (C3) is the most commonly used first line therapy in 279 (93.3%) of 299 patients with H. pylori gastritis. C3 treatment failure was observed in 69 (24.7%) patients. There were no statistically significant differences in Hispanic ethnicity (odds ratio [OR] 0.73, 95% CI 0.34–1.52,  $p = 0.4$ ), history of NSAID use (OR 1.65, 95% CI 0.74–3.65,  $p = 0.2$ ), history of PPI use (OR 0.95, 95% CI 0.49–1.86,  $p = 0.8$ ), modality of first diagnostic method and histological differences between C3 failure and success groups. After multivariate logistic regression analysis, we found a strong association of female sex (OR 2.86, 95% CI 1.23–6.62,  $p = 0.01$ ) and medication non-compliance (OR 4.98, 95% CI 1.80–13.8,  $p = 0.002$ ) in C3 failure group. Bismuth based quadruple therapy (B4) was the most commonly used second line therapy, followed by Levofloxacin based triple therapy (L3). Among those who had a third diagnostic testing performed, 15/28 (53.6%) patients in B4 group and 6/11 (54.5%) in L3 group had successful eradication of H pylori.

**Conclusion:** Patient education and medication compliance is one of the key factors in successful treatment of gastric H. pylori infection. Appropriate selection of first line therapy is crucial in preventing primary treatment failure and the subsequent emergence of resistant strains as a result of suboptimal treatment. Patients with risk factors for Clarithromycin resistance based on the medical history and geographic resistance pattern can be considered to be treated with either B4 or L3 as first line.

# **Marijuana Smoking as a Risk Factor for Myocardial Infarction-A large Epidemiological Study using NIS**

*Research*

Kavin Raj, MD

Umesh Bhagat

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**Introduction:** Marijuana is becoming one of the most common substances used for both medicinal and recreational purposes. It is estimated that 14.5% of North America uses cannabis. A large cross-sectional study showed that marijuana increased the odds for MI or CAD by 1.88. We sought to study this association further using the NIS (National inpatient sample).

**Methods:** We included all adults (18 or above) admitted to a teaching hospital with a primary or second diagnosis of myocardial infarction from the NIS 2016, 2017, and 2018. We used multivariate logistic regression to assess the association between any marijuana use and myocardial infarction

**Results:** Out of 107 million weighted hospitalizations, 2.7% (2.4 million) hospitalizations had a history of marijuana use or abuse. Out of 2.4 million weighted admissions for myocardial infarction, 1.7% (41,814 admissions) used marijuana. A total of 40 million weighted adult patients admitted to teaching hospitals in the United States were included in the analysis. On univariate logistic regression, marijuana use was significantly associated with myocardial infarction (OR 1.07, 95% CI 1.03-1.11, P=0.000). After adjusting for age, female sex, race, family history of MI, dyslipidemia, diabetes, prediabetes, diabetes, hypertension, nicotine dependence using a multivariate logistic regression model, marijuana use/abuse was not statistically associated with myocardial infarction (OR 0.98, 95% CI 0.94-1.02, P=0.394).

**Discussion/Conclusions:** Marijuana can cause ACS (Acute coronary syndrome) through sympathetic stimulation, increased blood pressure, tachycardia, and stimulation of pro-atherogenic endothelial CB1 receptors. A large systematic review concluded that the population attributable fractions (PAR) for a potential trigger of ACS was 0.8% for marijuana smoking. However, the long-term cardiovascular effects of marijuana smoking are unknown. Although our study demonstrates no possible association between marijuana use and MI, there is a possibility of type 2 error. NIS data is based on ICD codes generated by coders. It is reasonable to assume that many coders may not code for key variables used in our study, such as marijuana use, family history of MI, prediabetes, and dyslipidemia. With the legalization and widespread use of marijuana, high-quality, long-term prospective research is needed to settle the possible association between marijuana and ACS.

## **A Pilot Study: Impact of COVID-19 Recovery on HbA1C**

*Research*

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**Background:** Coronavirus disease 2019 (COVID-19) infection is confirmed to worsen type 2 diabetes (DM2) control by significantly increasing HbA1c. Most of the patients required insulin therapy inpatient setting, with higher insulin dose or need to start insulin if not on insulin before COVID19 infections. However, after discharge, the impact of recovery from acute COVID 19 on HbA1c is not clear to the medical society. This impact is very important to guide physicians to properly adjust insulin dose and whole DM2 management plan. Therefore, we conduct a pilot study to look up this impact.

**Method:** A retrospective chart review was performed with patients with Type 2 Diabetes Mellitus and admitted with acute COVID 19 infection during March 2020 and June 2020. They were followed up at our outpatient Adult Health Clinic after being discharged from our hospital. Data were extracted from the electronic medical record (EMR) system. A total of 18 charts were analyzed. Those patients who were not followed up in our clinic were excluded. HbA1C levels were checked every 3 months until one 1year since diagnosis of COVID-19 infection.

**Results:** The paired T-test for A1C between hospitalization and the first follow-up visit is performed. The mean difference in A1C is 4.17. The difference is statistically significant,  $P < 0.01$ . The Mean of HbA1C before discharge and the first follow-up visit are 12.0 and 7.8 indicating the significance of COVID infection on glycemic control. Medications during the management of COVID are also considered. 7 out of the 18 charts reviewed were treated with systemic steroids as standard care.

**Conclusion:** While several studies have already documented the impact of COVID19 acute infection on worsening HbA1c control, we would like to highlight the impact of the recovery of acute COVID -19 on glycemic control. Our study has demonstrated that people with diabetes with higher HbA1C during the time of COVID infection were found to have significant HbA1c improvement as evidenced by the mean difference of 4.17 during follow-up visits. Most of the patients had significantly decreased insulin requirements with adequate glycemic control. For those who did not need insulin before the Covid19 infection, insulin requirements significantly decreased and were eventually discontinued within the first year. We describe this result to highlight the importance to follow up with those COVID19 patients, who are discharged with insulin, more frequently (less than 3 months) to promptly decrease the insulin dose or adjust the Type2 Diabetes management plan to prevent life-threatening hypoglycemic events.

# **Hip Fractures in Older Adults with Alzheimer's Dementia is Associated with Higher Inpatient Mortality**

*Research*

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**Introduction:** Alzheimer's dementia patients have a higher incidence of hip fractures than other older adults. Dementia and hip fractures are associated with significant morbidity and mortality. Hip fractures occur in Alzheimer's dementia (AD) patients through several mechanisms including falls, osteoporosis or side effects of AD medications. Previous studies suggest that patients with AD are more likely to be hospitalized and have a higher mortality when compared to those without dementia.

**Aim.** We set out to compare length of hospital stay, mortality and costs among Hip fracture patients' older adults >65 years with or without AD

**Method:** From the 2018 National Inpatient Sample (NIS) data, we identified hospitalizations in adults aged >65 years. Using ICD10 codes, we selected adults >65 years of age who had a hip fracture with and without Alzheimer's Dementia. Multivariate logistic and linear regression analyses were used to adjust for possible confounders for the primary and secondary outcomes, respectively. The multivariate logistic regression was used to estimate the odds ratio of in-hospital mortality after adjusting for patient demographics, hospital type, hospital region, hospital teaching status, median household income, and medical comorbidities. In addition, the multivariate linear regression was used to estimate the average change in length of stay and hospital charges after adjusting the same covariates. All statistical analysis were performed by using SAS Survey Procedures (SAS 9.4, SAS Institute Inc, Cary, NC, USA).

**Results:** There were 59,630 hospitalizations for older adult patients age >65 years who had either a principal or secondary ICD-10 code for Hip fracture, and 4,550 (7.6%) of these Hip fracture hospitalizations had Alzheimer's Dementia. Compared to patients without Alzheimer's dementia, patient with Alzheimer's dementia were older (Mean age 85.0 vs 81.9), more females (77.0% vs 71.6%), have more comorbidities (Charleston comorbidity index >3, 26% vs 19.8%), more underweight (6.8% vs 4.4%), and more Osteoporosis (23.3% vs 19.1%). Hospitalizations for hip fracture with AD had higher inpatient mortality (3.3% vs. 2.4%; adjusted OR: 1.30; 95% CI: 1.09-1.54; p=0.003) compared to those without AD. Hip fracture with AD hospitalizations has lower adjusted mean LOS of -0.64 days (95% CI: -0.64; p<0.0001) compared to those without AD. Hip fractures with AD hospitalizations has a lower adjusted total hospital charge of \$-3,240 (95% CI: 1,810.1; p=0.074) compared to those without AD.

**Conclusion:** Hip fractures in older adults with AD is associated with a statistically significant higher inpatient mortality rate. The length of stay is 0.64 days shorter among the patients who had hip fractures with Alzheimer's dementia compared to those without AD. This is probably due to the higher In-hospital mortality rate among the patients with Alzheimer's dementia. There is no statistical difference for Hospital total charges between these two groups.

# Safety Profile of Nivolumab for Advanced Refractory Esophageal and Gastro-esophageal Junction Cancer: Systemic Review and Meta-A

*Research*

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**Introduction:** Recently Nivolumab, a fully human IgG4 monoclonal antibody inhibitor of programmed death-1, was studied as adjuvant treatment for patients with advanced esophageal or gastro-esophageal junction (GEJ) cancer while taking or after taking standard therapy, chemoradiotherapy or surgery. Our study aimed to evaluate the safety profile of Nivolumab for advanced refractory esophageal or GEJ cancer.

**Methods:** MEDLINE, the Cochrane Library, and EMBASE were searched up to 6/1/2021. The following keywords were used either alone or in combination: Nivolumab, esophageal cancer, esophagus cancer. Clinical trials that utilized Nivolumab for refractory esophageal cancer were included. The primary outcome was adverse effects from nivolumab, according to Common Terminology Criteria for Adverse Events v4.0. The rate of each event was calculated through meta-analysis. Data were analyzed with STATA version 16.0 (Stata Corp, College Station, TX, USA).

**Results:** A total of 264 manuscripts were identified and four clinical studies with 966 patients met inclusion criteria. Patient median ages were more than 60 in all 4 studies and 727 (83.9%) were male. As the most common gastrointestinal side effect, the diarrhea rate was 18% (95% confidence interval (CI) 16-21%). The hepatic function abnormal rate was 12% (95% CI 10-15%). The nausea and constipation rate were 10% (95% CI 6-12%) and 17% (95% CI 13-22%). The decreased appetite rate was 13% (95% CI 11-16%). The rash rate was 15% (95% CI 13-17%). The pruritus rate was 11% (95% CI 9-13%).

**Discussion:** In our meta-analysis, the incidence of side effects from nivolumab was similar to that seen in other types of solid tumors, which indicated tolerability and feasibility of treatment. However, more studies are warranted to validate the safety profile of nivolumab.

## **Cutaneous Reactions After Messenger RNA Based COVID-19 Vaccines: These Aren't an Excuse to Avoid Them!**

*Research*

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**Introduction:** The COVID-19 vaccine hesitancy is growing despite the known severe complication of the disease due to misinformation of the patients by different sources. COVID-19 vaccine is associated with various skin manifestations which as typically mild to moderate and require symptomatic treatment and these symptoms do not obscure the necessity of vaccination. Approximately 5% of the patients that are seen in primary care practice are dermatology patients and having the knowledge of skin reactions secondary to COVID-19 vaccination and the appropriate patient counseling and management is required. Herein in this review, we will discuss the skin side effects of the current COVID-19 vaccination.

**Materials and methods:** We conducted a literature review of PubMed in November 2021 to identify cutaneous side effects of the current vaccines Pfizer-BioNTech and Moderna vaccines. We primarily focused this assessment on the Pfizer BioNTech and Moderna mRNA vaccines because reports of cutaneous events from adenovirus vaccines (beyond clinical trials) were limited. Abstracts and titles of identified contributions published in 2020 and 2021 were reviewed for relevance. We included data from publicly available online reports and this review did not qualify as human subject research; therefore, institutional review board approval was not required at the Saint Peter's University Hospital. **Results:** The most reported cutaneous finding after vaccine administration was a delayed large local reaction a median of 7 days after the first vaccine dose, primarily after the Moderna vaccine (up to 92%). Less common skin adverse events were urticaria, morbilliform eruption, delayed large local reactions, and erythromelalgia. Rare cutaneous adverse events were Herpes Zoster activation, vasculitis, flaring of preexisting dermatitis, angioedema, pityriasis rosea, chilblains, vesicular eruption, ITP, lupus, and psoriasis activation.

**Discussion:** The reported reactions to COVID-19 mRNA vaccines are largely self-limited, with the most frequent presentations being local injection site reactions echoing those from clinical trials. Studies widely concur that these local findings should not discourage vaccination. Allergic-type cutaneous symptoms, including urticaria and angioedema, have been transient and rarely associated with anaphylaxis. The development of uncommon entities such as herpes zoster, dermal filler reactions, and ITP was seldom serious in nature but justify clinical monitoring among certain groups. Although further studies are needed to elucidate specific reaction mechanisms and identify optimal management approaches, these existing reports should reassure patients of the overall compelling safety profiles and benignity of skin reactions that may occur after mRNA COVID-19 vaccination.

**Conclusion:** The identified cutaneous reactions are largely self-limited and should not discourage vaccination. Existing reports should reassure patients of the overall compelling safety profiles of the mRNA COVID-19 vaccines and the benignity of skin reactions after vaccination.

**Title: Gastrointestinal Bleed in Patients with History of Myelodysplastic Syndrome - Inpatient Mortality and Temporal Association**

*Research*

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**Introduction:** Patients with a history of Myelodysplastic Syndrome (MDS) usually have cytopenias which theoretically predisposes them to bleeding events. In the past, cases of gastric ulcers among this population have been described. Studies dedicated to identifying the risk factors associated with mortality in patients with MDS that present with gastrointestinal bleed (GIB) are lacking. In this study, we aim to identify the mortality risk factors in this population.

**Methods:** We queried the National Inpatient Sample (NIS) database 2018 using the International Classification of Diseases, 10th revision, Clinical Modification (ICD-10-CM) coding system to identify the patients with a primary diagnosis of GIB and history of MDS. The primary outcome was mortality. Analysis was performed with STATA software. T-test was used for continuous variables and the chi-square test was used for categorical variables. Logistic, as well as multivariate regression, was used to identify risk factors associated with mortality.

**Results:** 59,735 patients met the inclusion criteria. Among these, 2,568 (0.04%) patients presented with GIB to the hospital. 77% was upper GI bleed and 22% was lower GI Bleed. The mean age at admission was 79.2 and the LOS was 5.09 compared to those without GI bleed 6.24. The mean cost among the patients with bleeding was 55K compared to 68K for the nonbleeding group. Total mortality was 0.03%. Patients with DM (OR 1.12,  $p < 0.005$ ), malnutrition (OR 3.33,  $p < 0.001$ ), heart failure (OR 2.43,  $p < 0.001$ ), coronary artery disease (OR 1.61,  $p < 0.001$ ) and thrombocytopenia (OR 2.8,  $p < 0.001$ ) had increased mortality compared to being female (OR 0.78,  $p < 0.001$ ) and being obese (OR 0.61,  $p < 0.001$ ). When adjusting for cofounders aOR remained similar for DM, malnutrition, heart failure, coronary artery disease and thrombocytopenia. HTN showed decreased likelihood of mortality with aOR of 0.83 and  $p < 0.001$ .

**Discussion:** Comorbidities increased the mortality in the patients with MDS and GI bleed. Optimization of the preexisting comorbidities especially cardiac will greatly improve the outcomes. Malnutrition is also the major comorbidity and optimization of the nutritional status is warranted. Further studies with regards to the cause of GI bleed is needed so that the outcome can be improved

## **Uptodate Review on Prognostic Factors in Mycosis Fungoides**

*Research*

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**Introduction:** Ten-year survival rates in mycosis fungoides (MF) broadly vary and there is no prognostic index available uptodate. This is presumably due to low prevalence, heterogeneity, and diagnostic challenges of the disease in early stages. Recent studies have focused on identifying objective prognostic indices by using different parameters for survival determinants. Detecting these factors and stratifying MF patients according to their disease progression risk may help to manage these patients more efficiently. In this presentation, we aimed to review the current literature to determine the risk factors determining prognosis in MF and increase the awareness of this rare clinical entity that Internists may come across during clinical practice.

**Methodology:** A Comprehensive literature search was performed using electronic online databases "PubMed" and "Google Scholar" using keywords 'prognostic factor', 'prognostic indicator', 'mycosis fungoides', 'Sezary syndrome', 'Skin Lymphoma', 'Cutaneous Lymphoma'. Articles published in the English language were considered for review.

**Results:** The strongest prognostic factor in MF patients is the stage of the disease. T stage and the presence of extracutaneous disease are the most important factors for survival. Other factors that are associated with worse prognosis are male gender, age>60, presence of plaques, folliculotropism, eosinophilia, and lymph node stage above N1/Nx.

**Conclusion:** The findings presented here illustrate that disease prognosis in the early stages of MF depends on many contributing factors. Detection and stratification of such factors may allow a personalized approach and improve outcomes in these patients.

## Reinforcing Image Interpretation Skills Using a Flipped Classroom Model During a Transition to Residency Curriculum

*Research*

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**Introduction and Background:** With only 25% of US medical school curricula requiring radiology clerkships, students often do not receive uniform training in radiologic image interpretation. To improve the consistency, a flipped classroom model for reinforcing image interpretation was developed and implemented through a mandatory transition to residency (TTR) program at the end of the 4th year of medical school.

**Case:** Using free open access medical education (FOAMed) videos, faculty curated a curriculum for the Radiology Flipped Classroom (RFC) that reviewed methods of image interpretation for chest and abdomen X-rays (CXR and AXR), Systematic Practical Approach to CT reading (SPA), CT chest (CTC), CT abdomen (CTAB), and CT head (CTH) scans. Prior to starting, students took a knowledge and attitudes assessment, which included questions regarding preparedness and behaviors during clinical activities and foreign body and structure identification. Students then participated in a 1.5-hour Radiology-led interactive image review workshop. Post-workshop, they completed a knowledge test covering the same topics. During analysis, students were divided into either control or RFC subgroups based on which videos they reported watching. Sixty-one students participated in the Internal Medicine TTR bootcamp, and fifty-nine students completed the post-test. Pre-test attitude assessments showed 78.7% and 44.3% of students felt they were at least moderately prepared for X-ray and CT interpretation, respectively. Only 14.8% of students reported feeling comfortable or confident with CTAB interpretation, and the most students, at 59%, felt comfortable with CTH interpretation. Clinically, 80% of students reported visualizing X-rays and 73.4% visualizing CTs for their patients over half the time. The mean post-test knowledge score increased by 1.7 questions compared to the pre-test score. The percentage of students who watched the videos and composed RFC groups was 35.5% for CXR; 30.5% for AXR; 30.5% for SPA; 22% for CTC; 20.3% for CTAB; and 59.3% for CTH. On subgroup analysis, CXR and AXR RFC groups scored 4.7% and 5.2% higher on X-ray questions respectively, compared to the control. The SPA RFC group scored higher than the control in CTAB (66.7% vs. 59.7%), CTC (64.4% vs. 56%), and CTH (78.9% vs. 63.9%). The CTC RFC group scored 9.7% higher on CTC questions compared to the control.

**Discussion:** Overall, students felt the workshop was a positive learning experience with high interactivity due to the virtual modality. Since the AY2021 TTR course was entirely virtual, students cited increased screentime as a barrier to completion of every FOAMed video. Limitations included a small sample size and lack of true randomization as students self-selected into RFC groups. Students appeared to choose videos based on the sequence they were listed and not based on filling knowledge gaps. Future iterations of this RFC workshop will emphasize CT videos and further decrease barriers to radiology education upstream in the curriculum.

## Comparing The Left Distal Transradial Artery Access to Traditional Accesses for Coronary Angiography: A Single Center Experience

### *Research*

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*Seaton Hall/St Francis - Sara Wallach, MD, MACP*

**Background:** The left distal transradial approach (LdTRA) is a newer vascular access for coronary angiography. We hypothesized that LdTRA is superior to traditional femoral and right radial cardiac catheterization approaches in patients who underwent prior bypass graft surgery.

**Methods:** We retrospectively screened 417 patients with prior CABG, undergoing coronary angiography at our institution between January 2018 and August 2020, to compare the type of intervention using site of access as an independent factor. We screened patients' charts using Xper IM. Analyses were performed by Statistical Product and Services Solution using Chi Square test and Pearson's correlation for categorical data and ANOVA test for nominal data, at a p value of <0.05. Pre-defined end points were time to access, procedure duration, fluoroscopy time and dose.

**Results:** The mean time for femoral access was  $37.68 \pm 1.19$  seconds (95% CI 35.3295-40.04), for snuffbox access  $36.4 \pm 5.06$  seconds (95% CI=26.03-46.81), and for proximal radial access  $40.71 \pm 4.17$  seconds (95% CI=31.21-50.20). Mean procedural time via femoral access was  $37.68 \pm 1.97$  minutes, via snuffbox access was  $36.43 \pm 5.06$  minutes, and via radial access was  $40.71 \pm 4.17$  minutes. Mean length of stay for femoral access was  $1.97 \pm 0.14$  days, for radial access  $2.13 \pm 0.31$  days and for snuffbox access  $1.68 \pm 0.27$  days. The fluoroscopy time for femoral access was  $10.23 \pm 0.41$  minutes, for snuffbox access was  $11.28 \pm 2.00$  minutes and for radial access was  $13.23 \pm 1.74$  minutes. The fluoroscopy dose for femoral access was  $599.98 \pm 26.63$  Gy/cm<sup>2</sup>, for snuffbox approach  $722.71 \pm 112.94$  Gy/cm<sup>2</sup> and for radial access was  $767.06 \pm 90.89$  Gy/cm<sup>2</sup>. There were no complications noted in our study. We found no statistical significance difference between approaches with regards to time of access, procedure duration, fluoroscopy time and dose.

**Conclusion:** Due to lack of statistical significance between outcomes of either approach, all approaches are acceptable options. Clinically, the snuffbox approach may be superior because it helps salvage the radial conduit for future coronary interventions and avoids the risk of femoral access complications. Therefore, we recommend to electively opt for snuffbox approach in the absence of lack of any significant side effect profile.

## **Goggles Awareness and Adherence: A Quality Improvement Initiative**

*Quality Improvement*

Natale Wasef, MD

Steven Hamilton; Michael Malak; Adam Kaplan

*Seaton Hall/St Francis - Sara Wallach, MD, MACP*

**Quality improvement Initiative:** With COVID-19 on the rise, the requirement for eye protection in all patients' rooms was necessary for additional protection. Therefore, an institutional policy mandated the use of a shield or goggles in all patient's rooms. The goal of our Goggle QI project is to improve resident adherence to this hospital policy. To achieve our aim first, we conducted a formal poll of PGY-1, 2, and 3 residents on their current use of goggles when interacting with patients. Initial surveillance revealed that most residents were non-adherent to the use of goggles in patients' rooms, and when they were, they depended upon multiple replacements throughout the day. Using this data, we utilized a custom A3 template to develop and implement our QI project.

**Description of Intervention/Results:** According to pre-implementation survey results, approximately 80% of residents conveyed that encumbrance and difficulty with storage were the major obstacles to goggle use. In addition to storage difficulty, about 75% of residents noted that their goggles were regularly and easily misplaced and subsequently lost, requiring frequent daily replacements. Utilizing the information mentioned above, we decided to initiate a project that we predicted would: 1. Improve adherence to goggle use among the residents, 2. Decrease the number of goggle replacements daily, and, 3. Reduce the overall cost of equipment for the hospital by reducing the goggle replacement rate. As a result, our first PDCA began with providing residents with locker hooks and eyewear strings to optimize storage and retention throughout the day. A post-implementation survey revealed a 50% reduction in goggle replacement after introducing the string and hook utilities. The post-implementation survey also demonstrated an increase in overall adherence to the goggles from 50 to 58%. There was a decrease in residents' encumbrance rate from 34% to 27% after implementing the goggle string and hook to our project. There was also a significant decrease in those who voted for storage difficulty from 48 to 15%.

**Results after implementation:** PDCA cycle 1: goggle string and locker hooks - Overall, our post-implementation survey exhibited increased awareness of the hospital policy regarding the goggle policy among the residents, increased adherence rate to goggle use, and decreased replacements per day and week. However, we would like to improve our adherence rate further.

**Future implications/changes:** signs around the hospital We aim to continue to improve the adherence rate further with an end goal of 100% adherence and continued reduction in goggle replacement. Further PDCA cycles are planned to achieve this, with future efforts geared towards adding visual signage as reminders.

## **A Case of Guillain Barre Syndrome Associated with COVID-19**

*Clinical Vignette*

Hafsa Anwar, MD

Khurram Zubair

*Capital Health - Saba Hasan, MD, MACP*

**Introduction:** More than 42 million US patients have been infected with COVID-19 with more than 1 million in New Jersey. Guillain Barre Syndrome (GBS) is an inflammatory polyradiculoneuropathy associated with various viral infections and is characterized by progressive, ascending, symmetrical flaccid limbs paralysis, along with areflexia or hyporeflexia and with or without cranial nerve involvement. We report here a case of GBS in a middle-aged female who was recently infected with COVID-19.

**Case:** A 55-year-old female with no significant medical history was admitted with bilateral lower extremity weakness and numbness for one week. She also reported pins and needles sensation associated with extreme fatigue. The patient tested positive for COVID-19 two weeks ago. She reported worsening weakness of the lower extremities to the point she could not ambulate. She denied prior history of such symptoms. Vital signs were unremarkable and physical exam revealed motor strength 4/5 in upper extremities and 2/5 in lower extremities. A sensory exam revealed paresthesia in the lower extremities and reflexes were also diminished. Blood work was unremarkable except for mild elevation of inflammatory markers and chest x-ray showed bibasilar opacities. Cerebrospinal fluid analysis was unremarkable including normal opening pressure. MRI of the cervical, thoracic, and lumbar spine was unremarkable. The patient was treated empirically with intravenous immunoglobulins with no improvement in symptoms. She continued to have progressive weakness and later developed acute urinary retention requiring Foley catheter placement. MRI brain was unremarkable, however MRI lumbar plexus showed diffuse enhancement of the cauda equina throughout lumbar spine extending to sacral region, highly suspicious for GBS. She was then started on plasmapheresis with improvement in her neurologic findings.

**Discussion:** Patients with GBS can develop autonomic dysfunction and neuromuscular respiratory failure requiring mechanical ventilation. Monitoring with frequent neurologic exams and respiratory parameters such as respiratory rate, oxygen saturation, forced vital capacity, maximal inspiratory pressure, and maximal expiratory pressure is recommended in all patients. Patients with severe weakness, imminent respiratory failure, and severe autonomic dysfunction may require monitoring in the intensive care unit. GBS can be debilitating but 80% of the patients will be able to walk independently after recovery. However, it can cause severe motor impairment in around 10% of the patients. Therefore, clinicians should be suspicious of GBS in patients with recent COVID-19 infection presenting with new neurologic signs and symptoms as early treatment with immunomodulatory therapy with either intravenous immunoglobulins or plasma exchange can improve patient outcomes and can decrease morbidity and mortality associated with this disease.

## Diffuse Hemorrhagic Gastritis Associated with Acetazolamide Toxicity

### *Clinical Vignette*

Zulfiya Manning, MD

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*Capital Health - Saba Hasan, MD, MACP*

**Introduction:** Acetazolamide inhibits the activity of the carbonic anhydrase enzyme, which plays an essential role in proximal bicarbonate, sodium, and chloride reabsorption. Acetazolamide causes a reduction of hydrogen ion secretion at the renal tubule and increased renal excretion of sodium, potassium, bicarbonate, and water. Acetazolamide is widely used in metabolic alkalosis, idiopathic intracranial hypertension, acute mountain sickness, high-altitude cerebral edema, central sleep apnea, hereditary ataxia, and glaucoma. Acetazolamide inhibits the production of prostaglandin levels and bicarbonate excretion into the gastric mucosal barrier.

**Case Presentation:** The patient is a 57-year-old female with multiple medical conditions, including hypertension, COPD, prediabetes, GERD, achalasia, depression, migraine, and Meniere's disease, treated with chronic acetazolamide treatment. She presented to her PCP with complaints of severe fatigue, malaise, and recent memory problems, especially with finding words. Her symptoms were severe enough that the patient could not perform her duties at work. Initial laboratory work was unremarkable, including serologic testing for collagen vascular disease, vitamin B12, thyroid functions, and random morning cortisol. The patient has no known apneic episodes, and her depression was well controlled on Bupropion. She was also on butalbital/acetaminophen/caffeine prn, diltiazem, meclizine, and montelukast. Serum IG tests revealed selective IgA deficiency. The Montreal Cognitive Assessment score was 26 out of 30. The neurologic exam and MRI Brain were unremarkable. Due to selective IgA deficiency and her GERD, she was referred for Gastroenterology evaluation. EGD showed diffuse hemorrhagic gastropathy and paraesophageal hernia. Colonoscopy found two 6mm and 10mm polyps in the descending colon and at the ileocecal valve, which were removed. The patient was started on Omeprazole DR 40mg per-oral daily. Biopsy findings showed gastric antral mucosa with surface erosions, negative for intestinal metaplasia and negative for Helicobacter Pylori microorganism. Acetazolamide was discontinued due to its side effects on the gastric mucosal barrier. Four months later, follow-up EGD showed healed gastric mucosa. Currently, the patient is doing well; her symptoms are improved.

**Discussion:** In our case, Acetazolamide's diuretic effect was used for treating severe refractory vertigo associated with Meniere's disease due to its possible benefit and the low risk of adverse effects. Diuretics are thought to improve endolymph resorption and maintain a balanced fluid dynamic in the endolymphatic system, mainly when used with sodium restriction. However, carbonic anhydrase inhibitors have adverse effects that must be considered, especially in outpatient settings, including aplastic anemia, agranulocytosis, thrombocytopenia, hypersensitivity reactions, and hemorrhagic gastritis.

## **A Rare Incidence of Polymicrobial Frontal Sinus Osteomyelitis in an Adult**

*Clinical Vignette*

Kyle Wiseman, MD

Zaka Ahmad, MD; Dhairya Gor MD; Sobaan Taj MD; Edward Liu MD; Shuvendu Sen, MD

*Jersey Shore University Medical Center - Christian Kaunzinger, MD*

**Introduction:** A rare consequence of sinusitis is Pott's Puffy Tumor, characterized by frontal osteomyelitis and subperiosteal abscess. Traditionally described by Sir Percival Pott in relation to frontal head trauma, the disease entity was later found to be more common in children with sinusitis.

**Case Report:** 62-year-old male with a past medical history significant for arthritis and hypertension presented with two weeks of malaise, fever, and chills. He also endorsed ongoing sinus pressure and pain, along with changes in taste and smell. Physical exam revealed a small skin opening on the midline of his forehead with purulent drainage, reportedly present for two months. The patient had a temperature of 98.4, blood pressure of 141/73 and a white blood cell count of  $9.1 \times 10^3/\mu\text{L}$ . Computed Tomography (CT) of the face revealed focal soft tissue swelling and emphysema involving the frontal scalp as well as underlying lytic destruction of the frontal bone and complete opacification of the frontal sinus. Also noted was bilateral maxillary sinus opacification suggestive of severe pansinusitis with fistulization to the anterior frontal scalp. He was started on ampicillin-sulbactam and sent to the operating room where he underwent multiple procedures including excision of a frontal sinus/cutaneous fistula, fronto-ethmoid debridement and cannulation with lavage/debridement. Post-operative wound cultures revealed the presence of Methicillin Sensitive Staphylococcus Aureus (MSSA), Streptococcus constellatus, Prevotella intermedia, Fusobacterium nucleatum, Candida dubliniensis, Parvimonas micra and a heterogeneous group of coagulase-negative staphylococci. The patient continued to have purulent drainage from his forehead wound and fluconazole was added. Given a lack of improvement on medical management, ENT performed a second surgery, including bilateral sphenoidotomy, bilateral frontal sinusotomy, frontoethmoid debridement, cannulation, lavage, bilateral and total ethmoidectomy sinuses. A penrose drain was temporarily placed. Osteomyelitis of the calvarium was noted and the patient was diagnosed with Pott's Puffy Tumor with forehead abscess. After discussion with ENT, the decision was made by infectious disease to treat the condition as osteomyelitis of the skull with Tigecycline twice-daily infusion for six weeks along with oral Fluconazole for two weeks.

**Discussion:** Pott's Puffy tumor was initially thought to be caused by head trauma, however, frontal sinusitis has now been deemed the more likely cause. The condition is characterized by limited and painful swelling on the forehead with fever, headache, nasal discharge, or high intracranial pressure. Though it is more commonly seen in young people, Pott's Puffy Tumor can rarely occur in adults. The cultures are usually polymicrobial with anaerobes often seen. Some of the common bacteria isolated include alpha-hemolytic streptococcus, peptostreptococcus, Bacteroides and Fusobacterium. To have the fullest chance of recovery and prevent life-threatening intracranial complications, it is imperative to detect and treat this condition as early as possible.

## Resistant SVT Requiring Ablation After Abortion with Methotrexate and Misoprostol

### *Clinical Vignette*

Gautham Upadrasta, MD

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**Introduction:** Supraventricular tachycardia is a dysrhythmia originating at or above atrioventricular node and defined by narrow complex tachycardia. There are numerous etiologies of SVT, including sinus tachycardia, atrial tachycardia, atrial fibrillation/flutter or multifocal atrial tachycardia. Medications, caffeine, alcohol, or stress can trigger SVT. Among medications, misoprostol has potential adverse effect of sinus tachycardia. The incidence of SVT triggered by misoprostol is unknown, but this case provides a valuable example that there could be a possible association.

**Case Description:** 26-year-old female G1P0010 presented to emergency department (ED) with complaints of palpitations, shortness of breath, abdominal pain, and nausea, worsening over the past day. One day prior, she underwent a medical abortion with methotrexate and misoprostol. She received one dose of misoprostol. Later that night, she had palpitations and shortness of breath, so she decided to go to ED. Physical exam showed irregular rhythm, tachycardia, and epigastric abdominal tenderness. In the ED, EKG showed supraventricular tachycardia with heart rate (HR) of 242 beats per minute (BPM). Labs showed normal troponin and elevated B-Type natriuretic peptide. Patient was given escalating doses of adenosine, ketamine, followed by cardioversion three times, but SVT persisted. Amiodarone and verapamil, eventually broke the SVT. EKG showed new tachycardia (HR 133 bpm), with alternating narrow complex and wide complex. Patient was transferred for possible electrophysiology study. After transfer, patient arrived with EKG, showing SVT with ventricular rate of 223 bpm (blood pressure stable). Patient was given magnesium, then procainamide infusion, which was stopped when blood pressure dropped to 78/50 mmHg. Next, verapamil was given, which converted the patient to narrow complex with distinct p-waves and 2:1 conduction to the ventricles (HR 91 bpm). Heart rate increased, so diltiazem drip was started, which decreased HR to 130's. Echocardiogram showed ejection fraction of 20% with global hypokinesis, likely tachycardia-induced cardiomyopathy. Patient was admitted to cardiac care unit. In the electrophysiology lab, atrial tachycardia was found localized to right atrium crista terminalis, along with inappropriate sinus tachycardia localized to sinus node region, which were ablated. Patient was discharged on metoprolol, ivabradine, and lisinopril. EKG now showed sinus tachycardia with HR of 113 bpm. Patient had outpatient follow-up scheduled with cardiology. Repeat echocardiogram showed normal left ventricular systolic function with ejection fraction of 55-60%.

**Discussion:** This case displays numerous possible etiologies that may have triggered the episode of SVT but we believe the recent administration of misoprostol is the key contributing factor. The known adverse effect of sinus tachycardia from misoprostol is rare and to present with resistant SVT is even more unusual. Although this patient has had a good outcome after cardiac ablation, more research may be needed to understand the cardiac risk of misoprostol use for medically-induced abortions.

## Fall into the “Octopus Trap”

### Reverse Takotsubo Cardiomyopathy Disguised As Hypertensive Emergency

*Clinical Vignette*

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**Introduction:** Reverse Takotsubo cardiomyopathy (RTC) occurs in 1-2% of patients presenting with acute coronary syndrome-like symptoms. Clinically, it presents similarly to Takotsubo cardiomyopathy (TC). Although, cardiac catheterization findings show apical hyperkinesis and basal hypokinesis, as opposed to the apical hypokinesis and basal hyperkinesis seen in classical Takotsubo syndrome. The scarcity of documented cases detailing the co-occurrence of hypertensive emergency and Takotsubo syndrome makes this case a valuable addition to the literature.

**Case Description:** A 60-year old woman presented to the emergency department with complaints of abrupt retrosternal chest pain that started 30 minutes prior to admission. It was associated with shortness of breath, nausea, vomiting, dizziness, and diaphoresis. She was found to have significant life stressors, including post-traumatic stress disorder from her involvement during 9/11, and the recent death of a loved one. She had a 30 pack-year smoking history as well. Initial vitals revealed blood pressure of 188/97 mm Hg, heart rate of 105 beats per minute, respiratory rate of 20 breaths per minute, and oxygen saturation of 94% on room air. Physical examination revealed jugular venous distention and bilateral rales. Labs revealed elevated troponin of 0.67 ng/mL (reference range: <0.04 ng/mL) and brain natriuretic peptide of 369 pg/mL (reference range: <100 pg/mL). Electrocardiogram revealed sinus tachycardia with ST depressions in inferolateral leads and T-wave inversion in aVL. Chest X-ray revealed increased lung markings bilaterally. Diagnosis of acute coronary syndrome (ACS) and hypertensive emergency was made. She was initially managed with standard ACS medications and anti-hypertensives. Three hours later, she remained hypertensive, became diaphoretic, tachypneic, cold/clammy, with labored breathing, requiring BiPAP. Trans-thoracic echocardiogram revealed mildly reduced left ventricular systolic function with an ejection fraction of 41-45% with evidence of regional wall motion abnormalities. She was taken for an emergent left heart catheterization, where she was found to have no diseased vessels, normal filling pressures, and an ejection fraction of 45-50%. In addition, there was clear evidence of apical hyperkinesis and basal hypokinesis, consistent with RTC. In the cardiac care unit, her post-catheterization course was significant for continuous labile blood pressures. Troponin level peaked at 3.13 ng/mL, and her chest pain resolved. Inpatient psychiatry consultation was made due to her recent life stressors and previous medical history. With the proper management, her blood pressure stabilized. She was discharged on standard medications for ACS, an antidepressant, and scheduled for outpatient cardiology follow-up.

**Discussion:** Our case is unique in that our patient did not have any other condition or factors mediating the relationship between RTC and hypertensive emergency. Thus, this case demonstrates a possible direct association between RTC and hypertensive emergency. Further studies exploring this association could provide new insight into the pathophysiology of RTC.

## **Biocompatible Membranes Cannot be Trusted: An Unusual Cause of Thrombocytopenia**

*Clinical Vignette*

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**Introduction:** Mild thrombocytopenia is an observable change seen frequently in patients undergoing renal replacement therapy. Our ability, to suspect, identify, and manage it, is a task that could sometimes be challenging. One way we continue to work towards a life of hemodialysis without thrombocytopenia is to engineer biocompatible hemodialysis membranes. These membranes are described by their ability to elicit the least amount of inflammatory response, particularly through complement activation, and thus, decrease platelet destruction. There are three main types of membrane dialyzers; cellulose, substituted cellulose, and synthetic non-cellulose. More synthetic membrane types have been introduced to the market with the goal of further advancing biocompatibility. One of them, polysulfone membranes (F-160) used in Optiflux dialyzers are considered biocompatible, however here we will describe a rare case in which this particular membrane dialyzer induced severe acute thrombocytopenia that resolved after it was changed to a polyethersulfone membrane.

**Case Presentation:** A 78-year-old female with a past medical history of type 2 diabetes, hyperlipidemia, hypertension, and chronic kidney disease stage 4, presented to the emergency department with worsening shortness of breath at rest and with exertion. She denied any chest pain. Physical examination revealed mild jugular venous distention, normal heart sounds, decreased breath sounds bilaterally on lower lung fields, and bilateral pedal edema. Chest X-ray showed cardiomegaly with bilateral pleural effusion. Initial laboratory tests showed normocytic anemia with normal platelet count of  $156 \times 10^3 \text{u/L}$  (reference range:  $140\text{-}450 \times 10^3 \text{u/L}$ ), blood urea nitrogen of 88 mg/dL (reference range: 5-25 mg/dL), and creatinine of 5.04 mg/dL (0.44-1.0 mg/dL). She was managed with furosemide 60 mg twice daily. Due to persistently declining renal function, hemodialysis was initiated on day 3 using a polysulfone membrane (F-160). A significant fall in platelet count to  $80 \times 10^3 \text{u/L}$  was observed following her first dialysis session. Ultimately, this reached a nadir of  $45 \times 10^3 \text{u/L}$  following subsequent dialysis sessions. Of note, between each dialysis session, her platelet counts improved. Heparin products were never used during dialysis or during her stay. Several thrombocytopenia workup tests ordered by the hematologist came back unremarkable. This aggressive decrease in platelets was corrected to a peak of  $210 \times 10^3 \text{u/L}$  following substitution with the Nipro ELISIO dialyzer which uses a polyethersulfone membrane.

**Discussion:** This case report describes severe transient thrombocytopenia associated with a particular hemodialysis membrane recognized as being highly biocompatible (Fresenius Medical Care Optiflux polysulfone membrane F-160). Quickly identifying that the hemodialysis membrane is inducing thrombocytopenia through complement activation will hasten the change to an alternative hemodialysis membrane and reduce overall inflammation present in dialysis patients already at high risk for inflammatory induced cardiac thrombosis, stenosis, and death.

## **Iatrogenic Ostia between the Left Atrium and Esophagus: An Unusual Complication of Intracardiac Manipulation**

*Clinical Vignette*

Sm Arif Saleh, MD

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**Introduction:** Radiofrequency catheter ablation (RFA) is an effective treatment for recurrent symptomatic atrial fibrillation despite medical therapy. Complications include cardiac tamponade, pulmonary vein stenosis, and rarely atrial-esophageal fistula (AEF). We present a case of infective endocarditis with septic emboli as a sequel of AEF from RFA.

**Case Presentation:** A 77-year-old male with a history of persistent atrial fibrillation status post posterior left atrial isolation 50 days prior presented to the emergency department with bilateral lower extremity weakness ongoing for an hour. In addition, he reported a non-productive cough, chest discomfort, and dysphagia. Vitals were BP 193/110, RR 28, HR 135, T 102.3 °F, and 91% oxygen saturation on room air. Physical exam was significant for a decreased light touch sensation and 4/5 weakness in the bilateral lower extremity. Labs were significant for a white blood cell count of  $17.9 \times 10^3/\mu\text{L}$  (normal:  $4.5 - 11.0 \times 10^3/\mu\text{L}$ ), and troponin I of 1.76 ng/mL (normal:  $<0.04 \text{ ng/mL}$ ). Electrocardiogram showed an irregularly irregular rhythm and no ST or T wave changes. Chest X-ray was unremarkable. Non-contrast computed tomography (CT) scan of the head showed areas of low attenuation in the left parietal, temporal, and occipital region, with no acute intracranial hemorrhage. Magnetic resonance imaging of the brain with/without contrast revealed hyperintensity in both cerebral and cerebellar hemispheres, consistent with subacute infarcts suggestive of embolic disease. Tissue plasminogen activator was contraindicated, as he was on apixaban. The patient was admitted for management of altered mental status and sepsis of an unknown origin. Due to associated chest discomfort and dysphagia, CT scan of the chest with contrast obtained revealed a small focus of air between the posterior wall of the left atrium and the esophagus. A few hours later, he deteriorated with worsened hypoxic respiratory failure, altered mental status, requiring intubation and mechanical ventilation. Cardiothoracic surgery was consulted, and he was taken to the operating room for open-heart surgery due to concern for AEF. Peri-operatively, a left atrial fistula measuring 0.5 cm was identified and closed. Also, a fibrinous material (3x4 cm) was identified and removed in the left inferior pulmonary vein. On post-op day 1, he underwent an upper endoscopy, and a 1 cm esophageal defect was closed. Biopsy from fibrinous material was positive for polymicrobial organisms (lactobacillus, candida, and prevotella), while blood cultures grew streptococcus anginosus. Despite treatment with aggressive intravenous antibiotics, the patient deteriorated with poor neurological function and ventilator dependency. A multidisciplinary team reached a consensus agreement for palliative measures. Unfortunately, he passed away shortly after.

**Discussion:** To our knowledge, this case represents one of the few cases documenting life-threatening infective endocarditis with septic emboli as a complication of AEF from RFA. Therefore, clinicians should have a high index of suspicion due to associated grave prognosis.

## Rare Case of Cytomegalovirus Associated Splenic Infarction in a Healthy Young Male

### *Clinical Vignette*

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**Introduction:** Cytomegalovirus can infect hosts with both intact and compromised immune systems. The spectrum of disease can range from mild fever and myalgias to devastating complications in immunocompromised hosts. Hematologic complications including thrombus formation, especially within the spleen, have been rarely reported. The pathophysiology remains to be described, however, an emerging association between CMV and production of antiphospholipid antibodies is under investigation.

**Case Presentation:** A 47-year-old male with no significant past medical history presented with acutely worsening left upper quadrant abdominal pain. The pain had started spontaneously two months ago and has been progressively worsening. A week prior to presentation, the patient was evaluated at another hospital with similar complaints and was found to have poorly defined splenic lesions on abdominal computed tomography (CT) scan. Laboratory studies were consistent with hemolytic anemia and repeat abdominal CT scan showed splenomegaly and multiple splenic infarcts. These findings were later confirmed on abdominal CT angiography. A complete infectious, cardiogenic with use of echocardiography, and hypercoagulable workup was performed and was remarkable only for positive CMV antibodies, anticardiolipin antibodies, and Beta-2 glycoprotein antibodies. Treatment was initiated with intravenous heparin and transitioned to rivaroxaban prior to discharge. The patient was counseled to avoid contact sports for four weeks and provided a follow-up appointment at our family health clinic.

**Discussion:** Splenic thrombosis, in the absence of an underlying cause, is a rarely encountered phenomenon. It has been previously reported in hospitalized patients with several comorbidities. Our case stands in stark contrast as our patient had no chronic medical issues and was not on any long-term medications. More importantly, CMV-associated thrombosis is most commonly reported in immunocompromised patients. In immunocompetent hosts, deep venous thrombosis and pulmonary embolism are more common. The pathophysiology of thrombus formation in patients with CMV remains to be confirmed, however, recent theories have contributed to our understanding. A meta-analysis of thrombosis in patients with CMV revealed that over two-thirds were immunocompromised and one-fifth had developed antiphospholipid antibodies. CMV has been described to cause thrombophilia by promoting the production of factor VIII while delaying the production of heparin sulfate. Furthermore, CMV-associated inflammation can cause vascular damage that inappropriately activates coagulation factors and promotes platelet adhesion. Recent investigation has also associated CMV with the production of antiphospholipid antibodies likely through molecular mimicry. The most common causes of splenic infarct include hemoglobinopathies, particularly sickle cell disease. Dangerous complications involving splenic infarction include pseudocyst formation, abscess formation, hemorrhage and hematoma, aneurysm, and rarely splenic rupture. Hemorrhagic conversion warrants emergent surgical evaluation. Most cases resolve spontaneously with supportive care and do not warrant the use of anticoagulation.

# **A Rare Case of Steroid-Refractory Evans Syndrome Secondary to Chronic Lymphocytic Leukemia Successfully Treated With Rituximab**

*Clinical Vignette*

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**Introduction:** Evans syndrome (ES) is an autoimmune condition with simultaneous or sequential development of autoimmune hemolytic anemia (AIHA) and immune thrombocytopenia (ITP), with or without immune neutropenia. ES is associated with primary immunodeficiencies, rheumatologic diseases, and lymphoproliferative disorders including chronic lymphocytic leukemia (CLL). Evans Syndrome secondary to CLL is a rare association and is seen in 5-15% of patients. Herein, we report a rare case of steroid-refractory Evans syndrome secondary to CLL, successfully treated with Rituximab.

**Case summary:** A 76-year-old Russian male diagnosed with chronic lymphocytic leukemia (CLL), not on any chemotherapy, presented to the emergency department with generalized weakness, exertional dyspnea, palpitations for 1 week. He denied having any B symptoms, bleeding from anywhere, and skin changes. He was hemodynamically stable. His complete blood count revealed hemoglobin of 5.1 g/dl, MCV 148.5, WBC was 144.8 cells/microliter, Platelet count 255k, Reticulocyte count elevated at 26, elevated LDH 338 U/L, low Haptoglobin < 10 mg/dl. Coombs test positive for IgG, C3. He was given 2 units of packed red blood cells and was started on prednisone 60 mg BID, for Autoimmune hemolytic anemia secondary to CLL, which improved his hemoglobin to 8 g/dl. He was discharged on a tapering dose of steroids and Chlorambucil 8 mg PO once a day, which he was non-compliant with. The patient got readmitted to the hospital after a few weeks with similar complaints. Blood work showed recurrent autoimmune hemolytic anemia and thrombocytopenia, with hemoglobin of 6 g/dl and platelet count of 90K. He is diagnosed to have steroid-resistant Evans syndrome. The molecular study is negative for P53 mutation (favorable), IGHV status unmutated (unfavorable prognosis), ZAP 70, CD 38 positive (unfavorable prognosis), del of chromosome 13 at q14 (favorable). He was given 4 doses of IV immunoglobulins and 3 cycles of rituximab, which stabilized his platelet count and halted hemolysis. He was started on Ibrutinib for CLL complicated with steroid-refractory Evans syndrome.

**Discussion:** The prognosis of ES secondary to CLL can be determined by the presence of mutations in ZAP-70 expression, immunoglobulin heavy chain gene status, and TP53. The previous use of corticosteroid treatment for ES secondary to CLL has shown to be a temporary solution, with the majority of patients having a recurrence within 36 months. Therefore, the treatment of Evans syndrome has been under investigation, where research shows chemotherapy with or without rituximab is associated with better patient outcomes than the previous standard of treatment which included steroids alone or steroids combined with intravenous immune globulin. Ibrutinib produces an immunological rebalancing in CLL through ITK-driven Th1 polarization of cell-mediated immune response and is hence used to treat autoimmunity.

## **Squamous Cell Carcinoma of the Renal Calyceal System Presenting With Multiple Overlapping Features of XGP**

*Clinical Vignette*

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**Background:** Xanthogranulomatous pyelonephritis (XGP) is a chronic renal inflammatory disorder associated with destruction of renal parenchyma in the setting of recurrent infections and nephrolithiasis. Squamous cell carcinoma (SCC) arising from the renal calyceal system is a rare and aggressive cancer that has poor prognosis due to its late-stage presentation and early metastases. XGP and SCC of the renal calyceal system have clinically similar presentations and it is important to differentiate between the two diseases as the disease course and prognosis differ for each.

**Case:** The patient is a 37-year-old male with a past medical history of recurrent nephrolithiasis and pyelonephritis who presented with a three-day history of right-sided flank pain and hematuria. Physical exam and lab workup were significant for right-sided CVA tenderness and UTI. Renal scan demonstrated decreased uptake and delayed excretion from the right kidney with moderate right hydronephrosis suspicious for right kidney obstruction. CT findings were significant for a large staghorn calculus in the right kidney. The initial diagnoses were XGP and UTI and patient was discharged on antibiotics with scheduled cystoscopy and ureteral stent placement. But patient returned shortly with bilateral worsening flank pain. Patient was treated with IV antibiotics and discharged after right nephrostomy stent placement. However, patient was called back after a repeat review of the CT imaging showed IVC thrombus with retroperitoneal lymphadenopathy. Lymph node biopsy showed extensive infiltration with neoplastic cells that stained p63+ on immunohistochemistry (IHC), indicating metastatic poorly-differentiated SCC. Patient underwent radical right nephrectomy and IHC of the nephrectomy tissue showed neoplastic Gata3+ cells confirming the urothelial origin of the SCC. Repeat imaging showed disease progression with liver metastasis and despite chemotherapy, patient later died from metastatic cancer.

**Discussion:** XGP is a destructive granulomatous process that can occasionally mimic other neoplastic and inflammatory processes of the kidney. In XGP, CT imaging and histology often reveal diffuse or focal disease with granulomatous inflammatory infiltrates. Chronic irritation from recurrent infections and inflammation can lead to dysplasia in the urothelium leading to renal SCC. Staghorn calculi often contribute to the chronic inflammatory process that leads to cellular transformation. Thus, renal SCC must be considered in the differential diagnosis in patients with long-standing renal calculi, particularly staghorn calculi. XGP results in high morbidity from chronic kidney dysfunction but the overall mortality from XGP is low. In contrast, renal SCC has a 5-year survival rate <10% with a median survival time of 5 months. Early differentiation between these two conditions with very different prognoses can help targeted disease management.

**Conclusion:** Understanding rare and overlapping clinical presentations of an aggressive malignant condition (Renal SCC) with a chronic inflammatory process (XGP) can help achieve better patient outcomes.

## **An Atypical Cause of Recurrent Pancreatitis**

*Clinical Vignette*

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**Introduction:** In most cases of pancreatitis, the underlying cause is typically identified, with gall stones and alcohol abuse accounting for most cases. However sometimes the identifiable cause is not obvious, and these instances provide a valuable learning opportunity.

**Case Description:** A 63-year-old male presents with a three-week history of burning, 8 out of 10, periumbilical and epigastric abdominal pain that radiates to the back and worsens with food. The patient did not report any nausea, vomiting, hematochezia, melena, chest pain, shortness of breath, fevers, or chills. His past medical history and family history were non-contributory. His social history was negative except he reported having several drinks on a recent weekend but that his most recent drink was a week prior to presenting. He did not have any recent medication changes. His vitals on presentation were stable. His physical exam was benign, including his abdominal exam which was negative for tenderness, guarding, rigidity or distention. Laboratory findings were significant for an elevated lipase of 245 and mild isolated elevation of ALT to 37. CT abdomen pelvis revealed mild haziness around the pancreatic head suspicious for pancreatitis. The patient was admitted with pancreatitis and treated for his pain while gradually advancing his diet. Nine days following discharge from the hospital he returned with an identical presenting complaint. During this second hospital stay it was revealed that the patient had undergone a recent right inguinal lymph node biopsy because of painful swelling in that region prior to his initial pancreatitis hospitalization. The biopsy revealed Diffuse Large B-Cell Lymphoma. Involvement of the pancreas was confirmed via PET scan which demonstrated a hypermetabolic lesion in the uncinate process. His condition improved with intravenous fluids and advancing his diet. He was discharged and followed up with oncology as an outpatient.

**Discussion:** The typical presentation for a patient with undiagnosed lymphoma typically involves the characteristic "B symptoms" of fevers, night sweats and weight loss. However, the patient in this case did not report these expected symptoms. Instead, his presenting symptom for his malignancy was recurring pancreatitis. His presentation met the diagnostic criteria for pancreatitis and given his improvement following typical treatment for pancreatitis, his clinical picture appeared standard for his condition. However, the persistent issue with the initial diagnosis of pancreatitis was an inability to identify an inciting cause. The only potential identifiable cause was his recent alcohol use; however, his initial episode of pain began before his alcohol use, and his second episode was unrelated to alcohol. This case demonstrates an interesting and atypical presentation of lymphoma and provides a valuable teaching opportunity to consider malignancy as cause of pancreatitis, especially when there is not a clear etiology.

## Remdesivir-Induced Extreme Bradycardia in COVID-19

*Clinical Vignette*

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**Introduction:** Remdesivir is the only antiviral fully FDA approved drug for the treatment of COVID-19 and has been shown to improve recovery time for severe disease without survival benefit. It inhibits the RNA-dependent RNA polymerase the SARS-CoV-2. However, it has been occasionally shown to induce bradycardia.

**Case:** A 53-year-old man with a history of diabetes mellitus type 2 presented with malaise, fatigue, anorexia and fever for 4 days. There was an associated worsening productive cough with yellowish sputum. He was recently in contact with a family member who tested positive for COVID-19 and on presentation the patient was found to have COVID-19 positivity. On admission, heart rate was 66bpm, temperature 100.6F, respiratory rate 30, oxygen saturation 88% on ambient air (improved to 94% on 4LPM via nasal cannula) and BP 139/73. Physical exam revealed a regular pulse, S1 and S2 without rubs, murmurs or gallops. Breath sounds were equal, bronchial and reduced bilaterally. Coarse rales were appreciated without wheezing. Chest X-ray showed bilateral infiltrates. He was loaded with remdesivir 200mg IV followed by 100mg IV daily. Simultaneously ivermectin and high dose methylprednisolone were started. Heart rate remained in the sixties for the first three days and on day 4 went to a nadir of 33. Pacer pads were placed on the patient and atropine at the bedside. At that time his oxygen requirements increased to 15LPM via the non-rebreather mask. A differential diagnosis of bradycardia secondary to remdesivir, ivermectin or hypoxia was entertained. Ivermectin was stopped and stable hypoxia persisted. An echocardiogram revealed ejection fraction of 55-60% with no valvular abnormality or pericardial effusion. Bradycardia persisted with a further nadir of 29. We extended the course of Remdesivir due to the latest update, but stopped it on day 7 due to persistent and worsening bradycardia. The heart rate recovered over the subsequent 3-7 days and he was successfully discharged home on nasal cannula (for use on exertion) with a stable heart rate in the seventies.

**Discussion:** Having stopped ivermectin and with stable hypoxia, we had a top differential of remdesivir-induced bradycardia. Consideration was given to use a dopamine drip to facilitate completion of Remdesivir, but given that 7 days had been completed and the evidence has been controversial for its use we stopped the drug and observed for chronotropic recovery. Heart rate improvement correlated with the half-life of remdesivir and did not recur throughout hospitalization. Recommendations for the use of remdesivir to treat COVID-19 vary and remain controversial. Prolonged use and high dosages may induce cardiotoxicity manifesting as severe bradycardia. Given that current evidence does not support survival benefit, clinicians should remain mindful of the cardiotoxic adverse effects.

# Rare Complications of Pseudomonal Sepsis Present as Ecthyma Gangrenosum at the Site of COVID Vaccine And Pyomyositis

*Clinical Vignette*

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**Introduction:** Patients with chronic lymphocytic leukemia (CLL) are at increased risk of infections. A review of the medical literature shows that hematological malignancies are a risk factor for pyomyositis, with most cases being due to *Staphylococcus aureus*. In contrast, *Pseudomonas aeruginosa* (PA) appears to be a rare causative organism. This case report illustrates how a CLL patient can rapidly become moribund with *Pseudomonas* septicemia with several of its complications, including pyomyositis in a severely neutropenic patient.

**Case Description:** A 66 year-old-male with diabetes and CLL, who completed chemotherapy (bendamustine and Rituximab) six months prior to admission, presented to the hospital with dizziness and weakness for three weeks and an eschar at the Covid vaccine site for two weeks. Associated symptoms included non-bloody diarrhea and polyuria/polydipsia for three days. He denied fevers, chills, recent travel, tick bites, sick contacts, or pets at home. Upon presentation, he was febrile (Tmax 100.5F), tachycardic, and hypotensive. On physical examination, he appeared lethargic and diaphoretic. A 2 X 2 cm dry necrotic lesion was noted on the left arm with surrounding erythema and tenderness without drainage and one 1 X 1 cm tender erythematous "bull's-eye" rash in his right inner thigh. Labs were notable for WBC of 1000/UL with ANC of 460, BUN 86 MG/DL, Creatinine 5.04 MG/DL, lactate 2.5 mmol/L, glucose of 522 MG/DL, anion gap 22, Bicarb 14 mEq/L. He was admitted to the ICU for DKA and sepsis and was started on IV fluids, insulin drip, IV Cefepime, Vancomycin, and Clindamycin for neutropenic fevers and suspected necrotizing fasciitis. Admission blood cultures (both sets) grew gram-negative rods. CT left arm without contrast showed necrosis of the soft tissues in the left arm without any reported extension into fascia or muscle. He underwent left arm wound debridement, and intraoperative findings showed necrotizing soft tissue infection with intra-op cultures growing PA. Diagnosis of ecthyma gangrenosum was made and IV Vancomycin and Clindamycin were discontinued. He was treated with IV Cefepime for pseudomonal sepsis. Filgrastim was initiated for count recovery, and on day three of this therapy, he developed erythema, swelling, warmth, and tenderness of the right arm with a patchy macular rash on the right thigh. MRI of the right lower extremity w/o showed myositis with an intramuscular abscess within the anterior tibialis and peroneus longus muscles. MRI of the right forearm w/o showed large confluent subcutaneous abscesses. CPK levels at this time were 35 U/L. He was taken to the OR for incision and abscess drainage, cultures from which grew PA. He received IV Cefepime for four weeks with resolution of symptoms and neutropenia.

**Discussion:** Ecthyma gangrenosum has been reported to occur in up to 30% of patients with *Pseudomonas* septicemia, and mortality rates range from 38% to 96%. It is thought that *pseudomonas* invades the media and adventitia of small vessel walls which leads to subsequent infarction and necrosis of the surrounding tissue. Pyomyositis is caused by transient bacteremia rather than local extension of a contiguous infection. Pyomyositis due to PA is very rare. Diagnosis requires a high index of suspicion and is confirmed with ultrasound, CT scan, or MRI. Early diagnosis enables complete drainage of purulent materials and successful treatments with IV antibiotics and leads to resolution in vast majority of cases.

## **Lemierre's Syndrome: A Rare, Yet Life-Threatening Cause of Sore Throat**

*Clinical Vignette*

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**Introduction:** Lemierre's syndrome (LS) is a rare, but life-threatening cause of sepsis characterised by thrombophlebitis of the internal jugular vein (IJV), usually due to anaerobic bacteremia following a recent oropharyngeal infection. With the advent of antibiotic use, its incidence has decreased dramatically however, its recognition and timely treatment remain crucial.

**Case Description:** A 24-year-old male with no known past medical history had presented to the Emergency Department (ED) due to 3 days of sore throat. He was febrile with a temperature of 103°F and his oropharynx was found to have bilateral tonsillar enlargement and erythema with exudates. Throat cultures did not grow any organism. He had been diagnosed with viral pharyngitis and discharged home from the ED with symptomatic treatment. In the week following, his sore throat continued to improve but he began experiencing fatigue with fevers, chills, left-sided pleuritic chest pain, neck pain and hence returned to the ED. He was febrile with a temperature of 103°F, pulse of 121, blood pressure of 106/51, respiratory rate of 18, and saturation of 97% on room air. Physical exam revealed a loud, grade III systolic murmur in the tricuspid region and bibasilar rales. He had a neutrophilic leukocytosis of 13.9K/UL. CT scan of the chest showed one cavitary infiltrate in the left upper lobe and multiple bilateral nodular opacities. A transthoracic echocardiogram did not show any valvular pathology or vegetations. Blood cultures did not grow any organisms. Subsequent gram stain and cultures from bronchoalveolar lavage were negative for acid fast bacilli and fungi. CT scan of his neck with contrast revealed a filling defect in the left IJV consistent with thrombophlebitis. Based on these findings, he was diagnosed with Lemierre's syndrome. He was treated empirically with vancomycin and meropenem. He continued to clinically improve, gradually defervesced and his leukocytosis resolved. He was discharged to continue 4 weeks of IV antibiotics as an outpatient.

**Discussion:** Lemierre's syndrome often presents with fever, sore throat and neck pain in an immunocompetent young adult. It is believed that its pathogenesis usually involves oral flora that migrates via veins, lymphatics or regional tissue to the IJV. Most common complications include pulmonary necrotic cavitary lesions and suppurative joint infections due to septic emboli. The diagnosis is based on the presence of IJV thrombophlebitis on imaging and bacterial growth in cultures, however negative cultures in LS have often been reported. Our case highlights the gravity of keeping a high index of suspicion for LS, in patients presenting with acute tonsillopharyngitis and neck pain, even in the absence of an organism identified on a blood culture.

**MEDICAL STUDENTS**

# Outpatient Podiatry Evaluations Did not Decrease Falls in Elderly Patients with Diabetes Mellitus

*Research*

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**Introduction:** Elderly patients with diabetes mellitus (DM) are faced with potential changes in their lower extremities, such as peripheral neuropathy and peripheral arterial disease, which lead to loss of sensation, weakness, ulceration and other changes in their feet, making them vulnerable to falls. We hypothesized that evaluation by podiatrists would decrease the frequency of falls in the elderly patients with DM.

**Methods:** Retrospective medical record review of patients with DM over the age of 65 years was performed who visited our primary care office between January 1, 2019 and June 30, 2019. Patients were divided into a group that had podiatrist evaluations (PODEVAL) and another group that did not have podiatrist evaluation (NoPODEVAL). Events and association of falls within a six-month follow-up period after podiatrist evaluations, and comorbid medical conditions, were compared between the two groups. Independent T-Tests were used to compare the means of continuous variables between the study groups. Chi Square tests were used to compare the proportions of categorical variables. A logistic regression model was used to examine the factors that contributed to falls.

**Results:** A total of 197 patients were included (PODEVAL = 92; NoPODEVAL = 105). Mean ages of the two groups were comparable (76.9 years PODEVAL, 75.5 years NoPODEVAL;  $P = 0.151$ ). There was no significant difference in the events of falls in a six-month follow-up period between PODEVAL and NoPODEVAL groups (35.9% vs 32.4%;  $P = 0.606$ ). We found significantly higher frequencies of association of several disorders of the lower extremities in PODEVAL group compared to NoPODEVAL group, such as bunions and calluses (48.9% vs 27.6%;  $P = 0.002$ ), foot ulcers (14.1% vs 3.8%;  $P = 0.010$ ), peripheral arterial disease (50.0% vs 26.7%;  $P < 0.001$ ), and peripheral neuropathy (75.0% vs 47.6%;  $P < 0.001$ ). Patients with falls had higher frequencies of associations of some comorbidities compared to the patients without reported falls, such as coronary artery disease (65.7% vs 42.3%;  $P = 0.002$ ), peripheral arterial disease (47.8% vs 32.3%;  $P = 0.034$ ), dementia (19.4% vs 8.5%;  $P = 0.026$ ), congestive heart failure (25.4% vs 13.1%;  $P = 0.030$ ), carotid stenosis (22.4% vs 10.8%;  $P = 0.029$ ), syncope (28.4% vs 7.7%;  $P < 0.001$ ), and Parkinson's Disease (9.0% vs 1.5%;  $P = 0.020$ ). Patients with anemia had 4.2 times greater odds of falls (95% CI 1.159-15.219).

**Conclusion:** Among elderly patients with DM, there is no significant difference in the events of falls between the group of patients who had podiatrist evaluations and the group who did not.

## A Model for Physician Burnout

*Research*

Karan Patel, MD

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**Introduction:** Physician burnout is an ongoing problem in the medical community. Many studies have shown that nearly half of all physicians experience burnout. While we are aware that various factors may contribute to burnout, there has not yet been a study that has analyzed the degree to which various factors impact burnout. In this study, we try to fill this gap by proposing a model with weights based on certain factors related to burnout.

**Methods:** In order to determine what factors contributed to burnout we used Medscape's Annual Burnout and Depression Surveys, Doximity op-ed articles, and PubMed searches utilizing the search term "physician burnout". After compiling various factors that contributed to burnout, we extracted data from various sources including research journal articles, NRMP match data, and Medscape's surveys in order to gather collected data for each of the factors that we included in our analysis (i.e. number of hours each speciality worked per week, match rates per speciality, ect). We decided to model our equation based on internal medicine and several of its fellowship specialties (cardiology, allergy/immunology, critical care, diabetes/endocrinology, gastroenterology, infectious diseases, nephrology, and rheumatology) as they cover a broad spectrum in medicine. We then found the burnout rates for each of these specialties (taken as the weighted average of them from 2018-2021) based on Medscape's Annual Burnout and Depression Surveys. Afterwards, we performed linear regression with XLminer. To confirm our model's validity, we tested our equation on various specialties (not included in our original development of the equation) and compared our predicted burnout rates with actual burnout rates from Medscape's Annual Burnout and Depression Surveys.

**Results:** Equation to Model Burnout

% Chance of burnout =  $43.4 - (0.08 * \text{hourly wage}) + (0.33 * \text{hours worked per week}) -$   
 $(1.89 * \text{years of residency} + \text{fellowship training}) - (0.0054 * \text{match rate}) + (5.06 * \text{procedural speciality})$

Note: procedural speciality = 1, cognitive speciality = 0

Other Statistics

Adjusted R<sup>2</sup> value = 0.8

P-value For Each Factor:

Hourly wage: p = 0.06

Hours worked per week: p = 0.03

Total length of training: p = 0.11

Match rate: p = 0.93

Procedural versus cognitive speciality: p = 0.10

**Conclusions:** Physician burnout is subjective in nature and is complex to quantify. Many institutions have hypothesized that various factors may increase or decrease physician burnout. However, we hope this model provides a more concrete basis to be used to determine not just which factors lead to burnout, but how modifying certain factors can increase or decrease burnout rates. In addition, the model can be used per individual, rather than just per speciality, to identify individuals who are at high risk for burnout.

# **An Analysis of Coping Mechanisms During COVID-19**

*Research*

Aleem Mohamed, MD

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**Background:** Media outlets have reported significant increases in maladaptive coping behaviors among physicians as a means of coping with pandemic-related stress. While the burden borne by physicians during the pandemic is indisputable, the increase in maladaptive coping mechanisms during the COVID-19 pandemic may not be significantly elevated. We seek to demonstrate that the coping mechanisms used by physicians to alleviate stress during the pandemic may be comparable to those used prior to the pandemic, hypothesizing that, during times of stress, people generally lean heavily on their existing coping mechanisms (maladaptive or otherwise) as opposed to developing new ones. Though it is likely that some physicians developed new maladaptive coping mechanisms to manage the stress of the COVID-19 pandemic, we theorize that this is not the case for the medical community at large and likely only applies to a small percentage of physicians.

**Methods:** We analyzed Medscape's National Physician Burnout & Suicide Reports from 2020-2021, focusing on the mechanisms by which physicians dealt with burnout prior to and during the COVID-19 pandemic. The 2020 survey results were used as the baseline, pre-pandemic standpoint (as the 2020 survey reflects data collected in 2019) and the 2021 survey reflected mid-pandemic coping strategies. To determine if the prevalence of use of coping mechanisms had changed significantly (increased or decreased propensity) we performed odds ratios and 95% confidence intervals per question.

**Results:** How do Physicians Cope with Burnout?

Maladaptive Behaviors:

Isolate myself from others (OR 0.92; 95%CI, 0.88-0.97)

Eat junk food (OR 1.09; 95%CI, 1.04-1.15)

Drink alcohol (OR 1.11; 95%CI, 1.05-1.18)

Binge Eat (OR 1.06; 95%CI, 1.00-1.13)

Prescription drugs (OR 1.52; 95%CI, 1.30-1.77)

Smokes cigarettes/use nicotine products (OR 0.67; 95%CI, 0.56-0.77)

Smoke marijuana (OR 1.00; 95%CI, 0.79-1.27)

Constructive Behaviors:

Exercise (OR 1.13; 95%CI, 1.08-1.18)

Talk with family members/close friends (OR 1.04; 95%CI, 0.99-1.09)

Sleep (OR 0.96; 95%CI, 0.91-1.01)

Play or listen to music (OR 1.20; 95%CI, 1.14-1.26)

Other (OR 1.00; 95%CI, 0.93-1.08)

**Conclusions:** Overall, stress-induced coping mechanisms amongst physicians were similar before and after the pandemic. After analyzing survey responses of ~28,000 physicians across 29 specialties, the notion that the pandemic prompted the use of maladaptive coping mechanisms is not well-represented in this analysis. We were not able to draw any conclusions about increase in pre-existing adaptive behaviors (ex. increase in tobacco use among pre-pandemic smokers) from the data available. It is possible that those with maladaptive coping mechanisms did indulge in these behaviors more.

# **Ethical and Legal Challenges with Big Data and Genomics for Privacy, Consent, and Ownership**

*Research*

Neil Mookerjee

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**Statement of Purpose:** Digital healthcare, as it relates to big data and genomics, presents a real threat to privacy and ownership rights for individuals and society.

**Research Question/Hypothesis:** Our experience with genomics provides a lens to facilitate the way we navigate towards a future health data space. Contemporary and innovative legal and ethical models can be applied to concepts of privacy, ownership, and consent in relation to big data.

**Significance:** Technological innovation has transformed healthcare at a faster rate than legal reform, security measures, and consent policies can adapt. HIPAA has been recognized as a work in progress in current big data related to healthcare and wellbeing of individuals. The shortcomings of HIPAA and its application to big data can be paralleled with its prior limitations surrounding genomics in last two decades. The Genetic Information and Nondiscrimination Act (2008) and Genomic Data sharing Policy (2015) were established to overcome HIPAA's inadequacies concerning genetic discrimination and security. These policies can serve as a basic model for approach to legislative reform as it relates to privacy risks with big data generated in healthcare and from healthy individuals in society who are not patients. In addition to notions of privacy, concepts of ownership and consent have become increasingly vague. The technological advancements have facilitated access and transmission of information such that big data can be sold for financial gain for commercial enterprises. This applies to genomics, with companies like 23andMe, in addition to big data, as it relates to big tech giants like Apple or Google who oversee wearable and search term data. Clarity of ownership within a digital healthcare arena needs to be defined through ethical and legal framework at global level.

**Approach:** A narrative review of literature published between 2010 and 2021 was performed using PubMed and Google Scholar. Articles discussing privacy, security, ownership, big data and genomics were included as relevant literature.

**Importance:** As a society, we are at a crossroad; we must determine the extent of privacy that we are willing to give for science and society. We cannot continue with the current status quo in hope that the individual will be used for the greater good of society. We need to strive for a cohesive approach to combat privacy violations by encouraging legislative reform, ethical accountability, and individual responsibility.

# A Snapshot Assessment of Telehealth Competencies Across Four Years of Medical School

*Research*

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**Background:** Telehealth services are an essential part of healthcare delivery, but medical schools do not all have a formal telehealth curriculum. In 2016-2017, 58% of US medical schools included telehealth as a required or elective course in their curriculum. However, during the SARS-CoV-2 pandemic, medical students have been exposed to more telehealth-based clinical activities. The purpose of this study is to investigate the effect of exposure to telehealth activities on medical students' telehealth-based knowledge and self-assessed competencies based on the AAMC telehealth-based competencies.

**Methods:** A survey was distributed to medical students enrolled at both the Rutgers Robert Wood Johnson Medical School and New Jersey Medical School from March to July 2021. Self-reported frequency and quality of exposure to telemedicine-based clinical activities were compared across the four years. Structured knowledge-based questions to evaluate general telehealth knowledge and self-assessment questions were created based on the AAMC Telehealth Competencies guidelines across the following domains: Patient Safety and Appropriate Use (Safety), Access and Equity (Equity), Communication, Data Collection and Assessment (Assessment), Technology (Technology) and Ethical Practices and Legal Requirements (Ethics). The responses were compared along different levels of education and exposure to clinical telehealth activities.

**Results:** Of the 82 respondents, 89% had experience with standardized patients via telemedicine, with second- and fourth-year students (on average 6.4 standardized patients) having almost double the exposure compared to the first-year and third-year students (on average 3.5 standardized patients). 78% of students had exposure to actual patients via telemedicine with third- and fourth-year students (on average 16 actual patients) having triple the exposure compared to first and second-year students (on average 5.6 actual patients). During these experiences, 65% of students observed physicians conducting a patient interview while only 31% observed a physician performing a physical exam using telehealth modalities. In assessing their knowledge base about telemedicine, all years performed relatively equally, with higher performance in the Equity and Assessment domains and lower scores in the Technology and Safety domains. Self-reported confidence across telehealth competencies domains of Safety, Assessment, Communication, Ethics, Technology, and Equity increased from first-year to fourth-year students. Overall, fourth-years demonstrated the highest confidence in their skills and had the most exposure to patients, standardized and real. 87% of students gave feedback that more telehealth services should be provided by physicians, and 63% of students felt telehealth increased patient satisfaction.

**Conclusion:** The results highlight the increased confidence in telehealth topics that have clinical parallels to in-person training, such as Equity and Assessment, but telehealth-specific topics like Communication and Ethics of telemedicine require more targeted education. The study supports the baseline findings that telehealth education should become integrated into the medical school curriculum in order to foster student telehealth competencies and promote telemedicine in future stages of training.

# Diagnosing Endometriosis using Artificial Intelligence on Ultrasound

*Research*

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**Introduction:** Endometriosis is a non-malignant process that affects more than 11% of American women between 15 and 44. It can cause severe dysmenorrhea, dyspareunia, and chronic pelvic pain. Because 30-50% of women with endometriosis are infertile, there is a significant need to diagnose patients at an early stage. While the current gold standard for diagnosis is laparoscopy with biopsy, ultrasound detection would provide a safer, more cost-effective diagnostic tool than surgery and/or MRI. Our objective is to evaluate the accuracy of diagnosing endometriosis at an early stage by detecting features on ultrasound not visible to the naked eye.

**Methods:** A retrospective cohort of 340 subjects with a diagnosis of endometriosis seen 2017-2020 at Rutgers were cross-referenced with 994 subjects who had undergone GYN surgeries. Two groups of 50 subjects were defined. The endometriosis group included subjects > 21 years old, diagnosed with endometriosis via laparoscopy or laparotomy, and assessed via transabdominal and transvaginal ultrasounds at Rutgers. The normal group met the same criteria except for the diagnosis of endometriosis. Subjects who had undergone hysterectomies or oophorectomies were excluded. A multitask neural network was evaluated on both sets of ultrasounds. All proposed networks were trained for 50 epochs using the early stopping technique to avoid overfitting, a learning rate of 0.001 for the first epoch, and a learning rate decay of 0.1 every 15 epochs with mini-batches of size 32. All images were normalized to have zero mean and unit variance and resized to the suitable size for each network during training. All techniques were implemented in Python using the Pytorch framework. Results: Three neural network algorithms, EfficientNetB2 (AUC=0.8278), ResNet50 (AUC=0.8219), and DenseNet121 (AUC=0.8457) were used to classify endometriosis. To improve accuracy, the number of images were increased via data augmentation, improving AUC values (EfficientNetB2=0.8758, ResNet50=0.8839, DenseNet121=0.8995).

**Conclusions and Future Directions:** Many clinical applications have successfully analyzed ultrasound images using multitask neural networks. Our pilot study successfully classifies endometriosis. We expect to identify early-stage endometriosis via a similar approach, which would reduce the need for diagnostic laparoscopy. Future work includes increasing the cohort size to validate results and developing our own multitask algorithm to improve prediction quality.

## Utilization of Medical Students in a Vaccine Outreach Initiative

### *Quality Improvement*

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**Background:** From March-July 2020, hospitalization rates of COVID-19 patients disproportionately affected minority groups, inclusive of racial, socioeconomic, education, and disability status, unveiling the inequities and discriminatory foundation that are perpetuated in our healthcare system. Since vaccination is the best defense against contracting SARS-CoV-2 and serious COVID-19 complications, providing equitable vaccine access to the public is of utmost importance. This includes equipping patients with the knowledge to make well-informed decisions regarding the vaccine. Here, we explain the workflow of an outreach initiative that employs medical students to address patients' concerns, answer questions, and clarify misinformation in an effort to improve the low vaccination rates and high levels of hesitancy that persist in Camden, NJ.

**Methods:** We partnered with the Urban Health Institute of Cooper University Hospital (CUH) and the Salvation Army Kroc Center in Camden to create a list of residents that met the Group 2B-2C eligibility requirements to receive the vaccine. Medical student volunteers from Cooper Medical School of Rowan University attended a training session that walked through the dual-lingual scripts, FAQs and CDC information pertinent to the pandemic and vaccinations, all of which were maintained in a shared drive. Several feedback sessions were routinely conducted to adjust the process as needed. All patients were confidentially called using DoximityApp with a 'Cooper University Hospital' caller ID. Students were encouraged to ask open-ended questions, implementing the motivational interviewing technique, and use the provided resources as a guide for open conversation without strictly stating facts or being persuasive. To measure vaccine hesitancy, students also asked patients whether or not they would be interested in receiving the vaccine (Y/N question) at the beginning of the call. A shared document maintained a record of volunteers, patient MRNs, vaccine status, 'chief complaint,' and other pertinent notes, along with a final indication of whether they would like to be contacted by a vaccination scheduler. All students documented calls within EPIC (electronic medical record system utilized by the CUH system). Future work will ascertain how many contacted patients ultimately attended their vaccination appointments.

**Conclusion:** In this initiative, we addressed the multitude of potential barriers to access of information that could persist in the Camden patient population by providing medical student support to help make informed decisions. Over the span of seven months, we had 55 volunteers contact more than 1,200 patients in the community who are largely socioeconomically disadvantaged and may lack access to care. While it is unclear at this point whether or not the program directly increased vaccination rates, it has been shown that the medical student body can be an invaluable resource for reaching out to populations at large for the improvement of patient care.

## **Internal Medicine and Subspecialties: Shadowing Opportunities for Preclinical Students**

### *Quality Improvement*

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**Introduction:** Clinical exposure to various specialties is critical to the development of future doctors as it provides insight into the responsibilities that practicing physicians undertake on a daily basis. For preclinical students, the onus to seek out clinicians to shadow falls on the student, which can be difficult and challenging, particularly if beginning medical school during a pandemic. At Cooper Medical School of Rowan University, the Internal Medicine Interest Group has developed a hospital-based shadowing program for Internal Medicine to equip students with the knowledge and experience to enter their clinical years with a solid foundation of how these physicians practice medicine.

**Methods:** This program was initiated in the Internal Medicine department at Cooper University Hospital in Camden, NJ. The decision to hold these sessions on Sundays from 7-10pm was based upon the resident cohort two week schedules and the ideal student to resident ratio that would not impede workflow of the team and third year medical student rotations. The Internal Medicine Interest Group leaders performed a trial run of the program before opening up enrollment to the student body, in order to resolve potential obstacles. A sign up sheet was then electronically distributed to pre-clinical first and second year students on a first come, first served basis. Students and the Chief Resident are emailed the Friday before each session with reminders and directions for the evening. At the time of this abstract 13 students had completed a shadowing experience.

**Results:** After completion of the shadowing experience, students were emailed a 5 question survey. Of the 13 students who completed a session the response rate was 84.6%. Students were asked on a 1-5 scale their interest in IM after shadowing. 45.5% responded with a 3, 45.5% with a 4, and 9.1% with a 5 on the interest scale. On a scale of 0-10 with 0 being the worst and 10 being the best, students were asked to rate their experience. The average was a 7.18/10 with a range of 6 (high:9, low:3). On a scale of 1-5 for how likely students were to recommend this experience to their peers, 81.9% of students indicated a 4 or 5. Every student was able to see at least one patient during their experience. Additionally, 36.4% students were able to have hands-on experience with patients, which included physical examination and/or patient interviewing.

**Future Directions:** Future directions include continuing the Internal Medicine shadowing program to ensure that the program continues despite transitions in the Internal Medicine Interest Group leadership and hospital residents. Additionally, coordination and sign-ups were initiated for gastroenterology endoscopy suite shadowing and cardiac catheterization lab sessions.

## **A Twenty-year-old Man with Acute Myocardial Infarction**

### *Clinical Vignette*

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**Introduction:** Premature coronary artery disease (CAD) refers to coronary atherothrombotic lesions, or atherosclerotic narrowing of the coronary arteries in men younger than 55 years and in women younger than 65 years of age.

**Case:** A 20-year-old man with diet-controlled type-2 diabetes mellitus (MODY) presented with acute mid-sternal chest pain provoked 1-hour after running, associated with diaphoresis and nausea. He had intermittent exertional chest pain 3-weeks prior to the presentation. Five months prior, he recovered from mild COVID-19 disease. His father had acute myocardial infarction at age 40, and his mother had systemic lupus erythematosus. He was not on any medication and denied use of tobacco, alcohol or recreational drugs. His vitals recorded blood pressure of 153/90 mmHg, pulse 85 beats/min, and respiratory rate of 26/min. His body-mass-index was 31.17 kg/m<sup>2</sup>. The rest of his physical exam and vitals were unremarkable. His electrocardiogram showed normal-sinus-rhythm with ST-segment elevations in anteroseptal leads. His delta high-sensitivity cardiac troponin-T was elevated. A comprehensive metabolic panel, complete blood count, and chest x-ray were unremarkable. Coronary angiography revealed a thrombotic lesion at the middle portion of the left anterior descending artery with 100% occlusion. He underwent percutaneous coronary intervention and stent placement. There was no intravascular dissection or plaque rupture identified in the intravascular ultrasonography. His hypercoagulability workup was non-contributory. He improved and was subsequently discharged.

**Discussion:** CAD is rare in young patients; the prevalence of CAD and MI in 20 to 39-year-olds is 1.2% and 0.3% respectively. Conventional CAD risk factors in the younger population manifest differently with smoking being the strongest independent risk factor. Factors such as use of tobacco, alcohol, and cocaine are independently associated with premature CAD. Family history of CAD is also an important component of premature CAD and predisposes to severe coronary atherosclerosis. CAD in younger populations usually presents with single-vessel disease, higher rates of normal coronary vessels on angiography, occlusive thrombus produced by rupture of angiographically invisible plaques, and symptoms of acute coronary syndrome instead of stable angina. SARS-CoV-2 infection is linked with cardiac injury, particularly predisposing to thrombosis and ischemia via upregulation of inflammatory cytokines that mediate atherosclerosis through local inflammation, hemodynamic changes, and procoagulant factors. Our case was unusual due to lack of age-based risk factors. A positive family history and COVID-19 inflammatory changes were the likely cause of acute MI in our patient.

**Conclusion:** We report a rare case of acute myocardial infarction in a 20-year-old man due to premature CAD likely accelerated by COVID-19 disease. With the ongoing pandemic, in which an estimated 1 out of 3 Americans have been infected with SARS-CoV-2, clinicians should be cognizant of the sequelae of COVID-19, such as worsening or acceleration of CAD even at younger ages.

## **Painless Scrotal Ulcers Becomes Something Unexpected: A Rare Case of Scrotal Calciphylaxis**

*Clinical Vignette*

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**Background:** Calciphylaxis is a rare and challenging vascular disorder characterized by painful cutaneous ulceration and necrosis. This diagnosis should be part of the differential in a patient with comorbidities even when the presentation is atypical. This fatal disease has an estimated six month survival of 50%. The high rate of mortality and morbidity coincide with the risk factors associated with this condition such as end stage renal disease, diabetes, and secondary hyperparathyroidism. Recent trends in the United States revealed an increase in prevalence of calciphylaxis in patients on hemodialysis. We report an atypical case of painless scrotal calciphylaxis masked by neuropathy in an end stage renal disease patient on hemodialysis (ESRD on HD).

**Case Presentation:** A 68-year-old male with a past medical history of ESRD on HD, diabetes mellitus II, peripheral vascular disease (PVD) neuropathy, presented to the hospital with altered mental status (AMS) and severe left foot necrosis. He was evaluated by vascular surgery and podiatry. Below the knee amputation of the left leg was performed with an eventual unremarkable recovery. Few days later, a painless 5 cm mid scrotal wound and eschar with sloughing was noted on physical exam. No crepitus and fluctuance were noted. The ulcer was nontender to palpation. Ultrasound identified calcifications in the scrotal tissue and CT of the pelvis without contrast showed extensive calcification of the arterial system. However, the scrotal biopsy indicated severe skin and soft tissue necrosis with acute and chronic inflammation; no calcium deposits were seen. A clinical diagnosis of calciphylaxis was made given the eschar raised concerns for calciphylaxis along with the patient's comorbidities of secondary hyperparathyroidism, ESRD, and his non-adherence to HD. Treatment was initiated with sodium thiosulfate 12.5g with an eventual dose increase to 25g. The patient stabilized over the next few days and was discharged to a post-acute care facility. Five days later, the patient was readmitted for evaluation of AMS and unfortunately passed away due to cardiac arrest.

**Discussion:** This case highlights the atypical presentation of painless ulcers as seen in this patient with calciphylaxis. Although the skin necrosis is typical of this disease, the lack of pain perception despite such a severe condition in our patient is noteworthy. Furthermore, the current literature provides data on several cases of penile calciphylaxis; however, scrotal calciphylaxis is seen less frequently and has little to no data on diagnosis and treatment when the presentation is painless.

**Conclusion:** This case is an atypical presentation of painless eschars. Therefore, a high degree of clinical suspicion in patients with ESRD on HD and T2DM is needed to effectively reach a diagnosis of calciphylaxis. The high rate of mortality and morbidity coincide with the risk factors associated with this condition. Early recognition of calciphylaxis in a patient with no pain despite the prevalence of ulcerations warrants a closer look into their comorbidities to identify this disease on the differential as it is critical to start treatment early to prevent devastating outcomes.