Internal Medicine Residency Program
Boston University Medical Center

Senior Resident Academic Day

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Handbook of Abstracts

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Oral Abstracts

Category: Oral Abstract

Characteristics and Outcomes of Direct-Action Antiviral-Experienced Patients with Hepatitis C Infection Undergoing Retreatment at an Essential Hospital in the United States

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Background: Hepatitis C virus (HCV) treatment guidelines recommend the use of more complex direct acting antiviral (DAA) rescue regimens in cases of treatment failure, whereas first-line regimens are recommended for the treatment of reinfection. In patients with barriers to follow-up after HCV treatment, it can be difficult to determine if a positive HCV viral load represents treatment failure or reinfection. Patients with an undetermined outcome of prior DAA therapy are often retreated with rescue regimens despite higher cost and complexity. We compared the outcome of first-line vs. rescue DAA therapy among a subset of DAA-experienced patients whose prior treatment outcome was undetermined.

Methods: This retrospective cohort study included DAA-experienced adults undergoing retreatment at an urban, essential hospital in Boston, MA between January 2016 and May 2022. We used descriptive statistics to characterize the population. For patients with an undetermined prior HCV treatment outcome, we used Fisher's exact test to compare the outcome of retreatment with first-line vs. rescue DAA therapy.

Results: We included 119 DAA-experienced patients with HCV viremia in the study. Median age was 55 years (IQR 41.5-61.5), 79% were male and 43% were white, 35% African American, and 22% Hispanic. A majority (81%) reported a history of substance use and nearly 1 in 3 (29%) reported active substance use, including 13% with active injection drug use. Outcomes of prior DAA treatment included a sustained virologic response at 12 weeks (SVR12) in 31% (n=37) and documented treatment failure in 27% (n=32). The prior DAA treatment outcome was undetermined in 42% (n=50), generally due to treatment non-completion and/or loss to follow-up. 18/50 patients were assessed for treatment outcome with first line vs. rescue therapy. Ten received first line regimens and eight received rescue regimes. SVR12 (60 vs. 63%), treatment failure (10% vs. 0%) and undetermined outcome (30% vs. 37%) were similar among groups (p = 1.000).

Conclusion: Outcomes with first line DAAs were comparable to rescue medications for retreatment of DAA-experienced patients with an undetermined prior treatment outcome. Our findings can help decrease barriers for HCV treatment.

Category: Oral Abstract

The Association of Exhaled Carbon Monoxide with Atrial Fibrillation and Left Atrial Size in the Framingham Heart Study

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Background: Exhaled carbon monoxide (eCO) is associated with subclinical and overt cardiovascular disease and stroke. The association between eCO with left atrial size, prevalent, or incident atrial fibrillation (AF) are uncertain.

Methods: eCO was measured using an Ecolyzer instrument among Framingham Heart Study Offspring and Omni participants who attended an examination from 1994-1998. We analyzed multivariable-adjusted (current smoking, and other covariates including age, race, sex, height, weight, systolic blood pressure, diastolic blood pressure, diabetes, hypertension treatment, prevalent myocardial infarction [MI], and prevalent heart failure [HF]). Cox and logistic regression models assessed the relations between eCO and incident AF (primary model), and prevalent AF and left atrial (LA) size (pre-specified secondary analyses). We also conducted secondary analyses adjusting for biomarkers, and interim MI and interim HF.

Results: Our study sample included 3814 participants (mean age 58±10 years; 54.4% women, 88.4% White). During an average of 18.8±6.5 years follow-up, 683 participants were diagnosed with AF. eCO was associated with incident AF after adjusting for established AF risk factors (HR, 1.31 [95% CI, 1.09-1.58]). In secondary analyses, the association remained significant after additionally adjusting for C-reactive protein and B-type natriuretic peptide, and interim MI and CHF, and in analyses excluding individuals who currently smoked. eCO was not significantly associated with LA size and prevalent AF.

Conclusion: In our community-based sample of individuals without AF, higher mean eCO concentrations were associated with incident AF. Further investigation is needed to explore the biological mechanisms linking eCO with AF.

Category: Oral Abstract

Latent tuberculosis and strongyloidiasis screening in patients with hematologic malignancy prior to cytotoxic therapy in Boston, Massachusetts.

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Background: Latent tuberculosis (LTBI) affects roughly one quarter of the world's population and *Strongyloides stercoralis* (SS) affects approximately 100 million people worldwide. Individuals with hematologic malignancy receiving chemotherapy and systemic steroids are at increased risk of LTBI reactivation and SS dissemination, which are associated with significant morbidity and mortality. However, LTBI and SS screening are not uniformly performed.

Methods: We conducted a quality improvement intervention of universal screening for LTBI and SS for one year (March 2023-March 2024) amongst patients initiating chemotherapy in the hematology clinic at Boston Medical Center, an urban academic safety net hospital with a large immigrant patient population. Screening was encouraged via integration into electronic medical record chemotherapy care plans and by lectures with hematology providers.

Results: 876 pre-intervention and 83 post-intervention patients were included. Mean age was 61-63 years (pre- vs post-intervention groups). Plasma cell malignancy was most common (~46%) followed by B-cell lymphoma (22-32%). Over 90% of individuals received systemic steroids, 2-3% were HIV+, and 2% were HTLV-1+. Between 33-40% of individuals immigrated from countries with high TB incidence rates $\geq$ 40 per 100,000 people and SS prevalence >10%. The intervention increased LTBI and SS screening rates [TB: 337/876 (38%) pre- vs 49/83 (59%) post-intervention, SS: 159/876 (18%) pre- vs 49/83 (59%) post-intervention], but universal screening was not achieved. Among those screened for LTBI, 73/337 (22%) pre- versus 9/83 (18%) post-intervention were positive. Among those screened for SS, 4/159 (3%) pre- versus 2/49 (4%) post-intervention were positive.

Conclusions: These preliminary findings demonstrate a patient population with several risk factors for reactivation and/or dissemination of LTBI and SS. Establishing screening guidelines for these high-risk individuals is essential for individual and public health to ensure early detection and appropriate management of preventable and potentially serious infections.

Category: Oral Abstract

Social Determinants Of Health And Clinical Outcomes In A Diverse Hypertrophic Cardiomyopathy Cohort

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Introduction: Contemporary studies are needed to evaluate impact of social determinants of health (SDH) and clinical outcomes in diverse hypertrophic cardiomyopathy (HCM) populations. Hypothesis: Among predominant Black/Hispanic minority population, HCM-related death is higher than reported literature and may be related to SDH.

Methods: Data from HCM patients were obtained in a large academic safety-net hospital from 2017 to 2022. Outcomes including heart failure (HF), atrial fibrillation, stroke, ventricular arrhythmias, septal reduction therapy (SRT) and death were obtained by chart review. Zip codes were extracted using the SDH database from the Neighborhood Atlas from University of Wisconsin to determine area deprivation index (ADI 1-10, higher ADI signifies greater neighborhood disadvantage). Chi-square and binary logistic regression analyses were conducted to assess association between ADI and outcomes, adjusting for demographic data.

Results: At baseline, 118 HCM patients, were 52 ± 15 years old, 44% female, 54% Black, 20% Hispanic, 10% White, BMI 31± 6 kg/m2, and ESC score 2.4 ± 1.9. Seventy-eight (82%) patients had nonobstructive HCM (22 % apical variant) with maximal wall thickness of 19 ± 6 mm; 14% had late gadolinium enhancement (LGE) >15%. Among 50% patients with genetic testing, 31% had a pathogenic/likely pathogenic sarcomere variant and 44% had variants of unknown significance. Over 6.3 years follow up (IQR 6.6), 20% patients developed incident HF, 19% AF, 8% SRT, and 6 (5%) patients suffered HCM-related death. Among the 23% of patients who had an ICD placed, 15% had appropriate ICD shock over 7 ± 7 years. Among the 105 patients with available zip codes, 44% patients had ADI > 6. There was no association between ADI and global outcome (OR [95% CI] = 1.32 [0.6-2.9], p = 0.49) or HCM-related death (OR [95% CI] = 0.46 [0.7-2.9], p = 0.41).

Conclusions: Compared to published literature, our cohort was mainly Black/Hispanic with high degree of apical remodeling and low frequency of obstruction, highlighting need for focused efforts to improve HCM diagnosis in this population. Further, global outcome and HCM-related death were not related to zip-code level SDH. Larger diverse cohorts are needed to include individual level SDH in relation to outcomes.

Category: Oral Abstract

Undocumented Immigrants and Advanced Heart Failure Therapies

Matthew Kogan, Sarah Kimball, Kate Purrington, Jennifer Cedor, Omar Siddiqi

Introduction: An estimated 10.5 – 12 million undocumented immigrants live in the United States, among whom approximately 4.4% have heart disease, compared to 1.8% of US citizens with heart failure. This suggests a substantial population of undocumented immigrants may have heart failure, yet they face considerable barriers to therapy. Notably, despite the policy of the U.S. Organ Procurement Transplant Network (OPTN) forbidding immigration status as a criterion for transplantation candidacy, undocumented immigrants encounter challenges accessing advanced cardiac therapies due to their legal status.

Methods: We distributed a survey to attending cardiologists and cardiology fellows in-training at Massachusetts teaching hospitals to assess their awareness of available advanced therapy options for undocumented immigrants with end-stage heart failure. The survey, comprising yes/no and open-response questions, targeted providers' understanding of what options are available to undocumented immigrants in end-stage heart failure. The survey was disseminated via email by program directors across cardiology training programs in Massachusetts.

Results: Forty respondents participated in the survey, including general cardiology fellows (27.5%), advanced cardiology fellows (2.5%), advanced heart failure and transplant attendings (17.5%), cardiology attendings (45%), and cardiology advanced practice providers (7.5%). The survey revealed that a significant proportion of providers perceive immigration status as a barrier to some end-stage heart failure treatments, with 82.5% still referring patients with uncertain or undocumented immigration status for advanced therapies.

Conclusions: Our investigation underscores the need for increased provider awareness and early referrals to professionals knowledgeable in immigration and public benefits access. By recognizing and addressing these barriers, we can ensure equitable access to life-saving treatments for undocumented immigrants in end-stage heart failure, thus mitigating disparities in healthcare delivery.

Category: Oral Abstract

Association Between Consumption of Ultra-Processed Foods and MASLD in the Framingham Heart Study

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Background: The prevalence of Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) has increased in parallel with a rise in consumption of ultra-processed foods (UPF), but little is known about their association.

Methods: We examined cross-sectional associations of UPF with hepatic steatosis and fibrosis in 2,458 (mean age 54 years; 55.9% women) Framingham Heart Study participants who completed vibration-controlled transient elastography (VCTE) and a food frequency questionnaire. Dietary intake was categorized into levels of food processing via the NOVA system. We used multivariable-adjusted logistic regression models to evaluate the association of energy-adjusted UPF intake (per 1 standard deviation unit and by quintile) with imaging-defined hepatic steatosis (Controlled Attenuation Parameter [CAP]≥ 290 dB/m) and fibrosis (Liver Stiffness Measurement [LSM] ≥ 8.2 kPa). We adjusted for age, sex, smoking, alcohol intake, physical activity, and intake of minimally processed foods. Additional models adjusted for diet quality index or body mass index (BMI).

Results: Higher intake of UPF was directly associated with higher odds of hepatic steatosis (OR=1.33 [95% CI 1.21, 1.46] per SD-increase, i.e. 2.3 servings/day). UPF intake and hepatic steatosis had a dose-response relation. There were 2.50 times higher odds of hepatic steatosis (CI 1.81, 3.45) with a 19.49 (SE 3.73) unit increase in CAP (P<0.001) when comparing quintile 5 to quintile 1 of UPF consumption. Higher UPF was not significantly associated with hepatic fibrosis (OR=1.15 [95% CI 0.99, 1.32] per SD-increase). Adjustment for BMI attenuated the strength of all UPF-hepatic associations.

Conclusion: UPF consumption was positively associated with imaging-defined hepatic steatosis. Longitudinal studies are needed to assess whether lowering consumption of UPF can decrease odds of hepatic fibrosis.

Poster Presentations

Category: Education / Quality Improvement

An unusual cause of a breast mass discovered on routine mamography

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Case: A 65-year-old woman was scheduled for annual breast cancer screening. Mammography revealed afocal asymmetric mass in the lower right breast and follow up ultrasound confirmed a 0.5x 0.5 x0.6 cm roundheterogeneous mass. Mammogram results from 2 years prior was BIRADS- 1 with no abnormalities.Ultrasound-guided core biopsy was performed. Pathology revealed sections of parasitic worm species withsurrounding granulomatous inflammation. No in-situ or invasive carcinoma was seen. Geographic andhistomorphologic features were suggestive of a parasitic worm. The CDC confirmed *Onchocerca* species, afilarial nematode. Antifilarial IgG and IgG4 were positive. Peripheral blood microscopy was negative formicrofilariae. Review of the absolute eosinophil counts showed a range of 100 to 400 (Normal < 500/mcL). Thepatient was subsequently referred to Infectious Diseases and was initiated on treatment for onchocerciasiswith Ivermectin and Doxycycline with a plan to monitor the mass on serial ultrasounds.

Discussion: Onchocerciasis is caused by a filarial worm called *Oncocerca volvulus* that is transmittedthrough the female black fly (*Simulium damnosum*). It is mainly found in sub-Saharan Africa. The mostcommon clinical manifestations include rash, pruritus, unilateral extremity swelling, or cutaneous nodule andthese findings may present years to decades after infection. Ocular lesions can progress to vision loss, givingthe condition its colloquial name River Blindness. Onchocerciasis presenting as a breast mass is relativelyrare. The patient immigrated from southwest Cameroon 10 years ago as an asylum seeker and had returnedfor a month-long visit 5 years prior to her diagnosis. Initial refugee health screening was unremarkable,including an absolute eosinophil count of 400. Absolute eosinophil count may serve as a marker of certainparasitic infections especially among migrants from low-resource settings. However, as eosinophilia onlyaccompanies some parts of the life cycle in a subset of parasites (more often helminths), the absence ofeosinophilia does not exclude disease. It is important to emphasize that some parasitic infections have verylong latent periods and it is imperative to know country of birth and travel history to assess the need forscreening and treatment. For this patient from Cameroon, *Loa loa* was excluded prior to treatment given therisk for precipitating dangerous encephalopathy with anti-helminthics in the setting of co-infection. For thisreason, Infectious Diseases consultation is recommended when considering parasitic treatment for a patientfrom areas endemic for *Loa loa* (West and Central Africa)

Conclusion: A detailed migration and travel history should be obtained in all patients to guide appropriateInfectious Disease screening and treatment as recommended by the CDC. Though atypical, onchocerciasiscan present as a breast mass or other soft tissue nodule. Tissue biopsy confirmation should be followed byreferral to Infectious Diseases.

Category: Clinical Research

Characterizing Gastrointestinal Motility Disorder Burden and Phenotype Among Patients with Opioid Use Disorder on Suboxone

Danielle Bellavance, Nir Bar, Kyle Staller

Background: Opioid use disorder is a major source of morbidity/mortality and GI complications of OUD are a significant cost to the healthcare system. Buprenorphine-naloxone (suboxone) is a first-line treatment for OUD. The effects of opioid analgesia on gi motility have been well characterized. However, studies evaluating the influence of opioids on gut motility have primarily focused on full opioid receptor agonists such as morphine, oxycodone, or hydrocodone and not partial agonists like suboxone. Additionally, these studies did not focus on patients with opioid use disorder in isolation. Interestingly, in addition to opioid-induced dysregulation of GI motility, patients with OUD also have an increased prevalence of risk factors for primary functional GI disorders. Despite their complex set of risk factors for altered GI motility, the burden of motility disorders in patients with OUD on suboxone has not been characterized

Aims: In this study, we aim to (1) Characterize motility disorder disease burden in patients with opioid use disorder on suboxone with a focus on disorders of constipation and, (2) Characterize differences in objective anorectal manometric parameters between patients with OUD on suboxone and controls.

Methods: We performed RPDR and CDW queries in order to build two cohorts of patients from two tertiary care centers in order to address our above aims. In order to characterize the prevalence of motility disorder among patients with OUD who have been treated with suboxone, we performed simple count queries identifying patients with OUD (or related ICD-10 diagnosis) on their problem list, who have ever had suboxone included on their medication list. Within this group, we performed a simple count query to identify the number of patients who have had a constipation related motility disorder included on their problem list. To address our second aim, we will performed queries identifying MRNs of patients with OUD and a constipation related motility disorder who have undergone anorectal manometry and who have had either (1) suboxone, (2) methadone, (3) or no medication for opioid use disorder included on their medication list at any point. We will perform chart review to gather key manometric parameters for comparisons between these three treatment groups. We will perform subgroup analyses comparing study parameters between patients with active and prior suboxone use at the time of study as well as multivariate analysis, adjusting for duration of suboxone use, and age, sex, race, and BMI.

Expected Results: In an initial query, we identified 6,585 patients with opioid use disorder who had suboxone included on their medication list at some point. Among these patients, 47 patients had undergone anorectal manometry. Upon completion of all planned analyses, we expect to identify a high prevalence of disorders of delayed motility. Further, given the complex set of risk factors for delayed motility, patients with OUD on suboxone may have unique phenotypic characteristics identified through anorectal manometry parameters compared to patient on methadone, those not on medication for opioid use disorder, and those previously described in patients on chronic opioid therapy.
Discussion: Better understanding of the gastrointestinal complications of suboxone in patients with OUD, a population with a unique set of risk factors for delayed gastrointestinal motility, will aid in optimizing therapy and improving outcomes for these patients.

Category: Clinical Research

Pharmacy-Led Optimization of Guideline-Directed Medical Therapy in Heart Failure with Reduced Ejection Fraction Program Improves Heart Failure Metrics in a Safety-Net Hospital

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Introduction: Quad-therapy with guideline-directed medical therapy (GDMT) improves heart failure with reduced ejection fraction (HFrEF) outcomes but is challenging to implement in safety-net centers. We expanded an ambulatory-based, pharmacy-led medication titration program (OPTIMAL-HF) to improve HFrEF care and outcomes by an algorithmic initiation and up-titration approach for HF GDMT.

Methods: From February 2022-February 2023, 122 patients were referred to OPTIMAL-HF from a HF hospitalization or cardiology clinic visit. A clinical pharmacist conducted either inperson/telemedicine visits. HF GDMT was titrated until goal doses or maximally tolerated doses were achieved signaling graduation from the program. Chart review was performed with an approved BUMC IRB.

Results: Of the 42 graduates, 71% self-reported as Black or Hispanic, the average age was 60 years old, 76% self-identified as male, and 71.4% resided in an area of deprivation index great than or equal to 5 (scale, 1-10, higher score signifying greater neighborhood disadvantage. The average time to graduation was 25 weeks with an average of 6.5 visits. In the 3 months prior to enrollment, there were 20 hospitalizations (11 due to heart failure); in the 3 months after graduation (n = 41), there were 4 hospitalizations (0 due to heart failure). At enrollment, 21% were on quad-therapy at any dose with 0% being on quad therapy at goal. At graduation, 45% were on quad-therapy at any dose and 23.8% were on quad therapy all at goal.

Discussion: OPTIMAL-HF program improved HF metrics including medication rates, all-cause/HF hospitalizations, and LVEF in graduates of this program. This pharmacist-led ambulatory program is promising as an effective model to improve HF care and outcomes in a safety-net center.

Category: Education / Quality Improvement

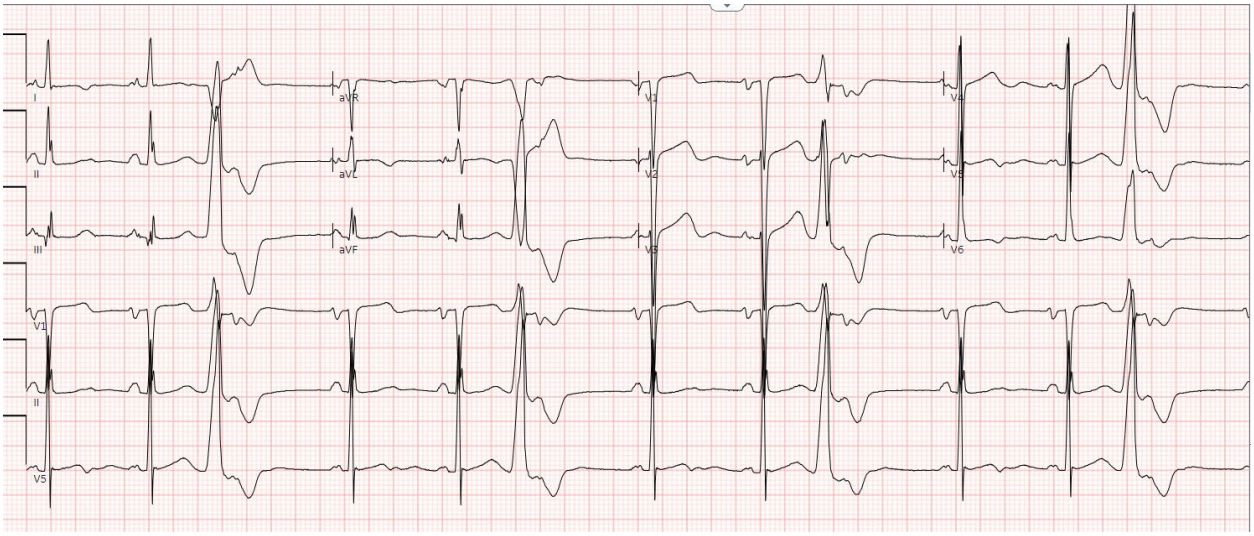
Premature Ventricular Complex-Induced Cardiomyopathy presenting as Hypertensive Urgency with Pulmonary Edema

Antonio Berumen Martinez

Introduction: An uncommon but potentially reversible cause of left ventricular dysfunction is frequent ventricular ectopy.

Case Description: A 55-year-old Portuguese female with history of asthma and type 2 diabetes presented with worsening shortness of breath, orthopnea, paroxysmal nocturnal dyspnea and chest tightness for several days and was found to have severe hypertension and acute pulmonary edema. She was managed with IV diuresis, BiPAP, nitroglycerin infusion, later transitioned to nicardipine infusion. Her symptoms resolved and, shortly after arrival, she was weaned from IV antihypertensives and switched to orals. Electrocardiogram (image 1) showed sinus rhythm with left atrial abnormality, left ventricular hypertrophy (LVH) and frequent premature ventricular complexes (PVC) in trigeminy. There was flat elevation of high-sensitivity troponin 59 -> 61-> 60. Transthoracic echocardiogram showed reduced left ventricular ejection fraction (LVEF) of 40% without regional variation and mild mitral regurgitation. Coronary CT angiogram revealed mild coronary artery disease in the mid left anterior descending (LAD) and mid to distal right coronary artery (RCA). No history of substance use including cocaine. TSH within normal limits. Chagas serology was non-reactive. Telemetry monitoring showed persistent unifocal PVCs in bigeminy and trigeminy. Patient was started on guideline directed medical therapy (GDMT) including carvedilol, losartan, spironolactone and empagliflozin. She was discharged with plan to obtain cardiac magnetic resonance imaging (cMRI) as outpatient to evaluate for fibrosis and other infiltrative diseases, and a 14-day event monitor to quantify frequency of PVCs. cMRI (image 2) demonstrated LVEF 45%, moderately increased wall thickness, global hypokinesis, overall findings consistent with nonischemic cardiomyopathy. There was no evidence of cardiac amyloidosis or imaging features of hypertrophic cardiomyopathy. Cardiac monitor showed baseline sinus rhythm at 60 beats per minute with PVCs in a pattern of bigeminy (33 PVCs/1 minute), burden of PVCs was 21%, appear unifocal and no symptoms reported. Patient has an upcoming appointment with electrophysiology to evaluate for possible ablation.

Discussion: PVC-induced cardiomyopathy is a potentially reversible cause of left ventricular dysfunction. A common challenge is determining whether the ventricular ectopy is the cause of the cardiomyopathy, or the ectopy is secondary to a cardiomyopathy of another etiology. Therefore, PVC-induced cardiomyopathy is often considered a diagnosis of exclusion after ruling out other causes of cardiomyopathy, ischemic and nonischemic. On diagnosis, GDMT for heart failure should be initiated on diagnosis. This includes a beta blocker which should help with PVC suppression. It is important to quantify the burden of PVCs with a cardiac monitor. Interestingly, despite having such a high burden of PVCs, our patient did not have any palpitations or chronic symptoms, until she presented with acute decompensation of heart failure. A high burden is considered >15% of total beats in a 24-hour period. Given the patient's high PVC burden (21%) and that the ectopy was unifocal, it is likely that she would benefit from catheter ablation. Successful ablation has demonstrated significant improvement in LVEF within months.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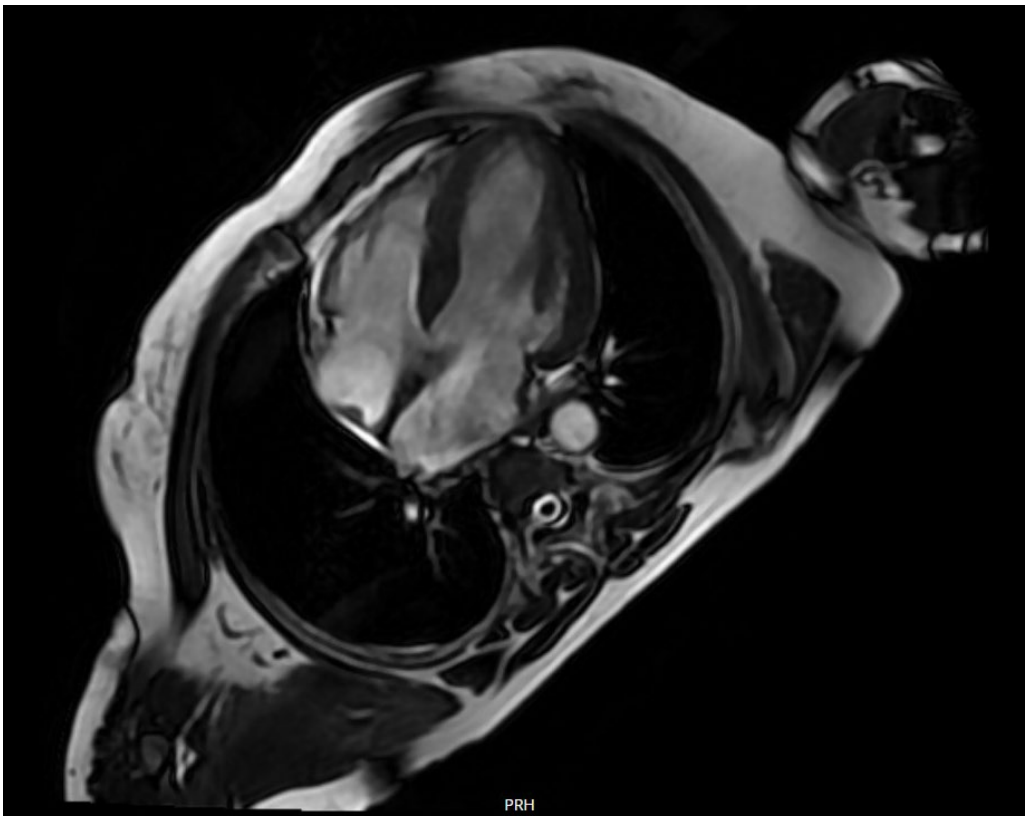
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Category: Clinical Research

Epidemiology of Irritable Bowel Syndrome in a Large Academic Safety-Net Hospital

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Background: Irritable bowel syndrome (IBS) is a highly prevalent disorder of gut–brain interaction (DGBI) that is known to reduce the quality of life and raise healthcare costs. The aim of this study was to describe the epidemiology of IBS in a large multiracial academic safety-net hospital.

Methods: An electronic query was performed using ICD-9 codes to identify 740 IBS outpatients seen at the Boston Medical Center (BMC) between January 2005 and September 2007. Demographic data were collected from electronic medical records. Bivariate analyses using chi-square tests and ANOVA were used to calculate the significance of categorical and continuous dependent variables, respectively.

Results: Compared with the general BMC outpatient population, the IBS cohort consisted of significantly higher proportions of White and Asian patients and lower proportions of Black and Hispanic patients ($p < 0.0001$). White and Asian patients predominantly had private insurance, while Black and Hispanic patients mostly had government/state-funded or no insurance ($p < 0.0001$). The IBS subgroup frequencies were similar across racial groups; however, Hispanic patients had IBS with constipation (32%, $p < 0.02$) more often compared to non-Hispanic patients.

Conclusions: Significant differences were found across the racial groups studied in this large outpatient IBS cohort. These findings are likely attributed to racial and socioeconomic disparities in healthcare access and utilization.

Category: Education / Quality Improvement

Hyperfibrinolysis: a rare cause of bleeding in patients with advanced liver disease.

Samantha Chua

Case: A 49 year old woman with severe alcohol use disorder and alcohol-related Child-Pugh C cirrhosis who was admitted to the hospital for alcoholic hepatitis was evaluated on the floor for worsening kidney function, acute on chronic anemia, and bleeding. She had presented 2 weeks prior with alcoholic hepatitis that was not treated with steroids due to her hospital course being complicated by hepatic encephalopathy and septic shock due to cholecystitis. She was transferred to the ICU, intubated, and underwent percutaneous cholecystostomy. During her ICU stay, she was noted to have oozing from the endotracheal tube, vaginal bleeding, and bleeding from line sites. Upper endoscopy showed known esophageal and gastric varices without evidence of bleeding. Her bleeding was thought to be related to disseminated intravascular coagulation or her acute on chronic liver disease. Patient improved on antibiotics, laxatives, and rifaximin, was extubated successfully, and transferred to the floor.

On the floor, her bleeding persisted and further work-up of her coagulopathy was obtained. Labs were notable for a hemoglobin of 7.8, platelets of 82, INR of 5.28, total bilirubin of 20.9 with a direct bilirubin of 12.3, fibrinogen of 79, D-dimer of 10,103, and LDH of 300. Factor 8 was drawn and later resulted at 331, suggesting her coagulopathy was related to cirrhosis. She was given IV Vitamin K with mild improvement in bleeding, however, vaginal bleeding recurred and progressed within a few days despite full vitamin K repletion and fresh frozen plasma. Gynecology was consulted and recommended no acute intervention given the patient remained hemodynamically stable and did not have life-threatening bleeding. Her bleeding was ultimately attributed to hyperfibrinolysis, a rare manifestation of advanced chronic liver disease. Unfortunately, the patient's hospital course had also been complicated by progressive AKI thought to be multifactorial in the setting of acute tubular necrosis and bile-related pigment nephropathy. She was transferred to the ICU for a trial of dialysis, but soon was transitioned to inpatient hospice and passed away a few days later.

Discussion: Patients with cirrhosis can bleed for many reasons, including decreased synthesis of coagulation factors and reduced production and dysfunction of platelets. Hyperfibrinolysis is a rare condition of inappropriate, excessive fibrinolytic activity seen in several conditions including moderate to severe liver failure (3). The decreased production of many fibrinolytic proteins, which are synthesized in the liver, portends an increased clotting tendency in patients with cirrhosis (2). However, factors involved in clot breakdown, such as tissue plasminogen activator (tPA), urokinase-type plasminogen activator (u-PA), and plasminogen activator inhibitor 1 (PAI-1), are all synthesized extrahepatically and hepatically cleared (1, 2). This milieu often manifests in patients with cirrhosis as impaired clot formation, increased fibrinolysis, and bleeding. The true prevalence is uncertain, but this condition has been seen in 30-46% of patients with end-stage liver disease and correlates with the Child-Pugh classification (4). The diagnosis is often made based on a deficiency of fibrinolytic inhibitors, an increased in activator enzymes, or indirectly through fibrinogen degradation products such as D-dimer (5). Another method of diagnosis is rotational thromboelastrometry (ROTEM), a point-of-care assay that analyzes clot formation and breakdown and giving information about the defects in the clotting cascade (6,7). The treatment for hyperfibrinolysis is typically supportive, involving transfusion of packed red blood cells and antifibrinolytics such as tranexamic acid (TXA) or aminocaproic acid. However, there is little evidence to support use of these agents in patients with chronic liver disease and the data best supports using TXA in patients with trauma or complications from surgery or postpartum (8). Hyperfibrinolysis should be consider in patients with cirrhosis and bleeding without severe thrombocytopenia, a clear coagulation factor deficiency, or other coagulopathy.

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Category: Clinical Research

Disparities in Lung Cancer Clinical Trial Discussion and Enrollment at a Safety Net Hospital

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Background: Boston Medical Center (BMC) is a safety net hospital that serves a diverse patient population with various socio-demographic backgrounds. It is crucial to understand whether such factors serve as barriers to care. Previous studies have investigated disparities among specific populations, such as African Americans, and have used the accounts of cancer survivors or oncologists, but few studies have addressed barriers that encompass multiple minority populations in a safety net hospital. This study investigates disparities in care regarding clinical trial discussion and enrollment in lung cancer patients.

Methods: 1,121 patients with a diagnosis of lung cancer between January 2015 to December 2020 at BMC were included in this study. Electronic medical records were searched for keywords “clinical trial” or “enroll”, or by filtering oncology notes for “research encounter.” Each chart was reviewed for one of three categories: 1) clinical trial discussed and patient enrolled, 2) clinical trial discussed but patient not enrolled, 3) clinical trial not discussed. Socio-demographic 2 variables such as age, gender, race, ethnicity, city, primary language, median household income, insurance, and education level were also collected. SPSS version 26.0 was used for chi-squared and t-test statistical analysis.

Results: Of 1,121 patients, 50.4% were of minority race, 16.9% did not speak English, 8% were Hispanic, 70.6% had an education of high school or below, and 70.6% belonged to a lower median house-hold income (<$84,000). Clinical trial was discussed in 141 patients (12.6%) and of those, 22 (15.6%) were enrolled. Although clinical trial enrollement has been historically low at BMC, we enrolled more African American patients (50%). When looking at age, clinical trial discussions were conducted more with younger patients (68.19 vs 71.37, p=0.001). There was no significant difference in clinical trial discussion or enrollment between gender, race, ethnicity, primary language, median household income, insurance, or education level.

Conclusion: Despite a low income, low education, and racially diverse population, clinical trial discussion and enrollment rates were similar across various sociodemographic factors. The only difference identified was clinical trials were discussed more with younger populations. In the future, it is important to investigate additional barriers to clinical trial discussion and enrollment at safety net institutions, serving as a first step to eliminating racial disparities on a national scale.

Category: Education/Quality Improvement

Title: Hypertensive Shock? A contradictory case of hypertensive cardiogenic shock in a patient with complete heart block

Authors: Lillian C Flashner, Rebecca A Scharf, Nir Ayalon

Learning objective 1: Discuss a case of hypertensive cardiogenic shock
Learning objective 2: Diagnose clinical features of cardiogenic shock, regardless of blood pressure.

Case: An 85-year-old female with a history of T2DM and HTN presented with shortness of breath, chest pain, and dizziness. Vital signs were notable for BP 225/95, HR 30s, SpO2 85% on room air. Exam was notable for altered mental status, bibasilar crackles, and lower extremity pitting edema. Chest x-ray showed hazy bibasilar opacities and bilateral pleural effusions. ECG showed 3:1 Mobitz II block, right bundle branch block, and left anterior fascicular block. Labs were notable for lactate 2.5, high-sensitivity troponin 40, BNP 524 (prior <10), Cr 1.28 (baseline 0.8), and HCO3 14. Due to bradycardia, patient was given 2mg atropine without improvement. Transcutaneous pacing was trialed, but unsuccessful given inability to capture. She was briefly placed on dopamine, but this worsened her hypertension, requiring a nitroglycerin drip and admission to the cardiac care unit. Given persistent bradycardia, she was started on an isoproterenol drip with minimal improvement. Repeat labs showed HCO3 12 and lactate uptrending to 5.6. She also developed anuria unresponsive to diuretics.

Despite ongoing hypertension, given rising lactate in the setting of significant bradycardia, there was concern for a normotensive cardiogenic shock (CS) given the decreased tissue perfusion and worsening lactic acidosis. Temporary pacing wire was placed with significant improvement in her symptoms. Patient ultimately underwent dual-chamber left bundle area PPM with complete resolution of symptoms and lactic acidosis and normalization of renal function.

Discussion: This case illustrates that patients with normal blood pressure may still have CS. In general, CS is accompanied by a >30mm drop from patient baseline blood pressure; however, there can be a significant compensatory vasoconstriction leading to hypertension. In this case, low cardiac output was driven primarily by bradycardia, leading to anuric AKI and volume overload. She failed to respond to initial attempts to lower blood pressure, increase heart rate, or diurese, and ultimately required temporary wire placement. Early recognition of her shock state was crucial to initiating appropriate invasive therapy.

Normotensive CS may be evaluated with both noninvasive and invasive testing. First, evidence of end-organ damage such as uptrending cardiac biomarkers, anuria, lactic acidosis, and cool/mottled skin are highly suggestive of CS. ECG, chest x-ray, and TTE should be obtained. Invasive testing such as left and right heart catheterization may confirm the diagnosis and allow for therapeutic intervention. Treatment is aimed at improving cardiac index, which may be achieved by invasive methods including transvenous pacing, coronary revascularization, or mechanical support.

Conclusions

- Normotensive CS is a rare but morbid condition that requires early recognition for appropriate treatment.
- In CS, SVR may increase significantly, leading to reflex hypertension.

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Category: Education / Quality Improvement

A 6-year analysis of the sustainability of an "opt-out" EHR-triggered Tobacco Treatment Consult Service at a large safety-net hospital

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Background: Hospital-based tobacco treatment interventions increase smoking cessation rates. Hospitalization is an opportunity to engage individuals who may not otherwise seek tobacco treatment. In July 2016, our safety-net hospital implemented a hospital-based tobacco treatment intervention in response to a state-level incentive program to engage people who smoke in tobacco treatment. The intervention is an "opt-out" Electronic Health Record (EHR)-based Best Practice Alert (BPA)+order-set, which triggers consultation to an inpatient Tobacco Treatment Consult (TTC) for all hospitalized patients who smoke cigarettes, regardless of readiness to quit. We have previously demonstrated the effectiveness of the TTC service at improving 6-month smoking abstinence and tobacco performance measures. The objective of this abstract is to report sustainability of the program 6 years after its inception.

Methods: We analyzed data from all hospitalizations between July 2016-June 2022 of patients who reported current tobacco use. We calculated the percent of clinicians who accepted the TTC order-set, thus generating the TTC referral. We then determined how many consults were completed by the TTC service. To assess sustainability, we compared clinician acceptance of the TTC order-set and number of consultations completed across the 6 years. Finally, we compared receipt of guideline-recommend combination nicotine replacement therapy (NRT) between cigarette users seen by the TTC service and those not seen due to resource limitations.

Results: Among 170,347 adult admissions from July 2016 to June 2022, 23.2% (39,558/170,347) were identified as having "current smoking" status in the EHR and for whom the BPA fired. Clinicians accepted the TTC order-set on 50.4% (19,932/39,558) of admissions for whom the BPA fired. The TTC team completed a consultation to 34% (6779/19,932) of those who had a TTC consult ordered. Although the state-level incentive program ended in 2017, the number of consultations completed remained stable over the six-year period (r= -.16, p=0.75); Figure. Compared to patients not seen by the TTC service, those seen by the TTC service were more likely to be prescribed guideline-recommended combination NRT (37.6% [1380/3667] vs. 22.8% [1088/4667], <.001).

Conclusions: The "opt-out" EHR-triggered TTC service at our large safety-net hospital is sustainable in providing evidence-based tobacco treatment for cigarette users, regardless of readiness to stop smoking. The TTC service increases guideline-recommended combination therapy, though many eligible individuals could not be seen due to resource constraints. Elevating and maintaining priority of hospital-based tobacco treatment programs is needed to increase reach to underserved populations.

Category: Education / Quality Improvement

An Unexpected Turn: Incidentally Found Anomalous Aortic Origin of a Coronary Artery

Carl Hashem, Amanda Fernandes

Learning Objectives:

- Recognize coronary CT angiography as an increasingly common tool for evaluation of chest pain
- Recognize indications for surgery for anomalous aortic origin of a coronary artery

Case: 49-year-old male with HTN, HLD, DM, tobacco use presented to the emergency room with subacute atypical chest pain. Serial ECGs were non-ischemic and serial high sensitivity troponin assays were within normal limits. Physical exam was notable for reproducible chest pain on palpation. Given patient's cardiac risk factors, coronary CT angiography (CCTA) was performed for risk stratification. CCTA demonstrated a coronary artery calcium score of 0, and an anomalous origin of the right coronary artery (RCA), which subtended the left coronary artery (LCA) and subsequently ran an interarterial (malignant) course between the pulmonary artery and aorta. The findings were determined to be incidental and unrelated to his presentation. He underwent an outpatient exercise echocardiogram stress test which did not produce symptoms or inferior ischemia. He is closely followed by his Cardiologist.

Discussion: CCTA has emerged as an increasingly common tool that can be used in the evaluation of chest pain in certain intermediate risk patients. Anomalous aortic origin of a coronary artery (AAOCA) is a form of congenital heart disease, and is the second leading cause of sudden cardiac death (SCD) in youth, but its significance and management in adults is less understood. Current guidelines recommend surgery for all patients with anomalous origin of the LCA regardless of symptoms due to risk of SCD, and anomalous origin of the RCA with symptoms (anginal pain, aborted SCD, syncope due to ventricular arrhythmia). Management of asymptomatic RCA anomalies are less defined. Exercise stress testing combined with nuclear perfusion or echocardiographic imaging can be pursued to assess for potential ischemic burden of the anatomic variant. Those without symptoms, ischemia during stress testing, or ventricular arrhythmia can be continually monitored or referred for surgical intervention. Certain morphologies such as intramural or interarterial course, and acute angle changes are considered higher risk and may warrant earlier surgical referral, although data is limited. Given the increasing use of CCTA, incidentally found AAOCA in adults will likely rise. It is important for clinicians to identify its significance and stratify those who would most likely benefit from surgical referral.

Conclusion:

- CCTA is an important diagnostic tool in the evaluation of chest pain in select patient populations. Its increasing use will likely lead to an increase in incidental findings, including AAOCA.
- AAOCA involving the LCA should be referred for surgical intervention regardless of symptoms. Asymptomatic AAOCA involving the RCA can be stratified with stress testing and cardiac monitoring to aid in the decision for surgical referral.

Category: Education / Quality Improvement

There are many hoofed animals besides horses - A rare cause of reversible dementia and encephalopathy.

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Case. A 68 year-old gentleman with a documented past medical history of spontaneous pneumothorax and vitamin D deficiency was admitted to the hospital in the setting of possible syncopal episode versus mechanical fall. ED work-up was noteworthy for mild normocytic anemia, normal thyroid studies, UA only remarkable for ketones, and CT head imaging demonstrated mild periventricular and subcortical white matter hypodensities suggestive of chronic small vessel occlusive disease, and a parieto-occipital subgaleal scalp hematoma. On the day of admission, he was noted to have symptoms of cognitive insufficiency with nebulous recent past medical history, signs of malnutrition, disorganized appearance, intention tremor, diffuse hyperreflexia, dysdiadochokinesia, apraxia, and a shuffled gait without foot drop. Early lab-work for evaluation of reversible dementia demonstrated normal cyanocobalamin, methylmalonic acid, and no evidence of HIV or syphilis. Thiamine levels could not be obtained given prior administration of thiamine in the ED. On review with the patient, he lived alone with unclear decompensation over several months, with no immediate collateral information obtainable, though some degree of alcohol use and limited nutritional intake was admitted. It was known that he had previously been employed as a university housekeeping employee. Initial PT/OT evaluations were concerning for behavioral limitations on self-care requiring 24-hour supervision or long-term care following post-acute care. Echocardiogram and 48-hour telemetry were unremarkable. He was empirically given Wernicke-dosing intravenous thiamine from hospital day 1, and with gradual return of nutritional lab-work, diffuse micronutrient deficiencies were appropriately repleted. Stage 3 hypertension was managed with nifedipine, and pure hypercholesterolemia was addressed with moderate-intensity statin with LDL goal <70 given concern for vascular dementia. Aspirin 81 mg for empiric neuroprotection in vascular dementia was discussed but deferred. On Geriatric Depression Screening, he was noted to have evidence of depression, and SSRI therapy was initiated. Overall, the clinical picture was felt to represent multifactorial dementia with decline related to malnutrition, thiamine deficiency, depression, vascular events, and possibly alcohol. However, given the persistence of gait abnormalities and hyperreflexia despite appropriate therapy, he underwent MRI brain imaging which demonstrated a right frontal lobe T2/FLAIR acute to subacute 6x6 mm infarct, but more impressively, extensive microhemorrhages in a peripheral pattern with sparing of the brainstem and deep gray matter with multifocal areas of vasogenic edema. A CT angiogram of the head and neck was next performed to rule out large vessel occlusion, which demonstrated multifocal extracranial and intracranial arterial stenosis due to noncalcified atherosclerotic plaques. Neurology was consulted, and he underwent a lumbar puncture with findings of highly elevated protein at 293 mg/dL and normal cell counts with negative infectious panels. The consensus opinion was that this represented probable cerebral amyloid angiopathy related inflammation (CAA-rI).

Discussion. CAA-rI is a largely reversible subacute encephalopathy that is considered a rare and aggressive variant of cerebral amyloid angiopathy.[1,2] Pathologically, it is characterized by non-destructive inflammatory reactions to deposited amyloid beta deposits in small and medium brain vessels. [3,4] It is a rare disease, with estimated prevalence of 30 to 40 cases per 100,000 persons, with ongoing recent neurologic literature suggesting onset in the 7th to 8th decade, or sooner.[3] The described clinical symptoms are a subacute encephalopathy with or without behavioral disturbances.[1, 3] It can be characterized by severe headache, seizures, and focal neurologic impairment, though presentations are variable, and given atypical features suggestive of alternative etiologies, recognition of the condition can be delayed.[2,3,4] The diagnosis is heavily

dependent on neurologic imaging of predominantly asymmetric white matter hyperintensities seen on T2 or fluid-attenuated inversion recovery sequences, and lobar cerebral microbleeds.[4] Complications can include lobar cerebral microbleeds progressing to hemorrhage.[2,5] Consensus neurologic management of CAA-rI currently includes antihypertensive management and high dose intravenous steroids with prolonged prednisone taper.[2,6] The prognosis is generally favorable, with some case series suggesting up to 50% of patients being asymptomatic or with only mild neurologic sequelae after two years, though there are case reports with persistent morbidity or mortality in up to 60% over a similar time course, suggesting a broad range of disease heterogeneity.[1,2,6] This disease is still undergoing active investigation for optimal management.

This patient was started on pulse dose methylprednisolone for five days, then prednisone 60 mg with weekly taper by 10 mg. There was a recovery in his mental status, and he was ultimately felt to have capacity to return to his prior living arrangements with close home-based support. His overall outcome is still pending follow-up. In summary, this represents a rare reversible cause of encephalopathy and dementia outside of the typical medical specialist's differential diagnosis. For the medical generalist or hospitalist, the overall recommendation would be to obtain early MRI imaging if faced with dementia with unclear baseline or collateral, or if with evidence of neurologic abnormalities, allowing for further characterization via imaging and consultation as needed.

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Category: Clinical Research

Comparative Efficacy of Advanced Therapies to Treat Arthropathy in Patients with Inflammatory Bowel Disease (IBD): A Network Meta-Analysis

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Background: Joint pain with or without inflammation (arthropathy) is a common extra-intestinal manifestation of IBD. Many approved therapies have systemic anti-inflammatory properties that improve arthropathies, but their relative efficacy in this role has not been compared to date.

Methods: We performed a systematic review and network meta-analysis of randomized clinical trials in adults with IBD comparing advanced therapies (biologics and/or oral small molecule drugs) with placebo or each other, that reported outcomes in patients with arthropathy at baseline (based on Crohn's disease activity index [CDAI] or physician assessment). We conducted network meta-analysis using a frequentist approach.

Results: Pooled data from 24 trials, including 2728 patients were included. Risk of bias in the studies was noted to be low. Only adalimumab was significantly superior to placebo (RR 1.79, 1.26-2.54) in inducing early (6-20 weeks) or late (52 weeks) resolution arthropathy. When comparing individual drugs to each other, adalimumab was super to ustekinumab in resolving arthropathy with induction therapy (RR 2, 95% CI 1.25-3.33).

Conclusions: Systemic therapies used for arthropathies have not shown equivalent effects on IBD-associated arthropathy in clinical trials in IBD. Objective assessments of arthropathy should be a secondary endpoint of future trials of novel agents in IBD.

Category: Education / Quality Improvement

CMV Associated Splenic Infarcts in a Healthy Woman

Shreya Bhatia, Sarah Jensen

Case: A 37 year old woman with obesity presented to the hospital with four days of progressively worsening abdominal pain, nausea, and vomiting. Vital signs were normal; however, she had diffuse tenderness to palpation of her left lower abdominal quadrant. Notable laboratory findings included thrombocytopenia of 135,000 and elevated AST 92 and ALT 98. Abdominal CT scan revealed splenomegaly and multiple areas of splenic hypoattenuation consistent with splenic infarcts. Relevant medication was a birth control implant. There was no personal or family history of blood clots or arrhythmias. She quit smoking 10 years prior. Denied other constitutional symptoms.

She was started on intravenous heparin due to concern for a thrombotic event. Broad hypercoagulable workup was negative. Transthoracic echo showed no signs of endocarditis or valvulopathy. No arrhythmias seen on telemetry. Infectious disease evaluation negative for HIV and EBV. Cytomegalovirus testing notable for positive CMV DNA PCR of 10,092. Positive CMV IgM antibody and negative IgG antibody suggested acute CMV infection. Symptoms improved within two days without intervention, and she was discharged on apixaban with close follow up.

Discussion: Splenic infarction occurs when arterial or venous blood supply to the spleen is compromised. It presents most commonly as severe left sided abdominal pain, nausea, vomiting, fever, and splenomegaly. Splenic infarcts can also be asymptomatic and identified incidentally on imaging.
Thromboembolic and hematologic disease are the most common causes of splenic infarcts. Risk factors include atrial fibrillation, endocarditis, valvular heart disease as well as malignancy, sickle cell disease, antiphospholipid syndrome, and exogenous estrogen.
This case emphasizes the importance of considering additional etiologies of splenic infarction such as trauma or infection. About 19% of splenic infarcts appear to be triggered by infection, however splenic infarcts triggered by CMV are only noted in case reports.1 In these reports, patients were predominantly febrile, whereas our patient remained afebrile.
While the pathophysiology remains unclear, studies suggest CMV-DNA damages endothelium inducing thrombus formation and increases inflammatory markers leading to hypercoagulability.2,3 Viruses such as COVID-19 have been seen to lead to hypercoagulability as well. Further studies of systemic effects of CMV are warranted as more case reports emerge of CMV associated infarcts.

Conclusion: Cytomegalovirus and other infectious causes should be considered when assessing the etiology of splenic infarcts, even in afebrile and immunocompetent patients.

Learning objectives:

1. Identify risk factors for splenic infarcts.
2. Recognize most common diagnostic imperatives for splenic infarcts, including infectious etiologies such as cytomegalovirus.

Resources

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Category: Clinical Research

Exercise Hemodynamics Unmasks Stage C Heart Failure With Preserved Ejection Fraction and Impaired Peripheral Oxygen Extraction in Stage A/B Patients in a Safety-Net Center

Garen Kroshian, Joshua Lepson, Stephanie Zombeck, Andy Truong, Shannon Gavin, Reza Nezafat Gary Balady, Matthew G Nayor,Jessica L Fetterman, Nir Ayalon and Deepa M Gopal

Introduction: There is a gap in research evaluating hemodynamics and impaired peripheral oxygen extraction in Stage A/B HFpEF in diverse groups. We sought to characterize the prevalence of impaired cardiac/peripheral profiles in Stage A/B HFpEF at Boston Medical Center.

Hypothesis: We hypothesize both abnormal cardiac and peripheral profiles will be unmasked in exercising Stage A/B HFpEF patients.

Methods: Invasive cardiopulmonary exercise testing (iCPET) was performed in 30 individuals with Stage A/B HFpEF. Significant valvular or pulmonary disease were excluded. Criteria for an impaired cardiac profile, with reclassification to Stage C, included exercise PCWP $\geq$ 25 mmHg or ΔPCWP/ΔCO slope > 2 mmHg/L/min. An impaired peripheral profile was defined as O_2 extraction ratio (peak arterio-venous oxygen saturation difference)/ (1.34*rest hemoglobin*rest arterial O_2 saturation) < 50%. With an approved IRB, the analysis was conducted in R.

Results: Cohort clinical data shown in **Table** with 47% non-white and 57% female patients. Exercise unmasked Stage C HFpEF in 23 (77%) of cases; 17% had an impaired peripheral profile (O_2 extraction ratio 43 $\pm$ 7) and 10% (3 out of 30 patients) had concomitant impaired cardiac and peripheral profiles. Both cardiac and peripheral metrics correlated to metabolic parameters: peak oxygen consumption correlated to PCWP (rho -0.52, p<0.004) and extraction ratio correlated to oxygen-uptake efficiency slope (rho 0.40, p=0.029).

Conclusions: In our diverse cohort, a significant proportion of Stage A/B patients reclassified to Stage C HFpEF via invasive exercise testing; abnormal peripheral profiles were also noted. Impaired cardiac and peripheral profile metrics were related to metabolic parameters. Broader implementation of iCPET in early disease stages and attention to both cardiac and peripheral profiles in diverse populations will guide further HFpEF research in novel mechanisms and therapeutics.

see next page for tables

Table. BU-IMETS Cohort (n=30)

Clinical Characteristics			
Age, years	62 ± 12		
Body Mass Index, kg/m^2	30 ± 6		
Non-white individuals, %	14 (47)		
Female, %	17 (57)		
Hypertension, %	19 (63)		
Atrial fibrillation, %	3 (10)		
Glycosylated hemoglobin (HbA1C), %	6.3 ± 1.4 (n=20)		
B-type natriuretic peptide, pg/mL	32 (13-74) (n=26)		
Estimated glomerular filtration rate (eGFR), mL/min/1.73m^2	82 ± 21 (n=28)		
Area deprivation index (Massachusetts)	5.1 ± 2.3		
Hemodynamics			
	Rest	**Exercise**	***P* value**
Right Atrial Pressure, mmHg	3.6 ± 2.2	12.6 ± 5.9	
Pulmonary Capillary Wedge Pressure (PCWP), mmHg	8.2 ± 2.5	25.8 ± 8.1	
Pulmonary Artery (PA) mean pressure, mmHg	15.7 ± 3.5	38.5 ± 8.9	
Fick cardiac output, L/min	5.2 ± 1.3	10.1 ± 2.8	
Fick cardiac index, L/min/m^2	2.6 ± 0.8	5.0 ± 1.5	
Systolic blood pressure, mmHg	149 ± 21	221 ± 45	
Heart rate, beats/min	70 ± 15	121 ± 24	
Exaggerated blood pressure response, % (n=29)	25 (86)		
Arterio-venous oxygen saturation difference (ΔAVO2), mL/dL	5.4 ± 1.3	10.9 ± 2.7	<0.001
ΔPCWP/Δcardiac output	3.6 (1.9-6.3)		
Extraction ratio, %	62 (52-70)		
Cardiac profile impairment, %	23 (77)		
Peripheral profile impairment, %	5 (17)		
Hemodynamics by cardiac profile			
	Impaired cardiac profile (n=23)	**Normal cardiac profile (n=7)**	***P* value**
PCWP, mmHg	28.8 ± 5.9	15.8 ± 6.3	<0.001
ΔPCWP/Δcardiac output	5.8 (3.2-7.0)	1.6 (0.7-1.6)	<0.001*
B-type natriuretic peptide	41 (21-76) (n=21)	15 (12-18) (n=5)	0.24*
Concomitant peripheral impairment profile, %	3 (13)	2 (29)	0.57**
Extraction ratio, %	63 ± 11	55 ± 14	0.19
Peak oxygen consumption (VO_2), mL/kg/min	11.5 ± 3.1	14.4 ± 6.7	0.31
Ventilatory efficiency (minute ventilation required to eliminate carbon dioxide) (V_E/ V_{CO2}) slope	33.8 ± 5.3	30.9 ± 8.6	0.43
Oxygen uptake efficiency slope	1149 ± 325 (n=22)	1501 ± 883	0.34
Respiratory Exchange Ratio (RER)	1.1 ± 0.1	1.1 ± 0.1	0.73

Category: Education / Quality Improvement

Euglycemic diabetic ketoacidosis in a non-diabetic patient on SGLT-2 inhibitor therapy

Jonathan Leong, Sayari Patel

Case: Euglycemic diabetic ketoacidosis is a rare but life-threatening condition that is often undiagnosed but requires increased vigilance in the era of widespread adoption of sodium-glucose-cotransporter-2 (SGLT-2) inhibitor therapy.
Here we present a case report of a 52-year-old male with heart failure with reduced ejection fraction of 45%, severe COPD, gastroesophageal reflux disease, generalized anxiety, moderate depressive disorder with no prior history of diabetes who initially presented with less than a week of progressive dyspnea on exertion, productive cough, nausea, watery diarrhea, and decreased appetite.
Initial laboratory investigations revealed metabolic acidosis with a pH of 7.17, pCO2 of 78 mmHg, bicarbonate level of 25 mmol/L, lactic acid of 2.9 mmol/L, glucose of 87 mg/dL, a leukocytosis of 22.6 K/uL with a 90% polymorphonuclear predominance. Initial imaging showed left lower lobe consolidation with background severe emphysema. The patient was initially triaged as a COPD exacerbation triggered by community-acquired pneumonia with lactic acidosis as the primary driver for his metabolic acidosis. However, his persistent anion gap acidosis despite normal lactate levels prompted further work-up that revealed ketonuria and a normal A1c prompting transfer to the ICU for treatment of euglycemic diabetic ketoacidosis with aggressive fluid resuscitation and insulin therapy.

Discussion: Diabetic ketoacidosis is a condition we typically consider in patients with a history of diabetes who present with classic gastrointestinal symptoms of nausea, vomiting, abdominal pain with hyperglycemia, and acidosis on their laboratory workup. The absence of hyperglycemia or diabetes in a patient with anion-gap acidosis poses a diagnostic challenge for the modern provider. This case underscores the need for increased awareness of and consideration for euglycemic DKA in patients receiving SGLT-2 inhibitors.

Category: Education / Quality Improvement

ICI induced neutropenia and management – Case report

Katie Li

Case: The patient is a 71-year-old man with metastatic prostate cancer and Lynch Syndrome who at presentation had high volume metastatic disease. He was started on ADT in castration sensitive setting along with abiraterone and prednisone but developed castration resistance after three months thus was transitioned to Docetaxel with additional progression . His germline genetic testing and somatic blood test showed MSI-H disease thus he was started on pembrolizumab (immune check point inhibitor) with rapid clinical, PSA and radiographic response. Patient tolerated the first three cycles of treatment without adverse effects but beginning on cycle four was noted to have isolated neutropenia without evidence of infection. Hematologic workup including peripheral smear and bone marrow biopsy without evidence of primary bone marrow disorder. Given the timing of neutropenia, it was felt to be ICI induced. As patient rapidly progressed through other therapy and had response on a he was re-challenged with ICI that resulted in neutropenia recurrence. A combination of GSCF given along with pembrolizumab was sufficient to abate neutropenia and allow patient to received additional 7 cycles of pembrolizumab before eventual further progression.

Discussion: ICIs are becoming increasingly used in the treatment of a variety of different cancers and can cause immune related adverse events (irAE). Neutropenia been a particularly rare irAE that can be difficult to manage given concerns about infection risk especially if chemotherapy is being given with ICI. Review of 46 cases of ICI induced neutropenia showed median time of onset of around 10 weeks, can occur in isolation or with concurrent anemia and thrombocytopenia with or without infection. Treatment strategy usually involves steroid, with or without GCSF or other agents as well as termination of ICI use. Steroids carry the risk of worsening immunosuppression and in our case, use of GCSF alone was sufficient to improve neutropenia to allow for continuation of pembrolizumab. Our case provides a possible strategy for patients who responded to ICI but then developed asymptomatic ICI induced neutropenia to allow for continued treatment with ICI without usage of steroids.

Category: Basis science

Site-Specific Transcriptomic Patterns and Cell Types Associated with Hypertensive Heart Disease

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Introduction: An estimated 2 million cardiovascular events each year are preventable with optimal risk factor control. Optimal blood pressure control is challenging, occurring in under half of all hypertensive patients, demonstrating the need for new therapeutic approaches and a deeper understanding of the underlying pathophysiology. Our understanding of the molecular mechanisms underlying cardiac responses to hypertension remains limited owing in part to the scarcity of donor cardiac tissue and available tissue being from donors with advanced disease. Site specific transcriptomic analyses of human cardiac tissue early after hypertension onset offer a promising avenue to gain new insights into the cardiac biology of hypertension.

Hypothesis: We hypothesize that the transcriptomic signatures and cell subtype proportions differ in heart tissue from hypertensive compared to non-hypertensive donors, in a cardiac site-specific manner.

Methods: Hypertensive (HTN, n=3) and non-hypertensive (NTN, n=2) donor hearts were obtained postmortem through the National Disease Research Interchange (NDRI). We performed bulk RNA-sequencing at an average depth of 114 million reads/sample on rRNA depleted libraries prepared from both left (LV) and right (RV) mid-ventricular-wall tissue from HTN and NTN samples. Additionally, we performed single-nucleus RNAsequencing on samples collected from the same sites as the bulk RNA-sequencing. Differential gene expression and pathway analyses were performed using established publicly available software and tools.

Results: HTN donors (n=3) and NTN donors (n=2) were all female and similarly matched for postmortem interval (time from death to tissue preservation, 19±9 vs 18±6 hours, respectively). HTN donors were older (65±7 years) compared to NTN donors (36±16 years). HTN donors were 33% White, 67% Black/Latinx, and NTN donors 50% black/Latinx. We identified 416 differentially expressed genes (DEGs) with a threshold of ≥2- fold change and q-value <0.05 after correcting for cardiac site, donor age, and PMI. Of the DEGs associated with HTN, 72 were uniquely expressed in the LV while 83 were unique to the RV. Top DEGs associated with HTN were enriched in pathways involved in single-stranded DNA helicase activity, branched chain amino acid catabolism, and NAD-dependent deacetylase activity. Single-nucleus RNA-sequencing of adjacent sections of LV and RV as the bulk RNA-sequencing (3,778 and 4,062 average nuclei per sample respectively) revealed

nine cell types, including chamber-specific cardiomyocyte, macrophage, fibroblast, and mural cell subtypes. Higher proportions of cardiomyocytes and lymphocytes were associated with the LV of HTN donors compared to LV from NTN donors. Cardiomyocytes from LV samples of HTN donors had more abundant expression of MYL6 and MYL7, suggestive of a reversion towards fetal-like contractile elements.

Conclusion: Systemic hypertension is associated with altered cardiac metabolic gene expression programs, cardiomyocyte and lymphocyte cell type proportions, and elevated expression of fetal cardiac contractile elements. Further study is required to validate our findings, including RNAscope and protein quantification, and elucidate the mechanisms driving the metabolic and contractile machinery dysregulation in the face of systemic hypertension.

Category: Education / Quality Improvement

Meningococcemia complicated by purpura fulminans: A Case Report and review of Management.

Connor O'Neill-Dee, James Blum, Patric Teoderescu, Aakash Deshpandeh, Christopher Kearney

Case: A 35 year old man presented to the emergency department one day after testing positive for COVID-19 at an OSH complaining of generalized fatigue and rash. His initial vitals were notable for tachycardia and otherwise unremarkable. Physical exam was notable for a purpuric rash over the entire abdomen and all four limbs. Initial laboratory studies were notable for anemia, severe thrombocytopenia, anion gap metabolic acidosis and severe acute kidney injury, with elevated D-dimer, decreased fibrinogen and prolonged PT and PTT. The patient had blood cultures drawn and was started on broad spectrum antibiotics.

Over the subsequent 2 hours in the emergency department, the patient became hypotensive which was refractory to intravenous fluid resuscitation which necessitated vasopressors. He was subsequently intubated and admitted to the intensive care unit. Over the first 48 hours the patient developed worsening vasopressor requirement, acute renal failure necessitating CVVH and worsening purpuric rash and ischemia of his digits. The patient was diagnosed with purpura fulminans, and hematology was consulted for consideration of therapeutic anticoagulation. After shared decision making the patient was initiated on therapeutic unfractionated heparin. His blood cultures from the OSH subsequently returned positive for Neisseria meningitidis and as such his antibiotics were switched to high dose ceftriaxone.

The patient had a prolonged ICU stay, however over the course of 2 weeks his vasopressors were weaned, and he was successfully extubated on hospital day 14. Despite antibiotics and therapeutic anticoagulation the patient's skin and digits continued to worsen and once he was stabilized he was transferred to a burn center for ongoing wound care.

Discussion: Purpura fulminans is a pro-thrombotic subtype of DIC which carries an extremely high mortality rate. In adults, purpura fulminans is most commonly triggered by bacterial or viral infections. The prothrombotic nature of DIC is driven by the depletion of protein C, protein S and antithrombin as well as by endothelial damage. While there are no consensus guidelines on the optimal management of purpura fulminans, the hallmark of management involves treating the underlying cause as well as addressing the disordered coagulation. Activated Protein C, Protein C concentrate, plasma exchange and therapeutic heparin have all been studied as possible treatments for purpura fulminans but larger trials are needed to determine mortality benefit if any. Therapeutic heparin is recommended in cases of DIC with thrombosis and is what we used in our case. Despite early recognition

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Category: Education / Quality improvement

Palliative Care Needs Assessment at BMC: Creating a Formal Curriculum within the Internal Medicine Residency Program

Sahaj Patel; Rachel Eddy; Kelly Vitale

Introduction: Currently, the formal exposure to Palliative Care within the internal medicine residency program at Boston Medical Center is variable. Residents can elect to rotate with Palliative Care inpatient consult service and may have the opportunity to engage in palliative care-focused content during noon conferences and other educational events. As the section of Palliative Care grows in size and services at BMC, we aim to create a formal palliative care curriculum to enhance both residents' knowledge of palliative care topics and comfort level in practicing specialized palliative care skills.

Methods: The first phase of this project consisted of a needs assessment to better characterize the palliative care knowledge base and content deficits that are present within the Internal Medicine residency program. Residents (PGY-1 to PGY-3) were prompted to complete a survey to ascertain their comfort level in a variety of palliative care topics from pain control to introducing hospice in goals of care meetings, drawing on some of the work from Adriadne Labs. This data was then analyzed to determine which content areas to focus on. As a result, 5 lectures were either adjusted or developed and delivered during Academic Half Day and Noon Conferences in Spring 2024. After each lecture, a post-survey was administered to help characterize efficacy of the lectures and collect further comments/suggestions.

Results: 45 Respondents filled out the needs assessment survey (44% were PGY-1, 29% were PGY-2, 27% were PGY-3). 82% of respondents had not completed a Palliative Care elective, and 72% of respondents stated they had not received any formal palliative care training at BMC. Comfort levels varied greatly as expected depending on the topic. For example, only 27.9% of respondents responded "fairly confident" or "very confident" in regard to artificial nutrition and hydration at end of life; only 16.3% of respondents responded "fairly confident" or "very confident" in regard to introducing hospice care to patients and their families. Only 25.6% of respondents responded "fairly confident" or "very confident" in regard to terminal delirium. Five lectures were created and adjusted to meet the gaps indicated via the needs assessment: pain, terminal delirium and anxiety, nausea and vomiting, advanced care planning, and artificial nutrition. At the end of each of these lectures, a post-survey was sent out to assess comfort level and gather feedback.

Discussion: Palliative Care at BMC is growing in both inpatient and outpatient services. As the services expand, the opportunity to educate residents on the latest palliative care knowledge base and skills also expands in parallel. Given BMC serves a largely safety-net population, it is important to offer robust palliative care, not only for ensuring goal-concordant care, but also equitable care. This needs assessment demonstrates that residents are both interested in learning palliative care topics and, for a majority, not currently receiving any formalized curriculum. This needs assessment gives us an opportunity to assess current knowledge deficits, provide lectures in both mandatory and non-mandatory spaces, and assess efficacy to adjust for future classes. Ultimately, we hope this project helps empower residents to deliver higher quality primary and specialty palliative care.

Category: Clinical Research

Life's Essential 8 Cardiovascular Health Score and Cardiorespiratory Fitness in the Community

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Background: The relation of cardiorespiratory fitness (CRF) to lifestyle behaviors and factors linked with cardiovascular health (CVH) remain unclear. We aimed to understand how the AHA's Life's Essential 8 (LE8) score (and its changes over time) relate to CRF and complementary exercise measures in community-dwelling adults.

Methods: Framingham Heart Study participants underwent maximum effort cardiopulmonary exercise testing for direct quantification of peak oxygen uptake ($\dot{V}O_2$). A 100-point LE8 score was constructed as the average across 8 factors: diet, physical activity, nicotine exposure, sleep, BMI, lipids, blood glucose, and blood pressure. We related total LE8 score, score components, and change in LE8 score over 8 years with peak $\dot{V}O_2$ (log-transformed) and complementary CRF measures.

Results: In age- and sex-adjusted linear models (N=1838, age 54±9 years, 54% women, LE8 score 76±12), a higher LE8 score was associated favorably with peak $\dot{V}O_2$, ventilatory efficiency, resting heart rate, and blood pressure response to exercise (all $p<0.0001$). A clinically meaningful 5-point higher LE8 score was associated with 6.0% greater peak $\dot{V}O_2$ (≈1.4 ml/kg/min at sample mean). All LE8 components were significantly associated with peak $\dot{V}O_2$ in models adjusted for age and sex, but blood lipids, diet, and sleep health were no longer statistically significant after adjustment for all LE8 components. Over an ≈8-year interval, a 5-unit increase in LE8 score was associated with a 3.7% higher peak $\dot{V}O_2$ ($p<0.0001$).

Conclusions: Higher LE8 score and improvement in LE8 over time is associated with greater CRF, highlighting the importance of the LE8 factors in maintaining CRF.

Category: Education / Quality Improvement

Guideline based Implementation of Telemetry in Hospitalized Patients

Christine Rehr, Sarah Jensen, Shreya Bhatia

Introduction: Telemetry is a useful tool to identity arrhythmias, but comes with the risks of decreasing patient mobility, creating insignificant incidental findings, increasing length of stay, and increasing healthcare costs. Telemetry overuse has been identified by the Society of Hospital Medicine as item #4 for the ABIM Choosing Wisely Campaign.[1] The average daily cost of telemetry in 2014 was quantified at $53.44 per patient, not including the time spent by staff responding to alerts.[1] Interventions targeted at decreasing inappropriate telemetry usage has shown a decrease in average length of stay from 2.75 days to 2.13 days,[2] decrease the usage of telemetry by up to 70%,[3] and in one hospital system creating a cost savings of about $4.8 million annually.[3]

Methods: A baseline survey was performed to assess current practices of telemetry usage on the resident teaching teams, before an intervention was delivered. Patients on GIM Teams 1 and 2 were selected as the population of interest, as this was felt to provide a cross-section of general medicine patients admitted to the hospital. Outcomes included: the number of patients on telemetry, the percentage of patients started on telemetry without a class I or II indication for its usage, and the percentage of patients continued on telemetry on the day of investigation without a class I or II indication. Baseline and post-intervention data was obtained via chart review, over a period of 14 days, with 6 days of collection over this period (M/W/F each week). The intervention included brief teaching about class I and II indications for appropriate telemetry usage, followed by posting a list of indications in the workrooms, showing residents how to add the telemetry symbol to their lists on Epic, and finally asking residents to review the appropriateness of telemetry usage for patients on their lists daily.

Results: The baseline data showed that on the GIM 1 and 2 teams, 24% of patients on telemetry were inappropriately started on it without a class I or II indication, and 45% of patients on telemetry were inappropriately maintained on it until the day of investigation. After the intervention, 17% of patients on telemetry were inappropriately started on it without a class I or II indication, and 20% of patients on telemetry were inappropriately maintained on it until the day of investigation.

Discussion: The intervention decreased the percentage of patients inappropriately started on telemetry by 7%, and decreased the percentage of patients inappropriately maintained on telemetry by 25%. The baseline data unexpectedly revealed that the larger opportunity for improvement lies in reassessing who still requires telemetry, and that reminding residents to reassess can cause a large reduction in patients inappropriately remaining on telemetry. Some limitations of the project included: no balancing measures to analyze whether the percentage of patients inappropriately not on telemetry increased, the intervention was not a permanent solution, and the intervention required attention and time from already busy residents. Next steps could include developing a more durable process for reassessment, such as exists for DVT prophylaxis.

Category: Education / Quality Improvement

Post-Ischemic Stroke Takotsubo Syndrome In A Patient With Multivessel Coronary Artery Disease

Jared Rodrigues

Introduction: Takotsubo Syndrome (TTS) or Stress Cardiomyopathy is an acute onset cardiomyopathy characterized by a reduction in Ejection Fraction (EF) with characteristic left ventricular wall motion abnormalities (WMA). It is typically diagnosed after severe emotional or physiological stressors and can present as acute decompensated heart failure or ACS. It is traditionally thought of as a diagnosis of exclusion when ischemic and other cardiomyopathies are ruled out. This case is notable for the combination of post-ischemic stroke TTS in a patient with severe multivessel coronary artery disease with a substantially elevated high sensitivity troponin (cTnI)

Case: The patient (DP) is a 52-year-old female with a past medical history of Left ICA/MCA (M2) CVA c/b left-sided deficits and aphasia, carotid artery stenosis (s/p stenting), PAD, CAD, HTN, T2DM, anxiety/PTSD, tobacco use disorder, and marijuana use. In December 2023, she was diagnosed with an ICA/MCA (M2) infarct. Cardiac catheterization showed Prox LAD (50%), Mid LAD (70%), Ost Cx to Distal Cx (70%), Prox RCA to Mid RCA (80%) and TTE EF (75%) with moderate concentric left ventricular hypertrophy. She underwent a successful cerebral angiogram with mechanical and pump-assisted suction embolectomy and carotid stenting. She was discharged in early January 2024. She presented to BMC on 2/13/2024 after her son noticed a new gaze deviation and worsening aphasia.

In the emergency department, she developed an oxygen requirement after receiving fluids. CTPA ruled out a pulmonary embolism but showed cardiomegaly, and bedside TTE showed a severely reduced EF. Initial cTnI was 19 ng/L (unl<35 ng/L) and increased to 1,802 ng/L several hours later. EKGs showed nonspecific ST and T Wave abnormalities and a QTCc of 562 ms and 602 ms. Neurology ruled out a new CVA. Cardiology recommended starting unfractionated heparin (UFH) for a possible Type 2 event. The next day, her BNP was 1751 PG/mL (nl 0-176 pg/ml) and quickly decreased to 541 pg/mL. Formal TTE showed an EF of 33% with severe hypokinesis of the left ventricular apex and mid-LV segments with preserved basal function. She was diagnosed with TTS, and UFH was stopped. Her cTnI peaked at 6,169 ng/L. Continuous EEG showed focal slowing but no epileptiform discharges, leading to a diagnosis of a post-stroke seizure with Todd's paralysis. She was discharged from BMC on 2/21/2024 on metoprolol and continued her home lisinopril. TTE on 3/2/2024 showed normal biventricular size and function with an EF of 60%-65% and no evidence of wall motion abnormalities.

Discussion: Although the exact mechanism of TTS is unknown, the consensus is that the reduced EF and characteristic WMA are caused by local and systemic catecholamine excess precipitated by severe emotional

stressors or medical illness.[1] [2] DP had many of the risk factors for TTS, including middle age, female sex, recent CVA,
DM2, mood disorder, and marijuana use. Several aspects of her presentation are atypical. TTS usually manifests concurrently with CVA and not weeks to months later.[3] And it is even rarer to be diagnosed after a seizure with Todd's paralysis.

Perhaps the most notable aspect of DP's case is that she was diagnosed with TTS in the setting of severe multivessel coronary artery disease. The traditional thinking was that TTS could not be diagnosed with concurrent CAD, especially in cases of clinically significant multivessel CAD. This led to the general practice of performing a LHC to rule ACS.[4] Recent research suggests that TTS is more common in patients with CAD than previously thought. In an effort to avoid unnecessary LHCs recent research focuses on using EKGs, and the relative elevations of cTnI and BNP to distinguish TTS from ACS. The consensus is that cTnI elevations are less significant than BNP in cases of TTS. However, DP's case is a departure from that pattern. Her cTnI of 6,169 ng/L was 177 times the UNL, while her BNP was only 3 times the UNL. Nonetheless, the rapid recovery in her EF with resolution of WMAs without LHC and PCI suggests that TTS can be diagnosed even with substantially elevated troponins.[5]

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Category: Clinical Research

Morbidity and Mortality of HCV Fibrosis after sustained viral response in an academic safety net hospital

Max Rosenthaler, Kathleen Cheng, S Young, David Nunes

Introduction: Patients with fibrosis due to chronic hepatitis C (HCV) retain elevated risk for progressive liver disease after sustained viral response (SVR). The morbidity, mortality, and risk factors for progression of liver disease have not been well studied in US and safety net patient populations. We performed a retrospective cohort study to identify predictors of morbidity and mortality in this population.

Methods: Subjects were selected who had received treatment for HCV from 2014 – 2018 with confirmed SVR and at least one liver stiffness (LS) measuring > 10 kPa. LS and controlled attenuation parameter (CAP) were collected from fibroscans completed between 2014 - 2021. Data on race, body mass index (BMI), drinks per week, hypertension, diabetes, as well as incidence of hepatocellular carcinoma (HCC), ascites, varices, and death were collected by chart review.

Analysis: Step-wise cox proportional hazards analysis was completed. Minimum LS, initial LS, and maximum LS were compared as risk factors. Other covariates with the strongest associations in univariate analysis were incorporated into multivariate analysis.

Results:

Morbidity and Mortality Analysis

Demographics, morbidity, and mortality are shown in table 1. The rate of HCC, ascites, varices, composite liver outcome, death, and liver related death were 18.7, 13.5, and 15.0, 40.3, 19.4, 5.5 per 1000 person-years respectively.

Risk Factor Analysis

Risk factor analysis is shown in table 2. Minimum LS outperformed initial and maximum LS in predicting all outcomes. Multivariate analysis demonstrated a strong positive association of minimum LS with all of our outcomes of interest, a negative association of BMI with HCC, ascites, and our composite liver outcome, and a positive association of age with HCC, varices, composite liver outcome, and death. Change in LS and hepatic steatosis (CAP > 250) were not associated with any outcomes.

Conclusion: Our study is the first to provide an estimate of liver disease related outcomes in a US safety net hospital. Rates of HCC were greater than 1.5% per year indicating that HCC screening is indicated in patients with HCV fibrosis after SVR.

Risk factor analysis reaffirmed that age and LS have a positive association with risk of liver decompensation and death. Minimum LS was uniformly superior at predicting outcomes compared with initial or maximum LS, indicating that it is a better marker of fibrosis in this population. A negative association was noted between BMI and HCC, ascites, and composite liver outcome. This association was weak and should be verified by larger scale studies. Change in liver stiffness over time did not have any predictive value when minimum liver stiffness was taken into account.

Limitations include a small sample size, retrospective nature of our study, and reliance on chart review for determining covariates of interest.

Category: Education / Quality Improvement

Heartbound Havoc: Navigating the Intricacies of Hepatocellular Carcinoma with Intracardiac Tumor Thrombus

Caroline Ross

Learning objectives:

1. Recognize intracardiac tumor thrombus as a poor prognostic sign in hepatocellular carcinoma
2. Recognize arrhythmias as a rare, but important complication of intracardiac tumor thrombus

Case: 68 year old Cape Verdean male with a history of recurrent atypical meningioma (WHO grade II) s/p resection and radiation in 2019 and repeat irradiation in 2022, hepatic adenoma, and atrial fibrillation presented to the ED with left lower extremity paresthesia and abdominal pain. He underwent a CT abdomen/pelvis which showed a 6.9 cm heterogeneous mass centered within the segment II/III representing neoplasm with extension into the IVC, right atrium, and right ventricle, resulting in a 5.8 cm tumor thrombus within the right heart. He underwent a liver biopsy that demonstrated well differentiated hepatocellular carcinoma.

His course was complicated by multiple runs of stable SVT and NSVT, presumed secondary to the intracardiac tumor thrombus. He was evaluated by cardiology and was initiated on metoprolol with suppression of ectopy. He was evaluated by cardiothoracic surgery for consideration of surgical management of his tumor thrombus. However, he was deemed not to be a surgical candidate given extent of the tumor thrombus. He was discharged from the hospital and subsequently initiated on durvalumab for treatment of HCC.

Discussion: Hepatocellular carcinoma is one of the leading cause of cancer death worldwide and is often diagnosed in late stages due to minimal symptoms in early disease and lack of regular surveillance in high risk patients. Intra-hepatic vascular invasion is common, however tumor thrombus of the IVC, RA, and RV are rare and portend a poor prognosis with a median survival on the order of months. Complications of intracardiac tumor thrombi include complete occlusion of the IVC and hepatic vein leading to Budd-Chiari and associated complications, pulmonary embolism, and rarely arrhythmias. There is no consensus on treatment of intracardiac tumor thrombus in HCC. Surgery has been shown to modestly improve survival, but can have high morbidity and may not be feasible at all depending on size and location of tumor thrombus. Other treatment options include radiation, TACE, chemotherapy, and immunotherapy.

Our patient had multiple runs of SVT and NSVT that were ultimately controlled with beta blockade. As he did not have complete obstruction of the IVC, he had no signs of Budd Chiari. A CTPA performed showed multiple small pulmonary nodules concerning for metastases, but no pulmonary tumor emboli. He remains at high risk of sudden cardiac death from arrhythmias, pulmonary embolus, and complete right sided obstruction.

Conclusion:

- Physicians should recognize that IVC and intracardiac tumor thrombi are rare, but serious complications of hepatocellular carcinomas.
- The complications of IVC and intracardiac tumor thrombi include Budd-Chiari and IVC syndrome, pulmonary embolism, and arrhythmias.
- Treatment of intracardiac tumor thrombi can include surgery, TACE, radiation, chemotherapy, and immunotherapy, but overall there is no consensus on treatment of intracardiac tumor thrombus.

Category: Education / Quality Improvement

Atherosclerotic acute coronary syndrome mimic: a rare case of multivessel SCAD

Rebecca Scharf

Learning Objectives:
1) Demonstrate a case of multivessel SCAD.
2) Discuss the diagnosis, treatment, workup of a patient with SCAD.

Case Description: A 58-year-old man with no significant medical history presented with acute-onset left-sided chest pain and diaphoresis. Vital signs were BP 155/78, HR 68, RR 16, and SpO2 99% on room air. Chest x-ray was unremarkable. ECG showed normal sinus rhythm without ischemic changes. Labs were notable for high-sensitivity troponin 4,596 (uptrended to 18,223), d-dimer <150, LDL 122, and Hgb A1c 5.3%. Patient reported recent emotional stress, endorsed daily exercise, and denied tobacco or alcohol use.

Given significant troponin elevation and patient's symptoms, there was concern for type I NSTEMI. The patient was given aspirin, atorvastatin, and continuous infusion heparin. Cardiac catheterization showed a diffuse 50% lesion of the upper pole of the OM3 and a long 60% lesion of the right posterior descending artery, suspicious for spontaneous coronary dissections (SCAD). No intervention was performed and the patient was treated with metoprolol with suggestion for repeat angiography in 4-6 weeks. TTE showed LVEF 62% with normal diastolic function and no wall motion abnormalities. Given SCAD's association with fibromuscular dysplasia (FMD), the patient underwent renal artery duplex that did not show significant stenosis. CTA head/neck showed no evidence of aneurysm, normal common and internal carotid arteries, and normal vertebral arteries.

Discussion: This case represents a rare presentation of a male patient with multivessel SCAD. SCAD may be suspected in patients without cardiovascular risk factors who present with chest pain similar to that of an atherosclerotic acute coronary syndrome (ACS) and are found to have elevated cardiac biomarkers +/- ECG changes.[2] Approximately 1-4% of cases of ACS are due to SCAD and multivessel SCAD is implicated in 9-23% of these cases.[18] With SCAD, there is hematoma development within the tunica media, leading to separation between the intima and underlying vessel.[2] The majority of patients with SCAD are women (~90%) and middle-aged, though younger pregnant women are also at increased risk; it is thought that estrogen and progesterone contribute to the pathogenesis of SCAD.[1] Emotional stress is also a risk factor. In this case, stress was the patient's only known risk factor.

Although the diagnostic work-up of SCAD is identical to that of other ACS, the management and evaluation differs. Percutaneous coronary intervention (PCI) is generally deferred given most patients improve with conservative management.[2] Further, PCI is associated with higher complication rates than when used for atherosclerotic ACS. Antiplatelets and statins are not routinely recommended. Hypertension management is recommended; beta blockers may have a similar benefit, likely due to decreased wall stress. Patients should undergo workup for FMD with imaging of carotid, vertebral, and renal vasculature as the prevalence of FMD among patients with SCAD ranges from 25-86%.

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Category: Clinical Research

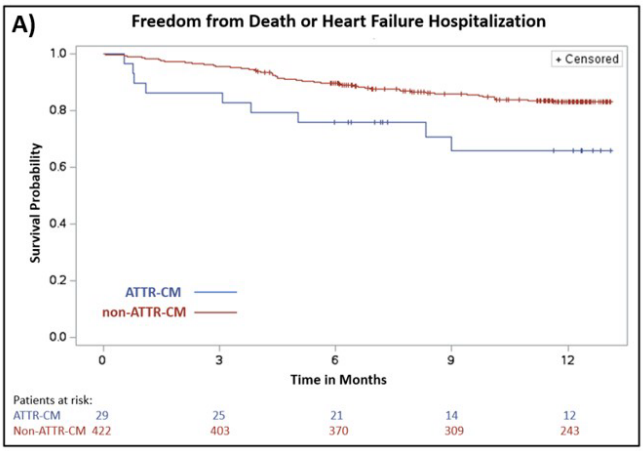
Transthyretin amyloid cardiomyopathy is associated with worse outcomes when compared to patients with non-amyloid related heart failure of similar race and ethnicity: The SCAN-MP Study

Alexander Schmidt, Ikram Ullah, Sergio Luis Teruya, Denise M. Fine, Natalia Sabogal, Rachel Foster, Stephen Helmke, Carlos Rodriguez, Brian Spencer, Morgan L. Winburn, Dimitrios Bampatsias, Abdirahman Wardhere, Cinthia De Freitas, Tatiana Prokaeva, Cesia Maria Gallegos Kattan, Edward James Miller, Michael Paul LaValley, Mathew S. Maurer, Frederick L. Ruberg, Boston University Chobanian & Avedisian School of Medicine and Boston Medical Center, Boston, MA, USA, Columbia University Irving Medical Center, New York, NY, USA

Background: Transthyretin amyloid cardiomyopathy (ATTR-CM) is a progressive cause of heart failure (HF). Data describing outcomes in ATTR-CM *vs*. non-ATTR-CM in populations of similar race and ethnicity are lacking. We leveraged the SCAN-MP study to compare outcomes of HF hospitalization and death in patients of similar backgrounds with and without ATTR-CM.

Methods: The Screening for Cardiac Amyloidosis with Nuclear imaging in Minority Populations (SCAN-MP) study examines the prevalence and impact of ATTR-CM in older, self-identified Black or Hispanic patients with HF. Among SCAN-MP patients, we compared outcomes of those with ATTR-CM to those without ATTR-CM over 12 months by Kaplan Meier analysis, linear regression, and by a hierarchical endpoint of mortality followed by HF hospitalization using the win ratio.

Results: ATTR-CM patients were older (80y *vs.* 71y, p< 0.001) and more likely Black (90% *vs*. 67%, p=0.012), but of similar sex and NYHA class. Patients with ATTR-CM (n=29) were more likely to experience death or HF hospitalization *vs*. non-ATTR-CM controls (n=422, p=0.01), with a hazard ratio of 2.3 (CI 1.2-4.7, p=0.02). Hierarchical analysis similarly found worse outcomes for ATTR-CM with a win ratio of 0.38 (CI 0.19-0.78, p=0.0078).



B)	Wins	Losses
Death	415	704
Heart Failure Hospitalization	959	2888
Total significant events	1374	3592
Total tie or censor events	7678	
Win Ratio	0.38 (95%CI 0.19-0.78, p= 0.0078)	

Figure 1. A) Freedom from death or heart failure hospitalization: Kaplan-Meier presentation of freedom from death or first heart failure hospitalization in ATTR-CM compared to non-ATTR-CM controls (n=422, p= 0.01) over 12 months. **B)** Hierarchical prioritization of death followed by first heart failure hospitalization in ATTR-CM (n=29) *vs*. non-ATTR-CM control (n=421). In total 12644 pairings were compared. Win ratio analysis found significantly worse outcome in ATTR-CM group with ratio 0.38 (95%CI 0.19-0.78, p=0.0078).

Conclusion: In older Black or Hispanic patients with HF of similar background, those with ATTR-CM had worse outcomes compared to non-ATTR-CM. These data reaffirm the progressive nature of ATTR- CM and importance of early recognition to permit appropriate therapy.

Category: Education / Quality Improvement

A Novel Use of Methadone Under the "72-Hour Rule" to Facilitate a Low-Dose Buprenorphine Induction

Sabetta Singh, Minaliza Shahlapour, Paul J. Christine, Jordana Laks, Natalija M. Farrell, G. Karim Khan, Jessica L. Taylor, Hallie Rozansky

Case: A 36-year-old man with opioid use disorder (OUD) presented to an outpatient bridge clinic to start buprenorphine. He had a history of severe precipitated opioid withdrawal (POW) when he tried to switch from fentanyl to buprenorphine on his own. He was therefore offered a low-dose buprenorphine induction, a novel strategy that may reduce the likelihood of POW.

Patients typically continue to use non-prescribed opioids (i.e., fentanyl) during the early phases of a low-dose induction, since the subtherapeutic doses of buprenorphine initially used do not effectively treat opioid withdrawal symptoms. This patient wished to stop fentanyl use immediately. Thus, after shared decision-making, he received methadone under the "72-hour rule" for withdrawal treatment during his low-dose induction. He successfully transitioned to buprenorphine without POW or significant concomitant fentanyl use and remained stable on buprenorphine for seven months, his longest period in remission at the time.

Discussion: The "72-hour rule" allows providers to administer methadone for up to 72 hours to treat opioid withdrawal or initiate OUD treatment even if they do not work in licensed opioid treatment programs (OTPs). The "72-hour rule" has primarily been used for patients entering long-term methadone treatment. Here, we describe how short-term methadone facilitated a buprenorphine induction in a patient who wished to continue long-term buprenorphine.

POW is a well-described challenge in transitioning from full opioid agonists to buprenorphine. Patients using nonprescribed fentanyl anedoctally report higher rates of POW, potentially due to fentanyl's lipophilicity, and challenges achieving sufficient periods of abstinence to avoid POW. Low-dose inductions may mitigate the risk of POW, but most rely on initial continuation of a full opioid agonist (i.e., fentanyl, in the absence of an alternative option). However, ongoing fentanyl use carries a risk of opioid overdose and further morbidity.

The success of this patient and others in transitioning to buprenorphine with overlapping methadone prompted us to formally incorporate methadone withdrawal management in our bridge clinic's low-dose buprenorphine protocol. Anecdotally, we see less POW with methadone than with ongoing nonprescribed fentanyl use. This case demonstrates the powerful impact of effective outpatient opioid withdrawal management with methadone and introduces a novel application of the "72-hour rule."

Conclusion: Low-dose buprenorphine induction with overlapping methadone treatment has potential to expand buprenorphine access to patients

Category: Clinical Research

Initiation and Persistence of Hormone Therapy in Endocrine Positive Breast Cancer at an Urban Safety-Net Hospital

Quinn Solfisburg, Brendin Beaulieu-Jones, Michael R. Cassidy, Naomi Y. Ko

Background: Evidence demonstrates inequities in receipt and persistence of hormone therapy among breast cancer patient populations based on race, ethnicity, insurance, and language. Institutions where patients seek cancer care may have an impact on receipt of treatment. It is unknown whether safety net hospitals, servicing a vulnerable patient population, exhibit inequities in receipt of hormone therapy for breast cancer.

Design: We performed a retrospective study of patients diagnosed with all stages of hormone positive (ER+ and/or PR +) breast cancer treated at a safety net institution over the five year period from January 1, 2009 to December 31, 2013. The initiation of and persistence of hormone therapy were assessed by race, ethnicity, insurance status, and primary language. Persistence of therapy was defined as defined as at least 3 prescriptions (90 day supply) or more than 1 visit after start of treatment documenting taking treatment.

Results: A total of 599 women were identified. The median age was 59 years, 58% were non-White, 32% were non-English-speaking, and 35% had Medicaid or no insurance. A total of 506 (84%) were started on hormone therapy. In multivariate regression analysis, the rate of endocrine therapy initiation was associated with higher stage at diagnosis, post-menopausal status, and HER2 negative status. Non-white race, Hispanic/Latino ethnicity, non-English-language, and Medicaid/no insurance were not significantly associated with or without initiation of hormone therapy. 93% of patients started on hormone therapy had evidence of continued treatment, 91% had evidence of continued treatment at 1 year, 75% finished their recommended course of hormone therapy.

Conclusion: At an urban safety-net hospital, we do not observe inequities in the initiation of endocrine therapy for breast cancer by race, ethnicity, insurance, or language. Persistence of therapy was similar to nationally reported data. Additional research by hospital type, and granular reasons for non-adherence are warranted.
We performed a retrospective study of patients diagnosed with all stages of hormone positive (ER+ and/or PR +) breast cancer treated at a safety net institution over the five year period from January 1, 2009 to December 31, 2013. The initiation of and persistence of hormone therapy were assessed by race, ethnicity, insurance status, and primary language. Persistence of therapy was defined as defined as at least 3 prescriptions (90 day supply) or more than 1 visit after start of treatment documenting taking treatment.

Category: Clinical Research

Heavy Alcohol Use and Oxidative Stress as Measured by 8-Isoprostane among People Living with HIV

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Introduction: Alcohol intake contributes to the pathogenesis of alcohol-related liver disease in part through the propagation of reactive oxygen species. 8-isoprostane, a stable by-product of lipid-peroxides, is a measure of *in vivo* oxidative stress. Several markers of oxidative stress are elevated in people with HIV (PWH) who consume alcohol compared to their HIV-negative counterparts who also drink. However, the link between the amount of alcohol consumption and oxidative stress remains largely unknown in this population.

Methods: Between 2017-2019, the Studying Partial-agonists for Ethanol and Tobacco Elimination in Russians with HIV (St PETER HIV) study collected data from 400 PWH aged 18-70 years in St. Petersburg, Russia who endorsed ≥5 heavy drinking days in the past 30 days. Participants were invited to engage in 5 in-person assessments and blood draw visits over 12 months. Linear mixed effect models were used to estimate the association between total grams of alcohol consumed within 30 days and 8-isoprostane levels at baseline and 3 months. Secondary analyses were conducted with phosphatidyl ethanol (PEth) dichotomized as positive or negative. Each analysis was adjusted for age, sex, BMI, CD4 count, log transformed HIV viral load, diabetes, smoking, illicit drug use, history of hepatitis C infection, FIB-4, and renal dysfunction.

Results: The final sample included 399 individuals, among whom the mean total grams of alcohol consumed within 30 days was 1019.0g ± 830.0g (mean ± standard deviation) and 68% had a positive PEth (124 ng/ml ± 250 ng/ml). The mean 8-isoprostane concentration (pg/ml) was 26 pg/ml ± 15.0 pg/ml. The primary adjusted analysis showed that a 1kg increase in total grams of alcohol was associated with a 5% increase in 8-isoprostane levels; however, the association was of borderline statistical significance (Ratio of means 1.05; confidence limits (CL) 1.00, 1.10; p=0.057). Secondary analyses found positive PEth was associated with higher 8-isoprostane levels (Ratio of means 1.13; 95% CL 1.04, 1.22; p=0.003).

Discussion: Among this sample of PWH, we did not observe a clear relationship between self-reported total grams of alcohol consumed within the last 30 days and oxidative stress. Testing positive for PEth however was associated with a measure of oxidative stress. Additional investigation is needed to evaluate whether higher alcohol intake is directly correlated with 8-isoprostane levels and whether reducing or eliminating alcohol use correlates with lower oxidative stress.

Category: Education / Quality Improvement

Early Surgical Excision of Necrotic Tissue Following Unintentional Dermal Injection of Extended-release Buprenorphine

Carly Taylor, Vanessa Loukas[1], Jasmine Muwonge, Jessica Taylor, Joseph Boyle

Introduction: Extended-release subcutaneous buprenorphine is an increasingly common treatment for opioid use disorder. Serious adverse events are rare and may be poorly understood. This report describes an early surgical intervention to address tissue necrosis resulting from misplaced buprenorphine injection into the subdermal space. We review identifying characteristics that distinguish the necrotic reaction from other adverse effects of subcutaneous buprenorphine and offer guidance to continue treatment with subcutaneous buprenorphine after skin necrosis.

Case Report: A 33-year old returned to clinic within an hour of his buprenorphine injection, reporting pain and skin changes unlike his previous injections. Non-blanching erythema consistent with early necrosis was evident, and the patient was referred to the emergency room for surgical removal of his buprenorphine depot. The patient had uncomplicated healing of the surgical site and was provided sublingual buprenorphine before returning to continue treatment with subcutaneous buprenorphine injections monthly.

Discussion: Although skin necrosis is known to be a rare complication of subcutaneous buprenorphine injection, early surgical excision to limit injury has not been described. Signs and symptoms of skin necrosis must be better understood to facilitate early intervention and continued treatment.

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Category: Education / Quality Improvement

Burden of obesity in heart failure patients at an urban safety-net hospital and implications for GLPI-agonist prescribing

Tracey Yee, Priya Gajjar, Deepa M Gopal

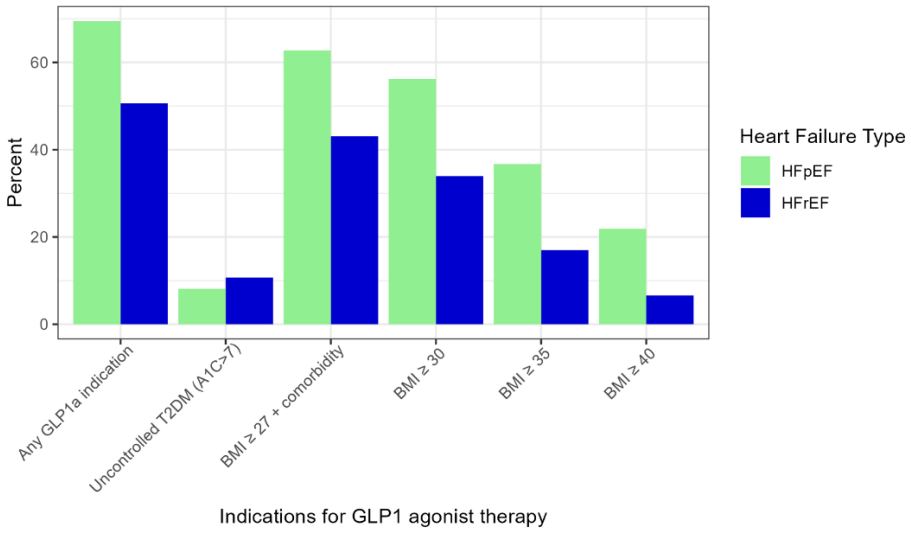
Background: Obesity is a key comorbidity in patients with heart failure (HF) that complicates management and limits quality of life. Glucagon-like peptide 1 agonist (GLP1a) medications may benefit patients with HF and obesity, especially in heart failure with preserved ejection fraction (HFpEF). We sought to describe the prevalence of obesity across HF subtypes in a contemporary sample of HF patients from an urban Massachusetts safety-net single-hospital system.

Methods: We conducted an electronic health record-based query to identify patients with HF admissions during 2019 and 2021 at Boston Medical Center and defined HFpEF vs HF with reduced ejection fraction (HFrEF) based on an ejection fraction (EF) cut point of 50%.

Results: We identified 1,383 unique patients with a HF admission (44% women, 57% Black, 15% Hispanic, 25% non-English speaking). Overall, 40% had HFpEF, 46% had HFrEF, and EF was unknown in 14%. Average BMI at discharge was higher for HFpEF (34±11) than HFrEF (28±11; P<0.001). Using currently approved indications for weight loss and diabetes, we demonstrate that up to 69% of HFpEF and 51% of HFrEF patients are eligible for GLP1a therapy (Figure 1).

Conclusion: The rising burden of obesity and HF call for novel joint treatment approaches. Our findings show that obesity is highly prevalent in an urban safety-net HF population and many of these patients qualify for GLP1a therapy. Affordable access to GLP1a could pose limitations to its practical utilization, and is an emerging health equity concern in heart failure care.

Figure 1: Indications for GLP1a by Heart Failure Type



T2DM: Type 2 diabetes mellitus
Comorbidity: obesity related comorbidity – type 2 diabetes mellitus hypertension, or hyperlipidemia

Category: Clinical research

Seeing the invisible: documentation and enrollment of racial, ethnic, and sexual and gender minorities in clinical trials for digestive disorders in the United States

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Introduction: Digestive diseases affect people with different backgrounds, with many of them disproportionally affecting the minority populations. To better understand health disparity and provide the best treatment for all minority populations, it is vital to include them in clinical trials. Our study aims to understand the documentation and enrollment of racial, ethnic, sexual, and gender minorities (SGM) in clinical trials for digestive disorders in the US.

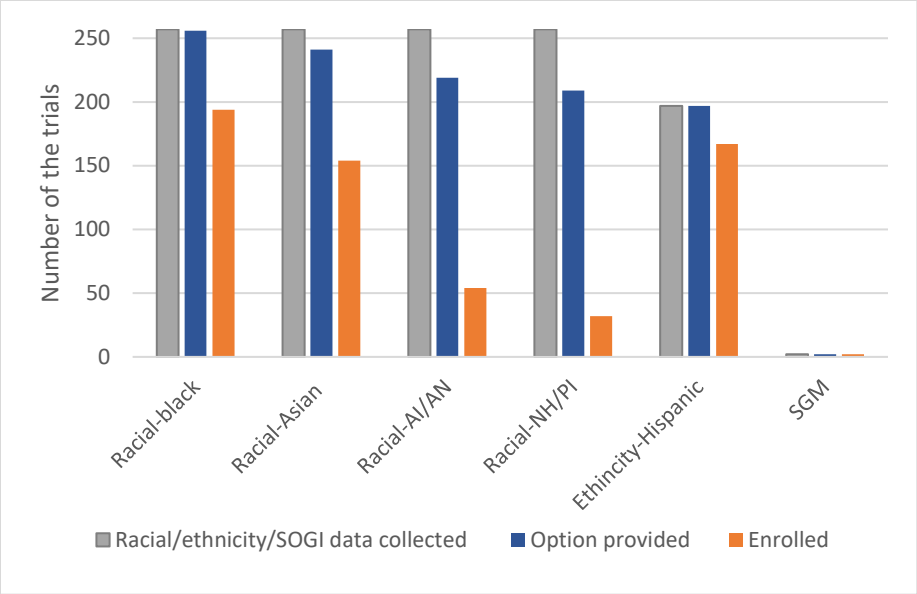
Methods: We systemically search database of clinicaltrial.gov using the pre-defined condition variable "digestive system disease". Clinical trials that were conducted in the US and enrolled adult patients with a start date between 1/1/2018 and 1/1/2023 and completed before 11/20/2023 were included. Number and demographic data of the participants, including race (reported as White, Black, Asian, American Indian [AI]/Alaska native [AN], or Native Hawaiian [NH]/Pacific islander [PI]), ethnicity (reported as Hispanic or Latino) and sexual orientation and gender identity (SOGI, reported as lesbian, gay, bisexual, transgender, gender diverse or non-binary) were reviewed.

Results: A total of 275 trials, encompassing 96,414 participants, included in our analysis. Race was collected in 93.4% of the trials, and most of these trials listed Black (99.6%), Asian (93.7%) , AI/AN (85.2%) and NH/PI (81.3%) as different categories (Figure 1). However, only 75.4% of the trials enrolled black participants and even lower in Asian (59.9%), AI/AN (21%) and NH/PI (13.2%). 71.6% of the trials reported ethnicity of the participants, and 84.7% of these actual enrolled Hispanic patients.
In contrast, only 2 (0.7%) clinical trials reported SOGI data. One regarding the association between red meat consumption and adverse GI outcomes reported 0.4% (13/3518) of participants identifying as non-binary. The other trial, investigating minimal monitoring strategy for Hepatitis C treatment, reported that 5.5% (22/400) of participants identified as transgender or gender diverse. Sexual orientation data was not collected in any of these trials.
After accounting for the number of participants in each trial, the average of Black enrollment was 16.7%, Asian 10.5%, NH/PI 0.4%, AI/AN 0.3%, Hispanic 11.5% and SGM 0.76%. In comparison to the 2022 US census data, AI/AN (0.3% vs. 1.3%), Hispanic (11.5% vs. 19.1%), and SGM (0.76% vs. 8.4%) are under-enrolled in clinical trials for digestive disorders (Figure 2).

Conclusions: Most of the digestive diseases trials reported race and more than two thirds reported ethnicity of the participants. However, enrollment of certain minority groups, such as AI/AN and Hispanics, is suboptimal.

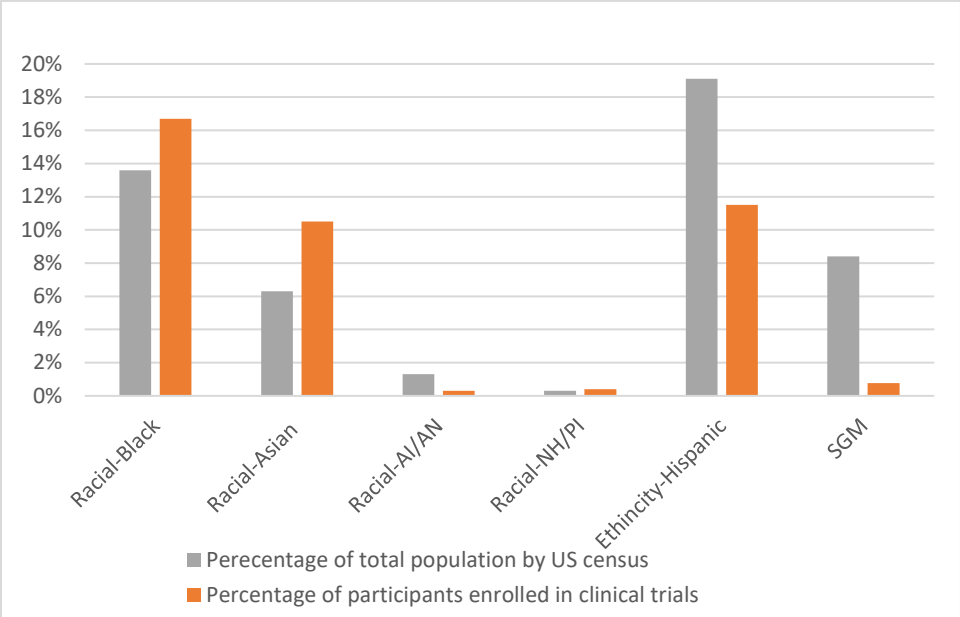
Furthermore, there is a notable deficiency in SOGI data collection. Culturally-sensitive strategies are urgently needed to increase SOGI data collection and enrollment of SGM in clinical trials.

Figure 1 Documentation and enrollment of racial, ethnic, gender and sexual minorities in clinical trials of digestive diseases in the US from 2018-2023



*SGM: Sexual and Gender Minorities

Figure 2 Percentage of minority participants enrolled in the digestive diseases clinical trials from 2018-2023 compared to the percentage of the total US population



*SGM: Sexual and Gender Minorities