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Basic Research

Implies the use of scientific method to derive original data in the laboratory.
Establishment of Monoclonal Cell Subpopulations as Model Systems for Functionally Exploring Resistance Mechanisms in EGFR Mutant Non-small Cell Cancers

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Introduction: Lung Cancer is the leading cause of cancer related deaths in the United States. EGFR mutant NSCLCs are routinely treated with targeted inhibitors such as Gefitinib or Osimertinib. However, resistance to treatment is constantly acquired through the emergence of coexisting subclones with a survival advantage against these targeted therapeutics. Thus, dissecting clonal evolution and identifying mechanisms of resistance within the same tumor is key to fully unleash precision medicine-based approaches for NSCLC patients. We investigated whether single cell cloning, and expansion can be used to dissect coexisting mechanisms of resistance in individual tumors.

Materials/ Methods: Scout IC50s were performed using Gefitinib and Osimertinib to determine dose used in study. MCPs were established from commercially available H820 and H1975 EGFR-mutant NSCLC cell line. Parental cells were counted using a hemocytometer and a limited dilution was performed at 1 cell per 100uL per well in a 96 well plate, for a total of eight plates. MCP were confirmed at 24 hours and then reevaluated for growth every 3 days. MCP were then expanded in step wise fashion from 96 well plates to 12 well plates, 25cc flasks, and finally 75cc flasks before evaluation. Cell morphology was evaluated using QPath and classified as circular, branched, or mixed. Cell populations were then treated with Osimertinib or Gefitinib for 72 hours and cell viability was assessed to determine response to treatment.

Results: H820 cell line MCP failed to be established. 120 individual cells of the H1975 cell line were established after the 24-hour growth period, of those, 22 were successfully expanded and treated with either Osimertinib or Gefitinib. Prominent morphology of the cells were branched, mixed, and circular at 68.75%, 18.75% and 12.5% respectively. Clone growth difference between morphology did not hold statistical significance. Clone responses to either Gefitinib or Osimertinib were variable with some clones being more resistant or susceptible to each drug. 10 of the clones were more resistant to Osimertinib than the parental and 6 of the clones were more resistant to Gefitinib than the parental.

Conclusion: It is theorized H820 MCP failed to be established due to failure to maintain necessary cell signals for survival or due to low parental cell population prior to plating. 22 monoclonal cell subpopulations were successfully established from the H1975 cell line. The morphological group of branched cells were observed the most, which may be attributed to parental morphology or could be due to underlying molecular survival mechanisms. Many clones were either more or less resistant to drug treatment than the parental cell line reinforcing the concept of clonal evolution. Establishing monoclonal cell populations for cancer research may lead to further advancement in precision clinical medicine, or cancer treatment in the future.
Measurements of Aortic Angiotensin Converting Enzyme 2 (ACE2) and Mas Receptor Expression in a Transgenic Mouse Model of Ascending Aortic Aneurysm

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**Introduction:** Marfan syndrome (MFS) is an autosomal dominant connective tissue disease caused by mutations in the fibrillin-1 (FBN1) gene (1). Thoracic aortic aneurysms are the most life-threatening complication of MFS leading to dissection, rupture, or death (2). Angiotensin II (AngII), an effector molecule of the Renin-Angiotensin-Aldosterone System (RAAS) system, is shown to contribute to the pathogenesis of aortic aneurysms (3). AngII can be converted by angiotensin-converting enzyme-2 (ACE2) to Angiotensin1-7 (Ang1-7), which binds to the Mas receptor. Previous studies have shown that overexpression of the ACE2 gene could block AngII-induced abdominal aortic aneurysm and Ang1-7 could stimulate endothelial nitric oxide synthase and reduce reactive oxygen species (ROS) production (4,5). Ang1-7 administration in diabetic mice was shown to enhance ACE2 and MasR expression and prevent hypertension (6)

**Methods:** Control and Marfan (n=6 male, n=6 female) mice were sacrificed at 6 months of age. The aortic arches were fixed in formalin, embedded in paraffin, sectioned (5 microns), and subjected to primary antibodies for ACE2 (1:250) and Mas1 receptor (1:1000). After treatment with the secondary antibody, the sections were stained using the EXPOSE mouse and rabbit specific horseradish peroxidase/3,3′-diaminobenzidine tetrahydrochloride (HRP/DAB) detection immunohistochemistry (IHC) kit. Digital images were obtained using an Olympus microscope at 200x magnification and AxioVision v4.8.2 imaging software. The data were analyzed using two-way ANOVA, and the student’s t-test determine the significance (Mean ± SEM; P < 0.05).

**Results:** Our data showed that there are no significant differences in ACE2 and MasR expression levels between male and female MFS aortic sections as compared to their age- and sex-matched control counterparts. Our observations warrant further investigations to measure the expression level of Ang1-7 within the aortic wall and blood circulation of the MFS mouse model.

**Discussion:** Currently, the MFS treatment and management is limited to blood pressure-lowering medications such as angiotensin II type I receptor blockers (ARBs) such as Losartan, which only delay the progression of aortic aneurysm, without completely removing the need for the aortic repair or replacement surgery, and therefore, new treatment options and innovative therapeutic approaches are needed (7). Although potential benefits of the ACE2/Ang1-7 pathway have been reported in other organ systems and other types of vascular disorders, its role in MFS-associated aortic aneurysms is still unclear. Through further investigation of the ACE2/Ang1-7 pathway, we may be able to use the RAAS anti-inflammatory pathway to improve aortic structural integrity and endothelial function with the aim of delaying or blocking aortic aneurysm in patients with MFS.
Farm To School Programs in Low-Income, High Minority K-12 Schools in New Jersey Before and After Implementation of the Healthy Hunger Free Kids Act

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Introduction: Farm to School programs (FTSP) have been promoted as part of the Healthy, Hunger-Free Kids Act (HHFKA) to improve school children’s access of nutritious, local food. We investigate the prevalence of FTSP in K-12 schools before and after the implementation of the HHFKA. We also examine differences in prevalence of FTSP by school-level (elementary vs middle/high school), proportion of students enrolled from various race/ethnicity groups and proportion of students eligible for free or reduced-price meals (FRPM).

Methods: A secondary analysis of data collected between 2010 – 2017 from 148 schools participating in the New Jersey Child Health Study (NJCHS) was analyzed. Schools were located in four low-income high minority cities in NJ: Camden, New Brunswick, Newark, and Trenton. Schools’ personnel answered surveys at three time points between 2010-2017 and reported on their schools’ participation in the FTSP for the year of the survey and the previous year. Bivariate and multivariate analyses were conducted to examine FTSP prevalence rates for each year of data collection and for time periods categorized as before and after the implementation of the HHFKA. Differences in prevalence rates were compared by school characteristics.

Results: Across all years, on average significantly (p<0.001) more elementary schools (21%) participated in the FTSP compared to middle/high schools (8%) (Figure 1). Based on multivariate logistic regression analysis, compared to 2010, the odds of FTSP participation were 4-5 times higher in 2016 (p=0.008) and 2017 (p=0.003). Adjusted estimates show that across K-12 schools, participation increased from 7% in 2010 to 26% and 27% in 2016 and 2017, respectively (Figure 2). No differences were observed in FTSP participation by other school demographics.

Discussion: Elementary schools are more likely to participate in FTSP and rates of participation in the program across K-12 schools have increased significantly in recent years. Findings underscore the importance of federal legislation in supporting child nutrition initiatives.
EMERGENCE: A RETROSPECTIVE ANALYSIS ON THE BRAIN AND THE MECHANISM BEHIND THE REDUCTION OF NIGHTMARES IN PTSD

Authors: Joseph Yacoub, George Bcharah, Michael Yacoub, David Yacoub, Mark Botros

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Background: REM sleep is a period of sleep distinguished by rapid eye movement, irregular heartbeat, and increased rates of respiration. REM sleep, nevertheless, is not continuous. It is composed of about five distinct periods during sleep. Such periods encompass about twenty percent of the total time spent asleep [24]. Nightmares in PTSD patients are often induced by the effects of noradrenaline [23]. Such effects reduce the amount of time spent in REM sleep. Prazosin is a medication that is commonly used to treat Raynaud phenomenon, manage hypertension, and treat benign prostatic hyperplasia [25]. Moreover, prazosin interacts with the $\alpha$-1 adrenergic receptors in the prefrontal cortex of the brain to reduce the extent in which noradrenaline affects the patient [4]. It does so by decreasing noradrenaline concentrations, which may result from prazosin’s blocking of alpha adrenergic receptors [26].

Methods: A variety of research papers were analyzed upon the mechanism of nightmare reduction in which prazosin is involved. Papers were analyzed which covered over 3000 patients. Over 25 papers were included based on whether they highlighted the efficacy of prazosin, the mechanism behind nightmare reduction, or the correlation between the amount of time in REM sleep and nightmares.

Results: On average, out of the 27 papers analyzed, prazosin increases total sleep time by about 90 minutes, including an increase in REM sleeping time for 92% of the patients examined. In 98% of the patient data analyzed, prazosin was more effective than the placebo in decreasing the occurrence of distressing dreams. For the patients analyzed, 97.2% had PTSD symptoms that lasted for a shorter duration during larger periods of REM sleep. Moreover, 85% of patients analyzed experienced reduced levels of non-REM sleep. In patients where data was available, 94% experienced a decrease in the levels of norepinephrine in the central nervous system after taking prazosin.

Conclusions: The intake of prazosin increases the amount of time patients spend in REM sleep. Furthermore, this increased amount of time in REM sleep decreases nightmares in PTSD patients. The use of prazosin is connected to a decrease in the occurrence of nightmares in PTSD patients and a decrease in the level of norepinephrine present in the central nervous system.
Clinical Research

Implies the use of scientific method to derive original data in the patient care setting.
The Association between RLS and Depression, and the Effect of Dopamine Agonists on the Clinical Course of Depression Among Patients with RLS

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Introduction: Restless legs syndrome (RLS) is a neuropsychological condition that causes an uncontrollable urge to move the legs, resulting in sleep impairment. It affects 5 to 10 percent of adults and 2 to 4 percent of children in the United States, men more than women. It is more prevalent in Northern European countries. Pathophysiology involves the nigrostriatal pathway, iron deficiency, and dopamine deficiency. There is a possible link between RLS and depression, which has been previously examined in the literature. The effect of dopamine agonists, used for treatment of RLS, on depression is not yet known. Our study investigates the effect of dopamine agonists on patients with concurrent diagnosis of RLS and depression.

Methods: This was a retrospective cohort study conducted in a multi-center hospital system in the Western US from 2015-2019. The primary outcome was the prevalence of depression among RLS patients versus the general population. The secondary outcome is the effect of dopaminergic agonists on the clinical course of depression in patients with RLS and depression. All ages, ethnicities and socioeconomic statuses are included. This data included persons in urban and rural settings. The only exclusion criteria were anxiety and/or other sleep disorders. Sample size was 18,153 patients. Subjects’ demographic and clinical characteristics with and without RLS will be reported as means, standard deviation for continuous variables and frequencies, percentages for categorical variables. The Wilcoxon signed-rank and chi square/issues exact test will be used to compare continuous and categorical variables respectively. Logistic regression will be used to calculate the odds ratios. All statistical models will be controlled for confounding variables.

Results: Our preliminary results show that of the 18153 subjects with RLS, 8325 had depression. That is 45.8% prevalence compared to 18.8% in the general population of the State of Arizona in 2017 (AZ DHS). The next phase of the data analysis to examine the secondary outcome is still in progress.

Discussion: There is a statistically significant link between RLS and depression (P < 0.00001). We recommend updating the standard of care for patients with RLS to include close monitoring for depression.
Advocating for Mental Health Within the Homeless Community: Identifying Trends in Mental Health Illness Across the Homeless Community

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Background: The mental health needs of homeless patients is complex, as it is influenced by the variety of factors that burden their lives. That is why providing comprehensive care to the homeless community requires an understanding of the life factors that present barriers to their care, from drug use to regional factors and mistrust in the healthcare system. Arkory is clinic that has offered mental health services to over 1000 homeless patients in the past year. In order to better understand the needs of these patients and offer more catered services, a study was done assessing trends in services offered and relationships between demographic factors and mental health disparities.

Methods: A chart review was performed on 202 patients selected randomly. Data on their age, gender, smoking status, alcohol/substance use, previous diagnoses (from other facilities), and current diagnoses was analyzed.

Results: The most common diagnosis was major depressive disorder (93%) followed by generalized anxiety disorder (91%), primary insomnia (71%), and substance abuse (41%). Men were more likely than women to suffer from PTSD (p < 0.05) and schizophrenia (p < 0.005). Substance users were more likely to have a previous diagnosis of depression and schizophrenia (p < 0.01) than non-users. Alcohol users were more likely to have a previous diagnosis of depression (p < 0.05). Patients under the age of 45 were more likely to be diagnosed with a substance abuse disorder compared with those under 45 (p < 0.01).

Conclusions: The results above point to the large role that factors such as gender, alcohol/substance use, and age can have on the mental health of homeless patients. Offering proper care to complex patients, like those experiencing homelessness, requires searching for trends in their needs, analyzing factors influencing them, and planning evidence-based goals to better cater to those needs.
Analysis of Same Day and Next Day Surgery in Ruptured AVMs: Outcomes and Inflammatory Characteristics

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Introduction: The optimal timing for surgical resection of a ruptured cerebral arteriovenous malformation (AVM) remains controversial. Historically, ruptured AVM resection was often delayed to mitigate the risk of damaging edematous brain parenchyma, which allowed the hematoma to resolve and facilitated improved visualization of the AVM and its angioarchitecture. Herein, we analyze the effect of same day and next day surgery in ruptured AVMs.

Methods: The authors retrospectively analyzed patients who underwent surgical treatment for a ruptured cerebral AVM between 2/2014 to 3/2020. Inclusion criteria included the availability of admission bloodwork. The primary outcome was poor neurologic outcome as defined by mRS > 2 at final follow-up. Exclusion criteria consisted of lack of precise rupture day, lack of admission lab work, patients who were not operated on within a 30-day period, and patients without functional follow-up assessment. Optimal cutoff points for continuous variables were determined using Euclidean distance analysis maximizing the specificity and sensitivity onto outcome.

Results: A total of 67 patients were included in the final analysis. Same day surgery (SDS) was performed in 14 (20.9%) patients, and the mean time to surgery in the delayed surgery (DS) group was 6 days (sD 7). The patients in the SDS group had significantly higher white blood cell count (13.5 sD 3.5) and absolute neutrophil count (11.3 sD 4.1, p = 0.022). The SDS patients had a greater proportion of poor neurologic outcomes (57%) when compared to the DS group (30%, p = 0.061). 28 (41.8%) patients had surgery same day or the following day after rupture, which exhibited similar inflammatory characteristics, and less drastic differences in proportions of poor neurological outcome for the delayed group (43% vs 31%, p = 0.31). Surgery before or on post-bleed day two in 38 patients (56.7%) resulted in near equivocal neurological outcomes (37% vs 34%, p = 0.84).

Conclusion: Patients operated on early in their post-rupture course had greater inflammatory states and experienced a greater proportion of poor neurological outcome with equivocation of outcomes at post-bleed day two.
Acupuncture Therapy as a Complementary Treatment Modality in the Perioperative Setting

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Introduction: Postoperative pain management and postoperative nausea and vomiting (PONV) are a persistent challenge for both healthcare providers and patients. Acupuncture is an effective and safe modality in the management of pain and nausea and has the potential to play a key role in postoperative pain management. This study aims to explore the utility and feasibility of acupuncture in the immediate postoperative setting.

Methods: In a retrospective case-control study, 22 patients who underwent elective procedures and received acupuncture therapy in the post-anesthesia care unit (PACU) were compared to 110 case controls. Indications for acupuncture therapy included refractory pain, nausea, or anxiety. Patient satisfaction and improvement in symptoms following acupuncture were assessed. PACU nurses and patients were queried on their perspective on this therapy. Demographic data, perioperative opioid consumption, pain score in the PACU, incidence of postoperative nausea, PACU length of stay, and unintended hospital admission were assessed. Comparisons were made between the groups with/without acupuncture using Wilcoxon rank sum test or fisher’s exact test as appropriate.

Results: A total of 78.9% of patients felt improvement in their symptoms among those who had acupuncture. 94.7% of recovery nurses who cared for patients that received acupuncture felt that it was helpful and 78.9% did not believe it was disruptive. Patients who opted for acupuncture had a statistically significant higher median (IQR) pain score in the PACU (7.0 (5.2, 9.5) vs. 5.0 (3.0, 7.0), p= 0.009) and higher postoperative opioid consumption (22.5 (9.8, 44.8) vs. 15.0 (0.0, 30.0), p= 0. 03). There was no difference between total perioperative opioid consumption between groups (p=0.94).

Discussion: The results of this study show that a majority of patients that received acupuncture therapy postoperatively were satisfied with their treatment, felt improvement in their symptoms, and would recommend it to future patients. Almost all nurses that cared for patients who received acupuncture in the recovery room felt it was helpful, not disruptive, and would like to see it utilized in the postoperative setting. Higher median pain scores and postoperative opioid consumption were seen in the acupuncture group; however, these patients may have opted for acupuncture when their pain was not controlled by pharmacologic therapy, the study did not record timing of medication and acupuncture administration. This study was limited by small sample size and retrospective nature, and randomized controlled trials are needed to make definitive recommendations on acupuncture therapy postoperatively. However, its low risk profile and acceptance among patients and nursing staff may suggest benefit in pre-emptive use of acupuncture as an adjunctive therapy.
High Infertility Rates and Pregnancy Complications in Female Urologists Indicate a Need for Culture Change

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Introduction: Medical training occurs during optimal childbearing years. While growing literature indicates increased rates of pregnancy complications and infertility in female surgeons, the prevalence in female physicians of specific surgical specialties is unknown¹². The goal of this study was to determine the prevalence of pregnancy complications and infertility in female urologists in comparison to the general population as well as between female urologists and other female physicians. Risk factors, workplace environment, and education were also examined.

Methods: An anonymous, voluntary survey was distributed to female physicians via private physician social media groups from June to August 2021. The survey queried pregnancy demographics and complications, infertility diagnosis and treatment, workplace environment, and prior education on these topics. Results were compared between urologists and the general population as well as between urologists and other female physicians.

Results: The survey was completed by 4612 female physicians including 241 (5%) urologists. Compared with the general population, female urologists had children significantly later in life (32.1 vs 23.6 years; p<0.0001), were significantly more likely to have had a miscarriage (39% vs 20%; p<0.0001), to have undergone infertility evaluation (30.3% vs 9%; p<0.0001) or infertility treatment (24% vs 13%; p<0.0001), and to have had a pre-term birth (20% vs 10%; p<0.0001), Table 1. 42% of urologists reported experiencing a pregnancy complication and only 9% of those surveyed received education on the risks of delaying pregnancy. Despite being educated more often regarding the risks of delaying pregnancy, compared to other female physicians, urologists were significantly less likely to have children (94% vs 99%, p<0.0001), had fewer children (1.7 vs. 2.0, p<0.0001), were significantly more likely to be discouraged from starting a family during training and practice (57% vs. 41%, p<0.0001), had significantly shorter parental leave (9 vs 10.4 weeks, p=0.0009), worked significantly more hours per week while pregnant (60 vs 54, p<0.0001), and were significantly less likely to receive breastfeeding/pumping accommodations (46% vs 65%, p<0.0001). There were no differences in age at first pregnancy, miscarriages, preterm births, or infertility evaluation or treatment between female urologists and other female physicians, Table 2.

Discussion: Female urologists have a greater incidence of miscarriage, infertility, and preterm birth compared to the general population. The incidence of these factors was no greater than that of other female physicians. Female urologists did, however, experience significantly more negative workplace attitudes and lack of support surrounding pregnancy and breastfeeding compared to their physician peers. The culture of medicine and surgery must continue to evolve to better support women with family planning during their training and careers.
Psychiatric Care to the Homeless Community: Assessing the Demographics of Homeless Patients Served by a Clinic in Los Angeles, California

**Authors:** David Yacoub, Michael Yacoub, Joseph Yacoub, George Bcharah, Hend Bcharah

**Affiliations:** Mayo Clinic Alix School of Medicine

**Background:** The homeless community is one of the most medically underserved populations in the US, especially from a mental health standpoint. Depression and anxiety have been identified as leading causes of comorbidities within homeless communities [1], and many studies attribute mental health as one of the major reasons behind homeless ED visits [2, 3]. Arklory established a full-service clinic that works to alleviate the mental health disparities amongst the homeless. The clinic aims to ease access to psychiatric care through services from trained professionals, on-site medication disbursement, follow-up care, and a non-judgmental practice.

**Methods:** Patients’ demographics were analyzed from a ~1 year period. Measures included age, gender, insurance status, and follow-up status. A chart review was also conducted on 202 randomly sampled patients, where data on smoking and alcohol/drug use was collected.

**Results:** In total, Arklory served 1328 homeless patients (56% males, 44% females) from January 2022 to February 2023, and 513 (39%) of those patients had follow-up visits. The average age of patients was 47.30±12.35. 18% of patients did not have valid insurance or were uninsured. Most insured patients (76%) had Beacon Health Strategies/LA Care as their primary plan. Per the chart review (55% male and 45% female), 61% of patients were substance users, 33% consumed alcohol, and 41% smoked. Male patients were more likely to be substance users (p < 0.05), while female ones were more likely to use alcohol and be smokers (p < 0.05). Patients who were not substance users were less likely to be smokers or alcohol use compared to substance users (p < 0.0001). There was no significant difference in alcohol/substance use or smoking between groups above and below the age of 45.

**Conclusions:** This study highlights the unique challenges homeless patients face and their impact on patients’ mental health. The large prevalence of substance use amongst the homeless calls for the importance of collaborating with rehabilitation and support organizations to offer help to these patients. Understanding their challenges from a demographic standpoint would allow service initiative, like Arklory, to provide evidence-based care in hopes of delivering a larger impact.
Quality of Healthcare in the Homeless Community: Assessing Patient Satisfaction and Outcomes at a Psychiatry Clinic

Authors: Michael Yacoub, Joseph Yacoub, David Yacoub, George Bcharah, Hend Bcharah

Affiliations: Mayo Clinic Alix School of Medicine

Background: Offering resource-limited healthcare to underserved populations can be present with many barriers. Evaluating the patient’s perspective on the services offered can therefore be a useful measure in determining their effectiveness and impact. Having served over 1,000 homeless patients within the past year, Arklory is a clinic that aims to cater to the mental health needs of the homeless population in Los Angeles. Providing mental health services to such a vulnerable population requires great sensitivity. Thus, it is crucial that the community being served is satisfied with the services and find them beneficial to their well-being.

Methods: A survey assessing patients’ perceptions on the clinic’s services, safety, and trustworthiness was administered following their visit. Patient rated their overall mental health before and after their visit. Lastly, patients were asked to note the number of visits they had at the clinic and their gender. A Likert scale (out of 5) was utilized for all rating questions. Data analysis was performed in R Studio.

Results: 108 responses were collected, with 70% of patients identifying as male. The average responses for general satisfaction, friendliness, and trustworthiness of the clinic were 4.61, 4.85, and 4.64 out of 5 respectively. Most patients have been to the clinic more than once (58%), and the number of visits was significantly correlated with higher general satisfaction rates (p < 0.05). Compared to their pre-visit mental health rating, patient’s mental health improved significantly after the visit (p < 0.00001). Higher general satisfaction was significantly associated with both higher pre-visit and post-visit mental health rating (p < 0.05). Friendliness and trustworthiness ratings were significantly associated with higher pre-visit mental health ratings (p < 0.05).

Conclusions: Overall, patients were satisfied by the clinic services. The high satisfaction rate is likely associated with the clinic’s focus on one-on-one care and honoring patient privacy as well as the enthusiasm and integrity of the team. We found patient satisfaction to be a significant contributor to patient’s mental health rating, which highlights the importance of quality services in achieving favorable outcomes. Patient satisfaction is an important measure when providing to an underserved community, especially with new initiatives like Arklory. The goal is to continue to administer and improve satisfaction surveys to assess the impact of the clinic and continue to enhance the clinic model.
Involves the presentation of one or more patient encounters that illuminate unique observation of a known disease, or that describe a novel disease process.
Middle Ear Neuroendocrine Tumors (MeNET) Misdiagnosed as Cholesteatoma in a 76-Year-Old Male with Conductive Hearing Loss

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Introduction: Neuroendocrine tumors can arise from various anatomical locations; however, the middle ear mucosa is an uncommon area for its occurrence. Middle ear neuroendocrine tumors (MeNET) comprise 2% of ear neoplasms and can be mistaken for other more common benign or malignant masses. MeNETs’ clinical presentation often includes unilateral conductive hearing loss, otitis media, and tinnitus. Due to the rarity and various architectural patterns of MeNET, there has been an ongoing debate regarding the malignancy's etiology, origin, and classification. New investigations suggest L-cells (neuroendocrine cells) as a possible source of MeNet. However, there is a consensus that it is a low-grade malignancy with 15-20% local recurrence when incompletely excised.

Case Presentation: We present a unique case of a 76-year-old male with a middle ear mass presenting with conductive hearing loss, chronic otitis media, and a misdiagnosis of cholesteatoma. Surgical resection identified a congested red-brown lobulated soft tissue mass with epithelial and neuroendocrine cytomorphological findings of nested cells forming a glandular architecture divided by fibrous septa and underlying fibrosis. Bone with epithelial lining, a small number of basophilic cells with salt and pepper nuclear features, and a pseudo-glandular architecture were also observed. Immunohistochemical staining showed positive epithelial differentiation (CK7 positive) and neuroendocrine differentiation (Synaptophysin and CD56 positive). These findings were consistent with a diagnosis of a middle ear neuroendocrine tumor.

Clinical Impacts/Relevance: Although MeNET is less prevalent than other middle ear pathologies, it is an important differential diagnosis in individuals with a soft tissue mass presenting as conductive hearing loss. It requires an understanding of the characteristic histopathological finding for proper diagnosis.

Discussion: In the past, MeNET was occasionally termed middle ear adenoma due to the range of potential histological architectures the tumor cells could display. However, this term should not be used due to the possibility of invasion, recurrence, and metastases. MeNET recurrence is common within seven years and can metastasize, with a preference for cervical nodes, bone, and liver. MeNET cases with surgical preservation of involved ossicles and increased mitotic activity, evaluated with Ki67, increase the risk of metastasis and recurrence. The Ki67 index is, therefore, a potential essential marker of prognosis. A tumor with Ki67 less than 2% is expected to have benign behavior, but tumors with Ki67 greater than 20% correlate with an aggressive nature. Hence, MeNET tumors should be graded similarly to all neuroendocrine tumors as G1, G2, and G3. The currently recommended treatment for this tumor is total resection of the mass and surveillance. Neoadjuvant therapy has been tried with no significant improvement in outcome. The presence of L-cell neuroendocrine cells opens a wide range of questions to study and understand the pathogenesis of this tumor and its physiological purpose in the middle ear.
Optic Neuritis in the Context of Rheumatological Disease: A Case Report

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Introduction: Optic Neuritis is often described classically in the autoimmune literature as secondary to major autoimmune diseases like that of Neuromylitis Optica and Multiple Sclerosis. As a result, the treatment and work up of these patients’ follows the autoimmune work up for these neurological disorders. However, in some rarer cases presented in the literature, other disorders like that of Lupus, Mixed Connective Tissue Disease, and other rheumatological disorders can lead to this presentation.

Case Presentation: The patient is a 57-year-old Morbidly Obese African American Woman, with pertinent past medical history of Lupus vs Mixed Connective Tissue Disease, who presented to our community center with chief complaint of new onset right sided decreased visual acuity. She states that this had begun three days prior to her arrival at the emergency room and that it initially began as a blurriness which progressively got worse over the weekend. She states that she lost the ability to see the color “red” in the right eye and that her ability to watch television with the right eye was now entirely diminished to being unable to see whatsoever. Physical examination demonstrated Pallor of the right optic nerve and loss of visual fields in the four quadrants on the right side with both finger wiggle testing and Red Topped Pen motion. Extraocular motions were intact to star and H method and the remainder of the neurological examination was within normal limits. Patient underwent Ophthalmological testing and was diagnosed with Optic Neuritis. The patient was started on 250 mg of Methylprednisolone four times daily for remission of what was presumed was autoimmune attack of the optic nerve and loss of visual fields in the four quadrants on the right side with both finger wiggle testing and Red Topped Pen motion. Extraocular motions were intact to star and H method and the remainder of the neurological examination was within normal limits. Patient underwent Interventional Radiology Lumbar Puncture and 10 mL of fluid were removed. Oligoclonal bands and Anti-AQP4 were both negative as was the paraneoplastic antibody panel, vitamin studies, Syphilis, and quantiferon Alpha. Following three days of treatment with methylprednisolone, the patient reported resolution of symptoms and was discharged to home with Rheumatology follow up.

Discussion: This case study demonstrates a few major pearls. First is the need for care to be taken in bariatric patients, as her larger adiposity lead to the need for a longer catheter for obtaining the Cerebrospinal fluid for testing. The second is the use of working diagnosis and the ability to change as further information becomes available as this patient was treated initially as a primary Multiple Sclerosis flair and was eventually diagnosed with Optic Neuritis Secondary to her Rheumatological disorder and sent for further treatment by her Rheumatologist.
Small Cell Lung Cancer and Left Ventricular Involvement

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Background: Most cardiac tumors are found incidentally during evaluation for an unrelated medical problem or physical finding. Cardiac involvement is rare, and a systematic documentation is infrequent. Furthermore, there are no clear guidelines referencing diagnosis and treatment of cardiac small cell lung carcinoma. We report a rare case of small cell lung cancer with metastasis to the left ventricle and our diagnostic approach to it.

Case Presentation: A 75-year-old patient with 30 pack years of tobacco use, and a history of lung cancer treated with right upper lung lobectomy 6 years prior presented to another facility with exertion shortness of breath. He was treated for a chronic obstructive pulmonary disease with guideline based therapy. He was found to be persistently short of breath which warranted a transthoracic echocardiographic exam which revealed the presence of a left ventricular mass but with poor acoustic window. The patient was transferred to our facility. We performed a transesophageal echocardiography which confirmed the presence of a left ventricular mass. We went further with a cardiac magnetic resonance imaging for better visualization of the tumor and its involvement in the left ventricle. A positron emission tomography scan was also done and revealed a hyper metabolic character of the mass. After a few days of cardiovascular and pulmonary optimization and better characterization of the mass location a left heart catheterization with left ventricular mass biopsy was done by the interventional and structural cardiology team. The biopsy of the mass showed a small cell lung carcinoma metastasis likely resulting from a primary lung cancer.

Discussion: There are no evidence-based guidelines currently on diagnostic approach in proceeding with left ventricular cardiac mass. Existing data from experts opinion suggest doing a biopsy from the suspected primary site of the tumor rather than cardiac because the vast majority of cardiac tumors are secondary to a primary location. Imaging remains by far the best way to confirm the presence of a cardiac mass in the presence of unclear cardiac symptoms. In the absence of a primary tumor site for possible biopsy, heart catheterization remains an adequate approach for biopsy. A prior right heart catheterization with right ventriculogram has been reported in literature, also our patient successfully underwent a left heart catheterization with left heart biopsy. Each patient will primarily require a cardiovascular, pulmonary optimization and hematologic optimization in the goal of preventing clotting event that could be life threatening.

Conclusion: Cardiac metastasis of SCLC is an uncommon condition, space occupying cardiac mass obstructing blood flow is usually the abnormality seen in symptomatic patients. In the absence of a primary location for biopsy and pathological review, Left and right heart catheterizations remains the approach of choice for tissue biopsy.
Stress-Induced Cardiomyopathy After Extubation in the ICU

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Introduction: Stress-induced cardiomyopathy is a very rare disease. The clinical presentation is similar to acute heart failure, usually with minimally elevated troponin levels. The most common stressors known are emotional stress (such as grief/loss, panic/fear/anxiety, interpersonal conflict, anger/frustration, financial or employment problem) and physical stress. We present a unique case of acute cardiomyopathy following extubation of a patient recovering from septic shock.

Case Presentation: The patient is a 33-year old woman who presented to the hospital in presumed septic shock with acute respiratory failure. She has a history of depression and substance use disorder. Echocardiography confirmed the presence of a tricuspid vegetation with severe tricuspid regurgitation and an left ventricular ejection fraction (LVEF) of 50-54%. CT of the chest demonstrated multifocal pulmonary septic emboli. Blood cultures grew Methicillin- resistant Staph aureus. She was treated with appropriate antibiotics and her condition was improved. She was extubated on hospital day 17 without incident, after a successful spontaneous breathing. Several hours after extubation, the patient developed acute respiratory distress. On exam, she was tachypneic, tachycardic, and hypoxic on 6L O2 by nasal cannula. Cardiopulmonary exam revealed new jugular venous distention, bilateral basilar crackles in the lungs, bilateral lower extremities swelling, and a persistent 1/6 grade systolic murmur at the left sternal border.

Discussion: A chest x-ray performed at the time of acute intervention demonstrated the presence of multifocal airspace opacities and pulmonary vascular congestion. Troponin level was minimally elevated and did not change with repeat testing. EKG revealed no acute ischemic changes. A repeat echocardiogram demonstrated a severely depressed LVEF 20-25% with global hypokinesis and regional variation, decreased anterior and anterolateral wall motion, and middle depressed right ventricular function. The complete work-up After excluding acute coronary or other decompensating event, we suspected a stress-induced cardiomyopathy secondary to extubation, requiring reintubation. She responded well to inotropic and diuretic therapies over the following week, achieving a net negative 16L urine output and normalization of her LVEF on repeat echocardiogram.

Conclusion: As its name implies, stress-induced cardiomyopathy most commonly occurs as a stress response. To our knowledge, this is only the second published report of this condition following extubation, which could have served as an inciting physical stressor. Internists should be aware of this important, though rare cause of stress-induced cardiomyopathy in the acute cardiac decompensation of patients who are otherwise clinically improving.
Fructose-1,6-Bisphosphatase Deficiency: A Rare Case of Hypoglycemia

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Introduction: Fructose-1,6-bisphosphatase plays an important role in the rate-limiting step of gluconeogenesis. Deficiency of this crucial enzyme typically manifests itself in the neonatal period. Patients with this affliction develop profound hypoglycemia which can cause irritability, hypoglycemia, lactic acidosis, liver disease, epilepsy, and failure to thrive[1]. The disease is incredibly rare, with only ~150 cases described[1]. It has high morbidity and mortality, and many patients do not survive beyond the neonatal period if the disease is not quickly diagnosed. Acute exacerbation can be life-threatening if not properly managed.

Case Presentation: We present the case of a 33-year-old female with a known diagnosis of fructose-1,6-bisphosphatase deficiency, who presented to our ED with weakness, emesis, and hypoglycemia. Prior to her presentation, she began feeling ill following a night of alcohol consumption. She presented to another facility with a blood glucose of 20 and was given oral dextrose. That night she returned with worsening symptoms and was admitted for an additional two days. She presented to our hospital one day later with worsening symptoms of dizziness, nausea, palpitations, and multiple episodes of emesis. Initial labs revealed leukocytosis (13.6), metabolic acidosis (pH 7.09), lactic acidosis (8.4), and a blood glucose of 36. She also tested positive for COVID-19. She was admitted under ICU-level care and remained on a D5 drip overnight. Per endocrinology recommendations, she resumed PO intake, with frequent meals. She was discharged home 48 hours later with endocrinology follow-up.

Clinical Impacts/Relevance: Acute exacerbation of Fructose-1,6-bisphosphatase deficiency can have many different triggers. In our case it was multifactorial; emesis, alcohol use, and infection all played a role. Profound hypoglycemia can result in confusion, weakness, seizure, and even coma. The metabolic derangements associated with an exacerbation have the potential to be life-threatening, with supportive care the only effective treatment. Intervention with oral (if tolerated) or IV glucose must take place early in an acute crisis, however, the measured blood glucose may be normal upon initial presentation. Delayed hypoglycemia occurs relatively late in the course of acute metabolic decompensation [1]. When not in acute exacerbation, the condition is managed by consuming frequent meals and avoiding fructose [1]. It is important for these patients to avoid circumstances that can precipitate hypoglycemia, and seek prompt medical treatment for infections and conditions limiting oral intake.

Discussion: Early recognition and prompt management by physicians is crucial to prevent patients from leaving the hospital without addressing the root cause of the exacerbation. In our case, the patient had been admitted and discharged twice prior to presenting at our emergency department. By the time she was admitted, her condition necessitated ICU-level care. Patients with Fructose-1,6-Bisphosphatase deficiency become accustomed to chronically low blood sugars that would normally cause profound symptoms, further complicating the clinical picture. In our case, the patient was coherent enough on presentation to describe her previous diagnosis, allowing proper management and a relatively swift recovery. Had the patient presented with a seizure, profound somnolence, or coma due to her condition, it would have led to a delayed diagnosis and sub-optimal management.
Diagnosing Pancreatic Cancer: When Imaging Fails, Clinical Acumen Prevails

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Introduction: Asthenia, anorexia, abdominal pain, and weight loss are the most common presenting symptoms of pancreatic cancer. Jaundice increases the positive predictive value of these symptoms greatly; 22% compared to <3% without jaundice [2]. Initial evaluation for pancreatic cancer typically includes transabdominal ultrasonography or CT scan. It can be a difficult diagnosis when initial imaging is negative, especially when the patient does not present with jaundice.

Case Presentation: We present the case of a 77-year-old female who presented with generalized fatigue, nonspecific abdominal pain, sacral decubitus ulcer, and urinary tract infection. Social history was pertinent for >50 pack-years of smoking and alcoholism. CT abdomen/pelvis did not demonstrate any acute process but showed diffuse edema and small bilateral pleural effusions. No pancreatic abnormalities were noted. The patient was anemic (hemoglobin 5.3) and had elevated lipase (408). She was septic with S. Pyogenes and MRSA bacteremia. Notably, the patient had a 15 kg weight loss over the preceding 5 months. She appeared cachectic and had pancytopenia, leading to high clinical suspicion of underlying malignancy. Tumor markers, CEA, CA19-9, and CA-125 were elevated at 9.1ng/mL, 86 U/mL, and 49.0 U/mL respectively. MRI of the abdomen revealed a 3.1cm x 2.5cm pancreatic head adenocarcinoma. This cancer was likely an intraductal papillary mucinous neoplasm (IPMN) that had locally invaded the gastric antropyloric region and D2/D3 segments of duodenum. Oncology was consulted however, the patient wished to be transitioned to comfort care and was discharged to inpatient hospice.

Clinical Impacts/Relevance: Diagnosing pancreatic cancer is often challenging, and there is no consensus in guidelines [11]. There is limited information on IPMN-associated pancreatic carcinoma, though some researchers believe IPMNs are responsible for 20-30% of all cases of pancreatic cancer [12]. MRI and CT scans have been shown to have similar sensitivity and specificity for detecting pancreatic cancers [6], however MRI is able to better distinguish normal pancreatic tissue from cancer in tumors <2cm [7]. Tumor markers are especially useful in non-jaundiced patients [9]. CA19-9 is an important pre-operative indicator for both surgical success and 5-year survival rate (38 to 80% if CA19-9 is <37U/mL and 0 to 27% if >4000U/mL). It is important to consider that CA19-9 (sensitivity 79% and specificity 82%) is valid only in patients who express the Lewis antigen. 7-10% of the population does not express the Lewis antigen, in whom this test would produce a false-negative result [4].

Discussion: Our patient presented with vague symptoms, moreover the CT scans did not reveal any masses. Significant weight loss, cachexia, high-risk factors, and clinical deterioration with clear immunocompromised status cast an air of suspicion over the initial CT scan. The next cost-effective step was evaluating tumor markers. The elevated tumor markers further supported our clinical suspicion of underlying malignancy. MRI confirmed the diagnosis. This is a unique case where the CT scan was negative, despite a large tumor (>2 cm). This case demonstrates that pancreatic cancer requires a holistic approach to diagnosis. It is necessary to continue to search when clinical suspicion is high.
Atypical Mycobacterium Abscessus Cutaneous Infection in the Immunosuppressed: A Case Report on an Emerging Pathogen

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Introduction: *Mycobacterium abscessus* (MAbc) is a rapidly-growing nontuberculous mycobacterium that represents an increasingly-prevalent cause of skin infections [1]. This report describes an atypical presentation of MAbc to heighten physician awareness of the pathogen.

Case Presentation: A 69-year-old female with immunocompromised status presented with a four-month history of solitary, nonhealing ulcer on her right lower extremity following an insect bite. After no improvement following oral amoxicillin/clavulanate and topical mupirocin for initial diagnosis of cellulitis, biopsy and culture of the lesion revealed MAbc. Microscopic exam revealed reactive cutaneous inflammation without evidence of malignancy. Acid-Fast bacteria (AFB) stain was negative, and no granulomas were noted histologically. Clarithromycin and doxycycline were initiated while awaiting susceptibility testing results. Final culture showed MAbc sensitive to amikacin, cefoxitin and clarithromycin. Unfortunately, before antibiotic therapy could be modified, the patient expired.

Clinical Impacts/Relevance: The presentation of a solitary, lower extremity ulcer is rare compared to current literature. This case occurred following an insect bite rather than instrumentation. Additionally, negative AFB stain and no granulomas on histology are atypical for this pathogen. The patient’s expiration did not allow for evaluation of treatment efficacy.

Discussion:

Existing literature characterizing MAbc is sparse. Most cases present as multiple papules, nodules, and abscesses with positive AFB staining and granulomas; it is possible for deviations to exist depending on immune status [2]. Considering the highly-drug-resistant nature of *M. abscessus*, correct diagnosis and treatment are crucial. For this to occur, clinicians must maintain high clinical suspicion for *M. abscessus* infection in any chronic, nonhealing wound failing to respond to initial treatment.
Scrotal Dissemination of Coccidioidomycosis in N. American Patient: Case Report

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Introduction: Coccidiomycosis (Valley Fever) is a prominent fungal infection in the American Southwest, Central America, and South America caused by the fungus Coccidioides. The immunocompromised are historically the most susceptible to coccidioidomycosis; however, race has shown to play a role in susceptibility to Coccidioides infection with increased rates of infection among African Americans and Hispanics\(^1\)\(^,\)\(^2\). Approximately 5 to 10% of people who develop coccidioidomycosis will develop serious or long-term problems in their lungs. In about 1% of those infected, the infection spreads from the lungs to other parts of the body. Typically, the central nervous system, skin, bones, or joints\(^3\).

We report a case of a 30-year-old Native American man who presented with chronic Coccidioides infection that spread to bones, central nervous system, and scrotum. This is significant because this is the first reporting of disseminated coccidioidomycosis with scrotal spread. It additionally raises awareness of the dangers of chronic coccidioidomycosis and the consequences of untreated disease in underserved and vulnerable populations.

Case Presentation: A 30-year-old Native American male with a PMH of disseminated coccidioidomycosis including meningitis presents to the ED with chief complaints of weakness and chronic ulcers of left foot. Vitals are TMP 97.9, BP 103/67, Pulse 91, RR 16. On physical exam, patient is A/O x3, chronically ill-appearing, and cachectic. No abnormalities to auscultation of heart or lungs. Two ulcers on the sole of his left foot with surrounding erythema, and a 2.2cm indeterminate mass in the superior pole of the right testicle with a right scrotal ulcer draining serous fluid without surrounding erythema or induration. Labs were significant for WBC 10.74, HCT 30.7, NEUT 8.18, IG 0.04, HIV negative. Chest CT demonstrated miliary pneumonitis. Ultrasound of scrotum showed a mass indenting the testicle. CT pelvis showed fluid collection posterior to bladder of unclear etiology.

Blood culture was positive for Coccidioides growth. Soft tissue culture grew MSSA and bone grew Coccidioides. Fluid collection posterior to bladder grew Coccidioides. Surgical debridement and cefazolin IV were performed for treatment of MSSA osteomyelitis of left foot. A combination of fluconazole IV and amphotericin B was begun for treatment of disseminated coccidioidomycosis and scrotal abscess.

Clinical Impacts/Relevance: There are roughly 20,000 cases of Coccidioidomycosis diagnosed in the United States annually\(^4\). Black, Hispanic, and Native American patients had rates of cryptococcosis, pneumocystosis, and coccidioidomycosis that were 1.4-5.9 times higher than those of non-Hispanic White patients who were hospitalized. Rate of hospitalization and serious illness may be even more disproportionate when considering socioeconomic status in addition to ethnicity as all fungal infections—aside from aspergillosis—have higher hospitalization rates in areas with lower incomes\(^5\).

Discussion: In conclusion, we present a new form of disseminated coccidioidomycosis as a scrotal abscess and lower extremity osteomyelitis in a patient without known immunocompromising comorbidities, highlighting the disease burden present in underserved communities.
Acute Limb Ischemia Resulting in Below Knee Amputation in a Transgender Female Presenting with Suicidal Ideation and Seizure

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Introduction: Current standards of care for transgender females recommend transdermal estrogen, instead of oral or IM routes, for those >45 years old or at increased risk for venous thromboembolism (VTE) to reduce the risks of adverse effects such as VTE, myocardial infarction, and stroke. Transgender patients also face barriers to accessing healthcare such as provider lack of knowledge, discrimination, and difficulty paying for adequate care.

Nontraumatic acute limb ischemia is typically associated with embolus from the heart or large vessels, or thrombus formed at peripheral atherosclerotic sites due to hyperviscosity, malignancy, low flow states, coagulopathies, or COVID-19. This is a case of acute limb ischemia, without an embolic source, in a transgender woman on IM estrogen with heavy tobacco use, only mild peripheral artery disease, and COVID-19 negative status.

Case presentation: A 56-year-old transgender female with history of seizures secondary to low grade glioma removal, COPD, anxiety, & depression with 30 pack-year history was transferred to the ED after a seizure while at an urgent psychiatric center(UPC) for suicidal ideation. Pt became febrile and work up for appendicitis was initiated. She mentioned right lower extremity pain but exam was normal at the time.

Approximately 12 hours after her arrival, right lower extremity pain was reported at a 10/10. Exam showed a pale, cool extremity with rapid progression to loss of pulses, motor, and sensory function within hours. CT angiogram showed 99% stenosis of right midpopliteal artery and complete occlusion of anterior tibial artery and tibioperoneal trunk without collaterals. Of note, the patient had not disclosed her transgender status and monthly IM estrogen use until specifically asked by vascular surgery after CT angiogram results. She also disclosed having episodic right lower extremity pain for several days prior to presentation.

Open thrombectomy with 4 compartment fasciotomy was performed. After 24 hours of reperfusion and warming, the limb was not viable. Below-the-knee amputation was performed. Surgical pathology showed only mild calcification in affected vessels with luminal thrombus causing vascular compromise without collateral vessels. Coagulation studies were normal. Echo showed no mural thrombus or valvular vegetation. CT angiogram of abdomen showed no aneurysm or thrombus.

Clinical Impacts/Relevance: There are few reported cases of acute limb ischemia associated with estrogen therapy. This case highlights unique considerations in treating transgender females.

Discussion: More knowledge is needed on screening guidelines and adverse effects of estrogen therapy for transwomen with additional risk factors for hypercoagulability. We hypothesize our patient’s age, IM estrogen use, and tobacco use contributed to a hypercoagulable state leading to acute limb ischemia. Improving transgender healthcare should be a multi-faceted approach including physician education and awareness of unique pathologies associated with exogenous hormone therapies as well as creation of inclusive environments and normalizing of asking patient’s their gender identity as important and influential pieces of patient history.
Gastrosplenic Fistula: Pancreatic or Gastric in Origin? A Case Report

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Introduction: Gastrosplenic fistula is an uncommon pathology that is most often associated with malignancy. However, it can also be associated with other pathologies such as gastric ulcer disease, pancreatic pseudocyst invasion, and sickle cell disease. Here, we present a patient with gastrosplenic fistula causing splenic autodigestion and development of an abscess. We propose two hypotheses regarding this pathology.

Case Presentation: Our patient is a 61 year old man who presented to the hospital with one month of left upper quadrant abdominal pain and poor appetite. He had a recent admission for acute pancreatitis with splenic vein thrombosis, and a bleeding gastric ulcer. He reports that an upper endoscopy was performed but no further intervention was required thereafter. He was discharged on warfarin for his splenic vein thrombus. When he returned to the ED, he was profoundly coagulopathic with an INR of 7.1, with tachycardia and leukocytosis. CT scan of the abdomen and pelvis demonstrated a 7.8 x 9.6 x 10.5cm fluid collection by the splenic fossa with locules of gas. Patient’s coagulopathy was corrected and he was started on broad-spectrum antibiotics. To further delineate the anatomy, an upper GI study was performed, revealing a fistula from the stomach to the left upper quadrant abscess. The patient was taken to the operating room for an exploratory laparotomy. In the left upper quadrant was malodorous liquefied material; no viable splenic parenchyma was identified. A splenic necrosectomy was performed. An EGD was performed to identify the fistula tract. The gastrosplenic fistula was excised and the stomach was debrided to healthy mucosa. The defect was closed in a Connell fashion. A post operative upper GI series did not demonstrate evidence of a leak. The patient was started on a diet and tolerated this well. Final pathology confirmed a gastric fistula with histiolytic reaction consistent with prior perforation. The stomach specimen was negative for malignancy but positive for H. Pylori. No identifiable splenic tissue was present in the specimen.

Clinical Impact and Discussion: Gastrosplenic fistulas with associated abscess has an unclear pathophysiology. Further imaging studies may provide more information to its etiology prior to operative intervention. We propose two hypotheses for this development of this pathology. One possibility is chronic gastritis with peptic ulcer disease, leading to a gastric perforation and subsequent fistulous tract from the stomach to the spleen. This hypothesis is difficult to confirm due to absence of splenic tissue. Management of a gastrosplenic fistula secondary to ulcer disease would be operative resection of the fistula tract and partial gastrectomy and splenectomy. Another possible etiology is pancreatic pseudocyst from the patient’s history of recurrent pancreatitis leading to erosion into surrounding structures. We posit that a pseudocyst led to a fistulous tract to the spleen, with pancreatic enzymes infiltrating the splenic parenchyma and causing autodigestion and necrosis. Ultimately, nonoperative management may be feasible for stable patients. Failure to improve warrants urgent surgical intervention.
“When the wind blows, it hurts” – Neuromyelitis Optica Presenting with Paresthesia’s and Allodynia

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Introduction: Neuromyelitis Optica Spectrum Disorder (NMOSD) and Multiple Sclerosis (MS) are two diseases with a complex and intertwined history. Once thought to be the same disease, the two are now denoted as two distinct pathologies. Both are demyelinating diseases of the central nervous system (CNS) with a wide variation in presentation, but NMOSD most often presents with optic neuritis. The most specific diagnostic indicator of NMOSD is IgG antibodies to aquaporin-4 (AQP4-Ab). Originally, NMOSD was thought to be limited to the spinal cord, but brain lesions now appear to be more common [1]. This particular case reflects the complicated history behind NMOSD and the importance of following through on a complete clinical workup.

Case Presentation: A 44-year-old male presented to the hospital following a neurological clinic appointment. The patient reported two previous neurological events, recording one event five months prior to presentation and another four months prior. In the first, he felt associated numbness and tingling in the left arm radiating to the hand, described as “hitting your funny bone,” with diminished forearm strength. This lasted three weeks until the second event began.

During the second, he experienced allodynia of the right flank and right lower extremity. The patient added, “when the wind blows on my leg, it hurts.” He experienced intermittent dizziness with increased fatigue. He denied any vision changes. He noticed a loss of sensation in the glans penis, and allodynia during sexual intercourse.

The physical exam revealed mild bilateral ptosis with weakness of the left frontalis muscle. Sensory testing revealed significant allodynia throughout the right sided T4-S2 dermatomes. The patient was positive for Lhermitte’s sign with flexion of the neck and positive for McArdle’s sign with left-sided wrist extensor weakness.

Clinical Impacts/Relevance: NMOSD has been debated to be a subtype of Multiple Sclerosis, but since discovery of the AQP-4 antibody, the two have been considered distinct. This is important, as the treatment of the disease differs. This case is of particular interest as the patient did not present with any optic nerve involvement. Proper diagnosis required the team to order the specific anti-aquaporin 4 testing. Had the team not obtained the AQP4-IgG testing, the patient would have undergone DMT empirically, resulting in mistreatment of the patient’s disease [2].

Discussion: The true diagnosis was the more rare neuroimmunologic disease - NMOSD. The team initially was leaning toward a diagnosis of MS based on consideration of Mcdonald criteria and the presence of MRI lesions. While NMOSD is similar to MS, there are enough differences to necessitate different treatment strategies [3].

Treatment for MS includes DMT, whereas NMOSD is typically treated with high-dose glucocorticoids and the effect of other therapies is under continued study [2]. DMT agents that have good clinical data include Tysabri, Alemtuzumab, and Mavenclad [4]. However, these are shown to have variable efficacy with some cases continuing to progress despite treatment, as well as a high risk of dangerous side effects [4][5]. In refractory disease, patients are treated with autologous hematopoietic stem cell transplantation [6].
Uncommon Presentation of a Common Infection in a Local Arizona Woman

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Introduction: Coccidioidomycosis (Valley Fever) is a fungal infection caused by the dimorphic fungus, Coccidioides. Endemic to the Southwestern United States, the infection may present with cough, fever, shortness of breath, muscle aches, and in rare instances, lower extremity erythematous rashes. In this presentation, we report a resident of Arizona with multiple risk factors for coccidioidomycosis presenting to the hospital with multiple erythematous rashes on her lower extremities.

Case Presentation: Patient is a 32-year-old female, with a past medical history of ADHD, and a history of fevers, chills, mild cough and worsening bilateral lower extremities rash. Patient expresses progressively increasing pain with rash, described as pins and needles sensation that becomes worse with standing. She sought treatment for the rash at an urgent care and was prescribed Keflex and Benadryl, which did not alleviate symptoms. Patient states rash began to spread further with the presence of a subjective fever. Social history included employment at Shamrock Farms, local residence in Phoenix. On a physical exam, patient was noted to have scattered raised popular erythematous exanthem on bilateral lower extremities, along with confluent erythematous patch on right anterior foot. Two additional lesions on both posterior triceps appeared red and raised.

Upon consult, CBC, CMP were ordered along with workup with coccidioidomycosis serology, Strep ASO, Mycoplasma, TB QuantiFERON assay, Hep B, RF, ANA, Liver enzyme, and ESR tests. Leukocyte count was noted to be elevated at 24.6. An ultrasound venous duplex scan of the lower extremities showed normal compressibility and no signs of DVT.

Clinical Impacts/Relevance: Coccidioides fungus is endemic to the Western Hemisphere, with Arizona, and notably Maricopa County representing one of the highest average incidences of reported Valley Fever per 100,000 people during 2011–2017. Coccidioides lives in the soil where it may become airborne if the soil is disrupted. The spherules may be inhaled into the lungs, causing Valley Fever. Risk factors include Environmental Exposure, Age and a Weakened Immune System. Symptoms include but are not limited to cough, fever, chills, shortness of breath, headache and erythematous rashes on the lower extremities.

Discussion: We report a resident of Arizona with risk factors for coccidioidomycosis such as occupation and place of residence. Notable in the patient, she presented as an Arizona local with several common symptoms of Valley Fever including a cough, fever, chills, and tender erythematous nodules bilaterally on the anterior shins. Upon blood work, the patient presented with a positive Coccidioides IgM and IgG, elevated inflammatory marker CRP and being an Arizona local, lead to the conclusion of an infectious prodrome from cocci infection, leading to the immunological response. Treatment is generally supportive if not severe. For the patient discussed, she presented with Erythema Nodosum secondary to a cocci infection; treatment includes steroids and NSAIDs. In conclusion, Coccidioides is a dimorphic fungus that causes Valley Fever, endemic to the Southwestern United States, particularly Maricopa County and should be suspected and diagnosed in the presence of any alarm findings in the history or physical exam.
Diagnostic Dilemma of Albendazole Induced Acute Liver Injury with Hereditary Hemochromatosis: A Case Report.

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Introduction: One leading cause of liver damage is Drug-induced liver injury (DILI) from prescription drugs, and dietary/herbal supplements. Undiagnosed chronic liver disease can be a risk factor for DILI. This case report illustrates a conflicting case of albendazole-induced DILI with laboratory findings concerning hemochromatosis (HH) requiring liver biopsy for diagnosis.

Case presentation: A 56-year-old Hispanic female presented with four-days of fatigue, right upper quadrant (RUQ) pain, and vomiting after a dose of albendazole. No known medical or surgical or family history. Initial vitals were normal, and BMI <25kg/m2. Physical examination includes scleral icterus, and RUQ tenderness. Laboratory findings showed elevated AST (3232 U/lit), ALT (3289 U/Lit), total bilirubin (4.3 mg/dl), ALP (193 IU/L) and GGT (280 IU/L). Other findings include normal CBC, lipase, creatinine, BUN, acetaminophen levels, negative UDS, alcohol, and pregnancy test. CT abdomen showed nonspecific hepatitis findings with periportal edema and gallbladder wall thickening with normal biliary tree. Ultrasound liver findings shown in the picture.

Workup showed ANA with 1:160 titers but negative Anti-dsDNA, Anti-F-actin antibody, negative for acute viral hepatitis, CMV, HSV, and EBV (IgM). Further workup showed elevated transferrin saturation is 54%, elevated ferritin levels (5496 mcg/l) (normal Iron levels 157mcg/dl, total iron binding capacity 292 mcg/dl), normal ceruloplasmin and alpha-1-anti-trypsin antibody levels. Liver biopsy was performed with inconclusive laboratory and imaging findings and pathology findings shown in the picture. Liver enzymes and symptoms improved with supportive care.

Discussion: Mechanism of albendazole-induced DILI is either by direct toxicity or immune-mediated reaction and can present with elevated liver enzymes that are transient (in most cases) to severe acute liver injury requiring transplantation.² Dose-independent variable severity in acute liver injury with albendazole requires evaluation for other causes of liver injury, including infectious, autoimmune, and chronic liver diseases.¹

HH is predominant in northern European descent and the Caucasian population. HFE gene is the most common mutation associated with HH and associated with excess iron deposits mainly in liver.¹ Iron studies are characterized by the elevation in transferrin saturation (TS) (>40% in women; >50% in men) and ferritin levels (>200 mcg/L in women; >300 mcg/L in men). Patients with suspected HH (elevated TS and ferritin levels) of northern European descent or Caucasian, next appropriate step is HFE genetic mutation testing. In contrast, populations such as Hispanics, African American, and Asian descents, HFE genetic testing might give false negative results. Among different racial or ethnic groups, Hispanic population has significantly varied HFE genotypes across geographic regions.⁴

Liver biopsy is indicated in situations with elevated liver enzymes in a diagnosed case of hemochromatosis and serum ferritin levels of more than 1000 mcg/L to exclude other etiologies of liver damage.⁵ In our patient, albendazole-induced-DILI was still under differential, therefore a liver biopsy was obtained.
Conclusion: Albendazole is known etiology of DILI, although dosage level is minimally studied in the literature. In severe liver injury cases in non-Caucasian/north European where laboratory, and imaging findings were inconclusive and suspicious for underlying hemochromatosis causing dilemma, liver biopsy will give a definitive diagnosis than genetic testing.
An Insidious Onset of Non-Convulsive Status Epilepticus (NCSE) in a Critically Ill Patient

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Introduction: Neurotoxicity in patients on cefepime therapy, especially in the setting of renal disease, is an emerging topic in medical literature. Here we present an interesting case of cefepime-induced neurotoxicity initially presenting with acute psychosis and progressing to non-convulsive status epilepticus (NCSE) associated with myoclonic jerks. This case was complicated with a complex clinical course and confounding factors making the diagnosis challenging.

Case Presentation: A 54-year-old male with poorly controlled diabetes mellitus was initially admitted for anasarca, nephrotic range proteinuria, and acute kidney injury requiring dialysis. Blood culture was positive for Enterobacter cloacae and urine culture for Enterococcus faecalis and Klebsiella. The patient was started on cefepime. Due to persistent leukocytosis, levofloxacin was added two days later. After one dose of levofloxacin, the patient developed an abrupt change in mentation with persecutory delusions and auditory hallucinations. He was treated with benzodiazepines and antipsychotics for concerns of levofloxacin-induced psychosis. Over the next two days, he became progressively withdrawn, somnolent, and minimally responsive to stimulation. Worsening mental status and subtle interruptible myoclonus of extremities, without clear cause on imaging, prompted an electroencephalogram (EEG). The EEG recording demonstrated rhythmic 2 cps sharp waves corresponding to the rhythmic jerking of extremities (Figure 1). Diazepam administered during continuous EEG abated the rhythmic sharp waves, and the patient became conscious, able to speak a few words, and follow simple one-step commands (Figure 2). EEG findings were consistent with non-convulsive status epilepticus (NCSE) alternating with migratory focal convulsive activity and myoclonic jerks. With a high concern for cefepime-induced neurotoxicity, cefepime was discontinued on the tenth day and transitioned to Ertapenem. He was loaded with levetiracetam and placed on a renally-adjusted maintenance dose. Over the next few days, the patient’s mental status improved remarkably, nearing his baseline.

Clinical Impact/Relevance: NCSE, reported in one-third of such cases, has elusive clinical signs, and is poorly characterized. It is essential to keep a high index of suspicion, primarily in patients with renal dysfunction.

Discussion: Cefepime is one of the most widely used empiric antibiotic therapy in the USA. Neurotoxicity with cefepime was first reported in 1999, but the mechanism is not yet fully understood. It is hypothesized to be dependent on the drug’s ability to cross the blood-brain barrier and inhibit GABA-mediated neurotransmission. The risk increases with higher concentrations of cefepime in blood, especially in the setting of renal dysfunction, the most important risk factor associated with the condition. It appears to be more prevalent in seriously ill patients. In such cases, an association of encephalopathy with cefepime is easily overlooked, often clouded by a myriad of other more common potential causes. The most frequently reported symptoms include confusion, myoclonus, and unconsciousness. Other symptoms such as agitation, aphasia, and seizures may also be seen. NCSE should be high on the differential in such patients. The decision to change the antibiotic regimen must be made earlier rather than later to prevent further toxicity. Prompt hemodialysis and EEG can further aid in the diagnosis and monitoring of the condition.
The Value of a Thorough History: Hepatitis Due to Coxsackie A Virus in an Adult

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Introduction: Coxsackie virus is an Enterovirus that most commonly affects children and neonates. Coxsackie A, specifically A16, causes Hand-foot-and-mouth disease in children, characterized by fever and erythematous papular eruptions [1]. Coxsackie B is known to cause myocarditis, meningitis, and gastrointestinal upset to name a few [2-3]. Coxsackie virus induced hepatitis has also been reported in children [4]; however, it has been rarely reported in the adult population. Only a few reported adult cases of hepatitis due to Coxsackie virus exist, including men and women aged 19 to 65 affected by various strains of Coxsackie A and B, with some having an underlying immunocompromised state and involvement of other organs [5-11]. We present a unique case of an adult male with acute hepatitis from Coxsackie A exposure and highlight the value of obtaining a detailed history.

Case Presentation: The patient is a 35-year-old male who presented with acute epigastric and right upper quadrant pain. His past medical history was significant for asthma, chronic back pain taking Tramadol, cholecystitis status post cholecystectomy, and an ongoing workup for autoimmune hepatitis. He was found to be febrile to 100.9 F, with leukocytosis of 12.6 x 10⁹ WBC/L, elevated liver function tests (LFTs) including aspartate aminotransferase (AST) of 386 IU/L and alanine transaminase (ALT) of 260 IU/L, and elevated total bilirubin of 2.2 mg/dL. The day after presentation, AST increased to 694 IU/L and ALT increased to 594 IU/L. Physical examination, abdominal imaging, and laboratory testing for classic viral causes of hepatitis were unremarkable.

The initial assessment included acute hepatitis that was autoimmune or drug-induced in nature. However, after more careful history taking, the patient was found to have exposure to Hand-foot-and-mouth disease through his young son. The team subsequently ordered an expanded viral panel, which was positive for Enterovirus. Based on the patient’s exposure history, this was determined to be Coxsackie A. The patient was treated with supportive care, leading to symptom improvement and downtrending LFTs.

Discussion: Coxsackie virus causing hepatitis in adults has been rarely reported. This unique case demonstrates Coxsackie A induced hepatitis in an adult due to exposure from a sick contact. Given the patient’s history of potential autoimmune and tramadol-induced hepatocyte damage, our case suggests that Coxsackie A may be more virulent in patients with underlying liver vulnerability. This is consistent with other reports of vulnerable patients who are either immunocompromised [10], pregnant [5,11], or have other comorbidities [8-11]. Such an etiology makes this likely a Hickam’s picture in which the patient had multiple liver insults at once causing this episode. We not only share a unique case, but also highlight the importance of meticulous patient interviewing to ensure appropriate treatment and prevent delays in management.
Clinical Impact/Relevance: We demonstrate the value of considering Coxsackie A as a rare cause of hepatitis in an adult with exposure history and negative workup for classic causes. Additionally, we highlight the importance of obtaining a thorough patient history for a busy practitioner.

An Atypical Presentation of Porphyria Cutanea Tarda: Acute Bullous and Eschar Eruption Following Treatment of Extensive Bilateral Deep Venous Thromboses

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Introduction: Porphyria cutanea tarda (PCT) is a rare blood disorder caused by an enzymatic deficiency in the heme production pathway. It is characterized by fragility and blistering of sun-exposed skin areas, mainly the face, chest, and hands. PCT typically develops in the 5th or 6th decade of life and risk factors are alcohol use, estrogen use, viral infections, smoking, and iron overload. Pseudoporphyria is a similar blistering skin condition that shares clinical and histopathologic features of PCT but lacks the enzyme deficiency. Research suggests an association of PCT with bullous pemphigoid, as both conditions can cause subepidermal blister development. There is a drug-induced subtype of bullous pemphigoid with over 50 medications as potential triggers, mainly diuretics, antibiotics, and anti hypertensives. The initiation of heparin has also been associated with various cutaneous complications, such as skin necrosis, hematomas, and bullae. This case report describes an 83-year-old female with PCT who presented to her family medicine physician for acute bullous eruption after recent hospitalization and treatment for extensive bilateral deep venous thromboses (DVT).

Case Presentation: An 83-year-old female with a 10-year history of PCT and recent treatment for bilateral DVTs presented to her family medicine physician for a hospital follow-up visit. She had been discharged 11 days prior for bilateral, extensive DVTs involving the superficial femoral veins and popliteal veins treated with therapeutic level of heparin. During her hospital stay, she developed several large, painful, and edematous blisters seeping serous fluid on her bilateral lower extremities. At the follow-up visit, the patient was in visible distress from her worsening and enlarging bullae and even developed a new serous-filled blister during the visit. Emergency medical services were called, and the patient was taken to the local hospital for better pain control. Further workup revealed full thickness skin loss with loose skin and hematoma involving the entire medial aspect of the right calf, a large eschar separating from the deep soft tissues with exposed muscle on the left calf, and additional large serous-filled blisters. Wound cultures revealed MSSA infection of a right calf bullae. The patient was started on IV ceftriaxone and fluids and wound debridement of bilateral cutaneous bullae was performed by plastic surgery. An ultrasound venous duplex found chronic appearing bilateral DVTs, and the patient was restarted on therapeutic level of heparin. She was subsequently transferred to a high-level burn center for more intensive wound care management and surveillance.

Clinical Impacts/Relevance: There are minimal cases in the literature that describe this rare presentation of PCT, which is associated with significant morbidity and mortality.

Discussion: This study reports an acute eruption of bullae and eschar with MSSA infection in a patient with a history of relatively well-controlled PCT. We hypothesize that the combination of our patient’s lower extremity edema secondary to bilateral DVTs, predisposition to bullous formation due to PCT, and initiation of heparin for
DVT treatment contributed to her painful bullous eruption. Ultimately, our patient was successfully treated with IV antibiotics and fluids, wound debridement, narcotics, and transfer to a high-level burn unit.
Ischemic Bowel Associated with Severe Burns and Concomitant Methamphetamine Use: A Case Series

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Introduction: Ischemic bowel is a rare and often fatal complication associated with severe burn injury. Several risk factors for developing this complication following burn injury have been identified in the literature, but do not include modifiable patient behaviors such as substance use. We describe an interesting case series of ischemic bowel occurring in the setting of severe burn injury and concomitant methamphetamine use.

Case Presentation: Four adult patients (age 33-63) presented to a 45-bed regional burn center in Maricopa County between May 2020 and June 2022 with severe contact burns and positive methamphetamine toxicology. All four patients were intubated and started on fluid resuscitation upon arrival. Total body surface areas were found to be 24%, 62%, 62%, and 65%. Three patients underwent escharotomies on the day of injury followed by excisional debridement in the OR. All patients required hemodynamic support with pressors. Fluid resuscitation was successful and largely uncomplicated for each of these patients. Surgical management of the burn wound was aggressive with the initial excision within 48 hours of cessation of resuscitation and complete excision within 7 days post-injury. All patients subsequently presented with clinical signs or imaging concerning for ischemic bowel and underwent exploratory laparotomy. All patients required multiple abdominal procedures. All patients ultimately died in the hospital from multi-organ failure and septic shock.

Clinical Impacts/Relevance: All four patients were young males with moderate to large burn injury associated with concomitant methamphetamine use. Despite uncomplicated resuscitations and aggressive, early burn excision and initial autografting, all developed ischemic bowel early in their clinic course and ultimately succumbed to septic shock and multisystem organ failure.

Discussion: Methamphetamines can cause splanchnic vasoconstriction leading to potential bowel ischemia. In burn patients, large volume resuscitation similarly induces vascular changes and subsequent disruption in organ perfusion. This case series of four patients with remarkably similar clinical courses demonstrates a unique tragic outcome associated with burn injury and methamphetamine use.
Health Policy/Medical Education

Refers broadly to any original, systematic, scientific analysis of, or model for, health care education or health care policy.
Building Community Relationships Via the Introduction of a Novel Medication Inventory System in a Free Community Health Center

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Introduction: Affordable treatment options improve patient adherence and outcomes, especially for those treated at nonprofit community health centers. Free-of-cost medication dispensaries can fulfill that role if utilized effectively.1,2 The Virginia G. Piper Medical Clinic at the Society of St. Vincent de Paul is a free healthcare center for the uninsured in Maricopa County, Arizona.3 The center includes a free medication dispensary that supplies donated medications to patients. After observing this local clinic’s challenge with managing their medication dispensary, our team worked with clinic staff to implement an automated inventory tracker system.

Methods: With the intention of better understanding the challenges the dispensary faced concerning inventory upkeep, we first surveyed the directors, clinic staff, and volunteer physicians. We learned the most significant concerns involved both inadequate records of which medications were in stock, which were being dispensed, which were being disposed of after expiration, and excessive effort required to keep everything updated. The first step to improve the inventory process involved reconciling the existing records with the inventory of available medications in the dispensary. Because management of Type II Diabetes Mellitus is a common reason for dispensary use, we focused exclusively on diabetes medications. We produced a precise record of the medications available with their respective lot numbers and expiration dates on a live, electronic inventory sheet.

Results: To improve the flow and organization of the medication dispensary, we designed a software to automate the deduction of medications from the inventory record when prescribed. Previously, these deductions were done manually. Not only did this process lead to unnecessary utilization of limited staff time, it also relied heavily on consistency which the staff could not guarantee. The lack of reliable updates quickly resulted in an inaccurate record and the system was subsequently abandoned. With the new automated system, which pulls a prescription report from the electronic health record and collates the dispensed drugs with the inventory records, we aim to eliminate these inefficiencies. We also aim for this system to reduce waste by generating color-coded warnings when medications are approaching expiration, allowing them to be prioritized for use or appropriately discarded.

Discussion: Free community clinics are often strained due to limited resources. The development of this automated procedure was done to alleviate the burden on the staff and provide a reliable method of medication inventory. However, the introduction and management of any novel system requires an understanding of where current systemic inefficiencies lie.4 After surveying stakeholders, we learned that the ancillary staff members were shouldering the burden of an inaccurate medication inventory. The effective plan required an automated deduction tracker as well as training for a staff member to routinely oversee the new process. Moving forward, we plan to expand the new system to include the rest of the dispensary medications and engage in quality evaluations to ensure the system is improving staff efficiency. In conclusion, development and implementation of newer technology can become a powerful tool for medical students to help free clinics better serve the community.
The Perceived Effectiveness of Near-Peer Teaching in a Graduate Level Gross Anatomy Dissection Lab

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Introduction: Near-peer teaching is a relationship between students and their more senior counterparts. The near-peer is seen as an extension of faculty and can facilitate discussion and provide support/feedback, but is typically overseen by senior faculty\textsuperscript{2}. The success of near-peer teaching is related to the ability of senior preceptors to draw on the knowledge gained through their previous experience and relate to the students to facilitate more engaging and collaborative learning spaces\textsuperscript{3}. This method of instruction is becoming more frequently recognized as a valued and practical approach in medical education, reflected by its incorporation into various healthcare programs and academia\textsuperscript{1,3}. This study aimed to investigate the perceived effectiveness/utility of near-peer teaching on content delivery and the creation of a collaborative learning environment in a 5-week graduate-level anatomy dissection course.

Methods: Upcoming second-year medical students volunteered to be near-peer teaching assistants, with eight total throughout the study. Participants in this course were of diverse educational backgrounds/career paths, from MD track students and master’s students to CRNA students in training. The study spanned two years, with two different cohorts receiving an evaluation survey upon completion of the course. Respondents evaluated near-peers’ perceived effectiveness of their ability to illustrate the relationship between anatomical structures and their form and function, encourage critical thinking and practical time management skills, and create a collaborative learning environment. Responses measured quantitative Likert-scale evaluations from “Agree” to “Disagree” and qualitative information in comment boxes.

Results: Data from 50 anonymous respondents was collected and analyzed. 100\% of participants either agreed or somewhat agreed that medical student TAs were helpful in identifying anatomical structures in the lab, applying anatomical terminology to describe form and function, and encouraging critical thinking about how injuries impact function. 98\% of participants either agreed or somewhat agreed that medical students TAs were helpful in learning efficient time management strategies. 100\% of participants also recommended that future versions of this course utilize medical student TAs due to their perceived effectiveness.

Discussion: Our study showed that in the opinion of the students, their near-peer teachers could impact the learning environment and assist in teaching various gross anatomical and clinical concepts. The role of near-peer teaching in a structured environment is beneficial to student engagement and learning. The implementation of near-peer teachers should be further explored and encouraged in medical education.
EMR Efficacy of Asthma Action Plan Implementation in an Outpatient Clinic

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Introduction: As a primary care clinic, there are a vast majority of patient encounters with reactive respiratory conditions, especially Asthma and COPD, either for maintenance or acute care. Research has shown better outcomes are achieved by educating the patient and using peak flow to guide treatment, either by GOLD guidelines or Asthma action plan. At the Yuma Regional Medical Family Medicine Center there has been poor compliance with the use of peak flow and asthma action plans. It was also noted that tracking methods of action plans were also poor. The purpose of this project is to educate our staff and providers in the use of peak flow, by increasing efficiency in the work flow and ensuring proper measurement of peak flow and it documentation in the patient chart in the office setting. Our goal is to have an increase of at least 80% of implementation after availability of plan in EMR with asthma or COPD being seen in the clinic.

Methods: Education clinical staff on what peak flow is along with correct measurement and importance of compliance. This will be accomplished in 3 educational sessions: initial and post with medical assistants as well as a didactic session with residents. Attendings would be notified via email. Develop an “Asthma Action Plan” link in EPIC that can be utilized by all users hospital wide. This plan can be reviewed by other users once one has been established as well. Develop a smartphrase HPI complied with initial questions of symptoms in the last 4 weeks to allow for a more efficient visit. One month post launch of asthma action plan on EPIC, we will review implementation results.

Results: Prior to implementation, results showed that there was only one trackable asthma action plan provided in the span of 1 year. Initial results since implementation date of February 1st, we have seen a 15-fold increase.

Discussion: Feedback from residents revealed subjective improvement in interpreting peak flow results and ease of usability of action plan.

- Patients whom have received the plan subjectively felt that better care was provided and had increase in knowledge of their own health.
- Educational sessions provided to ancillary staff have also proven to be beneficial and improved efficiency in the clinic.

Ongoing

- Continued training for residents and physicians in the clinic.
- Formal training scheduled into orientation month for new interns.
- Utilization hospital-wide along with attached clinics
- 3, 6, and 12 month post implementation data
The Happiness Selective: Curriculum for Improving Medical Student Well-being

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Introduction: Despite the fact that matriculating American medical students begin training with reports of better mental and emotional quality of life than their peers, their well-being decreases during their medical school education [1]. A potential solution for tackling learner mental and emotional health challenges includes courses in the psychology of well-being. One such course is the “Science of Well-Being” created by Professor Laurie Santos at Yale University, which has been found to significantly increase the level of well-being in undergraduates when compared to a control population [2].

The Happiness Longitudinal Selective at the Mayo Clinic Alix School of Medicine - Arizona Campus provides 1st and 2nd year medical students with evidence-based psychoeducation regarding well-being. This selective (optional course), modeled after the “Science of Well-Being,” has been designed and led by medical students and was offered for the first time in Fall 2021.

Methods: The Happiness Longitudinal Selective was open for enrollment from July to August of 2021. To assess initial happiness scores, baseline surveys are offered to all 1st and 2nd year students on the Arizona campus regardless of selective participation. Selective participants are also offered post-course and 3-month follow-up surveys and free-text course feedback. The survey asks students to report their perceived level of well-being using the Subjective Happiness Scale and the WHO-5 Well-Being Index [3], where a lower overall score indicates lower perceived happiness and well-being. ANOVA and Fisher’s Exact Test are used to compare responses of selective and non-selective participants for the baseline scores.

Results: All first and second-year students during the 2021-2022 academic year at the Mayo Clinic Alix School of Medicine Arizona campus were administered baseline surveys to measure perceived level of well-being using the Subjective Happiness Scale and the WHO-5 Well-Being Index. A total of 22 of 38 (58%) selective participants and 21 of 58 (36%) non-selective participants completed the voluntary survey regarding their happiness and well-being. On average, selective participants had a lower overall Subjective Happiness Scale score (4.5 vs. 5.6, P = 0.001) and lower WHO-5 Well-Being Index score (56.2 vs. 69.3, P = 0.008) than non-selective participants.

The Subjective Happiness Scale and the WHO-5 Well-Being Index score show that immediately after selective completion, participant scores “catch up” to students who opted out of the course. Additionally, we have found that there remains a statistically significant increase in these scores even at the 3-month mark.

Discussion: The results suggest that the baseline happiness and well-being scores of selective participants are significantly lower than non-selective participants. However, these scores increased immediately after completing the selective, and remained statistically significant compared to baseline when re-measured 3-months later. This indicates that students who are more in need of well-being strategies are opting to take this course and that it is addressing the differences between them and their peers. The eventual goal would be to implement this at as many institutions as possible to cultivate human flourishing and happiness among medical students.
Using Science of Health Care Delivery Curricula to Address Medical Career Burnout: Medical Students’ Perspective

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Introduction: Medical schools are increasingly implementing health system science courses to facilitate the transition to clinical practice [3,9]. Because these courses expose medical students to topics of high-value care, systems navigation, and quality improvement not otherwise addressed in a medical school curriculum, a multidimensional health systems science curriculum may provide trainees with a deeper understanding of the healthcare system and allow them to address burnout within medicine from both an individual- and system-level perspective [1]. Therefore, we propose a Science of Health Care (SHCD) delivery model that addresses emotional exhaustion, depersonalization, and a sense of reduced personal accomplishment through a health systems science lens [2].

Methods: In 2014, Mayo Clinic Alix School of Medicine (MCASOM) and Arizona State University used a multimodal approach to develop six core areas of focus for a SHCD curriculum: person-centered care; population-centered care; high-value care; team-based care; health policy, economics and technology (HPET); and leadership [3]. These topics are taught over a 4-year period through a combination of lectures, large- and small-group discussions, and interactive small-group activities (Table 1). As MCASOM students, we qualitatively analyzed how the curriculum’s focus on healthcare systems could be used to address medical burnout.

Results: We demonstrated that each SHCD topic teaches strategies for combating burnout through its own lens (Table 2).

Person-centered care: A SHCD education can leverage medical students' unique position to fill in gaps within person-centered patient care, thereby providing added meaning to students’ education [4,5].

Population-centered care: SHCD can foster the ability to proactively treat underserved populations, consider social determinants of health, and promote the development of patient advocacy skills [6,7,8].

High value care: SHCD begins developing students’ ability to identify healthcare gaps by proposing quality improvement projects, which can further increase engagement in work. Additionally, SHCD addresses administrative, legal, and financial competencies. [9]

Team-based care: SHCD introduces team-based exercises and encourages students to seek out social support. [10,11]

HPET: a SHCD curriculum encourages the use of technology to reduce workload burden and increase clinical competencies.

Leadership: SHCD may increase optimism among medical students about their career prospects as a medical leader. Medical students learn how to speak up in regards to medical errors or patient safety risks. [12]
**Discussion:** We were impressed by the curriculum’s aim to shift medical school education to meet the needs of the ever-evolving healthcare system. As a result of taking the course, we feel more equipped to handle stressors, find accomplishment in our work, and collaborate with a healthcare team, all of which help reduce and prevent burnout. Activities we felt particularly beneficial were health coaching, QI project development, navigating insurance and health law, and connecting with community health leaders. More hands-on practice and lessons on EPIC and patient navigation may increase the efficacy of the course to reduce burnout. In summary, a SHCD curriculum utilizes a multifaceted approach to provide medical students with a systems-level understanding of the healthcare system and strategies that can be used to combat burnout among trainees.
Introduction: From the first day of medical school, faculty members and career advisors stress that residency application metrics, such as the United States Medical Licensing Examination (USMLE) scores, peer-reviewed publications, Alpha Omega Alpha Honor Medical Society (AOA) membership, and volunteer experiences, are vital components of a successful match. These suggestions are well supported by recent data. However, the factors that are highly valued in residency admissions such as professionalism, clinical competency, and quality of patient care may not correlate with success during residency and beyond.1,2 Discrepancies may exist between the above-described measures of successful physicians and the activities meant to prepare medical students for residency, such as studying for USMLEs, publishing research papers, and attaining AOA membership. To investigate these discrepancies, we surveyed clinicians at Mayo Clinic who were recognized by their peers as having the highest standards of professional work and asked them to assess the degree to which various activities helped develop the traits of the ideal physician.

Methods: We developed an 8-question survey to assess clinician beliefs about the effectiveness of various activities in cultivating traits of an ideal physician. The survey was administered to clinicians who received the Mayo Clinic Distinguished Clinician Award from 2000 through 2018 at all 3 Mayo campuses. Distinguished clinicians were asked to score activities and competencies on a 5-point Likert scale. The survey also included an open-ended narrative question.

Results: The survey was sent to 99 distinguished clinicians; 66 accessed the survey and 64 completed it (response rate, 64.6%). The factors most commonly believed to contribute to development of the ideal physician were a desire to help others, interpersonal skills, and involvement in leadership and volunteer activities. Factors considered least important were the prestige of the institutions where a physician trained, Alpha Omega Alpha Honor Medical Society membership, number of peer-reviewed publications, and United States Medical Licensing Examination (USMLE) scores.

Discussion: Distinguished faculty at Mayo Clinic considered interpersonal skills and a desire to help others to be highly important characteristics of the ideal physician. Academic achievements were emphasized to a much lesser extent. Despite the increasing competitiveness of the residency match process, medical students should be encouraged to develop listening skills, compassion, empathy, and effective communication. However, this shift in focus can be nurtured only in environments that place less emphasis on academic achievements such as USMLE Step 1 scores, AOA membership, research publications, or clerkship grades. Recent data trends suggest that academic achievements may be overemphasized to the point that they are limiting the development of other essential components of physician training.
UACOM-P Student-Led Radiology Symposium: A MedEd Tool to Bridge the Gaps of Traditional Medical School Curricula

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Introduction: Traditional medical school curricula provide limited to no exposure to the fields of diagnostic radiology (DR) & vascular and interventional radiology (VIR). To help bridge the gap and provide exposure, a team of current medical students and a faculty radiologist mentor at the University of Arizona College of Medicine-Phoenix (UACOM-P) organized and implemented a national & international medical student-focused radiology symposium that has now run for three consecutive years. Surveys were used to assess changes in familiarity, attitudes, and perceptions about the fields DR and VIR among the students that attended. Our hypothesis was that additional exposure to the fields of DR and VIR through the student-focused symposium would increase perceived familiarity of the field as well as an interest in pursuing a career in radiology.

Methods: The annual International UACOM-P Medical Student Radiology Symposium is held virtually via Zoom and includes talks by radiologists from various US academic medical centers. Invitations for the symposium are sent via email to medical students across all US medical schools, as well as to many international medical schools. Pre- and post- symposium surveys were distributed to attendees for the past two Symposia (2021 and 2022) and included demographic factors (i.e., gender, race/ethnicity, level of training) and a series of questions to assess perceptions and attitudes about DR and VIR, using Likert scales. The surveys assessed changes in factors like familiarity and interest in DR & VIR, interest in shadowing radiologists or rotating in a clinical radiology elective, career deterrents (e.g., training length, impact of artificial intelligence), satisfaction of current level of exposure to DR & VIR at their home institution, and common misconceptions about the field (e.g., radiologists have no patient interaction). Wilcoxon Signed-Rank tests assessed changes in mean pre- and post-symposium Likert ratings.

Results: In 2021, 194 students attended the symposium, representing 74 institutions within the US, and 6 international institutions. Fifty-eight attendees completed both the pre- and post- surveys. In 2022, 169 students attended, representing 76 institutions within the US, and 21 international institutions. One hundred attendees completed both the pre- and post-surveys. Among the matched surveys of both 2021 and 2022, statistically significant (p<0.05) increases occurred in self-perceived familiarity with DR and VIR, interest in rotating in a clinical radiology elective, and perceptions on certain aspects of the field (e.g., radiologists have patient interaction, most subspecialties in DR involve procedural techniques, artificial intelligence has the potential to add value to radiology, and a career in radiology can involve global health experiences). In 2021, the interest to pursue a career in both fields, DR and VIR, changed significantly in a statistically positive manner. Self-perceived familiarity was increased among the following radiology subspecialties: Breast, GI, MSK, Pediatrics, and Neuroradiology.

Discussion: Our student-led medical student radiology symposium consistently shows positive effects on increasing familiarity and interest in the fields of diagnostic radiology & vascular and interventional radiology, as well as dispelling common radiology myths among medical students.
TikTok as a Source of Medical Information: Port Wine Stain Birthmarks and Treatment Using Vascular Lasers

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Background: In the age of social media, patients and providers continue to use digital media platforms to gain and share medical information. One platform, TikTok, has gained immense popularity as a means for different groups of people to interface. Despite its popularity, concerns exist around the accuracy and completeness of medical advice available on this social media site. We seek to evaluate the platform TikTok as an information source for patients planning to undergo laser treatment for port wine stain (PWS) birthmarks.

Methods: Using algorithm naïve TikTok profiles, we recorded key variables in TikTok videos about PWS treatment, including the source of information, the tone of the video, the description of adverse events and risks, and the mention of pathogenesis, definition, or etiology of the vascular birthmark. The first 200 videos that contained the hashtags #portwinestainlaser and #portwinestaintreatment were included.

Results: Our results showed that of 200 videos analyzed, 62% of videos were recorded by patients, 21% by parents, 9% by medical doctors, and 7.5% by other healthcare professionals. A total of 53% of videos contained at least one educational point while 47% of videos contained zero. The tone was overwhelmingly neutral in the videos analyzed, with 82% of videos taking a neutral tone when discussing port wine stains and 63% taking a neutral tone when discussing laser treatment. Risks, adverse events, and safety concerns were rarely discussed in TikTok videos (mentioned in 20% of videos). Several content creators appeared with significant frequency: 39% of all videos were produced by only 4 TikTok users.

Conclusion: TikTok remains an efficient and popular way to discuss treatment for dermatologic conditions. The majority (83%) of videos examined regarding the treatment of PWS with laser were published by patients and parents and the minority of posts were published by medical professionals (16.5%). Our review revealed that there is little information about risk, adverse events, and safety concerns on TikTok. TikTok is a popular information source for patients and their families with regard to PWS and laser treatment and physicians should engage with patients to determine what they understand in order to fill in knowledge gaps.
Impact of Patient Advocacy Programs in OB/GYN Settings: A Literature Review

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Introduction: Patient advocates help patients navigate today's complex healthcare system and are becoming more prevalent in many fields, including HIV care and intimate partner violence.¹² In OB/GYN, patient advocacy has proven effective in situations where language or cultural barriers are present and in assisting historically vulnerable populations such as Black patients and those with substance use disorders.³⁴ A literature review has not yet been performed on the effect of obstetric patient advocacy programs on overall maternal and neonatal outcomes.

Methods: Searches were conducted of PubMed, Google Scholar, and Creighton’s online library database using combinations of the search terms “patient advocacy program,” “OB/GYN,” and “pregnancy.” Articles were reviewed for criteria of relevance, full-article availability, English version available, and peer-review.

Results: The searches yielded 371 results with a total of six articles fitting the criteria. Of these articles, five showed that patient advocacy programs had a positive impact on patient care and birth experiences, including increased average birth weight⁵, referrals to addiction recovery programs⁶, and feelings of support⁷.

Conclusion: Use of patient advocates leads to improved pregnancy outcomes and experiences, but there is a paucity of literature describing the structure of programs, quantitative outcomes, and quality improvement measures. Further analysis would allow for new program development to benefit patients and for expansion of existing programs.
Knowledge and Attitudes toward Palliative Care and Hospice Amongst Hispanic Church Leaders and Members in Phoenix

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Introduction: The Latino community has historically been underrepresented in hospice and palliative care (HPC) usage compared to non-Hispanic whites, despite research demonstrating that values and preferences held by Latino patients and families at the end of life are consistent with the aims of HPC.1-3 Prior studies describe barriers including language, lack of insurance, and cultural or religious beliefs.4 This pilot study aims to characterize how faith-related factors impact the Latino community’s knowledge and attitudes towards HPC.

Methods: A mixed-methods pilot study was conducted in collaboration with Hispanic Christian and Catholic churches in the metropolitan Phoenix area. Qualitative data was obtained in the form of semi-structured interviews with local church leaders, who were recruited via phone or in-person attendance by the study team. Quantitative data was obtained in the form of surveys that were distributed by church leaders amongst their congregation members. Interviews were audio-recorded, transcribed, and analyzed using a multistep grounded theory approach. The Mann-Whitney U test was used to determine significance in participants’ knowledge of palliative and hospice care.

Results: Seven interviews were conducted with church leaders. All leaders had heard of hospice; however, all but one participant expressed little to no knowledge about palliative care. Attitudes toward hospice were overall negative with concerns related to 1) faith beliefs, 2) institutional wariness, and 3) cultural norms. Three themes emerged regarding the role of church leadership; leaders commonly 1) provide guidance and resources to parishioners navigating serious illness, 2) alleviate spiritual suffering, and 3) support families.

A total of 36 surveys were conducted with church leaders and members across three congregations. Significantly more participants reported no previous knowledge of palliative care compared to hospice care (70% vs 36%, respectively, p<0.05).

Discussion: The roles of church leaders in caring for parishioners faced with serious illness align with HPC principles. However, church leader attitudes toward hospice were overall negative. There appears to be less knowledge of palliative care than hospice amongst congregation members and church leaders. These findings suggest a need to explore potential interventions to increase awareness and reduce misconceptions about HPC among the Latino community by collaborating effectively with church leaders.
The Education of Allopathic and Naturopathic Medical Physicians: Similarities and Differences

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Introduction: Naturopathic medicine is a form of complementary and alternative medicine that aims to treat the underlying cause of illnesses by combining modern medicine with alternative therapies, such as botanical medicine and homeopathy. Naturopathic physicians are increasingly integrating into medical institutions such as the Cleveland Clinic, Columbia University, and Cancer Treatment Centers of America. Currently, there are four naturopathic medical schools in the United States with 6 campuses enrolling over 900 students to become Doctors of Naturopathic Medicine. Graduates of these programs may further pursue a growing number of specialties. Very little has been published about modern naturopathic medical education, especially as it compares to allopathic medical education.

Objective: The aim of this study is to compare curricula, grading methods, student demographics, graduation rates, and exam pass rates between naturopathic and allopathic medical training.

Methods: Data were obtained through publicly available published information. This is an IRB exempt study. Unpaired t-test was used to compare board exam pass rates between naturopathic and allopathic medical schools.

Results: Naturopathic and MD medical colleges both are four year, nationally accredited programs, in which graduates are eligible to take exams and obtain medical licensure. Both programs have basic sciences courses for the first two years, followed by a basic sciences licensure exam, with passage permitting entry into two years of clinical education. The basic sciences licensing exam is pass/fail for both naturopathic and MD students. MD students were significantly more likely to pass the basic sciences exams, with 19% higher pass rates than ND programs (95% CI: 16.7-21.1, p <0.0001). To meet accreditation requirements set by the Council on Naturopathic Medical Education, naturopathic medical schools require 1200 hours of clinical experience and at least 450 patient interactions. While the Liaison Committee on Medical Education sets week-based requirements for clinical training for allopathic medical schools, the third year of medical school alone provides over 1,800 clinical hours, if each week only lasted 40 hours. MD students take the Step 2 Clinical Knowledge Exam in their fourth year and receive a numeric score. Naturopathic medical students have a pass/fail grading system for their clinically-based licensing exam, and take this exam after graduation. MD students were significantly more likely to pass the clinical knowledge board exam, with pass rates 13% higher than naturopathic programs (95% CI: 10.9-14.3, p <0.0001). Attrition rates for MD granting medical colleges in 2016-2017, the most recently reported year was 2.5%. Attrition rates for naturopathic medical colleges varied significantly between institutions, with most recently published data ranging from 8.5% to 24%

Discussion: Both naturopathic and allopathic medical schools are four year nationally licensed programs, have pass/fail grading for their basic science exams, and have graduates that may enter residencies. Naturopathic and medical colleges differ in clinical hours, pass rates on their nationally standardized board exams, and on school retention.