46th Annual
Aurora Scientific Day

May 20, 2020 • 9:30 a.m. to 5 p.m.

Webinar Session 1
Welcome and Opening Remarks
9:30 to 9:32 a.m.

Oral Presentation Session I
9:32 to 11:29 a.m.

Rieselbach Distinguished Paper
11:29 to 11:49 a.m.

Lunch Break
11:49 a.m. to 12:29 p.m.

Webinar Session 2
Judged Oral Poster Session
12:29 to 1:53 p.m.

Oral Presentation Session II
1:53 to 2:58 p.m.

Rieselbach Distinguished Paper
2:58 to 3:18 p.m.

General Oral Poster Session
3:18 to 4:50 p.m.

Awards immediately following
Richard E. Rieselbach, MD

Distinguished Paper Sessions

Richard E. Rieselbach, MD, was born in Milwaukee, educated at the University of Wisconsin-Madison and Harvard Medical School, and trained in Internal Medicine at the University of Illinois and Nephrology at Washington University in St. Louis. Dr. Rieselbach has been a faculty member of the University of Wisconsin School of Medicine and Public Health since 1965.

Dr. Rieselbach served as Associate Dean and Chairman of the University of Wisconsin Medical School’s Milwaukee Clinical Campus from 1974 to 1991. He provided the inspiration and administrative leadership that created the Milwaukee Clinical Campus at Mount Sinai Hospital in 1974. He shepherded its growth from the initial 46 faculty (full-time and clinical) and 18 residents/fellows, to 90 full-time faculty, 158 clinical faculty and 108 residents/fellows in six departments by 1991.

Dr. Rieselbach’s high standards for clinical and academic excellence fostered the recruitment of leaders and the development of innovative programs in primary care, geriatrics, interventional cardiology and electrophysiology, and high-risk obstetrics, which came to characterize the campus. He maintained a strong commitment to caring for the medically indigent and fostering an expectation of community service in faculty and students. He projected a national vision in progressive reform of medical education and health care delivery.
Oral Presentation Session I

Attempted Isolation of Cryptococcus Species and Incidental Isolation of Exophiala dermatitidis From Human Oral Cavities

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Background: Historically, cryptococcal species were not thought to be part of the human microflora. Recently, they have been described as occasional members of human oral biofilms by molecular analyses. Having potential fungal pathogens such as Cryptococcus species present in the oral cavity could lead to opportunistic, and potentially deadly, infections.

Purpose: This pilot study aimed to determine if potentially pathogenic Cryptococcus species may be demonstrated in the human oral cavity by culture technique in order to potentially study the whole organism.

Methods: We prospectively enrolled adult English-speaking, non-acutely ill patients, as well as volunteer medical and non-medical staff from an academic primary care clinic and affiliated research office, in Southeastern Wisconsin, during the summer of 2019. Participants were only included if they could safely submit to oral sampling and did not use any oral or systemic antibiotic agents within the last four weeks. Specimens from an upper lip sulcus swab and a concentrated phosphate buffered saline oral rinse were obtained and inoculated separately onto Stain (birdseed) agar containing chloramphenicol and incubated in gas impermeable zip lock bags at 35°C. Basic demographic characteristics, chronic illness history, smoking status, and medication use, as well as time of last food and fluid intake, last tooth brushing, and mouthwash use were obtained. Basic descriptive statistics were calculated.

Results: No cryptococci were grown from any of the 122 samples from the 61 patients enrolled. Subjects were all generally healthy of mean age 44.0 (+17.1) years, primarily female (68.9%), white (85.3%), and non-Hispanic (86.9%). All but one individual resided in urban Southeastern WI. Subjects presented with a range of last food and fluid consumption, as well as last tooth brushing and mouthwash use. Both specimens from a woman with no risk factors for fungal disease, yielded a black yeast at 4 days on Staib agar. This isolate was shown to be Exophiala dermatitidis by colony and microscopic morphology, and analysis by MALDI-TOF-MS.

Conclusion: E. dermatitidis was incidentally isolated from the oral cavity of a generally healthy human, which appears to be a novel finding. Additional studies of a larger, more geodemographically diverse population are required to determine whether Cryptococcus species or E. dermatitidis commonly, if even transiently, colonize the oral cavities of healthy individuals.

Using Clinical Guidelines for Early Continuous Positive Airway Pressure (CPAP) to Decrease the Incidence of Chronic Lung Disease in Premature Infants Prior to Discharge

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Background: Infants born prematurely are at risk of developing chronic lung disease (CLD) due to their immature lungs and the use of invasive mechanical ventilation (MV). At Aurora Sinai Medical Center (ASMC), the rate of very low birth weight premature infants (<1500 gms) on oxygen at 36 weeks gestational age (GA) is above average when compared to the Vermont Oxford Network national database. Because CPAP at delivery has been recognized as an effective treatment to reduce intubation and invasive MV methods, we implemented a clinical guideline to provide a standard practice to reduce invasive MV for neonatal patients (26-32 weeks old) by using CPAP for the first 72 hours (hrs) of life.

Purpose: To evaluate the effectiveness of new clinical guidelines for neonatal CPAP to reduce intubation and invasive ventilation methods.

Methods: Retrospective chart review of all infants born between GA of 26 to 32 weeks and admitted to ASMC’s Neonatal Intensive Care Unit in 2018 and 2019. Data from 02/2018 to 12/2018 was compared to data after clinical guideline implementation, 02/2019 to 12/2019. Effectiveness is determined as non-diagnosis of CLD. Noninvasive ventilation techniques (NIVTs) include non-invasive ventilation; heated wire nasal cannula, and CPAP. Basic descriptive statistics were used to describe the population.

Results: There were 46 patients enrolled in 2018 and 50 patients enrolled in 2019. GA (M=29 weeks) was similar for 2018 and 2019 groups. Initial respiratory support at delivery showed that for infants <1500 gms NIVTs was used similarly in 2018 (47%) vs 2019 (40%). By 24 hrs of life, these NIVTs increased in infants <1500 gms to 85% in 2019 when compared to 66% in 2018. Similarly, NIVTs showed a clinical increase at 48 and 72 hrs of life in 2019 vs 2018 for infants <1500 gms. However, for infants ≥1500 gms for 24, 48, and 72 hrs of life NIVTs remained unchanged. Intubation at birth for infants <1500 gms occurred 53% in 2018 compared to 55% in 2019, and the trend was similar for infants ≥1500 gms in 2018 (36%) vs 2019 (40%). In terms of CLD diagnosis, there was no difference for infants born <1500 gms in 2018 (34%) compared to 2019 (35%). The same was seen in infants born ≥1500 gms in 2018 (14%) compared to 2019 (10%).

Conclusion: Although the new guidelines did not reduce the rate of CLD, the team was able to decrease the use of invasive MV in the first 72 hours of life. The need to hardwire best practices in this area will lead to a reduction in CLD and other related complications from invasive MV.
Low-Dose Clonidines in Veterans With Posttraumatic Stress Disorder: A Retrospective Review

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Background: Posttraumatic Stress Disorder (PTSD) is a trauma- and stressor-related disorder diagnosed in 10-31% of US military veterans. Treatments for PTSD include psychotherapy and/or pharmacotherapy. However, remission rates associated with individual therapies range from 20-60%, and remission rates for SSRIs are 20-30%, indicating a need for improved interventions. PTSD symptoms including flashbacks, nightmares, exaggerated physiologic arousal, intrusive memories, hypervigilance, exaggerated startle, irritability/anger, poor concentration and sleep disturbance are mediated through the sympathetic nervous system via norepinephrine dysregulation. Therefore, medications targeting norepinephrine are of interest. Clonidine is an alpha2-adrenergic agonist which reduces norepinephrine release. However, previous evidence is limited to case studies and small chart reviews of patients with PTSD.

Purpose: The purpose of this retrospective study was to determine whether the use of clonidine for veterans with PTSD was correlated with symptom improvement.

Methods: The medical records of 79 veterans with PTSD and prescribed clonidine at a midwestern Veterans Affairs hospital were analyzed for this study. Progress notes for each patient were scored using the Clinical Global Impressions Scales by three independent clinicians. PTSD severity was scored based on symptoms before starting clonidine using the Clinical Global Impressions – Severity (CGI-S) scale and after treatment with the Clinical Global Impression – Improvement (CGI-I) scale. Records were also assessed for demographics, comorbid diagnoses and medication prescriptions.

Results: All 78 subjects were male, mean age of 48 years. At baseline, the mean CGI-S was 4.8, (5 = “markedly ill”). After clonidine treatment, the mean CGI-I was 2.7, (2 = “much improved”, 3 = “minimally improved”). Over 50% of subjects had a CGI-I score between 1-2, and 70% of CGI-I scores suggested at least some improvement. Clonidine dosage, co-occurring diagnoses, and prescription history were correlated with CGI score. Further, side effects of clonidine use were low; the most commonly reported side effect was lightheadedness/dizziness in 5.1% of subjects.

Conclusion: Low-dose clonidine was associated with clinical improvements in veterans with PTSD. Further, scoring differences correlated with other medical variables suggest that subgroup responses to clonidine could potentially be predicted based on patient characteristics.

Evaluating Soluble AXL as a Potential Serum Biomarker for Glioblastoma

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Background: We previously found that the cell surface receptor AXL is overexpressed in GBM. AXL expression contributes to both a malignant and metastatic phenotype. While AXL is abundant in GBM, its expression in normal tissue is low or undetectable. The extracellular portion of AXL is enzymatically cleaved, releasing soluble AXL (sAXL). sAXL is detectable in serum and tumor related fluid collections, and has been described in melanoma and hepatocellular carcinoma. The relationship between sAXL and GBM is unclear.

Purpose: The purpose of this study was to determine if sAXL can be detected in serum from GBM patients and if there is a correlation with extent of disease.

Methods: We used 84 serum samples from 25 GBM patients and 42 samples from 42 healthy volunteers which were diluted 1:200 in Low-Cross Buffer (LCB) and PBS. Aliquots were stored at -80°C. Samples in LCB were tested using a commercially available AXL ELISA kit and the samples in PBS were tested for total protein using a commercially available BCA assay. Tumor tissue from 15 of the enrolled patients was evaluated for AXL expression using western blotting. Interpretation of tumor volume was performed using T1 MRI scans and was reviewed by a trained neuroradiologist. Student's T-test and linear regression were performed to determine significance of variation.

Results: The mean serum sAXL concentration was 35.77 ±1.25 ng/mL in the GBM samples compared to 29.99 ±1.80 ng/mL in the healthy controls (t(df) = 2.652(124), p = 0.009). Controlling for total protein further distinguished the two groups significantly. The difference between pre- and post-operative sAXL concentrations was not statistically significant. There was a slightly negative correlation between sAXL concentrations and corresponding pre-operative tumor volumes. Comparing sAXL concentrations to the AXL expression in the tumor lysates yielded a stronger negative correlation.

Conclusion: While serum sAXL concentration is significantly higher in GBM patients compared to control, in this small sample, there was not a significant correlation between sAXL levels and volume of GBM. Evaluating sheddase expression in the GBM lysates is needed to confirm the lack of correlation between sAXL in the serum to AXL found in GBM tumor tissue.
Predictors of Brain Metastases Among Female Patients Diagnosed With Stage IV Breast Cancer

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Background: Among the patients diagnosed with advanced stage of breast cancer there is possibility of developing distant metastases. The brain is one of the predominant sites of metastatic spread.

Purpose: The objective to this study is to identify patient characteristics and biomarkers for brain metastases among female patients diagnosed with breast cancer.

Methods: From the Commission on Cancer’s National Cancer Database from 2010 through 2014, we identified 983,769 female patients diagnosed with breast cancer and with non-missing information for brain metastasis. Since 98% of brain metastatic patients had stage IV cancer, for further analysis we included patients (n=42,880) with stage IV breast cancer. Patient demographics, tumor characteristics and biomarkers were analyzed using descriptive statistics. Odds ratios (OR) were computed using stepwise multivariate logistics regression. All statistical analysis was done using SAS version 9.4, SAS institute, Cary, NC and for all statistical tests alpha of 0.05 was used.

Results: Of 42,880 female patients diagnosed with stage IV breast cancer, there were 70% non-Hispanic white, 17% non-Hispanic black, 1% Hispanic and 12% from ‘other’ race category. The mean age of the patients at the time of diagnosis was 62.2 ± 14.02 years. Of the total patients only 8.2% had brain metastatic spread. Significant patient characteristics and biomarkers for prediction of brain metastatic spread included the insurance status (government vs no insurance, OR=0.78, 95%CI=0.66-0.93, p=0.0046; private vs no insurance, OR=0.76, 95%CI=0.64-0.90, p=0.0014), primary site (OR=1.24 95%CI=1.11-1.40, p=0.0003), laterality (left side vs bilateral, OR=0.72, 95%CI=0.57-0.90, p=0.0046, right side vs bilateral, OR=0.71, 95%CI=0.56-0.93, p=0.0034), ER positive (OR=0.62, 95%CI=0.55-0.71, p <0.0001), PR positive (OR=0.77, 95%CI=0.68-0.87, p <0.0001), and 10 year increment in age at the time of diagnosis (OR=0.88, 95%CI=0.84-0.91p <0.001).

Conclusion: The predictive factors for brain metastatic spread include lack of insurance, bilateral sites of breast cancer, and negative expression of ER and PR. Also, primary breast site tumor is 1.2 time more likely to results in brain metastatic spread. The chance of brain metastatic spread decreases with increasing age. These finding might provide insight for clinicians for the treatment plan for the patients.

Effectiveness and Impact of Ambulatory Blood Pressure Monitoring at Aurora St. Luke’s Medical Center

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Background: Hypertension (HTN), a common adult condition, confers significant risk in the development of cardiovascular (CV) disease. Ambulatory blood pressure monitoring (ABPM) is superior to office measurements alone in the management of HTN. Despite advances in technology making ABPMs easier and more cost-effective to use, its uptake in clinical practice remains low.

Purpose: Define what patient characteristics elevate the likelihood of ABPM use. Evaluate the impact which ABPM results have on the hypertension treatment plan.

Methods: We performed a retrospective chart review of patients with HTN seen in cardiology clinics from 7/1/2014 to 7/1/2018. Patients assigned an ABPM were compared to other hypertensive patients treated without the device during the same time period. Office blood pressure (BP) measurements at baseline, 3, 6, 9, and 12 months (mos) were analyzed. Patients with secondary HTN were excluded. HTN care plans were monitored in ABPM patients.

Results: 3927 patients with a diagnosis of HTN were seen of which 407 patients (10.3%) were prescribed an ABPM. Average baseline systolic BP in the ABPM group was higher than controls (137.3 mmHg vs. 130.3 mmHg; p <0.001). Of the 407 ABPM patients, 44% had changes made to their HTN care plan. Changes were associated with male gender, obesity, and history of coronary artery disease (p = <0.03). ABPMs were prescribed to younger patients (61.1 yrs p = <0.001) and resulted in a sustained decrease in systolic BP. The greatest difference in BP was seen at 3 mos. (Δ5.7 mmHg p = 0.01).

Conclusion: ABPM use in cardiology clinics remains unpopular despite its use resulting in sustained improvement of BP over 12 months.
Effects of Maternal Separation and Hypoxia on the Hypothalamic-Pituitary-Adrenal (HPA) and Hypothalamic-Pituitary-Gonadal (HPG) Axes: a Neonatal Rat Model of Prematurity

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**Background:** Acute hypoxia is common in prematurity and may lead to sexually dimorphic effects on the HPA and HPG axes. Separation of the premature human infant from maternal and caregiver contact is common in the neonatal intensive care unit (NICU). We hypothesize that the early neonatal surge in plasma testosterone that occurs within hours of birth and the stress-induced increase in corticosterone (the “cortisol” of the rat) may be responsible for HPA and HPG programming in the male rat.

**Purpose:** The purpose of this study was to evaluate the short-term effects of maternal-neonatal separation without or with hypoxia on the HPA and HGA axes in the neonatal rat during early postnatal life.

**Methods:** Male and female rat pups were studied at birth, postnatal hours 2, 4, and 8, and postnatal days (PD) 2, 3, 4, 5, 6, and 7. Baseline: Immediately after maternal separation, blood was collected for measurement of plasma corticosterone, LH, FSH, testosterone (males), and estradiol (females). Separation ± Hypoxia: After maternal separation, pups were exposed to 60 minutes of normoxia or hypoxia (8% O2). Adrenals and testes were analyzed for steroidogenic mRNAs (RT-qPCR).

**Results:** At birth, hypoxic separation attenuated plasma corticosterone but, thereafter, led to large increases in plasma corticosterone. Neither acute normoxic nor hypoxic separation had a major effect on adrenal steroidogenic pathways genes; however, baseline Cyp11a1, Mc2r, Mrap, and Star adrenal gene expression significantly decreased over the first week of life confirming the stress hyposresponsive period of the adrenal cortex. In male pups, a pituitary gonadotropin (LH/FSH)-independent increase in plasma testosterone was observed at birth in normoxic and hypoxic separated pups. Additionally, testicular Cyp11a1, Lhgr, and Star mRNA gene expression were high at birth and decreased with age suggesting a hyposresponsive period in the testes heretofore not described.

**Conclusion:** We demonstrated a large corticosterone response to hypoxia during the first five days of life suggesting that an increase in adrenal glucocorticoid secretion is critical to the adaptation of the premature infant to common stressors. The testosterone surge during the first hours after birth occurred independently of gonadotropins and may be due to a neonatal upregulation of critical steroidogenic pathway genes in the testes. The responses of HPA and HPG axes during prematurity are integral to the adaptation to neonatal stress.

Genetic Testing in the Evaluation of Thoracic Aortic Aneurysms: A Single Center Experience

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**Background:** Thoracic aortic aneurysms (TAA) are a life-threatening disorder of heterogeneous genetic background with an estimated prevalence of 1% in the general population.

**Purpose:** The purpose of this study was to determine how genetic variations can modulate disease severity and aid in the management of TAA patients.

**Methods:** All consecutive patients with aortic root and/or ascending aortic aneurysms ≥40 mm seen for specialized care at the Center for Aortopathy at Aurora St. Luke’s Medical Center, Milwaukee, between October 2011 and March 2019 were screened for mutations in comprehensive aortopathy gene panels (GeneDx or INVITAE). Echocardiographic, clinical and demographic data were available for all cases. STATA v.15 software was used for statistical analyses.

**Results:** A total of 204 patients (76% male, mean age 55±14 yrs; 38% known family history of TAA) at the time of maximal aortic aneurysm dimension formed the patient cohort. Of these, a total of 19 (9.3%) tested positive for pathogenic mutations whereas 68 (33.3%) showed variants of uncertain significance (VUS). A known family history of TAA was not associated with a higher likelihood of carrying a pathogenic gene mutation. The average size of the TAA was 5.09 mm larger in gene-positive patients with pathogenic mutations than in gene-negative patients (95% CI 2.40 – 7.78 mm, p < 0.001) irrespective of age and sex. On the other hand, no statistically significant association was found between VUS and aneurysm size. In addition, 58% of pathogenic mutation carriers underwent surgical aortic repair vs. 16% of VUS cases and 20% of gene-negative patients (p < 0.001).

**Conclusion:** Positive pathogenic gene mutations are associated with significantly larger TAA, and these patients are more likely to undergo aortic surgery. A negative family history does not preclude genetic positivity and thus should not be used as genetic testing criteria in the TAA population.
A Novel Protective Effect of Metformin in Human Myocardium

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Background: Metformin (Metf) is the first-line medication for treatment of type 2 diabetes. The primary action of the drug is to lower hepatic glucose synthesis and enhance peripheral glucose uptake through the activation of the insulin receptor. It has also been to reduce heart damage and death. However, mechanisms by which Metf protects human heart remain debated.

Purpose: The aim of the study was to evaluate the cardioprotective effect of Metf on cardiomyocytes derived from human-induced pluripotent stem cells (hiPSC-CMs) and mitochondria isolated from human cardiac tissue.

Methods: Mitochondria were isolated from left atrial appendage tissue collected from consented patients (n=26) undergoing open-heart surgery at St. Luke’s Medical Center. The hiPSC-CMs were derived from hiPSC line generated from human dermal fibroblasts. Both the isolated mitochondria and hiPSC-CMs were exposed to different concentrations of Metf (0-20 mM) with and without 5 µM compound C, a cell-permeable AMPK inhibitor, for 24h or acutely. Oxygen consumption rate (OCR) was assessed in the cells and mitochondria using XF96 Extracellular Flux Analyzer. Metabolites were determined in the hiPSC-CMs using a liquid chromatography coupled to tandem mass spectrometry (LCMS). Superoxide production was measured by monitoring changes in fluorescence intensity of dihydroethidium. Tukey’s pairwise comparison and one-way ANOVA were applied for comparison between groups. P < 0.05 was considered significant.

Results: At concentrations ≤ 2.5 mM, Metf significantly enhanced OCR in the hiPSC-CMs by activating AMPK-dependent signaling and enhancing mitochondrial biogenesis. At concentrations > 5 mM, Metf reduced the cellular OCR via direct inhibition of the mitochondrial electron-transport chain complex I and triggered metabolic reprogramming by increasing glycolysis and glutaminolysis in the cardiomyocytes. This was associated with reduction of oxidative stress in cardiac mitochondria.

Conclusion: Thus, in human heart, Metf might improve cardioprotection due to its biphasic effect on mitochondria: at low concentrations, it activates mitochondrial biogenesis via AMPK signaling and increases the OCR; at high concentrations, it inhibits the activity of complex I, reduces oxidative stress and cell death. Moreover, Metf at high concentrations causes metabolic reprogramming by enhancing glycolysis and glutaminolysis. These effects can be a beneficial alternative to patients with impaired endogenous cardioprotective responses.
**Circulating microRNA as a Non-Invasive Biomarker for Predicting Postoperative Heart Failure**

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**Background:** Advancements in surgical techniques and myocardial protection have led to decreasing operative risk in coronary artery bypass graft and valve replacement surgery. However, postoperative heart failure (PoHF) continues to be a common complication observed in 20-35% patients after cardiac surgery and remains an important determinant of the poor early and late outcome, with a 10-fold increase in 30-day mortality. Prognosis of PoHF after cardiac surgery is challenging, particularly in patients with no previous history of arrhythmia. Circulating microRNAs (miRNAs) were recently identified to predict AF, HF or HFpEF in the population but their role in predicting PoHF is not known.

**Purpose:** We hypothesize that circulating miRNA regulating the expression of genes involved in interstitial fibrosis, inflammation, alteration in calcium handling, and neurohumoral system are likely to identify the patients who are at risk of developing low output HF after cardiac surgery during their hospital stay.

**Methods:** Patients undergoing CABG surgery with no previous history of HF, supraventricular or ventricular tachycardia were recruited. Preoperative blood from patients undergoing CABG was used for RNA isolation. Differences in the relative levels of 13 miRNAs were assessed using real-time polymerase chain reaction (qPCR) between those who developed or remained free of PoHF. Preoperative echocardiography was performed using 2D Doppler. Principal component (PC) transformation and receiver operative characteristics were performed using SAS.

**Results:** Out of 68 patients, 13 developed PoHF (19.1%, mean age 64.1± 11.6y, 53.8% males), while 55 (mean age 68.3±12.4y) patients remained free of HF. Patients who developed PoHF have lower well-preserved LVEF (51.4±13.7 vs 58.2±9.9, P<0.05) but there were no differences in the prevalence of hypertension, diabetes, hyperlipidemia, obesity, previous of myocardial infarction, stroke, COPD, sleep apnea, or cardiac medications. The correlation matrix of all the 13 miRNAs was transformed in a PC matrix that resulted in three main PCs with Eigenvalue >1. PC2 consists of 4 miRNAs (miR-23a, -23b, -25, and -26a2) form the significant cluster that had the strongest association (AUC=0.797,95% CI, 0.619-0.975; p<0.01) in patients with PoHF

**Conclusion:** This demonstrates for the first time that miR-23a, -23b, -25, and -26a2 may be useful predictors for PoHF. Circulating miRNA as biomarkers may have diagnostic potential to preoperatively identify patients at risk of developing PoHF patients noninvasively.
Oncologic Outcomes of Robotic Compared to Open Pancreatic Surgery: A National Cancer Database Participant User File Study

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Background: Minimally invasive surgery (MIS) has faced significant criticism as an approach to cancer of the pancreas. While MIS, including robotic surgery, is used and accepted in colorectal, urologic and gynecologic oncologic resections, the majority of pancreaticoduodenectomies (PD) and distal pancreatectomy splenectomies (DPS) are done open. Concern for oncologic outcomes is a reason some cite for open surgery in these anatomically challenging operations. We sought to review oncologic outcomes of robotic vs open PD and DPS.

Purpose: We sought to compare oncologic outcomes (lymph node harvest and margins) between robotic and open surgery for pancreatic cancer.

Methods: Using the National Cancer Database Participant Use File (NCDB PUF), we identified patients with surgically resected pancreatic cancer. We stratified these patients into groups that underwent open and robotic PD and DPS. Resection margin, lymph node harvest, and 30 and 90 day mortality were evaluated. We excluded patients with incomplete data or who experienced crossover in surgical approaches.

Results: We found 12,579 patients who underwent PD (Open:12,312; Robotic:267). There were significantly more robotic PD cases with 12-30 lymph nodes harvested than open (72.7% vs 66.1%, p=0.0241). There was no significant difference in positive margin status for robotic vs open PD (19.8% vs 22.6%, p=0.2787). There was no difference in 30 and 90 day mortality. We found 5,756 patients who underwent DPS (Open:5,123; Robotic:633). There was a higher percentage of 12-30 lymph nodes harvested for robotic DPS vs open DPS, though not statistically significant (61.3% vs 57.7%, p=0.0833). Robotic DPS had a significantly lower rate of positive margins than open DPS (11.6% vs 15.2%, p=0.0020). There was a lower 90 day mortality associated with robotic DPS vs open (4.1% vs 1.2%, p=0.0037).

Conclusion: To our knowledge, this is the largest group of patients that underwent PD and DPS comparing purely open vs robotic without any crossover. This study demonstrates the oncologic safety of robotic surgery for both PD and DPS in terms of lymph node harvest and rate of margin negative resections. 30 and 90 day mortality were similar with the exception of improved 90 day mortality in the robotic DPS group. Robotic PD and DPS serves as a safe and non-inferior oncologic surgical approach to pancreatic cancer when performed by those well trained in the technique.

The Incidence of Vitamin D Deficiency in the Internal Medicine Clinic at Aurora Sinai Medical Center

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Background: According to the CDC, 10% of the U.S. population has severe vitamin D deficiency (VDD), with African Americans having the highest prevalence of low vitamin D concentration. Studies have shown that VDD is significantly higher among urban midwestern populations. The detrimental effects of VDD on the bone are well known, however, recent studies suggest that VDD might also be involved in the immune, cardiovascular, and neurological system. Nevertheless, there is still debate surrounding who, how, and how often individuals should be screened for VDD.

Purpose: To assess the prevalence of VDD in one internal medicine clinic and identify risk factors.

Methods: Data was retrospectively collected on unique adult patients (≥18 years old who attended the clinic at any point from 01/2018 to 12/2018. Vitamin D levels ≥ 30ng/ml were considered normal, while levels < 30ng/ml were considered deficient. Patients that had more than one vitamin D test were tracked for further analyses. Basic descriptive statistics were used to describe the population. Chi square tests and t-tests were used as appropriate to compare groups.

Results: Of the patient cohort (n=3,976), only 17.56% had vitamin D levels tested and 12% had a prior diagnosis of VDD. Of those tested, 68% were females, 72% were African Americans, and the average age was 59. Unlike race (P=0.80), women and patients with a previous diagnosis of bone fracture, and a current diagnosis of alcohol use disorder, celiac disease, or chronic kidney disease (CKD) were significantly more likely to have vitamin D levels tested (P<0.01). As expected, individuals were more likely to be tested in winter than in any other season (42%), and the majority of patients tested had VDD (71%), including individuals with CKD (P=0.002). However, there were no differences in VD based on race (P=0.464). In addition, if a patient was re-tested, they were more likely to show improvement of vitamin D levels (42%), while 28% stayed the same.

Conclusion: Although African Americans are generally known to have lower levels of vitamin D when compared to other races, we found they were not more likely to be tested nor have more VDD. Improvement of vitamin D levels for those re-tested indicates that potentially interventions are being utilized. Parallel to results previously reported, patients with CKD are more likely to have VDD and could benefit from annual testing for vitamin D levels. Awareness of these differences could help to lower rates of VDD in this at-risk population.
The Impact of Goals of Care Conversation Training
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**Background:** Palliative interventions by non-palliative healthcare providers such as hospitalists have proven to be beneficial to patients. A primary task of these providers is to hold goals of care (GOC) conversations with patients early during their hospital stay. This can help preserve the expertise of palliative care specialists for more complex patients. While a previous local evaluation focused on providers’ overall comfort in initiating GOC conversation before and after an intervention, no study has explored whether the intervention resulted in providers having more GOC conversations.

**Purpose:** To explore whether GOC training sessions increased hospitalists’ utilization of the GOC dotphrase (DP) generated by the EPIC Electronic Health Record (EHR). To evaluate if there was an improvement in the overall quality of GOC conversations held with patients upon admission.

**Methods:** Aurora hospitalists participated in training sessions covering GOC conversations during 2017-2018. We reviewed 200 History and Physical notes (H&Ps) for 5 full-time hospitalists before and after training. H&Ps were only reviewed for patients ≥ 65 years of age who were admitted directly to the Intensive Care Unit (ICU). For each hospitalist, only the 20 most recent charts before and after the intervention were included. Documented GOC conversations were tabulated, including the use of the GOC DP. Quality assessment was done by searching for goal-concordant keywords and their synonyms within these conversations. Basic descriptive statistics were used to describe the population. Chi square tests and t-tests were used as appropriate to compare groups.

**Results:** Patient demographics of H&Ps reviews were as follow: 95% White, 59% female, and mean age 79. Older patients (mean=84) were more likely to have a GOC conversation (P<0.001). Although there was an increase in usage of the GOC DP after training sessions (73% compared to 31%; P<0.01), only 23% of patients had a GOC conversation. The overall quality of the GOC conversations both before and after the intervention remained essentially unchanged (17% vs 18%).

**Conclusion:** Half-day training sessions in conducting GOC conversations were associated with an increased usage of the GOC DP. Our next steps will be to broaden the scope of this study by not only retraining hospitalists, but also including providers from other facilities in our analysis, thus increasing the number of analyzed H&Ps.

Offering Acupuncture to Patients in the Emergency Department Continues to Decrease Acute Pain
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**Background:** Acupuncture has been associated with improving various types of acute pain. Our previous study found that acupuncture administered in the emergency department (ED) setting decreases acute pain regardless of analgesics received during visit.

**Purpose:** The purpose of this study was to determine if two years after program onset, acupuncture continues to improve pain scores regardless of analgesics used during ED visits.

**Methods:** We retrospectively reviewed patients from 2019 who accessed our ED acupuncture program. Similar to our previously published work in 2017, acupuncture services were offered to patients ≥ 18 years of based on their emergency severity index (ESI; highest severity [1] - lowest severity [5]), reason for visit, and physician recommendation. Only patients’ first visit in 2019 was included in analyses. Basic summary statistics were used to describe patient characteristics. Pain T-tests were used to determine differences in pre- and post-acupuncture pain, stress, anxiety and nausea scores (i.e., no pain [0] - worst pain [10]). Logistic regression models were used to determine associations between improvements in pain and patient visit characteristics.

**Results:** Acupuncture services were provided to 199 patients (mean age 47.5 years, BMI 32.0 kg/m2), who were predominately female (78.4%), White non-Hispanic (70.4%), with an ESI score of 3 (63.3%) or 4 (31.2%). As in 2017, mean pre- and post-acupuncture scores for pain (6.7 vs 3.4), stress (6.3 vs 1.5), anxiety (4.9 vs 1.2), and nausea (2.5 vs. 0.4) significantly decreased (all Ps < 0.001). Most patients had a final acute pain related diagnosis for neck/back pain (41.9%), abdominal pain (18.7%), or head/headache (14.7%). Improved pain scores were not associated with any patient characteristics. Like 2017, receiving opioids only during the ED visit was not associated with improved pain scores (P=0.21), nor was receiving non-steroidal (P=0.07) or tramadol (P=0.42). However, receiving any pain medication in the ED was associated with improved pain scores (P=0.028). Improved pain scores did not predict for receiving any pain medications, including opioids, at discharge (all Ps > 0.05).

**Conclusion:** Similar to 2017 findings, ED acupuncture remains associated with significantly decreased pain, stress, anxiety, and nausea. Our findings continue to support ED acupuncture for acute pain in the ED, and further support the need for a larger randomized controlled trial.
Assessment of Decentralized, Inpatient Pharmacist Blood Culture Audit and Provider Feedback

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Background: Hospitalized patients with blood stream infections (BSIs) are at increased morbidity and mortality risk despite advances in therapy and overall care. Audit and provider feedback for positive blood cultures by pharmacists has been shown to improve care and outcomes for BSI patients. However, previous studies employed pharmacy specialists with infectious diseases (ID) training in a centralized audit and feedback model. It is unknown if decentralized, inpatient pharmacists, with support from ID pharmacists as needed, could impact patient care similarly.

Purpose: The goal of this project was to evaluate antibiotic treatment and outcomes for BSI patients for whom blood culture audit and provider feedback was performed by decentralized, inpatient pharmacists.

Methods: This was a retrospective review of 100 adult BSI patients in Advocate Aurora Health (legacy WI) with a positive blood culture from April 1 – June 30, 2019. Data collected included patient demographics, blood culture draw time, culture results (gram stain, pathogen, antibiotic susceptibilities), time to empiric antimicrobial therapy start and time to antibiotic optimization. The primary outcome assessed was time from blood culture draw to effective empiric antimicrobial therapy. The secondary outcome assessed was time from blood culture draw to optimal antimicrobial therapy. Outcomes collected were compared to previously published studies.

Results: 100 patients with positive blood cultures were included. Urine was the predominant BSI source (47%) followed by skin/soft tissue (14%). The most common pathogens were gram negative bacilli (61%). Eight multi-drug resistant organisms were identified. The median time to effective antibiotic therapy from blood culture draw was 2 hours (Interquartile Range; IQR, 1-4.75). The median time to optimal definitive antibiotic therapy was 36 hours (IQR, 2.13-64). These results are similar to previously published studies of ID pharmacy specialists in a centralized audit and feedback model.

Conclusion: BSI audit and provider feedback by decentralized, inpatient pharmacists, with as needed support from ID pharmacists, may represent an alternative to centralized ID pharmacist model. Application of these findings to practice will allow for more efficient use of pharmacist time and expand decentralized, inpatient pharmacy practice.

Fruit and Vegetable Vouchers Do Not Increase Redemption or Consumption

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Background: It is well known that a diet rich in fresh fruits and vegetables improves health outcomes. In central Milwaukee, specifically the 53233 ZIP code area, there is a limited supply of vendors that sell fresh produce to its residents.

Purpose: To increase produce consumption among patients through a Fruit and Vegetable Prescription (FnVRx) program.

Methods: In 2019, patients at one family medicine residency clinic in the 53233 ZIP code area were recruited and assigned to one of two groups. The study group was given a packet of materials including two $20 prescription vouchers for fresh produce redeemable at nearby (1.7 miles from clinic) Fondy Farmers Market along with a verbal explanation of packet contents, while control group was given the same packet, but without verbal overview. Groups were assigned based on availability of study team member to discuss packet contents. Participants completed a baseline assessment at their initial visit; follow-up phone surveys were completed at 4 and 8-weeks post-office visit. Basic descriptive statistics were performed, and Fisher Exact Tests were used for 2x2 tables.

Results: Of the total participants (N=107), 71% met food insecurity criteria, 46% had an income of < $15,000, and 89% shared food with ≥ 2 family members. Participants were predominately female (86%), African American (72%), and in the control group (77%). Overall, 71% never redeemed a FnVRx. Of those surveyed at 4 weeks post recruitment, 31% of individuals and 19% of households recalled consuming more produce, as opposed to 19% of individuals and 16% of households who had recalled more produce consumption at 8 weeks. No statistical difference was associated with redemption of FnVRx in regards to gender, income level, prior use of farmers’ markets, groups, presence of food insecurity, or size of household (all P’s > .0805; 0.05). However, increasing age was associated with FnVRx redemption (P=0.016). Overall, the most commonly cited reasons for not redeeming FnVRx were “too busy” or “forgot.”

Conclusion: The solution to increasing fresh produce consumption is multifactorial. The answer is not as simple as providing individuals with monetary based prescriptions for farmers’ markets. Many barriers likely prevent increased produce consumption (e.g., time, motivation, transportation, cultural preferences, distance to farmers’ markets, and education). Despite low redemption rates, this project identified a need for food resources for our patients and further development of interventions to meet those needs.
**Zika Virus Targets Stem Cell Markers and Modulates Antiviral Responses in Glioblastoma Cancer Stem Cells**

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**Background:** Glioblastoma (GBM) is the most common and lethal form of brain cancer. Standard treatment involves surgery, chemotherapy, and radiation. Tumor recurrence is caused by a population of glioblastoma stem cells (GSCs) that resist and survive treatment. There are currently no pharmacological agents available for specific targeting of GSCs. Zika virus (ZIKV) is a flavivirus that targets normal neural stem cells in the developing brain and causes microcephaly. ZIKV also selectively targets GSCs in a similar manner. We examined the effect of ZIKV on specific stem cell markers, as well as antiviral responses in patient derived GSCs.

**Purpose:** The purpose of this study is to understand the oncolytic mechanism of ZIKV towards glioblastoma cancer stem cells.

**Methods:** Glioblastoma patient derived cell lines were acquired from within our institution and used for the entirety of this study. Patient derived cell lines were grown in spheres using supplemented neurocult media. ZIKV strain MR766 was propagated in Vero cells and viral stock was titrated by plaque assays. Glioblastoma patient cell lines were infected with ZIKV at a multiplicity of infection (MOI) of 1. The percentage of infection was quantified by flow cytometry using a pan-flavivirus antibody. Western blotting was used to characterize protein expression, while qRT-PCR was used to quantify gene expression pre and post ZIKV infection in patient derived cell lines.

**Results:** We tested multiple stem cell markers and found that Sox2 and Nestin expression is highly upregulated in our GBM patient derived cell lines (7714, 7730, 7753), while Nanog, Oct 4, and Musashi-1 were at basal levels. We further found that both Sox2 and Nestin are significantly decreased post ZIKV infection. Next, we found that ZIKV induces antiviral responses post infection through an increase of IFN-induced genes IRF1, IFI1, ISG15, and IL6. Lastly, we found increased expression of FGF2 and Caspase 3 post ZIKV infection, which are involved in cell differentiation and cell death respectively.

**Conclusion:** Our results suggest that ZIKV infection causes loss of GSC self-renewal through decreased Sox2 and Nestin expression. Furthermore, ZIKV leads to antiviral responses in GSCs through an increase of multiple IFN-induced genes. Finally, genes involved in cell differentiation and cell death are upregulated in GSCs post ZIKV infection. Thus, there are multiple mechanisms to explain GSC cell death following ZIKV infection.

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**p53 Level and MGMT Promoter Methylation are Playing a Role in Zika Virus Replication in Glioblastoma**

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**Background:** Glioblastoma (GBM) is a malignant primary brain cancer. The poor median survival rate for patients with GBM of 15 months has not budged for the past 15 years, when the current standard treatment was first approved. There is no standard of care chemotherapy for recurrent GBM. Needless to say, novel treatments and treatment strategies for GBM are needed. One such novel treatment strategy is an oncolytic virus. Zika virus’ (ZIKV) affinity for fetal neural stem cells has made it a compelling candidate as an oncolytic therapy for glioblastoma. Previous studies have shown that ZIKV does infect and replicate in most but not all GBM cancer cells. Understanding the genetic milieu that is permissive for ZIKV infection is critical to the creation of a safe and effective viral oncolytic treatment. This report presents initial data for a ZIKV replication gene signature.

**Purpose:** We hypothesize that p53 level and MGMT promoter methylation are playing a role in ZIKV replication in glioblastoma cancer cells.

**Methods:** ZIKV strain MR766 was propagated in Vero cells. Viral stock was titrated by plaque assays. Western blot was used to characterize MGMT, AXL, p53 and Sox2 expression in eight commercial GBM cell lines (LN229, U87, A172, U251, LN18, T98G, U137, and U118). The cell lines were stratified by MGMT promoter methylation status and were exposed to ZIKV at MOI 1. The percentage of infected cells was quantified by flow cytometry using the pan-flavivirus antibody. Western blotting was used to characterize protein expression, while qRT-PCR was used to quantify gene expression pre and post ZIKV infection in patient derived cell lines.

**Results:** In this study, we found that AXL was overexpressed in all 8 commercial GBM cell lines. With flow cytometry, we found that productive ZIKV replication only occurs in the MGMT-methylated (LN229, A172, U87, and U251) cell lines and not in MGMT-unmethylated (T98G, LN18, U118, and U138) cell lines. qRT-PCR data showed that ZIKV enters all 8 cell lines but can only replicate in MGMT-methylated cell lines. Additionally, p53 expression trended lower in MGMT-methylated cell lines. RNA sequencing data comparing ZIKV replicating and non replicating GBM cell lines has identified multiple differentially genes.

**Conclusion:** Based on these results, there is a clear difference in the ability of ZIKV to replicate in GBM cell lines based on MGMT and p53 expression. Additional work is underway to understand the mechanism(s) underlying these findings and to define a ZIKV replication gene signature.
Data in the Electronic Health Record can be Used at the Bedside to Identify Older Hospitalized Patients with Delirium

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Background: Delirium is common among hospitalized older adult and associated with adverse outcomes. Delirium remains underrecognized and efforts are focused on early recognition as well as prediction. While several delirium predictive rules have been developed only a handful have focused on electronic health record (EHR) data. The coupling of prediction rules with features of the EHR are in their infancy but hold promise in their ability to aid in identification of delirium.

Purpose: To determine variables within our electronic health record (EHR) that can be used to identify older hospitalized patients with delirium.

Methods: This is a prospective study among hospitalized patients ≥ 65 years of age during 2/2016 to 11/2017. Patients were excluded if they were non-English speaking, comatose, ventilated, or combative, as well as intensive care and/or surgical patients. Patients were also excluded if they had severe aphasia, severe dementia, and/or a critical illness. Researchers screened daily for delirium using the 3-minute diagnostic confusion assessment method (3D-CAM). Predictive variables were extracted from the EHR. Basic descriptive statistics were conducted. Chi-squared and Fischer's exact tests were used to compare differences among those diagnosed with or without delirium. Binary logistic regression was used for multivariable modeling.

Results: Among 408 participants, mean age at admission was 75 years, 61% were female, and 83% were African American. The overall rate of delirium was 16.7% (prevalent delirium 10.5% [n=43]; incident delirium 6.1%[n=25]). There was no statistical difference in 30-day mortality (2.9% vs. 2.7%) or 30-day readmission (13.2% vs. 14.7%) rates between those with and without delirium (both P>0.05). Even so, patients with delirium were older, more likely to have a diagnosis of infection and/or cognitive impairment, as well as increased severity of illness (all P's <0.05). Moreover, patients with delirium had a lower Braden (pressure ulcer risk) score and higher Morse fall score (both P's <0.01). In multivariable analysis, cognitive impairment (OR 5.49; 95% CI 2.77-10.87) and lower Braden scores (OR 1.29; 95% CI 1.18-1.41) remained significant predictors of delirium among hospitalized patients.

Conclusion: Our study found that cognitive impairment and lower Braden scores were associated with hospital delirium. Further research is needed to develop an automated, dynamic (daily) prediction model inclusive of these variables.

The Usefulness of Procalcitonin in Aiding Physician Assessment and Treatment of Potential Serious Bacterial Infections

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Background: Procalcitonin (PCT) is used as a biomarker for the diagnosis of serious bacterial infections (SBI). To date, studies have not compared PCT to clinical judgment and it remains unclear whether PCT adds to the physician's clinical judgment when diagnosing SBI.

Purpose: To evaluate the diagnostic usefulness of PCT in comparison to blood culture results and the physician's clinical judgment in patients presenting to the Emergency Department (ED) with signs of SBI.

Methods: A prospective cohort study was conducted with 400 patients suspected of having an SBI who presented to the ED at two community hospitals in Wisconsin from 2016 – 2018. PCT was performed on all patients in addition to the standard of care (SOC) for suspected SBI. PCT results were not available to the physicians throughout the duration of the study. Physicians completed a brief survey that asked if they thought the patient was septic upon ordering SOC labs and again after they reviewed the SOC lab results. Data was collected to determine if patients were diagnosed with an SBI during their stay. Multivariate logistic regression was used to examine factors associated with an SBI diagnosis.

Results: Among the patients, 186 (46.5%) were diagnosed with an SBI during their hospital stay. High serum levels of PCT (≥ 0.25 ng/mL) were an independently significant predictor for an SBI diagnosis in patients with signs of infection (OR = 1.96, 95% CI: 1.13-3.39, p = 0.016). In addition, patients suspected of having an SBI are 2.62 times more likely to be diagnosed with an SBI when the blood culture result is positive (OR = 2.62, 95% CI: 1.19-5.77, p = 0.017) and 7.13 times more likely to be diagnosed with an SBI when the physician believes the patient is septic after reviewing the SOC lab results (OR = 7.13, 95% CI: 3.64-13.97, p < 0.001). There was no association between the physician's clinical judgment before reviewing the SOC lab results and SBI diagnosis (OR = 1.74, 95% CI: 0.88-3.45, p = 0.111). None of the other factors, including lactic acid, were found to be significant predictors for an SBI diagnosis.

Conclusion: PCT, blood culture results, and clinician judgment after reviewing SOC labs provide important diagnostic value when diagnosing SBI. Clinician judgment before reviewing SOC labs results was not associated with an SBI diagnosis, thus SOC labs do have added value in aiding physician assessment of potential SBI. This study offers a unique perspective as, to date, no other studies have compared PCT results to clinical judgment.
Goals of Care Conversations: A Training Program Evaluation

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Background: Patients benefit when their healthcare providers engage in conversations about treatment options and goals of care. However, these conversations frequently do not occur. Researchers have called for new approaches to increase such conversations. The Teaching Primary Palliative Care Training is one such approach.

Purpose: To determine whether the Teaching Primary Palliative Care Training increases participant comfort engaging in goals of care conversations with seriously ill and dying patients shortly after the training and one-year after the training.

Methods: Seventy-eight healthcare providers participated in the Teaching Primary Palliative Care Training during the fall of 2018. Participants completed a self-assessment in which they reported on their comfort level in various circumstances related to the management of seriously ill and dying patients at baseline before the training, shortly after completing the training, and again one year later. We used the one-sided sign test to assess for statistically significant improvement in self-reported comfort.

Results: At the first follow-up, self-assessments reflected significant improvement in comfort in all five circumstances related to the management of seriously ill and dying patients compared to baseline. These circumstances included: Delivering bad news (p=0.004); Discussing CPR/DNR (p=0.003); Discussing hospice or palliative care referral (p=0.001); Discussing artificial hydration or nutrition (e.g., PEG tubes) (p<0.001); and Discussing prognosis specifics (p<0.001). At the one-year follow-up, significant improvement remained in four of the five circumstances compared to baseline: Delivering bad news (p=0.010); Discussing hospice or palliative care referral (p=0.006); Discussing artificial hydration or nutrition (e.g., PEG tubes) (p=0.002); and Discussing prognosis specifics (p=0.009).

Conclusion: In this sample, participation in the Teaching Primary Palliative Care Training increased healthcare provider comfort in patient communication of various circumstances related to the management of seriously ill and dying patients. Improvements continued one year after the training. Next steps include determining whether increased comfort translates into changes in provider behavior such as conducting goals of care conversations with patients.

Predictors of Lymphovascular Invasion Among Female Patients Diagnosed With Breast Cancer

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Background: The presence of carcinoma cells in either lymphatic vessels, blood vessels or both is defined as lymphovascular invasion (LVI). The presence of LVI is associated with an increased risk of axillary lymph node and distant metastases. LVI is also characterized as one of the significant prognostic factors for the patients diagnosed with breast cancer.

Purpose: The objective of this study is to identify predictors of LVI among female patients diagnosed with breast cancer.

Methods: From the Commission on Cancer’s National Cancer Database from 2010 through 2014, we identified 842,704 female patients diagnosed with breast cancer and with non-missing value for LVI. Patient demographics, tumor characteristics and biomarkers were analyzed using descriptive statistics. Odds ratios (OR) were computed using stepwise multivariate logistics regression. All statistical analysis was done using SAS version 9.4, SAS institute, Cary, NC and for all statistical tests alpha of 0.05 was used.

Results: The study population included 76% non-Hispanic white, 11% non-Hispanic black, 1% Hispanic and 12% from ‘other’ race category. The mean age of the patients at the time of diagnosis was 61.2 ± 13.1 years. Of the total patients only 16.7% had LVI. Significant predictors of LVI include race (non-Hispanic Black vs Hispanic, (OR=0.92, 95%CI 0.86 -0.99 p =0.0287), insurance status (government vs no-insurance, OR=0.1.11, 95%CI=1.07-1.15, p<0.0001; private vs no-insurance, OR=0.1.11, 95%CI=1.07-1.15, p<0.0001), Charlson-Day Index (1 vs none, OR=1.31, 95%CI=1.06 -1.0, p<0.0001; 2 vs none, OR=1.14 95%CI=1.09 -1.19, p<0.0001; 3 or more vs none. OR=1.12 95%CI=1.04 -1.21, p=0.0030), primary sequence (OR=1.02, 95%CI=1.01-1.04, p=0.0043), cancer stage (I vs 0, OR=3.28, 95%CI=3.10-3.47, p <0.0001, II vs 0, OR=10.47, 95%CI=9.90-11.08, p <0.0001; III vs 0; III vs 0, OR=24.0, 95%CI=22.65-25.48, p <0.0001; and IV vs 0, OR=16.38, 95%CI=15.93-18.09, p <0.0001), PR (OR=1.02, 95%CI=1.01-1.04 p=0.0035), HER2neu (equivocal vs negative OR=1.12, 95%CI=1.08-1.17 p <0.0001; positive vs negative OR=1.33, 95%CI=1.30 -1.35, p <0.0001), and 10 year increment in age at the time of diagnosis (OR=0.89, 95%CI=0.89-0.90, p <0.0001).

Conclusion: The predictive factors for LVI include Hispanic race, government or private insurance, higher Charlson-Day scores, primary sequence, cancer stages, PR and HER2neu expression. The chances LVI decreases with increasing age. These finding might provide insights for clinicians for the treatment plan for the patients.
The Abandoned Inferior Vena Cava Filter: Is It a big Deal? IVC Filter Retrieval Rates and Clinical Outcomes of Non-Retrieval

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**Background:** Many patients with inferior vena cava filters (IVCF) never have them retrieved and there are no well-validated studies examining IVCF retrieval rates and clinical events in patients with abandoned IVCF.

**Purpose:** In this retrospective cohort study, we evaluated differences in the rates of venous thromboembolism, mortality and retrieval success as a function of time in patients who underwent filter retrieval within 12 months vs. patients in whom the filter was not retrieved.

**Methods:** Enrollment included 1,709 patients who underwent IVCF placement between 1/2011 - 12/2017 within the Aurora Health system. Procedure dates, recurrent deep vein thrombosis (DVT), pulmonary embolism (PE) and mortality dates were collected. Endpoints between patients who underwent successful filter retrieval within 12 months and those with abandoned IVCF (never retrieved after 12 months of follow-up) were compared via multivariate regression analysis.

**Results:** Of 1,709 patients who underwent IVCF placement, there was successful retrieval in 770. Success rate was 92.8% in the first retrieval attempt. There was a significant (p=0.018) decrease in retrieval success rate as time from insertion increased. Recurrent DVT rates and death were lower in patients that had IVCF retrieval but there was no significant difference in the rate of recurrent PE.

**Conclusion:** IVCF abandonment was associated with an increased rate of recurrent DVT and death. Successful filter retrieval became less likely as the time from insertion increased.

Targeting MGMT To Treat Therapy Resistant and Metastatic Melanoma Growth

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**Background:** Melanoma is one of the most aggressive forms of skin cancer leads to 80% of skin cancer related deaths. The current standard of care includes combination of BRAF/MEK inhibitors which improves the prognosis for melanoma patients, but most patients do not show lasting response to this treatment.

**Purpose:** O6 methylguanine DNA methyltransferase (MGMT) is a DNA repair protein over expressed in majority of cancers including melanoma. The purpose of this study is to show that MGMT inhibition not only decreases drug mediated resistance, but also inhibits the primary and metastatic melanoma growth.

**Methods:** In this study, we used BRAF-mutated (V600E) primary and metastatic melanoma cells to investigate the combination therapeutic effect (Dabrafenib, Trametinib, Disulfiram/Cu, and Temozolomide) using cell viability assay. We also investigated the effects of these drug combinations on effector molecules of the BRAF/MAPK signaling pathway associated with melanoma by western blot analysis and furthermore, MGMT interacting partners that promotes melanoma growth was detected by protein-protein interaction.

**Results:** The combination therapy significantly inhibited the growth of primary as well as metastatic melanoma growth compared to single agents, or combination of BRAF/MEK inhibitors. The combination therapy significantly inhibited MAPK signaling pathway to inhibit the melanoma growth. We show that triple lock – upstream and downstream, along the MAPK pathway - effectively restores durable BRAF and MEK inhibitor activity and significantly sensitizes melanoma cells to Temozolomide. The advantage of a multiple lock approach on the MAPK pathway is substantiated by the lack of signaling cross talk. MGMT is interacting with oncogene (cMYC) to promote the melanoma growth.

**Conclusion:** Combination of BRAF and MEK inhibitor therapy represents the gold standard of targeted therapy to treat melanoma patients with BRAF mutation. However, with this combination, efficacy and survival gains were limited due to development of acquired resistance. In this study, we showed that combination of BRAF, MEK and MGMT inhibitors significantly inhibited primary as well as metastatic melanoma tumor growth.
Medication Refill Protocol at a Residency Clinic
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Background: In primary care clinics, prescription refill requests significantly impact day-to-day clinic workflow and can increase clinician burnout and patient dissatisfaction. Delays in response cause gaps in treatment leading to potential patient adverse events and stress on patient/provider relationships.

Purpose: This project aimed at decreasing the time to complete refill requests (refill approved or declined) and improve consistency in management of refills.

Methods: We created an interdisciplinary refill protocol based on state Medicaid preferred drug list data to allow for centralized, nursing-driven management of most prescription refills at a Family Medicine residency clinic in Milwaukee, WI. Medication refill processing time (from the time a refill request was received for a refill request to the time it was closed with refill approval or denial) was measured in minutes and was compared pre-protocol (3/1/17 to 11/30/17), during protocol adoption (12/1/17 to 8/31/18) and post-protocol (9/1/18 to 6/28/19). Mood median test was used to compare the average time for a medication refill request to be addressed. Levene’s test was used to test for equal variance surrounding the median of each group.

Results: Pre-protocol N = 24,073, protocol adoption N = 23,770, and post-protocol N = 25,770. We found a statistically significant reduction in median time to refill completion, from 232 minutes in the pre-protocol phase to 157 minutes in the post-protocol phase (P<0.001). Reduction in median time to response was most apparent in the resident subgroup, with median times of 383 minutes pre-protocol and 79 minutes post-protocol (P<0.001). There were also statistically significant reductions in variability of response time. Response time standard deviations had an overall reduction across groups (pre-protocol mean SDs of 14.5 days, during protocol adoption mean SDs of 10.8 days, and post-protocol mean SD of 6 days P < 0.0001).

Conclusion: This project reinforces the importance of a standardized multidisciplinary medication refill protocol to increase consistency and decrease medication refill time. Results from this project are being used to further improve and expand the process of medication refill within both our academic family medicine clinics.

Substance Use Disorder Treatment Outcomes and Transitions at a Large Midwestern Healthcare System
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Background: Substance use disorder (SUD) is diagnosed in 10% of the US population across a lifetime. Although around 10% of individuals with SUD go into long-term remission each year, the disease is considered chronic and is punctuated by many periods of abstinence, relapse, and eventual long-term remission. Nevertheless, only 35-50% of individuals with SUD experience long-term remission within 17 years of diagnosis. To account for disease chronicity and varying levels of need over time, several treatment programs exist, each tailored to an individual’s current acuity and needs. These treatments include inpatient, residential, partial hospitalization program (PHP), intensive outpatient program, and outpatient treatment. Patients are assessed and referred for a specific level of treatment, and individual outcomes are superior if patients enter and complete the recommended program. However, many patients choose to reduce their lengths of stay, discharge against medical advice, or enter programs mismatched with their current acuity.

Purpose: The purpose of this retrospective study was to describe patient populations within the five unique SUD programs as well as variables related to program completion and length of stay.

Methods: Medical records were used to collect data. Eligible subjects were adults enrolled in SUD treatment at a midwestern psychiatric hospital between 1/1/17-11/20/19. Data included demographics, diagnoses, tobacco use, number and length of stays, referrals, discharge against medical advice, and program type. Basic descriptive statistics were conducted.

Results: Of the total population (N = 4,990), the majority of patients receiving treatment for SUD were male (59.9%), current smokers (61.8%), and had a mean age of 39.9 years. Further, many patients had concurrent mental health diagnoses; depression and/or anxiety disorders were prevalent in 53-57% of patients. Within the context of substance use, patients were most likely to have been diagnosed with alcohol use disorder, opioid use disorder, cocaine use disorder, and cannabis use disorder. Similarly, patients were most likely to receive treatment for alcohol use, cannabis use, opioid use, and cocaine use. Co-occurring diagnoses were extremely common, and patients in PHP programming had the greatest number of diagnoses.

Conclusion: Patients receiving treatment for SUD are highly varied, and population differences exist between programs. These data suggest opportunities for tailoring programs to meet the current and long-term needs of patients.
Predictors of Conduction Recovery in Patients With High-Degree Atrioventricular Block After Self Expandable Transcatheter Aortic Replacement

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Background: High-degree atrioventricular (HD-AVB) block is frequently seen post transcatheter aortic valve replacement (TAVR) with right ventricular pacing induced cardiomyopathy being a potential long-term complication.

Purpose: Serial pacemaker interrogations up to 1 year post TAVR were reviewed to assess for recovery of atrioventricular (AV) conduction defined as ventricular pacing percentage of < 3%.

Methods: A retrospective review of 59 patients (32 women, 27 men) who underwent permanent pacemaker implantation for HD-AVB block within a 7-day period post TAVR with self-expanding valves was performed. Serial pacemaker interrogations up to 1 year post TAVR were reviewed to assess for recovery of atrioventricular (AV) conduction defined as ventricular pacing percentage of < 3%. Baseline comorbidities, NYHA functional class, baseline and 7 years post TAVR left ventricular ejection fraction, baseline and immediate post TAVR EKG characteristics, procedural characteristics and cardiac medications on admission and discharge were analyzed to identify predictors of AV conduction recovery.

Results: AV conduction recovery within 7 years was observed in 18 (31%) patients, of which 10 recovered within 30 days. Univariate analysis showed betablocker use prior to TAVR and angiotensin receptor blocker use at discharge post TAVR to be associated with a higher likelihood of AV conduction recovery while complete heart block noted on the immediate post TAVR EKG was associated with lack of conduction recovery. On logistic regression multivariate analysis, betablocker use prior to TAVR (OR 5.96, 95% CI 1.04 - 33.9, p value=0.04) was associated with a higher likelihood of AV conduction recovery and complete heart block (CHB) on the immediate post TAVR EKG (OR 0.18, 95% CI 0.87 – 0.03, p value 0.03) was associated with an 82% higher risk of not recovering. PR interval, QRS duration, baseline first degree AV block, right bundle branch block and development of left bundle branch block post procedure were not significantly with AV conduction recovery.

Conclusion: Less than one-third of patients who developed HD-AVB post TAVR demonstrated evidence of AV conduction recovery at 1 year. Immediate peri-procedural development of CHB as evidenced by CHB on immediate post TAVR EKG was negatively associated with AV conduction recovery and betablocker use prior to TAVR appeared protective.

JTC Prolongation Provides Additional Prognostic Information for Life Threatening Arrhythmias In Patients With QRS Prolongation

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Background: Prolonged QRS interval reflecting conduction disease has been a well-recognized marker of mortality and cardiac arrhythmias. Patients with repolarization abnormalities have usually been excluded in analysis of patients with prolonged QRS duration.

Purpose: We hypothesize that JTC prolongation can be used as an important biomarker to identify patients with prolonged QRS at high risk for sudden cardiac death and mortality.

Methods: Patients > 18 years with an ECG and echocardiogram obtained at initial encounter between 11/2011 and 12/2016 with follow-up of at least 1 year were included. Based on JTC interval and QRS duration, patients were divided in to six groups and ventricular fibrillation (VF), cardiac arrest (CA) and mortality during follow-up was determined. Baseline characteristics were compared with Pearson’s chi-squared test. Multivariate logistic regression was used to identify independent predictors for VF, CA and mortality.

Results: 29,700 patients were divided in to six groups. VF, CA and overall mortality for each group is shown in figure. Median follow-up was 3.7 years. For each QRS group, JTC prolongation increased the risk for VF, CA and overall mortality.

Conclusion: In patients with QRS prolongation, a known risk factor for increase mortality, JTC prolongation provides incremental prognostic information in identifying those at risk for VF, CA and mortality and should be routinely reported in this population.
Pathogenic Aortopathy Genes are Associated With Faster Thoracic Aneurysm Growth: Long Term Experience From the Aurora St. Luke’s Aortopathy Clinic

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Background: Faster thoracic aortic aneurysm (TAA) growth is an important risk factor for Acute Aortic Syndrome. With as many as 22% of cases resulting in death before receiving medical attention, there is a need to better understand the factors driving TAA progression.

Purpose: Here, we seek to unravel the genetic background underlying the rate of TAA growth to help establish criteria for management optimization.

Methods: A total of 162 unoperated TAA patients with serial aneurysm diameter measurements were screened for mutations in aortopathy gene panels from 2011 to 2019. Patients were categorized into three groups according to genetic profile: Pathogenic Mutation, Variant of Uncertain Significance (VUS) and No Mutation. Results were obtained through mixed effects modeling with random effects using STATA software.

Results: Of the 162 patients, 6.8% were positive for pathogenic gene mutations and 34% for VUS. Aneurysms associated with pathogenic mutations were found to grow at a statistically significant higher rate (1.36 mm/year, 95% CI: 0.77-1.95) than aneurysms associated with VUS and no mutations (0.83 mm/year 95% CI: 0.66-0.99 and 0.89 mm/year 95% CI: 0.79-0.99, respectively p<0.001). Importantly, aneurysms were 20% more likely to eventually require surgical intervention for every mm increase in diameter.

Conclusion: Aneurysms associated with pathogenic gene mutations grow significantly faster than those in VUS and no mutations making them more likely to require closer follow-up and earlier surgical intervention.

Concordant Genomic Vulnerabilities of Patient-Derived Cell Line and Matched Xenograft-Derived Cell Line Through Whole Exome Sequencing in Breast-Brain Metastatic Cancer

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Background: Brains metastasis (mets) is often associated with the worst prognosis among all disseminated disease and one of the two main sources of brain mets is the breast, with reported 1-year survival rate of 20% once developed. Breast brain mets (BBM) usually happens in a late stage of breast cancer and options of treatment are very limited, which becomes a major limitation of life expectancy. Therefore, developing a cost-efficient, robust model that could precisely recapitulate the features of tumor origin will be beneficial to discovery of novel therapeutic strategies to further improve outcomes.

Purpose: Patient-derived xenografts (PDXs) often accurately recapitulate the tumor of origin in terms of genomic landscape, histopathology, and therapeutic response, however, restrictions such as cost, high maintenance and limited amenability for large-scale screening for potential therapies remain a challenge. To overcome these issues, we established a platform to derive cell lines from both BBM patient tumor and the matched PDX to further investigated the similarity of their pathogenic genomic variants.

Methods: DNAs from the first passage of cells derived from patient tumor along with two different passages of cells derived from PDXs were extracted, followed by the whole exome sequencing analysis. Raw FASTQ files were quality controlled using FASTQC and then aligned to hg38 using BWA-MEM without trimming. The aligned BAM files were processed using GATK4 following best practice. Mutations were called using mutect2 without normal control. Classification of variants was finally referred to ClinVar.

Results: Cells derived from PDXs (PDXL) has a significantly shorter doubling time than cells derived from patient tumor (PTL). PDXL was able to recapitulate the entire spectrum of PTL’s pathogenic variants. Exome sequencing analyses delineated several pathogenic variants of some common oncogenes and tumor suppressors, which potentially contributed to progression of this tumor. PDXL and PTL have shown consistent response to drug that targets on the certain pathogenic variants.

Conclusion: Our PT-PDX cell line platform represents a preclinical tool for functional gene validation and proof of concept studies to identify novel druggable vulnerabilities in BBM, which could be further applied to other types of brain mets.
Can you Hear us Now? The Economic Impact of Rare Disease in the U.S.

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Background: Rare diseases, defined in the United States (U.S.) as conditions with a prevalence of <200,000 people, are often complex and costly to treat for patients and health care systems. The impact of rare disease is felt broadly, with nearly 7,000 unique conditions collectively affecting over 30 million people in the U.S. (~10%). Moreover, the economic burden of a single rare disease can be massive, with lifetime treatments costing patients millions of dollars. However, the collective footprint of health care utilization and resource allocation by rare disease patients remains poorly understood. Therefore, health care cost and utilization was analyzed using hospital discharges, inpatient length of stay and all associated costs to estimate the overall economic impact of rare disease.

Purpose: To estimate health care spending and utilization by rare disease patients in the U.S.

Methods: 2016 Healthcare Cost and Utilization Project (HCUP) national databases were used to extract hospital care data. HCUP databases include a random sample of 20% of all inpatient hospitalization and emergency data compiled from encounter-level information provided by all payers across 47 states and the District of Columbia. ICD-10 codes linked to rare diseases were derived from a structured and machine computable rare disease reference database (Orphanet) to characterize health care utilization by rare disease patients compared to the non-rare population.

Results: Analysis of over 7 million records revealed a disproportionate number of rare disease patient discharges (2,757,596) compared to non-rare disease patients (4,376,072). The average cost per discharge was $60,033 for rare disease and $38,825 for non-rare disease across all ages, and $113,950 for rare compared to $24,440 for non-rare when those under 21 years of age were analyzed. Emergency department utilization was also disproportionately higher in rare patients. Within this 20% sample, charge data across inpatient and emergency utilization totaled $185M for rare disease patients. Further analysis demonstrated significant differences in discharge status (e.g., home, inpatient), payer type (e.g., private, Medicaid) and sex between rare and non-rare patients.

Conclusion: Collectively, rare disease patients have a massive financial impact within health care, with disproportionate utilization of inpatient and emergency services.
**Oral Presentations II**

**Buprenorphine Therapy for Opioid use Disorder in a Rural Family Medicine Residency Clinic: Outcomes**

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**Background:** Opioid use disorder (OUD) is a national epidemic. Office-based Medication Assisted Treatment (MAT) with buprenorphine, a partial opioid agonist, is effective and can be offered by primary care physicians to increase patient access.

**Purpose:** To assess effectiveness of MAT for OUD in a rural Family Medicine clinic and identify factors associated with patient discontinuation/drop-out of treatment.

**Methods:** Study design: retrospective chart review of all 123 MAT patients entering treatment for OUD at Aurora Lakeland Family Medicine Clinic from January 1, 2018 to July 1, 2019. Data was collected for the first 6 months or until discontinuation. Variables studied: basic demographics, opioid first used, history of heroin use, continued use of illicit/non-prescribed drugs, maintenance MAT dose, and involvement in Behavioral Health Treatment (BHT). Analysis: regression analysis and Fischer two-tailed Exact test.

**Results:** Mean age: 38.7 years. Gender: 48% male, 52% female. Mean time in MAT: 21 weeks. Patients in MAT at 6 months: 63%. Patients remaining opioid-free: 58%. Patients who started with prescription opioids: 65%; ever used heroin: 63%; ever used intravenous (IV) heroin: 43%. Factors associated with MAT discontinuation: cocaine in urine drug screen (UDS) (P = 0.049), non-prescribed opioids in UDS (P < 0.001), and lack of BHT (dropout rate for BHT vs. no BHT 15% vs. 52%, p < 0.001). Factors not associated with MAT discontinuation: age (P = 0.407), gender (P = 0.454), history of heroin use (P = 0.244) or IV heroin use (P = 0.575), alcohol in UDS (P = 0.515), non-prescribed stimulants in UDS (P = 0.445), non-prescribed benzodiazepines in UDS (P = 0.201), or maintenance buprenorphine dose (P = 0.890).

**Conclusion:** Over half of patients remained in MAT and opioid-free. Cocaine and illicit opioid use were associated with decreased retention in MAT, while alcohol, non-prescribed stimulant, and non-prescribed benzodiazepine use were not. Participation in behavioral health treatment was associated with significantly higher retention in MAT, although 48% of patients not receiving BHT remained in MAT.

**Improved Surgical Margins With Neoadjuvant Versus Adjuvant Chemotherapy in Clinical Stage I Resectable Pancreatic Adenocarcinoma: A National Cancer Database Study**

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**Background:** A strengthening consensus exists for neoadjuvant therapy (NAT) in borderline resectable pancreatic adenocarcinoma (PA). However, the utilization of NAT in resectable stage I and II PA remains controversial. The use of NAT in this population has increased over recent years, particularly in academic centers. Nevertheless, other centers continue to offer upfront surgery and adjuvant therapy (AT). However, we continue to see that PA is often under-staged clinically. While many studies analyze both stage I and II PA together in terms of a resectable cohort, we sought to analyze only clinical stage I pts. We hypothesized that NAT would improve margin negative resection and pathologic upstaging as compared to upfront surgery in clinical stage I resectable PA.

**Purpose:** The purpose of this study was to compare NAT vs upfront surgery in terms of the margin negative resection and pathologic upstaging rates in pts with resectable clinical stage I PA.

**Methods:** We utilized the IRB approved 2016 national cancer database for pancreas to establish a cohort of stage I PA pts. We divided this subset into pts who underwent NAT vs AT. We compared demographics. Primary endpoint was surgical margins.

**Results:** 10,453 pts from 2004 to 2016 had clinical stage I resectable pancreatic adenocarcinoma. 8483 pts (81.1%) underwent AT and 1970 pts (18.9%) underwent total or partial NAT. There was a statistical difference in age (64.9 ± 9.9 years NAT and 66.2 ± 9.9 years AT, p < 0.001), but no difference in Charlson comorbidity score (p = 0.1693). NAT pts had significantly higher margin negative resection rates (84.5%) than AT pts (79.4%) (p < 0.0001). Final pathologic staging was available for 10,237 pts: 8369 (81.8%) AT and 1868 (18.2%) NAT. Significantly fewer pts were upstaged on final pathologic to stage II or greater (73.5%) in the NAT group than the AT group (84.1%) (p < 0.0001).

**Conclusion:** NAT led to significantly higher margin negative resection rates for resectable clinical stage I pancreatic adenocarcinoma than surgery followed by AT. Pts that underwent NAT also tended to be significantly younger. The majority of pts for both groups were upstaged, suggesting that we continue to clinically understage the majority of these pts. However, significantly fewer pts in the NAT group were upstaged. Overall, total or partial NAT for clinical stage I resectable PA provides an improved margin negative resection rate in this patient population. Further study in the form of a randomized control trial is necessary.
A Physiological Approach to the Diagnosis of Cushing’s Syndrome Useful to Primary Care Providers

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Background: Endogenous hypercortisolism (Cushing’s syndrome; CS) is more common than previously thought and is characterized by increased late-night cortisol and decreased sensitivity to cortisol negative feedback. Historically, the screening tests for endogenous hypercortisolism were measurement of 24 hr urine free cortisol (UFC) and the low dose dexamethasone suppression test. UFC is too insensitive as a first-line approach for CS diagnosis. Late-night (11PM) salivary cortisol (LNSC) which is in equilibrium with bioactive serum free cortisol, is useful in the diagnosis of CS (Raff et al. J Clin Endo Metab 83:2681-2686, 1998). Patients sample their saliva at home and mail their samples to the laboratory. The standard analytic method for LNSC uses an FDA-cleared enzyme immunoassay (EIA). The salivary gland expresses 11β-HSD which converts >70% of the salivary cortisol to cortisone, making the measurement of salivary cortisone by liquid chromatography-tandem mass spectrometry (LC-MS/MS) of potential diagnostic use.

Purpose: The purpose of this study was to develop and validate an LC-MS/MS method for the measurement of cortisol and cortisone and to evaluate its usefulness compared to EIA in the diagnosis of CS. We also evaluated whether sampling at the normal bedtime is superior to a forced sampling at 11PM.

Methods: Salivary cortisol (EIA) and cortisol/cortisone (LC-MS/MS) concentrations were measured in 53 normal adults at normal bedtime (8-11PM) and in 714 patients with suspected CS.

Results: The upper limit of the normal bedtime LNSC (EIA) reference range was <2.3 nmol/L which is significantly lower than forced sampling at 11PM (<4.3 nmol/L; N=73). This demonstrates lower stress levels at the normal bedtime, thereby improving the diagnostic accuracy of the LNSC test for CS. Out of 714 patients suspected of CS who were screened with LNSC, we identified 47 (6.6%) with CS. Measuring salivary cortisone did not improve diagnostic sensitivity compared to measuring LNSC by EIA.

Conclusion: Since endogenous Cushing’s syndrome is much more common than previously thought, LNSC measured with a simple, widely available EIA is an important clinical tool readily accessible to primary care providers.

National Trends in Delirium Rates of Hospitalized Older Adults With Heart Failure (HF) in the United States (1998-2014)

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Background: Delirium is common (17-38%) in hospitalized older adults with HF. Improved care in the field of cardiology, along with a decline in HF hospitalizations, may result in a reduction of delirium associated with HF. However, delirium is often under-recognized, so the recent national efforts to improve delirium recognition may result in an increase in delirium diagnosis.

Purpose: We aim to compare the trends in delirium rates over a period of 16 years in patients admitted with a primary diagnosis of heart failure and to determine their associated factors.

Methods: The Healthcare Cost and Utilization Project’s National Inpatient Sample (NIS) database was used to identify older adults ≥ 65 years of age with a diagnosis of HF and Delirium from 1998-2014. The NIS is a representative sample of 20% of the national hospitalizations. ICD-9 diagnostic codes were used to identify delirium and primary diagnosis of HF. The trend in the rates of HF were then compared to patients with and without delirium. Regression models and chi squared tests between groups were used to determine statistical differences.

Results: Out of 1,820,818 patients with a diagnosis of HF, 61% were White, 56% female, 4% hospital mortality, and a mean age of 79. Delirium diagnosis was identified in 28,937 (1.6%) patients. There is a reduction in the proportion of HF admissions that suggested a decline in HF over the study time period (1998 vs 2014; P<0.001). In addition, although not as drastic, there is a drop in HF admission with a delirium diagnosis (1998 vs 2014; P<0.001). Patients with delirium, when compared with those without delirium, had a longer length of stay (7 days vs 5 days; P<0.001), higher mortality (13% vs 5%; P<0.001), and were more likely to be discharged to a nursing home (34% vs 20%; P<0.001). Delirium diagnosis was more common in Whites (64% vs 36%; P<0.001) and less likely in females (47% vs 53%; P<0.001). Variables associated with delirium in logistic regression analysis included: male sex, white race, age, length of stay, dementia diagnosis, admission to a teaching hospital, elective admission, and Charles Deyo Comorbidity score (AUC=0.64).

Conclusion: Overall, primary HF alone illustrated a substantial decrease over the 16-year time period. However, the rate of delirium in older patients with primary HF was not only much lower than expected but remained stable in the same time period. Most importantly, those with delirium had higher inpatient mortality and length of stay as compared to those who did not have delirium.
The Association Between Residential Greenspace and Stroke

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Background: An increasingly recognized social determinant of mental and physical health is residential greenspace. Greenspace is defined as areas covered with trees, grass or other vegetation, and includes forests, parks, gardens, and street-side landscaping. Compelling data links increased greenspace to a decrease in hospitalization for stroke, stroke mortality, and stroke severity. While clearly linked to stroke outcome, greenspace as a risk factor for stroke has not been previously reported. Also, as socioeconomic status decreases, stroke incidence increases.

Purpose: To determine if residential greenspace and neighborhood deprivation effect the odds of stroke, independent of the more traditional stroke risk factors.

Methods: This is a 1:4 matched case-control study of adults 18 or older admitted to ASLMC in 2016-2018. Cases included patients with ischemic stroke, TIA, subarachnoid hemorrhage, and intracerebral hemorrhage. Matching variables included gender, 5-year age group, admission month and year, race, hypertension, diabetes, smoking, and BMI. Greenspace is measured using the Normalized Difference in Vegetation Index (NDVI). Socioeconomic status is measured using the Area Deprivation Index (ADI).

Results: Data from 5870 patients were analyzed including 1174 stroke cases and 4696 non stroke controls. We found that as NDVI increases, the odds of stroke decreases (OR 0.33, 95% CI 0.111-0.975, p = 0.045). NDVI values were then grouped into quartiles. We found that odds of stroke were 19% lower for patients living in the highest NDVI quartile compared to those patients living in the lowest NDVI quartile (OR 0.81, 95% CI 0.672-0.984, p=0.034). Also, patients living in the highest quartile of state ADI deciles or most disadvantaged neighborhood had 28% higher odds of stroke compared to those living in the lowest or least disadvantaged neighborhoods (OR 1.28, 95% CI 1.02-1.6, p=0.029). Greenspace is not a proxy for socioeconomic status.

Conclusion: Patients living in homes with greater surrounding residential greenspace have a significantly lower odds of stroke. This effect of greenspace on stroke risk is independent of the traditional stroke risk factors on which we matched. We also found that patients living in the most disadvantaged state ADI quartile have a significantly higher odds of stroke compared to those living in the least disadvantaged quartile. Urban greenspace reclamation and rejuvenation may be an effective intervention to improve health outcomes.
Machine Learning Models for Distinguishing Hypertrophic Cardiomyopathy From Amyloidosis Using Body Surface ECGs

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Background: The echocardiogram is the current gold standard for diagnosing Hypertrophic Cardiomyopathy (HCM) and Amyloidosis. The equipment and medical expertise required to perform this procedure and interpret results can be costly and relatively scarce in some healthcare systems. The 12-lead electrocardiogram (ECG) is a widely available, lower-cost tool to establish baseline cardiac function. If demonstrated to be an accurate method for diagnosing HCM and Amyloidosis, there is potential to expand the diagnostic capabilities of the ECG for these diseases.

Purpose: In this study, we aim to demonstrate the viability of using Machine Learning models to diagnose patients with HCM and/or Amyloidosis from 12-lead ECG data by assigning them to one of two disease groups.

Methods: We analyzed ECG parameters that were extracted from raw ECG data by the MUSE database. We selected 19 patients who had undergone previous echocardiograms: ten HCM patients contributed 116 ECG scans, and nine Amyloidosis patients contributed 181 ECG scans. Seventy-eight ECG parameters were analyzed from each 12-lead ECG trace, for a total of nearly 300,000 data elements analyzed in this study. The dataset was split into two parts: 75% of the data was used to train the models, and the remaining 25% was used to validate results. Several different Machine Learning models were evaluated, including Neural Networks, Support Vector Machines, and Random Forests. Model performance was measured in terms of accuracy, sensitivity, and specificity.

Results: The results from our analysis demonstrate that Machine Learning models can distinguish HCM from Amyloidosis using 12-lead ECG data. Random Forests appear to be the most appropriate model (accuracy up to 99.80%), while the Neural Network model is the least accurate (96.43%). All models have sensitivity and specificity values greater than 0.96.

Conclusion: HCM can be distinguished from Amyloidosis by Machine Learning models using 12-lead ECG data. Machine Learning has the potential to automate and reduce the cost of diagnosing these cardiac diseases in more healthcare systems. Future work will use this approach to determine if HCM can be distinguished from structurally normal hearts and/or other cardiac diseases.
**Gynecologic Cancer Patients’ Interests in Music Therapy**

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**Background:** Music therapy has been used as complementary therapy in oncology patients undergoing chemotherapy for decades. Several studies have suggested potential benefits associated with music therapy use, including alleviation of mood symptoms such as anxiety, as well as other common chemotherapy side effects like nausea and vomiting. Although case reports have reported music therapy use among women with gynecologic cancers, no formal studies have been conducted.

**Purpose:** Our study aimed to evaluate patients’ thoughts on music therapy as an adjunct to chemotherapy and to evaluate patients’ use of music therapy in comparison to other media types.

**Methods:** We conducted a feasibility study that prospectively surveyed adult women undergoing chemotherapy for a gynecologic cancer (e.g., endometrial cancer, ovarian cancer, cervical cancer, etc.) within one hospital center from 6/2018 to 7/2019. Women were asked demographic and preliminary questions prior to being provided preselected music on an audio listening device. Following their chemotherapy session, women were asked to complete a survey remarking on their thoughts about music therapy and use of other media. Basic descriptive statistics were conducted.

**Results:** Overall, 20 women completed surveys, of which 50% were 30-59 years of age, with the remainder greater than 60 years of age. Women were predominately Caucasian (75%) and had either ovarian (50%) or endometrial (45%) cancer. Overall, 80% of women chose to listen to the music provided instead of their own music. Most women (35%) listened to music for 30-39 minutes during their chemotherapy session. Choice of music genre varied greatly between women. Ultimately, 70% of women participated in another activity in addition to listening to music, with 85% choosing to switch to another activity entirely at some point during their chemotherapy session. The most common activities engaged in besides music therapy included talking to family and friends (65%), social media (30%), reading (25%), and sleeping (25%). Women found music therapy to be very helpful, relaxing, and a good time filler.

**Conclusion:** Although many women listened to music during their chemotherapy, most also engaged in another activity, sometimes switching completely to that other activity. Based on our findings and the difficulties of even surveying patients, participation in a larger study aimed at evaluating the effects of music therapy on chemotherapy in women with gynecologic cancers may be quite difficult.

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**Dancing During labor: Are Women Down to Boogie?**

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**Background:** Recent social media trends have demonstrated an increased interest in dancing during the final weeks of pregnancy and in the first stage of labor. Aerobic exercise during pregnancy, like low-impact dancing, is likely beneficial. However, few studies have evaluated the effects of exercise or movement, specifically low-impact dance, during the first stage of labor, particularly for pain management and impact on labor duration.

**Purpose:** As enrollment is often a challenge when conducting prospective studies, we conducted a feasibility study to gauge the willingness of pregnant patients to participate in a future study that would involve low-impact dance during labor.

**Methods:** During June-July 2019, we anonymously surveyed a convenience sample of English speaking/reading pregnant women who were receiving prenatal care at one of three clinics. The survey included up to 23 questions related to demographics, current activity level, pregnancy history, and interest in future participation. Basic descriptive statistics were conducted.

**Results:** Overall, 132 of the 177 women approached completed the survey (74.6% completion rate). Of those that completed the survey 43.9% (N=58) of participants had heard of dancing during labor and 88.6% (N=117) indicated that they would hypothetically participate in a future study on low-impact dance. Regardless of demographic characteristics, current activity level, and pregnancy history, there was a high rate of interest in future participation. Reasons for not parting included health problems (N=2; 13.3%), wanting to focus on the birthing experience (N=6; 40.0%), unknown expectations (N=5; 33.3%), and other (N=2; 13.3%). Additionally, 47.9% and 34.2% of interested women preferred that dance moves or music were provided, respectively. Unsurprisingly, over 70% wanted either a video clip or photo of themselves dancing.

**Conclusion:** As 88.6% of pregnant women who completed the survey indicated that they would be interested in participating in a future study on low-impact dance during labor, enrollment may be less problematic than previously expected. Such a study is warranted to identify alternative non-pharmacologic methods for pain management in labor.
Impact on Patient Outcomes of Creating a Robotic Complex Pancreatic Surgery Training Program

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Background: The utilization of minimally invasive techniques for complex oncology and pancreatic surgery is increasing. Evaluating the impact on patients of starting a program is critical in understanding how to create sustainability in training for complex robotic oncologic surgery.

Purpose: Determine the impact of prolonged console/opening room time of complex robotic surgery on patient outcomes.

Methods: This is a retrospective review of robotic vs open pancreatic cases performed at a quaternary community cancer teaching hospital from 2017-2019. Operative indications, final pathologic diagnosis, operative time, console time, conversions, complications, 30/90 day outcomes, hospital/LOS were evaluated.

Results: A total of 53 robotic pancreatic cases were attempted compared to 43 open cases. 31 Robotic pancreaticoduodenectomy (RPD) were 39% were completed; 55% were converted (RPD-C), 6% were aborted for metastasis. For RPD, console time (CT) was 397 minutes vs. 181 for RPD-C (p<0.01). Average total operating room time (TORT) for RPD was 433 minutes vs. 347 for RPD-C (p<0.01). Pathology was pancreatic or biliary carcinoma in 66% for RPD vs. 59% for RPD-C. Reasons for conversion were major vascular adhesions (53%), aberrant arterial anatomy (24%) and PV bleeding/resection/repair (12%). For robotic distal pancreatectomy (RPD), 16 (76%) procedures were completed, 6 (34%) were converted (RPD-C). Average CT was 168 minutes for RDP vs. 106 minutes for RDP-C (p<0.01). Average TORT was 220 minutes vs. 241 minutes (p=0.35). Path for both groups was PNET (47%), IPMN (33%), and benign (20%). Reasons for conversion were bleeding (3), adhesions (2). There was no significant difference in margin status, lymph node harvest, complications, hospital LOS, or ICU LOS for completed robotic cases vs. converted robotic cases vs. open cases.

Conclusion: Attempting most complex pancreatic surgery cases with a minimally invasive robotic approach did not alter or negatively impact patient outcomes. Adopting a robot approach as an attending or trainee is safe even if the need to convert to open surgery arises.

Humans of Family Medicine

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Presented by: Anna Karst, DO

Background: Primary care providers in Milwaukee are surrounded by a diverse community, often hearing stories of overcoming adversity. Celebrating patients’ and staffs’ successes are part of what makes medicine so rewarding. The concept of Humans of Family Medicine (HFM) stems from the Instagram account Humans of New York, which highlights the stories of everyday people in NYC.

Purpose: The purpose of our study was to highlight and share unique patient and staff stories in hopes of bringing a humanitarian side to the practice of family medicine.

Methods: We conducted a quality improvement project at two family medicine clinics within Milwaukee County during 2019. The project was approved by our local IRB. Consent was obtained from patients and staff who agreed to have their story told. The stories were written and then vetted by our social media team, before being published on institutional social media accounts. Family medicine providers and staff were surveyed before and after the project to gauge use of social media and thoughts on the project. Pre/post-survey responses were compared with Fisher Exact Tests. P<0.05 was considered significant.

Results: A total of 25 individuals were asked if they would like to participate and share their story; 1 declined. Overall, 24 stories were written; 18 have been published (3 on Facebook (FB) alone, 0 on Instagram (IG) alone, and 15 on both platforms). Of the 24 stories, 12 were current patients, 10 were staff members, and 2 were resident physicians. Mean FB likes were 485 (range 75-1155) and mean IG were 96 (range 45-490). Mean FB comments were 33 (range 3-173) and mean IG were 5 (range 0-56). Family medicine providers and staff (N=23 pre-survey; N=28 post-survey) were significantly more likely to follow our institution on Facebook following project implementation (P=0.005). Additionally, family medicine providers and staff were significantly more likely to think it was a good idea to showcase patient and staff stories on social media following the project (P<0.001). Those surveyed initially were unsure of whether their patients would like their stories showcased (36% yes would like). However, 82% thought patients would like being showcased on social media following the project (P=0.001).

Conclusion: HFM creates a platform to share stories about the people we serve and is something our staff and providers think is a good idea. It is possible that showcasing these stories may bring a more humanitarian side to the practice of family medicine.
Hot Spinning Medically Complex Socially At-Risk Patients Accomplishes the Quadruple Aim

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Background: The goal of the quadruple aim for health care is to 1) improve patients’ experiences, 2) address social determinants of health (SDOH), 3) reduce health care costs, and 4) prioritize the well-being of care team members. Hot spotting or collaborating with other health care professionals to create a care plan to address our most complex patients, may accomplish the quadruple aim.

Purpose: The purpose of this project is to illustrate that hot spotting addresses the ideology behind the quadruple aim.

Methods: Across three clinic sites in 2019, providers recommended patients that would benefit from the hot spotting intervention (pre-intervention period 6/1/18-2/28/19; post-intervention period 3/1/19-12/1/19). Three times per year, interdisciplinary teams at each site completed care plans for each patient. Patients received at least one home visit and increased calls from nursing/social work. SDOH were assessed. Hospitalizations and emergency department (ED) visits were compared. Pre- and post-intervention surveys were conducted by staff and providers involved in hot spotting. Basic descriptive statistics, and Mann-Whitney Test as appropriate, were conducted.

Results: Sixty-four patients were hot spotted. Patients were predominately female (69%), African American (60%), English speaking (89%), and all had Medicare/Medicaid insurance (100%). Patient ages ranged from 2-98 years. Patients lived on average within 3.7 (±2.8) miles to their respective clinics. Addressing the first aim, hot spotting improved the patient experience for 78% of patients who received additional coordination of care as a result of their involvement that differed from the traditional health care model. Evaluation of the SDOH revealed concerns with transportation (39%), food insecurity (31%), safe relationships (34%), financial safety (45%), and safe housing (36%) allowing us to better address these needs during home visits and accomplish the second aim. Moreover, for a third year, although not statistically significant, ED visits decreased among hot spots (13.1% decrease), implying cost savings. Overall, prior to and following the hot spotting intervention, a majority of survey respondents felt that they were able to provide better care to their patients because of the intervention.

Conclusion: Hot spotting accomplishes the quadruple aim by 1) demonstrating improved patient experiences, 2) addressing underlying SDOH, and 3) reducing health care costs, while 4) showing an overwhelmingly positive care team response to the intervention.

Novel 3D Mapping System Reduced Procedure and Fluoroscopy Time for Persistent Atrial Fibrillation Ablation?

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Background: Navik 3D is a novel mapping system that can locate radiopaque objects in 3 dimensions. Pulmonary vein isolation (PVI), roof line, and posterior wall debunking can be performed using radiofrequency (RF) guided by electroanatomic mapping (EAM) or cryoballoon guided by Navik 3D, or both. We compared these approaches during consecutive complex ablations for persistent atrial fibrillation (AF).

Purpose: We compared procedure time and radiation dose approaches during consecutive complex ablations for persistent atrial fibrillation (AF).

Methods: PVI with cryoballoon ablation was performed in 57 patients. Additional lesions (posterior wall, roofline, or mitral isthmus) were guided by Navik 3D (n=16), EAM (n=15) or both Navik 3D/EAM (n=26), using cryoballoon (n=18), RF (n=15) or both (n=24).

Results: Procedure time (minutes), fluoroscopy dose (mgY), and fluoroscopy time (minutes) with EMS vs EMS with Navik 3D vs Navik respectively are: [249 (211,266)], [821 (349, 1428)], [51.6 (34.1, 70)] vs [220 (182, 262)], [862.5 (576, 1219)], [51.2 (44.4, 59.3)] vs [156.5 (146.5, 182)], [277 (180.5, 349.5)], [33.7 (26.1, 38.4)]. p value <0.01.

Conclusion: Navik 3D resulted in lower procedure time and radiation dose when used for complex ablations in persistent AF.
**Correlation of Occurrence of Legionella pneumophila and Blastomycosis Cases Within Zip Codes: Eastern Wisconsin**

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**Background:** Legionella pneumophila (intracellular bacteria) pneumonia (LpP) and blastomycosis (dimorphic fungi, Blastomyces) are potentially serious environmentally acquired infections which are both prevalent in Wisconsin. There is good evidence that blastomycosis is associated with waterways, and preliminary evidence that some LpP may be as well. If the acquisition of both diseases is similarly associated with a geographic feature, one might expect similar geographic distributions of case addresses.

**Purpose:** To perform a preliminary exploratory analysis of the correlation of the distribution of LpP and blastomycosis cases among ZIP codes in Eastern Wisconsin.

**Methods:** Secondary data analyses of two Eastern Wisconsin ACL laboratories registries from overlapping 5-year time periods: positive Legionella pneumophila urine antigen (LUAT) tests (fits CDC criteria for diagnosis) 2013-2017, and laboratory-confirmed blastomycosis cases 2015-2019. Number of respective cases, by ZIP code, were compared for ZIP codes 530xx-532xx and 534xx containing 5 or more LUAT results. One ZIP code outlier was eliminated. Incidence figures for each disease were calculated from our previously published analysis data. Pearson correlation was calculated, and linear regression was performed with LpP case distribution as outcome variable, blastomycosis distribution as predictor.

**Results:** Yearly predicted LpP and blastomycosis cases in the Aurora Wisconsin catchment area were 27 and 24, respectively, such that an approximately 1:1 distribution was assumed. Pearson correlation of distribution of LpP and blastomycosis cases by ZIP code was moderate at 0.541 (p<0.001). Of 136 ZIPs from 11 counties studied, 61 had no LpP or blastomycosis cases, 35 both types of cases, 24 only LpP cases, 16 only blastomycosis cases. Blastomycosis case distribution was a significant predictor of LpP cases in a linear regression model (p<0.001) with equation LpP cases by ZIP = 0.419 + 0.636(number of blastomycosis cases); R-squared (adj) = 28.7%.

**Conclusion:** This preliminary, modest correlation of the ZIP code distribution of LpP and blastomycosis is intriguing given known association of LpP with human built water sources. It may suggest an undescribed common outdoor environmental source. Further study of LpP and blastomycosis co-associations with waterways, and other potential common sources (or common environmental hosts such as Acanthamoeba in which both can propagate) seems warranted.

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**Comparison of Doppler Indices in Patients With Umbilical Vein Varix to Standard Doppler Indices**

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**Background:** Umbilical vein varices (UVV), a focal dilation of the umbilical vein within the fetal abdomen, is rare but may potentially cause fetal death due to rupture of the vein or thrombosis secondary to turbulence. Due to its rarity, there is little consensus on antenatal management, which may include serial sonographic imaging and Dopplers. To date, no study has reviewed antenatal management of UVV with Doppler interrogation and respective fetal outcomes.

**Purpose:** We sought to describe antenatal management in patients with UVV.

**Methods:** We retrospectively reviewed singleton pregnancies with UVV from 1/1/2012 to 6/1/2019 in a large integrated medical system. Of those with Doppler studies, we compared middle cerebral artery (MCA) and umbilical artery (UA) values to the 50th percentile of standard indices. Of those with ductus venosus Doppler studies, we noted if they were normal or abnormal. We also reviewed BPP scores, fetal abnormalities, mode of delivery, maternal comorbidities, neonatal intensive care unit (NICU) admission, and APGARs. Basic descriptive statistics were conducted.

**Results:** Overall, 84 women were identified with UVV at an average gestational age of 32 weeks. Notably, 41% were identified as ever smokers. Of the fetuses, 13% had intrauterine growth restriction, 6% tricuspid regurgitation, and 31% anatomic abnormalities. All patients had at least one BPP and none were abnormal. Twelve patients never had a Doppler completed; 62% (N=52) had an abnormal Doppler value with the MCA Doppler differing most from standard indices. Two patients had an abnormal DV value, but only 29 had DV completed. The average gestational age at time of delivery was 37 weeks and the cesarean section rate was 26% (N=21) with a minority due to non-reassuring fetal status (29%; N=6). For the neonates, 31% (N=26) were admitted to the NICU for monitoring; majority (N=14) due to respiratory issues. Of clinical relevance, only one had a 5-minute APGAR score <5 and there were no fetal deaths.

**Conclusion:** Antenatal management is variable. Doppler abnormalities are common in pregnancies affected by UVV. Even so, no patient had an abnormal BPP and few required interventions such as indicated cesarean section due to poor fetal status. Given that the current testing strategy with BPP and Doppler studies was not effective for altering management or outcomes, further study is needed to elucidate a more appropriate surveillance methodology.
**Identifying the Value of Graduate Medical Education to a Health Care System**

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*Presented by: Jacob Bidwell, MD*

**Background:** Our newly merged health care system sponsors over 650 residents and fellows in our accredited programs. Sponsoring graduate medical education (GME) programs requires a significant financial and human investment from multiple parts of the organization – ranging from the executive leadership/board, C-Suite and hospital leaders to leaders responsible for human resource, legal, finance, quality, and safety.

**Purpose:** To identify what system leaders perceived to be GME’s value to our health care system.

**Methods:** Our GME leadership team developed a few brief questions seeking to have interviews <20 minutes: (1) When you need to advocate for the value of our GME programs, what do you highlight? and (2) What do you wish others would value about our GME Programs? Three authors were assigned to contact a key system leader through e-mail, phone call, F2F. Project purpose was explained (eg, interested in their perceptions re: the value of GME to our organization) and asked if they would be willing to meet with us. A field notes worksheet was created for interviewers to note key findings. Respondent's leadership role (eg, Exec Leadership team, C-Suite, hospital president/CMO, finance/legal) along with their responses to each question. Responses were then coded and categorized using standard qualitative methodology to identify cross-cutting themes.

**Results:** 29/31 (94%) leaders agreed to be interviewed, field notes analyzed. The top 4 areas our system leaders highlighted when advocating for GME, with little/no disagreement by leadership role, were: 1) its value and cost-effectiveness as a pipeline for physician recruitment; 2) GME’s contribution to a culture of continuous learning; (3) the prestige/reputation associated with being an organization that trains future physicians; and (4) the expectations of the community and the profession to train the next cohort of physicians. Typical response was that (Residents create a) “healthy tension in the organization. Organizations are built to just ‘do,’ not to create questions/reflect... It wouldn’t happen without education programs.” All 4 of these areas matched what leaders wished others valued about our GME programs with one area added: the infrastructure needed to support education.

**Conclusion:** Identifying GME’s value beyond a workforce pipeline allows GME leaders to emphasize GME's broader assets to the organization. Next step: engage program directors to metrics for these values and share those findings to further enhance GME’s value to the organization.

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**Evaluation of a New Insulin Infusion Protocol**

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**Background:** Hyperglycemia is common in the inpatient setting in both diabetic and non-diabetic patients and is correlated with negative outcomes. Alternatively, hypoglycemia carries its own risks. The American Diabetes Association (ADA) currently recommends starting insulin for persistent hyperglycemia in hospitalized patients with a target blood glucose (BG) range of 140-180 mg/dL in most patients or a tighter goal of 110-140 mg/dL, as appropriate, for selected patients (e.g. cardiovascular surgery patients). In accordance with these recommendations, Advocate Aurora Health (AAH) has implemented two new insulin infusion protocols. The Endo IP protocol is for patients targeting a goal BG of 140-180 mg/dL and the CV surgery (CVS) protocol is for cardiovascular surgery patients with a goal BG of 110-150 mg/dL.

**Purpose:** A validated IV insulin infusion protocol that optimizes patient time in the ADA recommended goal BG ranges while avoiding hyper- and hypoglycemia is vital. Glucometrics is the systematic analysis of inpatient BG data and a useful tool for protocol validation. The purpose of this study was to evaluate the safety and efficacy of these two new insulin infusion protocols and develop a glucometrics data report to allow continual assessment of the protocols.

**Methods:** A retrospective review was performed for the first 4 months after protocol launch on all patients started on one of the new insulin protocols within AAH. Data collected included all point of care (POC) BG values while receiving an insulin infusion, protocol used, hospital, and hospital unit. The primary safety endpoint chosen was the percent of patient stays experiencing any severe hypoglycemia (BG<54 mg/dL) The primary efficacy endpoints were average BG and percent of BG samples within pre-determined acceptable BG ranges. These endpoints were compiled into an insulin infusion glucometrics report that will be updated monthly.

**Results:** Severe hypoglycemia was rare, occurring in 2.0% and 2.8% with average blood glucose values of 185 and 135 mg/dL for the Endo IP and CV protocols respectively. The CV protocol was able to keep patients in a clinically acceptable range for 92.4% of BG values while the Endo IP protocol kept patients in this range for 73.9% of BG values.

**Conclusion:** Both protocols perform well for minimizing hypoglycemia. Efficacy in the Endo IP protocol was identified as a target for future improvement and results have been presented to the endocrine group at AAH with modifications being piloted in select inpatient units.
Radiation Exposure, Reduction Techniques, and Standardization of Swallow Study Evaluations

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Background: Long-term exposure to ionizing radiation from fluoroscopic procedures can lead to deterministic and stochastic effects not only for the patient but for the medical personnel as well. Swallow study evaluations are the most frequent fluoroscopic procedures performed and often require a speech pathologist, fluoroscopy technician, and radiology resident to be present in the room during the study. While C-arm radiography machines calculate the estimated absorbed radiation dose to the patient, cumulative radiation exposure badge data and baselines for medical personnel are difficult to interpret, track, and maintain.

Purpose: Establishing a fluoroscopic radiation exposure baseline in radiology residents may help in estimating other medical personnel exposure and monitoring future reduction techniques.

Methods: For the baseline radiation exposure analysis, fluoroscopic study data was retrospectively collected. Powerscribe is a radiology dictation software where study reports are organized, and we sorted each resident's studies into a database. Swallow study absorbed dose, which is ionizing radiation absorbed per unit mass measured in Grays (Gy), is recorded with respect to the patient's dosing. This amount was used to estimate the radiology resident's radiation exposure utilizing an intensity calculated based off a distance of 2.5 m. Radiation exposure data was analyzed per individual residents in the current PGY3 class. Future methods include implementing reduction techniques and analyzing radiation exposure data in the current PGY2 class.

Results: Patient radiation exposure data per swallow study evaluation averaged 1.9 minutes (median 1.8, range 0.3 - 4.3), where the average radiation exposure was 7.9 mGy (median 7.2, range 1.5 - 24.3). Residents performed approximately 5 swallow studies/day, or 100 swallow studies/4-week rotation. By utilizing an intensity calculation of Intensity = 1/distance^2, estimated resident radiation exposure data over 8 weeks (2 x 4-week rotations) was 367.7 minutes (6.1 hours) and 23.9 mGy.

Conclusion: In residents, exposed areas of skin receive ionizing radiation dose equivalent of 3 CT scan per 4-week fluoroscopy rotation. Eye lenses have a deterministic threshold of 2-6 Gy. Residents absorb over 10% of the lower end of this threshold during their first year of radiology training. Speech pathologists and fluoroscopy technicians without protective equipment could be at similar risk levels.

Retrospective Review of Pulmonary Hypertension Medication Transitions Within a Large Health Care System

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Background: There is currently a wide variety of available medications for the treatment of pulmonary arterial hypertension (PAH), such as prostacyclin analogs. Due to significant nuances between medications even within a certain medication class, such as route of administration, side effect profile, and patient tolerability, there is the need for medication transitions when managing these patients. Medication transitions are done for a variety of reasons, including to minimize adverse drug reactions, optimize disease management, change route of administration and improve quality of life. However, transitioning between prostacyclin analogs is not a benign process, and comes with inherent risks such as prostacyclin excess, insufficiency, and patient decompensation. The inherent need for medication transitions and paucity of available primary literature drives the impetus for development and evaluation of proprietary transition protocols. From 2016 to 2019, our center has facilitated the transition of 126 patients between different PAH medications.

Purpose: To assess the efficacy and safety of current PAH medication transition practices and protocols at our institution.

Methods: Eligible participants are adults (age >18 years) transitioned between different PAH agents between January 2016 and December 2019. Transition protocols reviewed included at least seven patients. A total of 73 patients and seven different transition protocols were included. All the patients included were transitioned to and from a prostacyclin or prostacyclin analog. Data evaluated included baseline demographics, baseline and post-transition hemodynamics, acute transition safety and efficacy, and six-month safety. Transition success was defined as a transition to new medication without worsening of disease or new intolerable side effects at the first follow-up within 30 days, no increased escalation of care required acutely or death.

Results: A total of 73 patients underwent medication transitions with 69 successful transitions (94.5%). The 4 complications included 2 (2.7%) needing increased escalation of care, 1 (1.9%) intolerable side effect requiring discontinuation and 1 (1.9%) death during the transition admission unrelated to medication transition.

Conclusion: Transitions of PAH medications appears safe and efficacious when following our institutional guideline protocols. Patients may require acute adjustments to transition protocol based on side effects, prostacyclin insufficiency, and patient reason for transition.
Improving Timeliness of Early Hospital Discharges: A Quality Improvement Project

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Background: Delayed hospital discharges create bottlenecks in health care systems, increase health care costs, backlog emergency departments, and leave hospitalized patients susceptible to infections and emotional distress. Several studies have identified barriers to and interventions for discharge timeliness in order to decrease the impact of delayed patient discharges.

Purpose: Our quality improvement project aimed to explore and identify barriers to early discharge for patients within one hospital teaching service.

Methods: From 8/2019-11/2019, semi-structured interviews with family medicine faculty, residents, and hospital nurses were performed and recorded to further explore barriers and opportunities to early (before noon) discharges within one tertiary academic hospital in urban Milwaukee, WI. Transcribed interviews were further reviewed using qualitative software Dedoose 8.3.17 for thematic inductive analysis. Additionally, an online survey for residents was distributed and basic descriptive statistics were calculated to summarize survey responses.

Results: Through qualitative analyses, four themes were identified. Overarching themes included (1) barriers to early discharges (e.g. sub-optimal communication [components cited 87 times during interviews], safety concerns [cited 4 times], language/transportation barriers [cited 60 times], specialty clearance [cited 20 times]), (2) suggestions for improvement (e.g. EHR tools, examples of good communication, clear expectations, waiting lounge, process standardization), (3) discharge planning process (e.g. timely medicine reconciliation and patient discharge expectations [cited 15 times]), and (4) system implications of discharge by noon (e.g. workflow improvement, communication improvement).

Conclusion: Our findings highlighted the need for standardization of discharge workflow and as potentially modifiable early discharge barriers. Results from this study will be used to implement interventions and educate providers on ways to optimize early hospital discharges.

Treatment Strategies in Patients with Stable Obstructive Coronary Artery Disease and Severe Aortic Valve Stenosis who Underwent TAVR

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Background: Obstructive coronary artery disease (OCAD) is frequently found in the work up of severe aortic valve stenosis (AS), and bypass is routinely performed during surgical aortic valve replacement. Clinical equipoise remains for OCAD management prior to transcatheter aortic valve replacement (TAVR).

Purpose: Primary and secondary endpoints included acute coronary syndrome, revascularization, re-hospitalization, and all-cause death at 30 days and 1-year post-TAVR.

Methods: Single-center retrospective review of OCAD management in patients undergoing TAVR from November 2012 until January 2019. Native OCAD was defined as ≥70% stenosis in ≥ one major coronary artery or branch vessel ≥ 2.5 mm diameter, and > 50% stenosis in the left main coronary artery (LM).

Results: A total of 1285 patients were included in the analysis: 95% Caucasian, 53% female, mean age 81 years, mean BMI 29 kg/m². Total 216 patients (16.8%) had newly diagnosed native OCAD; of these, 102 (47%) underwent percutaneous intervention (PCI) and 114 (53%) treated with optimal medical therapy (OMT). Mean left ventricular ejection fraction was similar in both groups (57% vs 59% in PCI and OMT, respectively), and diabetes was present in 35% vs 29%, respectively. Self-expanding TAVR was predominantly utilized in both groups (92% PCI vs 95% OMT). OCAD distribution was similar in both groups with the exception of LM involvement (LM-PCI 10% vs LM-OMT 5%, LAD-PCI 52% vs LAD-OMT 57%, RCA-PCI 58% vs RCA-OMT 50%, LCX-PCI 31% vs LCX-OMT 36%). Syntax score was calculated on both PCI and OMT groups (high 7% vs 3.5%, intermediate 9% vs 8%, low 84% vs 88%, respectively). Physiology-guided PCI was performed in 11 patients (5%). At 30 days and 1 year there was no significant difference in composite outcomes between both groups. In a multivariate model, the independent predictors of the composite outcome at 1 year were BMI and STS risk score classification. PCI was not a significant predictor of outcome at any time point.

Conclusion: This single-center registry of patients who underwent predominantly angiography-guided PCI followed by self-expansible TAVR for treatment of combined severe AS and native OCAD showed no short- or mid-term benefit over OMT-TAVR alone.
Group Visits in Chronic Disease Management

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Background: Chronic disease management encompasses most of a primary care provider's practice. However, brief office visits often pose a challenge to provide comprehensive patient education for their chronic conditions. One modality thought to improve management of chronic diseases is the group medical visit model. Even so, despite proven benefits for patients and medical providers, creating a sustainable chronic disease group is challenging.

Purpose: To identify the benefits and challenges of developing and maintaining a group visit model in academic primary care clinics, in urban underserved settings.

Methods: Semi-structured interviews (N=9) were performed and recorded from 10/2018 through 3/2019 with team members who had previously led or participated in group sessions for chronic disease management at two academic primary care clinics in Milwaukee, WI. Interviews were reviewed by two different investigators who independently coded transcriptions using inductive methods using qualitative software (Dedoose v.8.3.17). Codes generated independently were then integrated into a single codebook by a third investigator.

Results: Three major themes were identified from the interviews: [1] Expected and actual benefits (e.g., overall patient and provider satisfaction [56% of interviewees identified], patient empowerment [67%], more time with patients [34%]); [2] Expected and actual challenges (e.g., recruitment [78%], retention [100%], scheduling of providers [45%], language barriers [23%], poor health literacy [34%]); [3] Advice for providers conducting future group visits (e.g., establishing a consistent leader to champion the group visit [23%], develop well an organized curriculum [56%], understand reimbursement [23%]).

Conclusion: Group medical visits have several inherent barriers especially around recruitment and retention. Even so, interviewees identified that group medical visits are beneficial to both patients and providers. Given the identified potential patient benefits such as patient empowerment and improved health literacy, findings from our qualitative study will be used to identify resources to promote group visit success.

Blood Lead Screening Rates in Children Aged 12-35 Months Within a Milwaukee Family Medicine Residency Clinic

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Background: There is no safe level of lead in the body. Elevated blood lead levels primarily affect the development of the central nervous system. Blood lead levels are highest between the ages of 18-36 months secondary to an increase in mobility and hand to mouth behavior. Children in the city of Milwaukee are recommended to be screened for lead levels at 12, 18, and 24 months, followed by annual screening through the age of five. Yet, the city of Milwaukee continues to have a greater proportion of children who test positive for elevated lead levels compared to the national average.

Purpose: To review the rate of lead screening in children aged 12 to 35 months at Aurora Sinai’s Family Care Center (FCC) and to identify risk factors.

Methods: Data was retrospectively collected from Aurora Health Care’s electronic health records and the Wisconsin Lead Registry on children 12 to 35 months who attended FCC for well child exams during 10/01/2018 to 9/30/2019. The screening results were sorted into the age groups of 12-17, 18-23, and 24-35 months, giving us a snapshot of screening rates. Basic descriptive statistics were computed, and Fisher Exact Test was used for categorical analysis.

Results: A total of 383 patients were included for analysis. In all, there was an equal percentage of females and males, 72% were Black, followed by 10% White and 10% Hispanics. Appropriate lead level screening rates of children were as follows: 45% for 12-17 months, 26% for 18-23 months, and 35% for 24-35 months. Overall 62% of children at FCC ages 12-35 months had at least one blood lead test. There was no statistically significant difference in screening based on race as defined by Black vs non-Black (P=0.56). However, there was a statistically significant difference between insurance carriers with Medicaid patients being screened more than those with other types of insurance (P=0.016).

Conclusion: Lead screening rates at FCC were comparable to statewide screening. The higher screening rate for Medicaid patients may likely be due to having additional access to WIC services and recommended point of care lead testing. Implementation of point of care lead testing at FCC may improve overall future screening rates.
Adoption of Macy Catheter by Aurora at Home Hospice Staff: A Quality Improvement Evaluation Study

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Background: The Macy Catheter is a tool to aid rectal delivery of oral medications in micro-enemas. In 2019, Aurora at Home Hospice chose the MC as a preferred route for delivery of medications when patients no longer tolerate the oral route. Despite training, adoption of the MC has been slow.

Purpose: The primary objective of our study is to determine what barriers exist to faster adoption and utilization of the MC by hospice nursing staff. It is anticipated that once the barriers are identified they will be addressed through a campaign of QI projects with subsequent monitoring of adoption.

Methods: An anonymous survey was given to 28 nurses at two meetings. The survey identified nurses that used the MC and their experience. Nurses who had not used it were queried to see if they had no eligible patients or if they had eligible patients what were their reasons for not using it. Demographic data included: age, experience as an RN and hospice RN, usual shift worked, and work status. Basic descriptive statistics were used to describe the population.

Results: Of a total of 28 surveys completed, 7 reflected use of the MC, with most using it only once and one using it 3-5 times. The number of medication doses given ranged from 1 to 10-20. There was an overall agreement regarding the ease of the MC insertion and its effectiveness when compared to the oral route. There were no complications noted. Ten nurses reported to never have used the MC because of not having eligible patients, while 12 reported having eligible patients and not using the MC, although 9 considered it. Common reasons for not using it include patient/family objections, inexperience using the MC, or confidence in other methods. One nurse reported not using it due to a nursing facility policy. Of those who had eligible patients and who did not consider using it reasons given include unfamiliarity and not thinking of it in the ‘heat of the moment.’ There were no demographic differences among these groups that would account for their willingness to use or consider the MC.

Conclusion: The study identified leadership opportunities to increase the use of the MC. Experienced nurses can help train and teach their peers how to ‘sell’ this device to patients, families and other clinicians. There is a need to develop educational collateral to help families understand the utility of the MC. We can work with facilities to make sure their policies align with the latest nursing approaches for excellent hospice care.

Medical Students Add Value in Your Clinical Setting

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Background: First- and second-year medical students (MSs) perceive that they can make meaningful contributions to patient care and/or the health care team’s learning. However, there is limited formal data from more senior MSs re: the value they add to patient care and/or the team during their late 2nd-4th year required clinical rotations.

Purpose: To obtain and codify senior MSs’ perceptions regarding the value they add to patient care and/or the health care team during their required clinical rotations.

Methods: Senior MSs at end of required clinical rotations voluntarily completed an on-line, anonymous 5-item value added to clinical care survey. MSs checked if they added value to one of 5 literature derived categories and then were asked to describe the situation in HIPPA compliant format. Analysis included frequency tabulations by value added category and qualitative analysis of narrative examples by category.

Results: 131 respondents, 80% of whom were within 12-24 months of graduation with 53% women. 67% of valued added contributions occurred in the outpatient setting, 23% inpatient with 10% Other (eg, 50-50 inpt/outpt and ER). 53% of reports focused on Patient’s/Family’s Experience of Their Care (e.g., enhancing patient’s understanding of their clinical situation). For example, “I had a visit (with patient) who had a gynecological concern, but also had recently lost her twin sister. I addressed her chief complaint, but then spent some extra time talking to her about how she is handling her loss and the grief she is experiencing.” 24% focused on added value to clinical quality (e.g., obtaining data/information from the patient that impacted a clinical decision, identifying alternative approaches), 18% on Preceptor/Team Learning, and 3% of students reported patient safety related valued added situations. (e.g., shared a Patient Safety concern/a potential risk).

Conclusion: Identifying the value added by students allows educators to identify assets and potential opportunities (patient safety) to enhance student roles in clinical care. It also provides rich data for educational leaders use with key clinical/community stakeholders regarding how medical student education adds value to patient care and the health care team.
Patient Feedback of Graduate Medical Trainees: Capturing an Elusive Aspect of Professional Development

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**Background:** Business card use by residents has been shown to improve patient experience and is thought to improve the patient-physician relationship. The Accreditation Council for Graduate Medical Education (ACGME) outlines domains of clinical competence that trainees should develop. Patient experience data are particularly important in the domain of interpersonal and communication skills. The ACGME supports the use of patient experience data in resident and fellow feedback; however, mechanisms for this are limited.

**Purpose:** Evaluate the utility of Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) surveys as a feedback mechanism for trainees.

**Methods:** Between fall 2018 and spring 2019 cardiovascular disease (CVD) fellows’ patient encounters were tracked over a two-month period. Six weeks were allowed for HCAHPS surveys to be returned. Business cards were subsequently deployed and encounters similarly tracked.

**Results:** During control-group monitoring, 721 patient encounters were logged and 80 (11.1%) HCAHPS surveys were returned. Qualitative feedback was provided in 41/80 (51.3%). During business card use, 508 patient encounters occurred and 97 (19.1%) HCAHPS surveys were returned. Qualitative feedback was provided in 52/97 (53.6%). No fellow specific feedback was returned in either group.

**Conclusion:** Business card use by trainees increased the rate of HCAHPS survey return by 80% (11.1% to 19.1%) but did not impact feedback to fellows or patient satisfaction. HCAHPS surveys were not useful in providing trainees with feedback. Immediate verbal feedback from patients via ancillary staff was observed. A method of relaying communication from patient to ancillary staff and medical education program is needed.

Younger Hypertensive Patients are More Likely to Have Activated MyChart Accounts

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**Background:** National epidemiological studies note that young adults, those under 39, tend to have less awareness of their hypertension (HTN) diagnosis and are less likely than older adults to have their blood pressure under control. Proposed barriers to hypertension control in young adults include provider reluctance to diagnose hypertension, hesitancy to prescribe antihypertensives, less access to primary medical care, and patient perceptions of their health status. HTN, as a silent disease, has major long-term consequences on cardiovascular health. Identifying HTN patients by age and seeking to control it is an important role for primary care.

**Purpose:** To determine if the percentage of patients with diagnosed uncontrolled HTN who have signed up for MyAurora differs by age (18-49; > 50), and if those MyAurora patients were more likely to have controlled their HTN.

**Methods:** Data was abstracted from EHR records using the BI Launch Pad (the data warehouse for Aurora Quality Improvement) for HTN by age, blood pressure control status and MyAurora account activation. Data was reviewed by each family medicine residency clinic and then aggregated across the two clinics using descriptive statistics.

**Results:** At one residency clinic, 30% of 18-49 year-old adults had (46/156) and at the second, 31% (43/139) of the same aged patients had uncontrolled HTN. Adults aged 50 and older with uncontrolled HTN was 18% (144/816) and 23% (85/364) by clinic. When comparing account activation for MyAurora across our two clinics, we found 49% of patients aged 18-49 with diagnosed HTN have signed up while only 27% of patients age > 50 with diagnosed HTN have activated their accounts. Across our two clinics, across all ages, hypertensive patients signed up for MyAurora were 2.3% more likely to have BP control; however, in the younger adult hypertensive population, patients signed up for MyAurora were 8.1% more likely to have controlled BP compared to their unenrolled peers.

**Conclusion:** Consistent with the literature, the percentage of uncontrolled HTN patients decreases with age in our primary care clinics. Hypertensive patients aged 18-49 were more likely to sign up for MyAurora. Higher MyAurora utilization rates for young adult hypertensive patients points to its potential use as an intervention for improving blood pressure control in this group.
Clinical Predictors of the Need for Pericardial Window or Recurrent Effusion Following Therapeutic Pericardiocentesis

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**Background:** Pericardial effusion is a commonly entity in cardiology practice, often as an incidental finding on echo or computed tomographic imaging. Pericardiocentesis can be performed for diagnostic or therapeutic purposes, the latter for cardiac tamponade, hemodynamically significant effusions with no frank tamponade, or for progressively enlarging effusions. Treatment consists of pericardiocentesis and drain placement.

**Purpose:** Pericardial window is often employed second line if percutaneous drainage fails due to the relatively more invasive nature of the procedure. This usually occurs after the patient has been hospitalized for several days with ongoing, significant volume pericardial drainage. We sought to identify patients more likely to require a second line pericardial window or subsequent pericardial drain following initial percutaneous drainage.

**Methods:** We identified 144 pericardial effusions treated with therapeutic pericardiocentesis at our institution between 2012 and 2018. Chart review was performed to identify the patients’ clinical characteristics including comorbidities often related to pericardial effusion as well as procedural details such as amount of fluid initially removed right when the drain was placed.

**Results:** Baseline characteristics revealed similar frequency of end stage renal disease, active cancer, pericarditis as well as other comorbidities in both groups. Multivariate analysis revealed an inflammatory condition (lupus, rheumatoid arthritis, scleroderma) was associated with a higher likelihood of subsequent pericardial window with an odds ratio of 5.33 (p = 0.03). No other clinical characteristics were associated with pericardial window

**Conclusion:** In this single-center study of patients undergoing therapeutic pericardiocentesis, patients with inflammatory conditions were the only identified group more likely to require a pericardial window following initial pericardiocentesis.

Oncology Precision Medicine for Hepatobiliary and Pancreatic Cancer: Insights and Updates From a Large Community Health System

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**Background:** Oncology precision medicine (OPM) continues to grow exponentially. Hepatobiliary cancers - hepatocellular carcinoma (HCC), intra or extrahepatic cholangiocarcinoma (I/EC), and gallbladder carcinoma (GB) - and pancreatic adenocarcinoma (PC) do have actionable alterations (AA). The importance of testing early in a patient’s (pts) course to identify oncology precision medicine (OPM) options could be paramount for progression free survival (PFS).

**Purpose:** The purpose of this study was to analyze our rates of actionable mutations in HCC, I/EC, GB and PC and evaluate the timing of precision medicine testing within this subset of pts treatment course.

**Methods:** We identified pts with HCC, IC, EC, GB or PC in our OPM database since the centralization of our system. Pts who underwent molecular panel testing had AA’s identified and stratified by cancer type. Treatment course for BRAF mutated pts was analyzed using swimmer plots.

**Results:** 456 pts were diagnosed with HCC, IC, EC, GB or PC. 104/456 pts (23%) were ordered for molecular testing (Figure 1) and 88/456 pts (19.3%) completed testing: 18/88 (20.4%) I/EC, 2/88 (2.3%) HCC, 5/88 (5.7%) GB, and 63/88 (71.6%) PC. 3/63 (4.8%) PC pts had a BRCA mutation. These pts did not receive targeted therapy. Overall, 5/88 pts (5.7%) had a BRAF mutation (2 PC, 2 I/EC, 1 GB). Thus, 8/88 (9.1%) of tested pts became eligible for targeted therapy over their treatment course (Table 1). Of those with a BRAF mutation, only 2/5 pts had OPM testing sent with initial diagnostic workup, and 2/5 eventually began targeted therapy. One had a progression free survival (PFS) of 2.5months while the other discontinued secondary to toxicity.

**Conclusion:** Our data showed that we are testing a minority of pts with pancreas and hepatobiliary cancers. Of those tested, it may have occurred too late in the course of illness to improve outcomes. Given the potential utility of uncovering potential germline alterations like BRCA1/2 as well as pragmatic AAs including somatic BRCA and BRAF, we are moving to a more systematic evaluation of pts to capture and respond to these issues.
Quality Improvement Project to Increase Breast Cancer Screening in Aurora Sinai Internal Medicine Clinic*

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Background: Breast cancer is the most common non-skin cancer among American women accounting for 7% of all cancer deaths each year. Fortunately, when detected early with regular screening mammograms the 5-year survival rate for breast cancer approaches 99%. Resident clinics such as ours that serve an underserved urban population bear the brunt of this challenge.

Purpose: Our objective was to improve the completion percentage of screening mammograms in our underserved urban community from 73% to 80%. We looked to see if primary care providers and clinic staff could utilize the methods as described below as effective ways to improve breast cancer screening rates in our community.

Methods: We sought to achieve this goal by reviewing our patient’s records to find individuals with a care gap specifically regarding annual breast cancer screening. Once identified, we would personally telephone eligible patients once per week to discuss their breast cancer screening status, explain the risks and benefits of screening mammograms, and encourage them to perform appropriate testing. If they were agreeable, patients were provided a phone number to call and schedule their mammogram. Additional phone calls and mail reminders were sent to patients who agreed to complete mammograms as a way to follow up and encourage timely completion of the screening test.

Results: The initial six-month data indicate a change in our breast cancer screening completion percentage from 73% to 77%. Just one phone call per provider per week led to a 4% improvement in our breast cancer screening completion rate. This outcome is preliminary, and we are aiming for a more significant improvement in the following months.

Conclusion: Our findings indicate that identifying and contacting patients who are overdue on their preventative health measures, specifically screening mammograms, can have a measurable impact. While the COVID-19 pandemic did affect our abilities to reach our original goal, the results thus far are promising, and that with continued effort we will reach our goal of 80% and beyond.

Measures to Enhance Breast Cancer Screening*

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Background: Breast cancer (BC) is responsible for the deaths of over 40,000 women in the USA. The United States Preventive Services Task Force (USPSTF) recommends biannual mammograms for all women aged 50-74 years. Today, the 5-year survival of BC is almost 90%, compared to 75% in 1975. Breast cancer screening (BCS) leads to earlier detection and treatment, reduced mortality, and reduced need for the toxic treatments. Despite the documented screening benefits, only 64-81% of the population that meets the criteria for regular BCS is regularly screened.

Purpose: The USPSTF guideline for BCS is a Quality Improvement (QI) measure that is tracked for Primary Care Physicians (PCPs) in Advocate Aurora Health. The primary care providers (PCPs) in our clinic had a BCS of 67% for the eligible patient assigned to them September 2019 (system goal was ≥ 84%). We hypothesized that regular BCS has been limited by factors including inadequate emphasis, education and reminders for BCS. By April 1, 2020, our PCPs aim to fill these gaps and improve patient outcomes by increasing our BCS by >10%.

Methods: The study population included our clinic PCPs (Drs. Sharma, Hunde, and Usmaiel), who performed personal outreach to their patients due for BCS. Every month, data was generated through the system’s QI process, which included percentage of eligible BCS patients who are up-to-date and a list of patients who are due. The process for the study was our routine clinic workflow, in addition to dedicated outreach to our patients (the intervention). We called, mailed letters, or messaged through our electronic messaging system (MyAdvocateAurora) to our patients who were due for BCS. We advised our patients to complete a screening mammogram given supporting facts. A screening mammogram was ordered for those who agreed. We provided the patients with a phone number to schedule it. For patients who had BCS in other systems, we collected the results through the usual process and updated it in our system.

Results: At the start of our QI projects, only 67% of patients of age 50-75 had up to date BCS. By continuous and dedicated outreach, our BCS score has improved to 75% by February 20, 2020.

Conclusion: To improve the BCS rates and decrease breast cancer-related mortality, we established individualized outreach. Our efforts increased our QI measures. However, our project was not able to continue until April 1, 2020 as planned due to indefinite closure of non-essential clinic visits starting at the end of February 2020, due to the COVID-19 pandemic. Even though we were not able to continue the project, by continuing these dedicated outreach reminders, we might have been able to reach our BCS rate Goal to ≥77% if it were not for COVID-19 pandemic.

* These two abstracts were combined into one presentation

46th Annual Aurora Scientific Day 2020