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## Conference Proceedings: Select Abstracts Presented at Advocate Aurora Scientific Day 2022

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# Conference Proceedings: Select Abstracts Presented at Advocate Aurora Scientific Day 2022

The abstracts published in this supplement were presented at the 48th annual Advocate Aurora Scientific Day on May 25, 2022. This scholarly symposium provides a closed forum for sharing preliminary results from research studies conducted by faculty physicians and nurses, fellows, residents, scientists, and other health professionals associated with U.S. Midwest-based health system Advocate Aurora Health, publisher of the *Journal of Patient-Centered Research and Reviews*. (*J Patient Cent Res Rev*. 2022;9:298-314.)

## **RIESELBACH DISTINGUISHED PRESENTATIONS**

### **Impact of Geriatric Emergency Department Postdischarge Service Orders on 30-Day Emergency Department Revisit and 30-Day Hospital Admission**

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**Background:** Older adults comprise an increasing proportion of patients presenting to emergency departments (ED). At Advocate Aurora Health (AAH), 28% of individuals who present to the ED are >65 years old and, on average, 60% are discharged home from the ED. AAH's geriatric emergency department (GED) program is based on standardized national guidelines. One focus of the guidelines includes interprofessional assessments designed to address the unique needs of older adults in the ED and inform postdischarge service orders.

**Purpose:** To examine the impact of ED postdischarge service orders on 72-hour and 30-day ED revisit and 30-day all-cause and unplanned hospital admission.

**Methods:** This is a retrospective cohort study of patients >65 years old with an ED visit at 10 AAH-accredited GEDs who were discharged home between January 2019 and December 2020. Patient demographic and clinical variables and health care utilization outcomes were extracted from the electronic health record. All significant variables based on the bivariate analysis (ie,  $P < 0.05$ ) were included in logistic regression models with ED revisit and hospital admission as the outcome variables.

**Results:** Among 28,492 participants, there were 51,582 encounters. Among these older adults, 52.1% were 65–74 years old, 56.9% were female, 90% were White, and 42.7% had a high-risk Identification of Seniors at Risk<sup>®</sup> (ISAR)

score. Average ED length of stay was 178 (standard deviation: 90) minutes. Overall, 2.9% of patients revisited the ED within 72 hours, and 19.5% revisited within 30 days; 21.2% had an unplanned hospital admission within 30 days, and 39.6% had an all-cause (unplanned or planned) hospital admission. Less than one-fifth (17.4%) of patients had an ED postdischarge service ordered. After adjusting for age, gender, race, length of stay, and ISAR score, patients with a postdischarge service order had a lower risk of 72-hour ED revisit (odds ratio [OR]: 0.15, 95% CI: 0.06–0.4), 30-day ED revisit (OR: 0.20, 95% CI: 0.14–0.27), all-cause 30-day admission (OR: 0.08, 95% CI: 0.06–0.11), and unplanned 30-day admission (OR: 0.17, 95% CI: 0.12–0.23).

**Conclusion:** Patients who had ED postdischarge service orders had lower ED revisit rates and 30-day admission rates. The lower revisits and admissions could be attributed to the nursing, case manager, and physicians' processes of care that lead to service orders placed during the patient's GED visit. There is potential for these GED processes to improve older adults' health care utilization.

### **Metformin Dose Optimization Program With Common Ground Healthcare Cooperative**

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**Background:** Type 2 diabetes is a common health condition with potentially devastating complications that can be prevented or delayed with proper blood glucose control. Metformin is the most prescribed medication to treat type 2 diabetes; it is highly efficacious but requires active dose titration for maximum efficacy. A prior review at

Advocate Aurora Health (AAH) identified that nearly half of patients with an elevated hemoglobin A1C (HbA1c) were on suboptimal metformin doses that were not titrated. A pharmacist-led, telephonic, metformin dose optimization program was then established to enhance between-visit care and improve diabetes control, primarily in the Medicare population. The program was later expanded to include patients insured by Common Ground Healthcare Cooperative (CGHC), a marketplace exchange program.

**Purpose:** To evaluate the effectiveness of the metformin dose optimization program for AAH patients insured by CGHC, including engagement and impact on diabetes control.

**Methods:** Patients with type 2 diabetes (HbA1c of 7%–10%) who were prescribed metformin ( $\leq 1500$  mg/day) were included. Exclusion criteria included being prescribed additional diabetes medication(s) or safety concerns, such as renal impairment. Program referrals were sent to primary care providers (PCPs) through the electronic health record (Epic) for co-signature. Pharmacists performed telephonic outreach to enroll patients, with follow-up every 2–4 weeks during the 12-week program. Outreach included metformin titration, patient monitoring, education, and adherence support.

**Results:** A total of 405 patients were identified as potential program candidates. After chart review, 284 patients did not meet program criteria. Referrals were sent to PCPs of 121 eligible patients, and 86% of referrals were signed. After initial pharmacist outreach, 37 patients (31%) were enrolled, 70% of whom successfully completed the program. Average increase in total daily metformin dose after 12 weeks was 964 mg, with 81% of patients taking the target dose of 2000 mg. Average HbA1c improvement was -0.6% (from 7.6% to 7%); 6 patients (16%) were lost to follow-up, and 5 patients (14%) were referred to the PCP for alternate medication considerations. Engagement rates were lower than previously seen in the Medicare population.

**Conclusion:** The metformin dose optimization program was effective in enhancing coordinated team-based care and improving diabetes control. For the working-age population, alternative outreach methods may enhance engagement.

## **ORAL PRESENTATIONS**

### **Comparison of Management of Clinically Well Infants Born at $\geq 35$ Weeks Gestational Age to Mothers With Chorioamnionitis Before and After Implementation of Early-Onset Sepsis Calculator**

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**Background:** Use of an early-onset sepsis calculator (EOSC) may reduce lab evaluation and antibiotic treatment without apparent adverse effects in infants born at  $\geq 35$  weeks gestational age. Few studies were done comparing management of infants born to mothers with chorioamnionitis by retrospective use of EOSC before and prospective use of EOSC after implementation of an EOSC protocol in the same center.

**Purpose:** To compare management of infants born to mothers with chorioamnionitis before and after implementation of EOSC usage.

**Methods:** An EOSC protocol was implemented in a newborn nursery in January 2021. Data were collected retrospectively from mothers with chorioamnionitis and their infants born at  $\geq 35$  weeks gestational age and admitted directly to the newborn nursery from January 2019 to December 2021. Study population was stratified into two groups: Group A included infants managed per the Centers for Disease Control and Prevention's 2010 guideline prior to EOSC implementation (and for whom EOSC was used retrospectively); Group B included infants managed by prospective use of EOSC after EOSC protocol implementation. Comparison of EOSC recommendation, blood culture, antibiotic treatment and initiation time, length of stay, and neonatal intensive care unit (NICU) admission before discharge was done using chi-squared/Fisher's exact test for categorical variables and *t*-test/Mann-Whitney test for continuous variables.

**Results:** A total of 277 infants were included after excluding 6 infants with improper use of EOSC. There was no difference in demographics or clinical characteristics between groups A and B. Of the 177 infants in Group A, retrospective use of EOSC decreased blood culture from 94% to 21% and antibiotic treatment from 94% to 13%. In Group B, 14% received blood culture and 5% received antibiotic treatment. There was significant delay in antibiotic initiation with no increase in median length of stay in Group B. There was no significant difference in NICU admission between the groups. Of 2 EOS-positive in Group A (per blood culture), EOSC recommended antibiotic for 1. None of the blood cultures were positive in Group B. An estimated \$61,622 was saved.

**Conclusion:** EOSC could decrease unnecessary lab evaluation and antibiotic treatment and associated health care costs among clinically well infants born to mothers with chorioamnionitis at  $\geq 35$  weeks gestational age. Prospective use of EOSC decreased antibiotic treatment more than projected by retrospective usage. Though retrospective use of EOSC missed blood culture-positive EOS, prospective use of EOSC in the same center did not increase NICU admission before discharge. EOSC may delay antibiotic treatment for those who appear clinically equivocal or ill later with no prolonged median length of stay. Larger prospective studies on EOSC, including follow-up after discharge, are required to confirm frequency of missed EOS in infants born to mothers with chorioamnionitis.

## Lipid Signatures of Chronic Pain in Female Adolescents With and Without Obesity

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**Background:** Chronic pain in adolescence is associated with diminished outcomes, lower socioeconomic status in later life, and decreased family well-being. Approximately 30% of adolescents with chronic pain have obesity compared to 20.5% in the general population. In obesity, lipid signals regulate insulin sensitivity, satiety, and pain sensation. This study presents data on lipid signatures associated with chronic pain, obesity, and the combination of these diseases in female adolescents.

**Purpose:** To determine whether there is a distinct lipid signature associated with chronic pain and its co-occurrence with obesity in female adolescents.

**Methods:** We performed global lipidomics in serum samples from female adolescents 13–17 years of age (N=67) with no pain/healthy weight (Control), chronic pain/healthy weight (Pain Nonobese), no pain/obesity (Obese), or chronic pain/obesity (Pain Obese). Untargeted lipidomics analyses were performed in both positive and negative mode on an Agilent 6546 quadrupole time-of-flight dual Agilent Jet Stream ESI liquid chromatograph/mass spectrometer (Q-TOF LC/MS) system. Data were analyzed in R software using tidyverse and normalized to the appropriate internal standard. P-value cutoff was <0.05 (ANOVA with post-hoc Tukey test).

**Results:** Most participants in both chronic pain groups presented with headache/migraine pain, followed by extremity pain (Pain Nonobese group) and abdominal pain (Pain Obese). “Other” pain conditions were combined into a single category (including back pain and joint pain). The Pain Nonobese group had lipid profiles similar to the Obese and Pain Obese groups. The major difference in these lipids included decreased lysophosphatidylinositol (LPI), lysophosphatidylcholine (LPC), and lysophosphatidylethanolamine (LPE) in the three clinical groups, as compared to the Control group. Furthermore, ceramides and sphingomyelin were higher in the groups with obesity when compared to the groups with healthy weight, while plasmalogens were elevated in the Pain Obese group only.

**Conclusion:** We conclude that serum lipid markers are associated with chronic pain and suggest that specific lipid metabolites may be a signaling mechanism for inflammation

associated with co-occurring chronic pain and obesity in female adolescents. Results may provide insight in the search for mechanistic links between obesity and chronic pain. We hope to apply these findings to develop novel ways to mitigate pain in adolescents with co-occurring obesity.

## Association Between Right Ventricular Echocardiographic Parameters and Clinical Deterioration/Mortality in Patients With Submassive Pulmonary Embolism

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**Background:** Submassive pulmonary embolism (PE) represents a wide spectrum of morbidity and mortality in pulmonary thromboembolic disease. Risk stratification and therapeutic intervention have been established for low-risk and massive PE. Submassive PE risk stratification by echocardiography parameters, beyond the presence or absence of right ventricular (RV) dysfunction, remains elusive.

**Purpose:** To describe the selection, evaluation, exclusion, and analysis of RV parameters by echocardiography to risk-stratify patients with submassive PE on presentation.

**Methods:** Using a retrospective cohort, we evaluated the electronic medical records of 209 patients hospitalized with submassive (intermediate-low and high-risk) PE admitted to Aurora St. Luke's Medical Center from March 2017 through August 2021. Patients included were diagnosed with submassive PE and had echocardiography within 30 hours of admission. Patients were excluded if they presented with shock, sustained hypertension, cardiac arrest, or transition to comfort care measures within 24 hours. Univariable as well as multivariable logistic and negative binomial regression models were used to determine an association between cardiac index derived from left ventricular outflow tract velocity time integral measured by Doppler or RV systolic tissue velocity and the following variables: hospital length of stay (LOS), intensive care unit (ICU) LOS, and vasopressor use during stay. Categorical variables were expressed as count and percentage and continuous variables as median and interquartile range (IQR).

**Results:** Death (n=7, 3.4%), hospital LOS (median: 7.4 days, IQR: 4.8-13.1), ICU LOS (median: 1.8 days, IQR: 0.9–3.1), and vasopressor use during stay (n=19, 9.1%) were not found to be associated with either cardiac index or RV systolic tissue velocity.

**Conclusion:** Controlling confounding factors, including bed availability, timing of echocardiography, and intervention for submassive PE, may be necessary to determine if RV echocardiographic parameters are associated with more clinical endpoints.

### **Faculty Perceptions of Diversity, Equity, and Inclusion Competence Using a Structural Fluency Milestone**

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**Background:** Medical education leaders are accountable, per accreditation guidelines, for addressing structural “isms” in all forms (eg, race, gender identity, religion), including in faculty development. Yet, data on the competency level of our faculty specific to identified diversity, equity, and inclusion (DE&I) structural fluency competency domains were not available. Data must be used to guide faculty development efforts and to monitor progress over time.

**Purpose:** To reframe a literature-based structural fluency competency milestone (a.k.a. structural “isms” including race, gender identity, differently abled) as a quick needs assessment tool and gather data for faculty development and long-term tracking.

**Methods:** In 2020, an interprofessional team developed a structural fluency milestone for assessing resident and fellow performance. The milestone was approved by the Graduate Medical Education (GME) Committee for implementation in January 2021 across all GME programs. In 2021, this existing milestone was reframed as a faculty development needs assessment tool and placed on SurveyMonkey. The self-assessment asked respondents to rate their competence on the 6 structural fluency domains (eg, medical knowledge, patient care, professionalism) consistent with Accreditation Council for Graduate Medical Education (ACGME) framework. For each domain, respondents checked their perceived competence level using an annotated rating scale — level 1 novice to level 5 proficient — consistent with the ACGME’s competency rating model. Teaching faculty received an email directly from SurveyMonkey to facilitate reminders to nonrespondents and assure that results were not linked to their email.

**Results:** A 70% response rate (126 of 179) was achieved across 16 GME programs. In all domains, at least 70% of faculty perceived themselves to be competent or proficient (level 4 or 5). Faculty felt most competent in the patient care (75%) and practice-based improvement (83%) domains. Professionalism was identified as a faculty development focus given DE&I competence requires faculty to “act non-

judgmentally and speak up in the moment cognizant that historical injustices and inequalities impact patient’s health,” an essential skill as teacher and role model for creating an inclusive learning environment.

**Conclusion:** Utilizing a competency framework that parallels the ACGME milestone format yields needs assessment data to focus faculty development and continuing DE&I education.

### **Utilization of Simulation to Test a Standard Systemwide Approach to Malignant Hyperthermia**

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**Background:** In the last several years, our 28-hospital health system has experienced a number of serious safety events related to our response to malignant hyperthermia (MH) in Illinois and Wisconsin. These events prompted the creation of a workgroup to standardize our approach to MH. The Malignant Hyperthermia Association of the United States (MHAUS) national benchmark of dantrolene availability to anesthetizing locations is within 10 minutes of the decision to treat MH.

**Purpose:** To evaluate, using simulation, whether teams could meet benchmarks utilizing a standardized approach and to identify any remaining latent safety threats or gaps within this process.

**Methods:** We identified 38 sites of care that may utilize MH-triggering agents. These sites were directed to conduct a diagnostic simulation and debrief within their high-risk MH event areas, including surgical services, other procedural areas (ie, gastrointestinal laboratory), and nonprocedural areas (ie, intensive care unit). During each simulation we documented time to dantrolene administration and noted and categorized any system-, medication-, or individual-related latent safety threats.

**Results:** We completed simulation at 25 of 38 sites (66%) within all targeted areas; 11 of 38 (29%) completed at least one simulation in an MH high-risk area and 2 of 38 (5%) were unable to complete the diagnostic simulation. Overall, 1089 learners participated in simulation during 161 hours of simulation; 27 sites had all departments tested able to meet the MHAUS national benchmark. During simulation we were able to identify 424 latent safety threats related to patient care during an MH event. Of these 424, 200 (47%) were related to system factors, 173 (40%) to individual factors, and 56 (13%) to medication factors. A consistent opportunity noted during event debriefings was the need for a specific MH alert to promote a timely and appropriate response to meet the MHAUS benchmark.

**Conclusion:** Simulation process testing can be utilized to identify latent safety threats and gaps that may create delays or barriers in MH management. Furthermore, debriefings allow an opportunity to gather frontline feedback to further improve our processes.

## **ORAL/POSTER HYBRID PRESENTATIONS**

### **Early-Life Periodic Hypoxia With Pain Elicits Increases in Corticosterone and Insulin Resistance Index in a Neonatal Rat Model of Human Prematurity**

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**Background:** Preterm birth is a global public health problem. Neonatal hypoxia, a stressor associated with preterm birth, has sexually dimorphic metabolic and endocrine effects that may last into adulthood. Maternal/caregiver separation and pain from necessary clinical procedures are additional stressors in the preterm infant in the neonatal intensive care unit (NICU); their interaction with hypoxia is not known. We have developed and refined a rat model of human prematurity that addresses multiple clinical issues relevant to NICU care: caregiver isolation, periodic bouts of acute hypoxia, and pain from clinical procedures.

**Purpose:** We propose that an interaction of isolation, acute hypoxia, and pain mimicking clinical procedures will augment the acute neonatal stress response that could lead to long-term effects.

**Methods:** Male and female rat pups were studied on postnatal day (PD) 1, 2, 3, and 4. Periodic hypoxia  $\pm$  pain: Pups were each isolated from the dam and their littermates and were exposed daily to 6 cycles of acute hypoxia (5 minutes of 10% O<sub>2</sub>, 30 minutes apart). Pain was administered by needle prick (control was touching with a cotton swab) to the feet after the second, fourth, and sixth cycles of hypoxia. Normoxia (control)  $\pm$  pain: Pups were treated as above without periodic hypoxia. After hypoxia or normoxia, blood was collected for measurement of plasma corticosterone, glucose, and insulin. Livers were analyzed for glucocorticoid receptor (GR)-sensitive mRNAs (via RT-qPCR).

**Results:** Acute pain combined with periodic hypoxic separation led to a large increase in plasma corticosterone compared to hypoxic separated control pups (no pain) at PD1, PD2, and PD3, although the magnitude of increase in plasma corticosterone decreased with age. Homeostatic Model Assessment for Insulin Resistance (HOMA-IR), an index of insulin resistance, was increased in PD1 normoxic and periodic hypoxic pups with pain compared to their no pain controls. In the liver, mRNA of *PER1*, a GR-sensitive gene, had an approximately 3-fold increase in pups with pain compared to control (no pain).

**Conclusion:** The augmentation of corticosterone and HOMA-IR from the combination of hypoxia and pain within 24 hours of birth, and a subsequent decrease in this effect with age, suggests early intervention to attenuate the stress response may be critical for decreasing the metabolic programming effects of early-life stress in preterm humans.

### **Effect of Preeclampsia and Maternal Obesity on Neonatal Oxidative Stress Biomarkers and Endothelin-1 Levels**

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**Background:** Preeclampsia is one of the leading causes of maternal mortality worldwide and elicits up to 25% of intrauterine growth retardation and preterm births. Obesity also triggers many pregnancy and neonatal complications such as gestational diabetes, hypertension, and stillbirths. Both preeclampsia and obesity contribute to maternal and neonatal oxidative stress and related endothelial dysfunction via endothelin-1 (ET-1) signaling pathway alterations that are implicated in the pathogenesis of many serious and potentially life-threatening neonatal morbidities (hypoxic-ischemic encephalopathy, retinopathy of prematurity, etc).

**Purpose:** To determine the relationship between preeclampsia, maternal body mass index (BMI), and neonatal levels of oxidative stress biomarkers (glutathione [GSH], malondialdehyde [MDA]) and ET-1.

**Methods:** A total of 63 neonates were prospectively enrolled in a Level IV neonatal intensive care unit and divided into subgroups: Preeclampsia or non-Preeclampsia, and maternal BMI of Normal, Overweight, or Obese. Umbilical cord and 24 ( $\pm$ 4) hours of life (24h) blood samples were collected for GSH, MDA and ET-1 analyses. All study procedures were approved by the local institutional review board. One-way ANOVA and Pearson correlation analyses were used to compare continuous variables between the independent groups. Fisher's exact test was used for categorical variables.

**Results:** Mean umbilical GSH and 24h ET-1 levels in the Preeclampsia subgroup ( $0.84 \pm 0.11$  mmol/L and  $6.36 \pm 4.15$  pg/mL, respectively) were significantly higher than non-Preeclampsia counterparts ( $0.71 \pm 0.16$  mmol/L and  $4.31 \pm 0.83$  pg/mL, respectively);  $P < 0.05$ . No significant difference was found between umbilical or 24h MDA samples among Preeclampsia and non-Preeclampsia subgroups ( $P > 0.05$ ). No significant correlation ( $P > 0.05$ ) was found between umbilical or 24h neonatal oxidative stress markers and maternal BMI. Mean umbilical ET-1 and 24h ET-1 levels were significantly higher in the Obese

group ( $P=0.021$  and  $P=0.015$ , respectively). Maternal BMI significantly correlated with 24h ET-1 levels ( $r^2=0.0340$ ;  $P<0.001$ ) but not with umbilical ET-1 levels ( $r^2=0.160$ ;  $P>0.05$ ). Mean umbilical MDA levels in preterm neonates exposed to prenatal corticosteroids ( $1.87 \pm 0.31$  nmol/L) were significantly lower ( $P<0.05$ ) than those who were not exposed ( $2.85 \pm 0.12$  nmol/L).

**Conclusion:** Preeclampsia affects both oxidative stress and ET-1 levels in neonates, and effects continue after delivery. Neonatal pro- and anti-oxidative stress markers (MDA and GSH) are independently affected by preeclampsia and maternal BMI. Maternal BMI alone is not predictive of neonatal oxidative stress and related complications. Prenatal steroids may reduce oxidative stress injury.

## Becoming an Upstander to Patient Microaggressions

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**Background:** The frequency with which medical students, residents, and faculty experience belittling comments, inquiries into their racial/ethnic origins, and/or credential/ability questions (a.k.a. microaggressions) is unacceptable in a clinical environment seeking to promote learning and growth and does not meet medical education accreditation standards. In a national survey, 72% of surgical residents experienced microaggressions, with patients as the most common source; 52% of internal medicine residents from three different programs experienced belittling comments and 45% experienced credential or ability questions on a weekly basis; percentages are higher for non-White male respondents. The cumulative effects of microaggressions have detrimental effects on learning, patient care, and well-being.

**Purpose:** To use a quality improvement approach with rapid Plan-Do-Study-Act cycles to prepare learners and faculty to stand up to microaggressions from patients.

**Methods:** In 2022, a convenience sample of students, residents, and faculty participated in a 45–60-minute upstander training session integrated into one of their established educational meetings. Framed using Robert Livingston's PRESS model, participants received an overview of 1) the Problem highlighting frequency and consequences of microaggressions, 2) Root causes including implicit bias and structural factors, 3) Empathy shifting to action, 4) Strategy using a microaggression mnemonic, and

5) Sacrifice acknowledging the personal and professional risks of action. Mayo's GRIT mnemonic (Gather your thoughts, Restate, Inquire, Talk it out) was demonstrated/practiced using scenarios followed by a brief retrospective pre-post evaluation form.

**Results:** A total of 37 participants responded. Using a 4-point Likert scale (1 = very unlikely/no, definitely not; 4 = very likely/yes, definitely), increases in retrospective pre-post ratings were seen across all items, including intention to apply PRESS approach (preintervention: 2.3; postintervention: 3.3), intention to apply GRIT mnemonic (pre: 2.0; post: 3.4), and commitment to being an upstander (pre: 3.2; post: 3.7). Overall, 97% of respondents would recommend the session to their colleagues, and 75% requested additional training on GRIT.

**Conclusion:** To create inclusive clinical environments that ensure our learners' and faculty's continued development and excellent patient care, we must continuously improve their ability to respond professionally to patient-initiated microaggressions through brief educational sessions.

## Addressing Food Insecurity in Medically Complex and Socially At-Risk Patients

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**Background:** Food insecurity is defined as “lacking access to enough food for an active, healthy life for all household members.” In 2021, the projected food insecurity rate in Milwaukee was 13.7% and Milwaukee County ranked 70 out of 72 Wisconsin counties in health outcomes. While poverty plays a role in food insecurity, food deserts also limit access in low-income neighborhoods. Our family medicine clinics in Milwaukee see a predominantly urban, underserved patient population, many of whom are medically complex and socially at risk (ie, “hotspots”). These individuals are often on fixed budgets and struggle with food insecurity, resulting in a lack of healthy food both physically and economically. Food insecurity is not routinely screened for by our clinics.

**Purpose:** To highlight the importance of not only screening for food insecurity but also pilot a creative solution to assist patients.

**Methods:** Our project focused on hotspot patients at 2 family medicine residency clinics in Milwaukee who were screened for food insecurity in April 2021. Those who were identified as

having very low food security, defined as “reports of multiple indications of disrupted eating patterns and reduced food intake,” were randomly selected for either the intervention or control group and were administered an initial quality-of-life (QOL) survey. For 6 months the intervention group received monthly food from a local pantry that was delivered by the medical team. Qualitative data were collected. At end of the study a repeat QOL survey was administered. Microsoft Excel was used to run paired 2-sample *t*-tests on all pre- and post-QOL survey results. Two-tailed *P*-values of <0.05 were deemed statistically significant.

**Results:** Of the 62 hotspot patients identified, 45 underwent food insecurity screening. Of those 45, 22 (49%) screened positive for food insecurity and 15 (33%) screened positive for very low food security. While overall QOL remained unchanged, there was a statistically significant improvement in the social relationships domain in the intervention group (*P*=0.01). On analysis of qualitative data, 4 themes emerged: appreciated food visits, enjoyed food quality and quantity, improved food insecurity, and bridged transportation access.

**Conclusion:** Overall, home food deliveries to our food-insecure patients were viewed positively. In the future, we hope to expand this pilot to screen all patients during office visits for food insecurity and to find creative, collaborative approaches to provide home food deliveries to the most vulnerable.

### Universal COVID-19 Testing in Labor and Delivery Patients: A Retrospective Study at Aurora BayCare Medical Center

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**Background:** Pregnant women and their fetuses have been significantly impacted by the increased risk of complications from emerging infections. It is important to understand and monitor the risks and impact of SARS-CoV-2/COVID-19 infection on delivery outcomes.

**Purpose:** To monitor rates of COVID-19 infection among laboring patients in northeast Wisconsin and impact on delivery outcomes.

**Methods:** A retrospective study was conducted as part of a universal COVID-19 testing policy at Aurora BayCare Medical Center for laboring patients from April 14, 2020, to June 7, 2021. Chart reviews were conducted to collect demographic data, COVID-19 test results (mother and infant), and delivery outcomes (Apgar score, delivery method, gestational age, and arterial blood gas). Descriptive and frequency statistics were used to summarize the characteristics of the study

population. Mann-Whitney U tests were used to compare group differences for continuous variables. Chi-squared or Fisher’s exact tests (cell size of <5) were used to determine group differences for categorical variables.

**Results:** Out of 1710 singleton deliveries, 53 mothers tested positive, 1654 mothers tested negative, and 3 mothers refused to be tested. The overall COVID-19 positive rate was 3.1% (n=53). The asymptomatic COVID-19 positive rate was 2.5% (n=43). The symptomatic COVID-19 positive rate was 0.6% (n=10). None of the newborns tested positive for COVID-19. Results indicated that the age of mothers who tested positive for COVID-19 (median of 27) was statistically significantly lower than those who tested negative (median of 29; *U*=34474.0; *P*=0.008). There was a significant relationship between race and COVID-19 test results (*P*=0.049), with some minority groups being disproportionately affected. A significant relationship was found between delivery method and COVID-19 test results (*P*=0.020), with a higher rate of cesarean delivery among mothers who tested positive (41.5%) compared to those who tested negative (27%). However, only 1 (1.9%) mother who tested positive experienced a change in delivery method due to the COVID-19 test result.

**Conclusion:** There was a higher rate of cesarean delivery among mothers infected with COVID-19. Demographic disparities (eg, age, race, and ethnicity) in COVID-19 cases have been observed, and these findings may help to support and guide outreach efforts in northeast Wisconsin. This study offers additional reassurance of a low risk of newborn infection and morbidity.

### Transcutaneous Bilirubin Monitoring in the Neonatal Intensive Care Unit

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**Background:** Hyperbilirubinemia can be screened with total serum bilirubin (TSB) or noninvasive transcutaneous bilirubin (TcB) monitoring in newborns at ≥35 weeks gestation.

**Purpose:** To establish a consistent practice of TcB monitoring for evaluation of hyperbilirubinemia in newborns (≥35 weeks gestation) admitted to a tertiary neonatal intensive care unit to reduce blood draws.

**Methods:** A retrospective cohort analysis was done comparing preintervention group (July 2020–June 2021) and postintervention group (July 2021–January 2022). Preintervention, TSB was used for screening; postintervention, TcB was used as first-line screening. First TcB was performed at 24 hours of life and continued daily, with total occurrences based on Bhutani risk stratification — 3 occurrences for low risk, 7 for medium risk and high risk.

If levels fell within 3 of TSB thresholds for phototherapy, serum levels were drawn. TSB draws were compared between pre- and postintervention; statistical analysis was performed using Mann-Whitney *t*-test.

**Results:** A total of 293 patients were identified, 136 in preintervention and 157 in postintervention; 10 preintervention and 22 postintervention patients were excluded for pathology that necessitated regular liver function tests per unit protocol. There was statistically significant reduction in TSB blood draws following TcB protocol implementation ( $2.6 \pm 1.8$  preintervention vs  $1.6 \pm 1.8$  postintervention;  $P < 0.001$ ), which was retained in the low-risk ( $2.0 \pm 1.4$  preintervention vs  $0.9 \pm 1.2$  postintervention;  $P < 0.001$ ) and medium-risk ( $3.1 \pm 1.7$  preintervention vs  $1.8 \pm 2.0$  postintervention;  $P < 0.001$ ) groups but not in the high-risk group ( $3.5 \pm 1.7$  preintervention vs  $3.2 \pm 2.0$  postintervention;  $P = 0.835$ ). Postintervention, 34% (54 of 157) of newborns only required TcB screening, 73% (53 of 73) of newborns that had TSB following TcB were found to have TcB correlating within 3 measures, and 66% of TSB levels were lower than TcB levels (44 of 67) when measured differences were  $> 3$ .

**Conclusion:** TcB screening reduced serum blood draws in qualifying neonates with low-risk and medium-risk hyperbilirubinemia stratification. As most TSB levels correlated with or were below TcB levels, it would be safe to narrow the window for serum blood draws, which may further reduce draws.

### Long-Term Outcomes in Older Patients Who Had a Delirium Diagnosis During Their Hospital Stay: Systematic Review and Meta-Analysis

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**Background:** Delirium, an acute change in cognition and attention, is a common but often preventable disorder in hospitalized older patients. While delirium research largely focuses on challenges faced in the hospital setting, there is increasing evidence indicating unfavorable outcomes after discharge, including decline in cognition and function, higher mortality, and institutionalization.

**Purpose:** To summarize the posthospitalization/long-term outcomes in older patients who had delirium in the hospital. Outcomes included cognition, mental health illness, health care outcomes, medication issues, and functional status.

**Methods:** Published articles on long-term outcomes after

delirium in the hospital were searched for between June 1, 2021, and July 1, 2021. The electronic databases Ovid MEDLINE and PubMed were searched using PICO-based inquiries. Articles were included if they were original research, evaluated patients who were  $\geq 55$  years of age, and evaluated patients who had transitioned home from the hospital. The quality of the selected studies was assessed using the Newcastle-Ottawa Scale (NOS). Meta-analysis was performed for mortality outcome.

**Results:** A total of 570 articles were identified from the initial literature search. After review, data were extracted from 13 studies. The quality of these studies, as assessed by NOS, was classified as good. Long-term outcomes including dementia, decreased functional status, adverse health outcomes such as emergency department visits, readmission to hospital, admission to skilled nursing facility/long-term care, and mortality were more frequent in older adults who experienced delirium in the hospital compared to those who did not. The meta-analysis of 3 studies comprised of 1174 total patients demonstrated a weighted average of mortality rates of 39% in older adult patients who had delirium at 1-year follow-up.

**Conclusion:** This systematic review confirms that older adults who have delirium in the hospital have poor long-term outcomes. We hope to use this research to develop interventions for this set of patients in the posthospitalization period to mitigate poor outcomes and drive best practices for health systems and clinicians as they are providing ongoing care. These findings will help identify the main adverse outcomes to be focused on for patients with previous delirium as an inpatient that transition from the hospital to home.

### Obesity and Placenta Accreta Spectrum Outcomes

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**Background:** The frequency of placenta accreta spectrum (PAS) has risen with the increased number of cesarean deliveries, contributing to higher maternal morbidity and mortality. Obesity is also increasing in prevalence in the United States.

**Purpose:** To evaluate the effect of obesity on maternal outcomes in the setting of placenta accreta spectrum.

**Methods:** This was a retrospective cohort study utilizing the National Inpatient Sample (Healthcare Cost and Utilization Project) from January to December 2018. Those patients with placenta accreta spectrum were included. Those with body mass index (BMI) of  $\geq 30$  kg/m<sup>2</sup> (obese) were compared

to those with BMI of <30 kg/m<sup>2</sup>. The primary outcome was a composite of severe maternal morbidity (SMM) as defined by the Centers for Disease Control and Prevention. Secondary outcomes included each individual outcome of the SMM composite, infection, wound complications, and surgical complications. Groups were compared via Student's *t*-tests, chi-squared, and logistic regression analyses.

**Results:** A total of 1045 subjects met inclusion criteria, of which 164 were obese. Obese subjects were more likely to be non-Hispanic Black, use tobacco, in lowest quartile of income, and have chronic hypertension, asthma, and history of cesarean delivery. Obese subjects had longer hospital stays with higher rates of the primary composite outcome of SMM (64% vs 53%; *P*=0.007), wound complication, and any surgical complication. After controlling for confounders, obese women persistently demonstrated significantly higher rates of infection (adjusted odds ratio: 3.23, 95% CI: 1.05–9.97) and cystoscopy or ureteral stent placement (adjusted odds ratio: 2.19, 95% CI: 1.39–3.47).

**Conclusion:** Obesity in patients with placenta accreta spectrum is associated with increased rates of infection and cystoscopy or ureteral stent placement compared to nonobese subjects.

### Implementing Functional Testing With the Mobility Assessment Tool (Short Form) in Hospice and Palliative Medicine

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**Background:** Among tools commonly used for documenting progressive functional decline in hospice and palliative medicine is the Palliative Performance Scale (PPS). One drawback to the PPS is its subjectivity. Mobility is a powerful biomarker of health, yet performance-based measures of mobility in the clinical setting are time-consuming and impractical. The short form of the Mobility Assessment Tool (MAT-sf), which involves a series of 10 short computer-generated animations depicting mobility levels in different environments, was developed to overcome these limitations.

**Purpose:** To assess the acceptance of the use of this novel tool in patients receiving hospice and palliative care.

**Methods:** Patients (>50 years of age) were referred from our health system's home hospice/palliative program. Participants completed a 5-question, 5-point Likert scale survey investigating attitudes and experiences after using the MAT-sf. Measures of function, including PPS (percentage), MAT-sf (total), and grip strength (kg) scores, were obtained

at baseline and at 3 months. Data are expressed as percentage or mean ± standard deviation.

**Results:** Among 17 patients (11 hospice, 6 palliative) who agreed to participate, 12 living patients completed baseline measures and 5 were withdrawn due to death at a mean of 36 days (range: 13–76). Respondents (mean age of 72 years [range: 59–88], 53% female, 17% Black, 77% White, 47% with cancer, 29% with cardiopulmonary disease, 12% with neurologic conditions, and 6% with renal or liver disease) had generally positive attitudes and experiences using the MAT-sf. Nearly all agreed that the MAT-sf was easy to use (94%), that the quality and quantity of mobility vignettes were good (89%), and that self-perception of mobility was easy/effortless (100%). While 1 negative response was linked to vignette quantity, 82% of respondents agreed that the exercise was enjoyable. Of the 5 patients who died before follow-up, baseline PPS, MAT-sf, and grip strength scores were 54% ± 9%, 43 ± 11, and 19 ± 8 kg, respectively. To date, of those who completed the 3-month study, declines in function (percentage change from baseline) were detected by all three tools (-15% ± 20% for PPS, -22% ± 3% for MAT-sf, and -21% ± 22% for grip strength).

**Conclusion:** Health systems may benefit from knowing that self-reported mobility using the MAT-sf is acceptable among hospice and palliative medicine patients and could be easily and effectively incorporated into home visits, particularly across a 3-month care period, to assist in decision making.

### POSTER PRESENTATIONS

#### Ammonia Tolerance of *Exophiala dermatitidis*: A Tale of Two Fungi

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**Background:** There is increasing recognition of the importance of fungal ammonia tolerance and production as virulence factors in the pathogenesis of opportunistic fungi in humans. Host tissue alkalization through ammonia release and carbon deprivation promote infection by some fungi.

**Purpose:** These experiments explored the ammonia tolerance of two additional ubiquitous potentially opportunistic fungal pathogens.

**Methods:** We previously reported isolation and identification of *Exophiala dermatitidis* from a human mouth in July 2019. A probable *Rhodotorula* species (by colony morphology and microscopic appearance) was isolated from live maple tree bark from a northern Wisconsin lakeshore in August 2020. Both fungi were isolated on Staib (birdseed) agar containing chloramphenicol and incubated in gas impermeable zip-lock bags at 35°–37°C. Matrix-assisted laser desorption/

ionization time-of-flight mass spectrometry (MALDI-TOF) was performed by ACL Laboratories. Strains were tested on urease agar; for ammonia tolerance on an ammonium sulfate, basic salts, low-glucose agar containing 4 mM NH<sub>3</sub> at 37°C (previously used to demonstrate ammonia tolerance in *Blastomyces*), and on a minimal salts/L-asparagine/maltose (initial disaccharide product of oral salivary amylase breakdown of starch) liquid media at 37°C.

**Results:** The *Rhodotorula* isolate was shown to be *R. mucilaginosa* by MALDI-TOF analysis. Others have identified some members of this genus to be ammonia tolerant. *E. dermatitidis* has not been reported to be ammonia tolerant. Both this strain and our *E. dermatitidis* were urease-positive at 35°–37°C. Both exhibited moderate growth at 37°C on 4 mM NH<sub>3</sub>/salts/low-glucose agar. In addition, *E. dermatitidis* exhibited moderate growth and increase in pH from 7.2 to 7.4 on liquid maltose/asparagine media at 37°C, suggesting potential ammonia production and release by this strain.

**Conclusion:** This is very preliminary in-vitro evidence of a novel finding of ammonia tolerance and release by *E. dermatitidis*. Further study, including in carbon-deprived environments, is needed for confirmation of these findings and to determine if these properties exist and enhance virulence of this opportunistic fungus.

### Implementation and Use of a Standardized Decision Tree for Decreasing Abdominal Hysterectomy Rates in a Large Hospital System

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**Background:** Minimally invasive hysterectomies (eg, vaginal/laparoscopic) reduce length of stay and postoperative recovery time when compared to abdominal hysterectomies. In 2017, a decision tree was disseminated among all gynecologic surgeons in our health system to guide route decision for benign disease in hopes of decreasing abdominal hysterectomies. By 2018, system rates had been reduced from 16.4% in 2016 to 7.9%.

**Purpose:** To characterize the relative knowledge and utilization of the decision tree by providers for route of hysterectomy decision.

**Methods:** All gynecologic providers (N=100) were asked to complete an anonymous 5-question survey. Respondents were excluded if they did not work within the system at

the time of decision tree implementation or perform a hysterectomy between June 1, 2017, and December 31, 2019. Survey responses were summarized using frequency statistics.

**Results:** Overall, 60 of 100 (60%) providers completed the survey; 52 (86.7%) were included following exclusions. When asked if they received information about the decision tree for determining route of hysterectomy, only 50% acknowledged receiving the decision tree. Among 52 providers, 21.2% knew how to access the decision tree and 25% thought they might know. Only 25% had utilized the decision tree.

**Conclusion:** While widely distributed to gynecologic providers, only one-quarter utilized the decision tree for route decision. Further examination on whether the tree truly was the driver for decreased abdominal hysterectomies or if there were other contributing factors (eg, retrospective quality reviews with surgeon) is warranted. We plan to retrospectively apply the decision tree to all abdominal hysterectomies to determine expected vs actual rates during the study period.

### Tofacitinib-Associated Adverse Vascular Events Reported to the FDA Adverse Event Reporting System (FAERS) Database

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**Background:** Tofacitinib, an intracellular tyrosine (Janus) kinase inhibitor, is approved by the U.S. Food and Drug Administration (FDA) for treatment of active rheumatoid arthritis, psoriatic arthritis, and ulcerative colitis. In 2019, the FDA released a safety alert for the risk of blood clots and death in patients receiving tofacitinib. In 2021, “black box warnings” were issued for low-dose (5 mg b.i.d.) and high-dose (10 mg b.i.d.) tofacitinib noting increased risk of serious heart-related adverse events (AEs) and cancer.

**Purpose:** To provide a summary of reporting trends concerning tofacitinib AEs, particularly those cardiovascular in nature, since the FDA boxed warning was first introduced in 2019 and to provide physicians with knowledge that allows them to more confidently manage clinical care for patients suffering from rheumatoid arthritis, psoriatic arthritis, and ulcerative colitis.

**Methods:** Federal Adverse Event Reporting System (FAERS) is a database of voluntarily reported AEs used for postmarketing surveillance of medications. We examined 8,863,077 FAERS reports from January 2018 to September 2021. Of these, there were 84,225 reports of tofacitinib-related AEs. Using MedDRA terminology,

reports of cardiovascular AEs emphasized in recent boxed warnings (pulmonary embolism, deep vein thrombosis, cerebral thrombosis, cerebral venous thrombosis, and cerebral vascular occlusion) were reviewed. There were 650 cardiovascular AEs reported in the study period. Demographics, cumulative dosage, indications for drug use, outcomes, reactions, and reporter trends were analyzed. Reporter odds ratio (ROR) for all reporting groups (physicians, lawyers, community, pharmacists, etc) were calculated. ROR of >1 indicates interference in reporting.

**Results:** The most common indication for tofacitinib was rheumatoid arthritis — 43,386 reports (52%). Hospitalization occurred in 10,182 of 84,225 (12.0%) reports. There were 3856 reports (5%) when tofacitinib was indicated for ulcerative colitis. A total of 42,671 AEs (51%) occurred in subjects 36–64 years old. Females represented 65,806 reports (78%). Physicians were 13% of reporters, while consumers were 59% of reporters (ROR: 1.52, 95% CI: 1.49–1.54). Lawyer reporting demonstrated a sharp rise in 2021. Lawyer reports accounted for 70 of 170 (41%) cardiovascular AEs in 2021 (ROR: 942, 95% CI: 505–1757).

**Conclusion:** Interference of the reporting of tofacitinib-related cardiovascular AEs to FAERS appears to be occurring, initially by excess consumer reporting and more recently by lawyers. The effect of reporting bias on the use of tofacitinib in the clinical setting requires further investigation.

### Addressing the Gap in Parenting Education for Pediatric Residents: An Interdisciplinary Interactive Curriculum Focused on Parenting Infants

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**Background:** Pediatric residents are viewed by parents as authorities in parenting and raising children. Therefore, pediatric residency education should include curricula that addresses this important role. However, this type of education is lacking in current pediatric residencies. According to an online survey distributed to members of the Association of Pediatric Program Directors, respondents noted it was “very important” to educate residents about parenting skills, but only 11% rated their program as doing so “very well.”

**Purpose:** A curriculum or avenue of exposure is needed during residency to address the gap between pediatric resident training in parenting and expectation of parenting expertise.

**Methods:** Our team created a 2-hour interactive and interdisciplinary infant parenting workshop for pediatric residents, delivered during the academic half-day. The workshop included 4 stations: 1) Car Seat Safety, led by a car seat safety technician; 2) Breastfeeding, led by lactation

consultants; 3) Formula and Feeding, led by speech therapists and registered dietitians; and 4) Parenting Tips and Tricks, led by resident and attending parents who presented swaddling techniques, toys, gadgets, and books. Residents were given preworkshop and postworkshop surveys to assess baseline and postworkshop self-reflective competencies.

**Results:** A total of 26 pediatric residents participated in the preworkshop survey, and 20 participated in the postworkshop survey. Wilcoxon signed-rank P-values for the overall analysis for 9 out of the 9 objectives showed a significant ( $P<0.05$ ) increase in resident self-reported confidence. Most notably, first-year residents found the most significant increase in 7 of the 9 objectives, as compared to the senior residents, who found 1 of 9 for second-year residents and 3 of 9 for third-year residents.

**Conclusion:** Our infant-parenting curriculum offers an interactive multidisciplinary approach to bridging the gap pediatric residents have between anticipatory guidance and realistic, applicable parenting advice. Within a single workshop, there was a significant increase in self-reported competencies in topics of infant feeding, car seat safety, and parenting resources. Our program also highlighted the success of resident small group learning with experts within various fields of pediatrics. Our initial results are also indicating that first-year residents will likely benefit the most from a workshop with this content, which may influence scheduling of similar workshops during the academic year. Next steps include 1) integrating this session into the program's 18-month curriculum, and 2) development of similar workshops for toddlers, children, and teenagers.

### Left Atrial Strain and Myocardial Work in Hypertension

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**Background:** Early diagnosis of hypertension is crucial for its control. Both left atrial strain (LAS) and global myocardial work index (GMWI) are novel measuring techniques of left ventricular function and have been shown to be altered in hypertension. This may aid in early detection. However, both LAS and GMWI are not currently utilized frequently in clinical settings and continue to be poorly studied.

**Purpose:** To assess whether LAS and GMWI are significantly different in patients with hypertension. Secondary endpoints include correlation of LAS and GMWI with each other and grades of hypertension.

**Methods:** We performed a retrospective analysis of 64 patients that underwent recent echocardiography, excluding

those with suboptimal imaging quality or when LAS or GMWI could not be calculated. Patients were divided into groups with and without hypertension. Those with hypertension were further subdivided into Elevated, Stage I, or Stage II groups based on American College of Cardiology guidelines. Statistical analysis was performed.

**Results:** Of the 64 patients, 44 (68.8%) had hypertension. Between those with and without hypertension, median LAS was not statistically significantly different in either 4-chamber (16% [interquartile range (IQR): 11–22] vs 20% [IQR: 11–26];  $P=0.32$ ) or 2-chamber (21% [IQR: 12–25] vs 26.5% [IQR: 13.5–31.5];  $P=0.19$ ) echocardiographic views. Mean GMWI also remained similar ( $1583.58 \pm 582.1$  vs  $1720.4 \pm 544.88$ ;  $P=0.39$ ) though breaking down the hypertensive patients by stages of hypertension yielded significant differences ( $1635.24 \pm 510.5$  for Elevated vs  $1376.41 \pm 559.1$  for Stage I vs  $1935.53 \pm 527.8$  for Stage II;  $P=0.023$ ). However, 4-chamber LAS and GMWI were weakly correlated ( $r=0.341$ ;  $P=0.011$ ).

**Conclusion:** Unlike findings from prior studies, our results demonstrate that LAS and GMWI are not significantly changed in those with hypertension. Elevation of these parameters on echocardiography warrants further evaluation. GMWI does change with hypertensive stages but does not appear to be predictive. There is also evidence that 4-chamber LAS and GMWI appear to be weakly positively correlated, meriting further study for clinical usage is needed.

### Cardiac Surgery as a Predictor of Cell-Mediated Immunity in Patients With 22q11.2 Deletion Syndrome

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**Background:** Patients with 22q11.2 deletion syndrome, a.k.a. DiGeorge syndrome (DGS), are known to have diminished thymic function or athymia, with close to 75% of cases having a concomitant cardiac anomaly. Given the reduction of thymic tissue, it is expected that patients will have reduced T-cell function and stunted cell-mediated immunity. Cardiac anomalies in DGS are surgically corrected within the first year of life and generally require the removal of thymic tissue to better access the underlying cardiac structures. As a result, these patients are often referred for immunologic screening tests to monitor T-cell activity in anticipation of development of a primary T-cell deficiency. Interestingly, studies have shown that only 2% of DGS patients have severe primary immunodeficiency. A portion of these patients had full athymia (previously known as complete DGS), and studies indicated a benefit for these patients to receive thymus transplants. The remainder of the

population showed decreased T-cell subsets, specifically in the first 2 years of life.

**Purpose:** To evaluate T-cell function in patients within the first 2 years of life with DGS and assess the role of cardiothoracic surgery as stressor for stunting cell-mediated immunity. This was done by measuring the difference between CD3, CD4, CD8, CD19, NK cells, CD45RA, and CD45RO levels (ARUP T-cell subset panel 6) in the first 2 years of life in patients who were diagnosed with DGS and comparing them to patients with DGS who did not undergo a cardiothoracic surgery.

**Methods:** This retrospective study was comprised of a total of 46 patients diagnosed DGS via fluorescence in situ hybridization (FISH); 24 of these patients underwent a cardiothoracic surgery, and 22 patients did not undergo any surgical procedure. Of the 24 patients who underwent cardiothoracic surgery, 9 patients had pre- and postsurgery data to directly compare changes in T-cell lines.

**Results:** Our results showed that there was no significant difference in any of the T-cell lines with the exception of CD4 in the control group. When comparing pre- and postsurgery T-cell levels, there was no significant change in lab values. For those patients who had T-cell levels that were below normal range, only 1 patient presented with frequent infections and was immunocompromised (suggesting true thymic aplasia with little extrathymic T-cell differentiation). Among patients who did not undergo cardiothoracic surgery, there was a significant decrease in CD4 percentage from the baseline ( $P=0.03$ ). This is likely due to a small population size. Removal of thymic tissue did not play a significant role in alteration of the cell-mediated immunity. When examining T-cell levels of patients past the age of 2 years in this study, only 1 patient was truly immunocompromised with no increase in T-cell levels. This can be correlated to the general population of DGS in which 2% of the population truly have stunted cell-mediated immunity.

**Conclusion:** It is likely that most patients with 22q11.2 deletion syndrome do not present with severe primary cell-mediated immunodeficiencies because their altered immune system compensates with extrathymic T-cell differentiation. Maintenance of cell-mediated immunity has been documented in patients with DGS who have undergone cardiac surgery in previous studies but never prior to age 2. A study assessing the long-term pattern of T-cell populations in DGS indicated that a deterioration of T-cell number or function did not occur overtime. Findings warrant further investigation with a larger population size. It would be beneficial to investigate T-cell levels in patients who underwent similar studies but were not diagnosed with DGS (who likely have less extrathymic T-cell differentiation). However, results of this novel retrospective study indicate that frequent testing of T-cell levels in the first 2 years of life for patients with DGS who have undergone cardiac surgery, a potential stressor on cell-mediated immunity, is not indicated.

## A Retrospective Review of Endoscopic Retrograde Cholangiopancreatography Performance Among the Pediatric Population in a Community Hospital Setting

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**Background:** Recent evidence suggests increases in pediatric hospitalizations for pancreaticobiliary disease and performance of therapeutic endoscopic retrograde cholangiopancreatography (ERCP). Historically, pediatric ERCP has been performed by nonpediatric gastroenterologists.

**Purpose:** There are limited data examining safety and outcomes of gastroenterology (GI) fellow participation in pediatric ERCP; our retrospective study explores GI fellow participation in this unique subgroup of patients.

**Methods:** ERCP cases performed in patients under 18 years of age within the Advocate Aurora Health system from January 1, 2010, to July 16, 2021, were reviewed. Patients were identified using the ERCP procedure billing code. All cases were analyzed for presenting symptoms, imaging, ERCP findings, post-ERCP complications, and outcomes. Patient demographics were summarized. Subgroup analysis was performed on cases with GI fellow participation. Two-tailed Fisher's exact test was performed on post-ERCP pancreatitis cases between those with and without fellow involvement.

**Results:** A total of 33 ERCP case procedures were identified; 81.8% were female and average age was  $14.9 \pm 3$  years. Average BMI was  $25.92 \pm 6.09$ . Caucasian represented the most common ethnicity ( $n=17$ , 60.71%) followed by African American ( $n=5$ , 17.86%) and Native American ( $n=5$ , 17.86%). Choledocholithiasis was the most common indication for ERCP ( $n=31$ , 93.9%), and gallstone pancreatitis was identified in 4 cases (12.1%). Complications occurred in 4 patients (12.1%) with all indicating post-ERCP pancreatitis. No cases resulted in mortality; 10 cases included GI fellow involvement. There were similar patient demographics with no statistically significant difference in average age among those with fellow involvement and those without. Preprocedure total bilirubin was higher in non-fellow-involved cases in comparison to fellow-involved cases ( $6.00 \pm 8.28$  vs  $1.45 \pm 0.61$ ), but laboratory findings were otherwise similar. Three cases (30%) of post-ERCP pancreatitis were identified in fellow-involved cases in comparison to 1 case in non-fellow-involved cases (4.35%);  $P=0.0726$ .

**Conclusion:** ERCP in the pediatric population is relatively rare compared to adults, and there are limited data to define training standards for this patient population. Our study identified a higher rate of post-ERCP pancreatitis in cases with GI fellow involvement. However, given case limitations, further research on GI fellow participation in pediatric ERCP cases is recommended.

## Closing the Gap in Preventive Care for Patients With Inflammatory Bowel Disease: A Systems-Based Approach

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**Background:** Despite being at higher risk for developing many preventable diseases, patients with inflammatory bowel disease (IBD) do not receive preventive care at the same rate as the general population. American College of Gastroenterology's 2017 Clinical Guideline on preventive care in IBD identified specific measures to guide appropriate preventive care in IBD. However, this care gap continues. Barriers to guideline adoption include determining who should provide a preventive service (eg, vaccinations, cancer screenings, smoking cessation): the gastroenterologist or the primary care physician?

**Purpose:** To identify patients with IBD in our outpatient IBD clinic who have a clear lack in preventive care, then offer preventive interventions during clinic visit to tackle disparity gap. Our goal is to have a 90% completion rate in 1 year.

**Methods:** For each IBD clinic patient lacking in previously defined quality measures, provide actionable counseling (for smoking cessation), appropriate referrals to primary care physician, dermatologist, etc, and adequate orders for completion of certain measures (DEXA scan, colonoscopy, vaccination against influenza virus and pneumococcal pneumonia), all of which are to be completed prior to patient leaving the clinic visit. Utilize metrics to identify successes and gaps in preventive care. Initiate new Plan-Do-Study-Act cycle as needed.

**Results:** Currently, preliminary data collection shows a clear need for intervention and expansion of scope for improvement within our IBD clinic at Aurora Sinai Medical Center, with nearly 50% of patients missing routine preventive screening measures such as DEXA scan, colonoscopy, influenza vaccine, pneumococcal vaccines, and referral to a dermatologist. A large portion of these patients also do not have an identified primary care provider, which may be contributing to this gap.

**Conclusion:** We hope postintervention data (collected in 3 months' time) reveal that said intervention has shown a significant improvement in the level of preventive care provided to patients with chronic medical conditions such as IBD. We hope to use a similar methodology to implement a systemwide change for patients with other chronic medical conditions who are lacking in primary health care.

## Medication-Induced Osteonecrosis of the Jaw: A Review of Cases From the FDA Adverse Event Reporting System (FAERS)

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**Background:** Osteonecrosis of the jaw (ONJ) is a rare but serious adverse drug reaction commonly associated with bisphosphonate and denosumab therapy. Prior research utilized an online, public database, the U.S. Food and Drug Administration (FDA) Adverse Event System (FAERS), to explore this serious side effect further. Their data identified and described several novel medications associated with ONJ.

**Purpose:** To build upon prior findings by reporting trends over time and identifying newly described associations, allowing for increased global awareness of medication effects, and to reemphasize the importance of routine dental screenings and proper oral hygiene.

**Methods:** We searched the FAERS database for all reported cases of medication-related ONJ from 2010 to 2021. Cases lacking patient age or gender were excluded. Only adults (18+ years of age) and reports from Health Care Professions were included. Duplicate cases were removed. The top 20 medications were identified and described for April 2010–December 2014 and April 2015–January 2021.

**Results:** A total of 19,668 cases of ONJ were reported to the FAERS database from 2010 to 2021. Of these, 8908 cases met inclusion criteria, with 3132 cases from 2010–2014 and 5776 cases from 2015–2021. Within the 2010–2014 cases, 64.7% were female, 35.3% were male, and average age was  $66.1 \pm 11.1$  years. Over the 2015–2021 period, 64.3% were female, 35.7% were male, and average age was  $69.2 \pm 11.5$  years. Review of the 2010–2014 data identified several medications and drug classes associated with ONJ not previously described. They include lenalidomide, corticosteroids (prednisolone and dexamethasone), docetaxel and paclitaxel, letrozole, methothrexate, imatinib, and teriparatide. Novel drugs and classes described during 2015–2021 include palbociclib, pomalidomide, radium 223, nivolumab, and cabozantinib.

**Conclusion:** With stricter inclusion criteria and removal of duplicate cases leading to fewer overall identified cases of medication-related ONJ when compared to prior research, our data set represents a more reliable analysis of medication-related ONJ reports to the FAERS database. Denosumab was the most frequently reported medication associated with ONJ. While unable to imply incidence rates due to the nature of the FAERS database, our findings provide further description of the various medications associated with ONJ and elucidate patient demographics associated with the adverse drug reaction.

## Pediatric Visual Acuity Quality Improvement Project

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**Background:** Visual acuity refers to the ability to discern the shapes and details of viewed objects and is one factor involved in overall vision. Visual acuity testing is critical in evaluating the need for further ophthalmological intervention ranging from corrective lenses to referral to an ophthalmologist. It is common for patients to only undergo this testing at scheduled pediatric annual examinations. However, recommendations regarding routine screening are not consistent among medical societies. We suspected that this screening was underperformed, which led to the creation of a quality improvement study with a goal of including visual acuity testing as part of every pediatric annual examination from age 5 to 18 years in hopes of providing the best medical care to our patients using the recommended screening guidelines.

**Purpose:** To ensure that appropriate recommended pediatric populations received visual acuity screening as well as develop a consistent and easy-to-execute workflow for visual acuity screening in the clinic.

**Methods:** We obtained data from a Slicer Dicer report via our electronic medical record software (Epic). The first value obtained was the total number of pediatric well-child visits and sports preparticipation physicals from 5 to 18 years of age that had visual acuity testing performed. We compared this number with the total possible visits this screening could have been performed to calculate a percentage. We checked these data at 3, 6, 9, and 12 months to track potential progress in this vital screening modality in the primary care setting.

**Results:** During October 1–December 31, 2020, there were 334 eligible patients and 22 (6.6%) patients screened. During January 1–March 31, 2021, there were 207 eligible patients and 37 (17.9%) patients screened. During April 1–June 30, 2021, there were 264 eligible patients and 97 (36.7%) patients screened. During July 1–September 30, 2021, there were 663 eligible patients and 363 (54.8%) patients screened.

**Conclusion:** We have continued to see improvement in the number of pediatric visual acuity screens being completed. However, despite the improvement in overall percentage, we are still remote from our goal of 100%. Based on the current trajectory, we anticipate we will be close to achieving this goal by the end of 2022. For the next year, in addition to continued reminders to our clinic staff, we plan to incorporate a dot phrase in our Epic note templates for all well-child exams in the 15–18-year age group, which requires providers to address vision screening completion and provide reasoning for noncompletion.

## Psychiatric Collaborative Care Model for Family Medicine Clinic

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**Background:** The goal of this quality improvement project was to create a method for the family medicine (FM) clinic to consult with the psychiatry clinic to assist with psychiatry patient cases. Prior to this project, there was no consultation service in place. If FM residents needed assistance with their patients, they would refer them to psychiatric services, but there was no direct communication between teams. Previous research has shown that a collaborative care model for mental health teams was associated with reductions in mental health hospitalizations and cost savings and that more patients had a decrease in depression symptoms once collaborative models were put in place.

**Purpose:** To create a process for the FM clinic to consult psychiatry to assist with its outpatients, with goals of creating more access for patients to see psychiatry services and providing support for the FM clinic to continue implementing the psychiatric plan set in place for patients.

**Methods:** FM clinic contacts the psychiatry clinic with a consult for assessment. The co-investigator does a short chart review to ensure the consult is appropriate. The patient is called to schedule an appointment. Psychiatry residents see this patient for 1 to 2 visits. This is communicated back to the FM residents through Epic, who continue the plan as specified by psychiatry. A survey was sent out 1 month into the process and 6 months into the process to evaluate psychiatry and FM residents' satisfaction and learning.

**Results:** This was a 6-month study, with n=15 consulted patients and n=13 who participated after being called to schedule an appointment. Surveys of psychiatry and FM residents were conducted at 1 and 6 months. Surveys showed that FM residents had more confidence in treating their patients from the 1- to 6-month marks (22.2% to 90% confidence, respectively). FM residents showed improvement in psychiatry diagnosis knowledge (44.4% to 70%, respectively) and knowledge of psychiatry treatment plans (33.3% to 80%, respectively). Both FM (80%) and psychiatry (100%) residents believed the study was helpful for their patients.

**Conclusion:** This study showed the benefit of creating a psychiatric collaborative care model for FM residents. It created access to psychiatric care for more patients, assisted FM residents in treating their patients, and provided education for residents. This could potentially decrease mental health hospitalizations and frequency of appointments, thereby decreasing costs to patients and hospitals.

## Medications and Gene Interactions in Patients With Delirium

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**Background:** Cytochrome P450 metabolism is typically responsible for converting medications to compounds that are more water-soluble and more easily excreted. Genetic variations of cytochrome P450 enzymes may affect metabolism of medications, manifesting phenotypically as ranging from "poor" to "extensive" metabolizers. The P450 enzyme families with major CYP genetic polymorphisms are CYP2D6, CYP2C19, and CYP2C9. Medications themselves also may affect the activity of these enzymes, producing complex interactions between an individual's P450 enzyme activities and drugs that modify those activities. Both mechanisms may contribute to medication-induced delirium.

**Purpose:** To examine whether patients with delirium have a higher prevalence of cytochrome P450 drug-phenotype interactions compared to patients without delirium.

**Methods:** Study sample included 13 patients (8 patients in delirium group, 5 patients in control group). Patients were included if they had diagnosis of a stroke without aphasia, nontraumatic spinal cord injury, or cardiac surgery. Study duration was from February 2019 to June 2020. Interventions included the University of California, San Diego Brief Assessment of Capacity to Consent (UBACC) decision capacity tool, the short version of Informant Questionnaire for Cognitive Decline in the Elderly (IQCODE) dementia screening, delirium severity assessment by using the Delirium Rating Scale (DRS)-98, and blood samples for cytochrome CYP2D6 and CYP2C19 isoenzyme genetic testing.

**Results:** We identified 2 patients in the delirium group with CYP2D6 drug-phenotype interaction due to metoprolol. In addition, 1 patient in delirium group had fluoxetine and metoprolol drug-drug interaction. There were no control subjects with drug-phenotype or drug-drug interaction associated with metoprolol.

**Conclusion:** Cytochrome P450 genotyping and phenotyping may play a role in the prevention of delirium by providing additional information to guide safer medication prescribing.

## Comparison of Functional Outcomes in Early vs Delayed Administration of Alteplase for Acute Ischemic Stroke in the Emergency Department

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**Background:** Alteplase is a U.S. Food and Drug Administration (FDA)-approved thrombolytic indicated in acute ischemic stroke if administered within 4.5 hours of symptom onset. It is speculated that earlier administration of alteplase leads to improved patient outcomes, however, the optimal time window is uncertain. Although recent literature has demonstrated a door-to-needle time of <45 minutes improves patient mortality outcomes, this does not account for outcomes related to quality of life.

**Purpose:** To evaluate the difference in a patient's functional status at the time of discharge when alteplase is administered early (<45 minutes) compared to delayed ( $\geq 45$  minutes) from time of hospital arrival.

**Methods:** This retrospective cohort study captured 143 adult patients who received alteplase within 4.5 hours of symptom onset in the emergency department at Advocate Christ Medical Center following diagnosis of acute ischemic stroke between December 1, 2018, and March 22, 2022. The study excluded 57 patients for either receiving alteplase as an inpatient, having poor baseline functional status defined as modified Rankin Scale (mRS) of  $>2$ , or missing a documented mRS at discharge. Included patients were separated as those who received alteplase at <45 minutes vs  $\geq 45$  minutes from hospital arrival. The primary endpoint evaluated was good functional status on hospital discharge, defined as mRS of  $<2$ . Secondary endpoints include readmission for stroke or cardiac-related events, reasons for alteplase delay, and incidence of intracranial hemorrhage (ICH). Statistical analyses utilized chi-squared and Fisher's exact tests for categorical data, and Student's *t*-tests and Wilcoxon tests for all continuous data.

**Results:** Among the 143 patients who received alteplase for acute ischemic stroke in the emergency department, the median age was 64.5 years and 49.5% were male. As expected, the early administration group (<45 minutes) had shorter median door-to-needle and onset-to-needle times in minutes (35.5 vs 63 and 79 vs 119, respectively). For the primary outcome of mRS $<2$  at discharge, there was no difference between the early and delayed administration groups (31.4% vs 31.5%;  $P=0.9920$ ). Neuroimaging and obtaining consent were the biggest factors for alteplase delay. Incidence of any ICH was more common in the early administration group (21.4% vs 9.6%;  $P=0.0498$ ).

**Conclusion:** Early, as opposed to delayed, administration of alteplase for patients with acute ischemic stroke resulted in no difference in functional outcome at hospital discharge, with an increased incidence of ICH in the early administration group.

## Comparison of Esmolol and Labetalol in Acute Aortic Dissection

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**Background:** Acute aortic dissection is a medical emergency requiring immediate medical intervention. American Heart Association guidelines recommend patients have a controlled heart rate (HR) of less than 60 beats per minute (bpm) and systolic blood pressure (SBP) of  $<120$  mmHg. Beta blockers are recommended to achieve this. There are currently no studies looking at the comparison of esmolol and labetalol.

**Purpose:** To evaluate the efficacy of the HR-lowering effects for patients with acute aortic dissection.

**Methods:** This institutional review board-approved, retrospective chart review included patients treated in the Advocate Christ Medical Center emergency department between January 1, 2016, and January 1, 2022. Patients were included if they were at least 18 years of age with an acute aortic dissection confirmed with imaging and had received intravenous esmolol or labetalol. Patients were excluded if they did not have postadministration vitals at 30 minutes, were pregnant, were transferred from outside facility, had traumatic dissection, or were incarcerated. The primary endpoint was time to goal HR less than 60 bpm. Secondary outcomes include time to HR less than 80 bpm, median HR reduction at 30, 60, and 120 minutes, time to SBP of  $<120$  mmHg, need for additional agents, survival to hospital discharge, and 30-day survival. Continuous data were analyzed using Wilcoxon signed-rank test, while categorical data were evaluated with chi-squared or Fisher's exact test.

**Results:** After exclusion, 59 patients were included in the esmolol group and 12 in the labetalol group. Primary outcome occurred in 16 patients (27.1%) in the esmolol group compared to 5 patients (41.7%) in the labetalol group. Time to primary outcome was 95 minutes (49–214) for esmolol vs 105 minutes (19–122) for labetalol. In all, 49 patients (83%) in the esmolol group achieved a HR of less than 80 bpm compared to 9 patients (75%) in the labetalol group. This hemostatic control was achieved in 28 minutes (0–113) in the esmolol group compared to 13 minutes (10–

16) in the labetalol group. There was no difference in time to SBP of <120 mmHg, achievement of SBP of <120 mmHg, median HR reductions, or survival.

**Conclusion:** Data suggested more patients on esmolol reached HR and SBP goals, while patients on labetalol trended toward reaching HR and SBP goals faster. However, there was no statistically significant difference observed in hemostatic control, safety outcomes, and mortality benefits.

### **Evaluation of Missed Doses of Pharmacologic Venous Thromboembolism Prophylaxis and the Incidence of Venous Thromboembolism in Patients With Traumatic Orthopedic Injuries**

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**Background:** Venous thromboembolism (VTE) is a complication that can occur due to injury. It has been extensively studied and documented that physical trauma places patients in a hypercoagulable state and at increased risk of VTE. Previously, VTE prophylaxis for all trauma patients undergoing orthopedic surgery at Advocate Christ Medical Center (ACMC) was administered without interruption. More recently, all trauma patients at ACMC undergoing orthopedic surgery have had their VTE prophylaxis dose held immediately before surgery. There are limited data on the impact of missed prophylactic doses on trauma patients.

**Purpose:** To examine the relationship between missed prophylactic enoxaparin doses and rates of VTE formation in the orthopedic trauma population at ACMC.

**Methods:** This single-center, retrospective review evaluated trauma patients admitted to ACMC using the trauma registry and electronic medical records from January 1, 2010, to July 31, 2021. They were included in the study if they were admitted to the trauma service with an orthopedic injury, greater than 18 years old, underwent orthopedic surgery, and received enoxaparin during their hospital stay. Patients were excluded if they were pregnant, had a history of VTE, received therapeutic anticoagulation preinjury, or had contraindications to VTE prophylaxis. The primary endpoint was incidence of VTE. Secondary endpoint was the incidence of bleeding complications.

**Results:** A total of 79 patients were included — 3 who developed VTE, 76 who did not. Of the 79 patients, 61 (77%) experienced interruption in enoxaparin prophylaxis. A 0% VTE rate was observed in the uninterrupted therapy group. Median (interquartile range) number of missed doses of VTE prophylaxis was 1 (1–3) in the no VTE group compared with 3 (2–7) in the VTE group (P=0.08). There was a statistically significant increase in the median hospital length of stay in the VTE group compared to the no VTE group (12 [12–19] vs 5 [3–8]; P=0.01). There was no statistically significant difference in coagulation variables between the two groups; 16.7% of patients in the uninterrupted group required an intervention due to bleeding compared to the 0.03% of patients in the interrupted therapy group.

**Conclusion:** Uninterrupted VTE prophylaxis should be considered in trauma patients undergoing orthopedic surgery to reduce the VTE risk without an increase in bleeding risk.

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