Resident	Primary Investigator	Co-Investigators	Project Title	Results and Findings
Rachel Larmer – PGY1 Community	Matthew Sodor	Julianne Wallace	Impact of outpatient pharmacist interventions in ACO "High Utilization" patients with chronic kidney disease	This was a retrospective cohort study of the initial Accountable Care Organization (ACO) patient cohort identified as “high utilizers” with Chronic Kidney Disease (CKD) by ACO leadership according to their metrics. The goal of this study was to evaluate the impact of the new outpatient pharmacy ACO CKD Outreach service on acute hospital utilization. Of the initial 253 patients screened, 116 were successfully contacted and completed the medication review performed by an outpatient pharmacist between February and July 2022. These patients had been diagnosed with CKD for a median 3.6 years, with a median number of disease states and active medications of 17 and 16, respectively. A total of 49 barriers to treatment and 51 drug therapy problems were identified in 116 patients. The median time to medication review was 6.2 days from consult placement by the ACO Care Coordinator, well within the 14-day goal. The majority (50%) of reviews lasted an estimated 15-30 minutes, and 34.5% of reviews lasted an estimated 30-60 minutes. Only 13 patients (11.2%) received a subsequent follow-up encounter by the pharmacist. For the composite primary outcome of acute hospital utilization (emergency department (ED) and inpatient hospital (IP) admissions), there were less patients with utilization in the 90 days post-medication review compared to the 90 days prior [59 (50.9%) vs. 50 (43.1%)]. This led to a number needed to treat (NNT) of 13 patients and a 15% lower relative risk (RR) after intervention (RR 0.85, 95% CI 0.64-1.12). Similar findings were seen for the secondary outcomes of emergency department admissions alone [26 (22.4%) patients with an ED admission in the 90 days prior vs. 16 (13.8%) in the 90 days post-intervention, NNT = 12, RR 0.62 (95% CI 0.35-1.08)] and inpatient hospital admissions alone [44 (37.9%) patients with an IP admission in the 90 days prior vs. 40 (34.5%) in the 90 days post-intervention, NNT = 30, RR 0.91 (95% CI 0.65-1.28)]. In conclusion, we observed a lower risk of acute hospital utilization in the high utilizer patients after receiving a pharmacist-led medication review, and pharmacists identified many actionable barriers to treatment and drug therapy problems.
Trate DeVolld – PGY1 Pharmacy Practice	Stephanie Ciapala, PharmD	Nicole Palm, PharmD Ramara Walker, PharmD Bethany Bandi, PA-C Arielle Kanters, MD	Adherence to Institutional Antimicrobial Prophylaxis Guidelines in Patients Undergoing Non-Emergent Colectomy	Colorectal surgery accounts for the highest rate of surgical site infections (SSIs) in the United States, which are associated with worse patient outcomes and a significant economic burden. Recent evidence shows significant non-adherence to guideline recommended prophylactic antimicrobials. Our study was a retrospective, observational assessment of patients 18 years or older receiving a non-emergent colectomy between January 1, 2021 and December 31, 2021. Patients with active infections or experiencing sepsis, receiving immunosuppression or chemotherapy, and those undergoing concurrent procedures, or those meeting systemic inflammatory response syndrome, sepsis, or septic shock criteria were excluded. Of the 1,277 colectomies performed during the study timeframe, three-hundred and twenty-nine patients were included with a guideline-concordance rate of 80.9%. There were no significant differences in patient demographics, comorbidities, renal function, or previous culture results between the two groups. Select differences noted between groups (guideline-concordant versus guideline-discordant) were increased rates of transfusions (P = 0.04), penicillin allergy (P = 0.04), open operative approach (P = 0.001), post-operative renal insufficiency (P = 0.02), length of operation (P = 0.002), intensive care unit admission (P = 0.01), and length of stay (P <0.001) in patients receiving guideline-discordant therapy. There was no noted difference in the rate of SSIs (P = 0.50) based on guideline concordance. When comparing previous data published by our institution, adherence to antimicrobial prophylaxis has decreased in the last several years, but SSI rate remain similar. This finding was expected, as most patients receiving guideline-discordant therapy were receiving broader agents or extended durations of prophylaxis than necessary. In conclusion, we identified several characteristics that may be more common in patients receiving guideline-discordant therapy. These findings can help drive targeted stewardship efforts in specific patients and provide an opportunity to reduce our current discordance of over 19% and limit antimicrobial exposure and side effect potential.
Emma Gerthoffer – PGY1 Pharmacy Practice	Katie Rivard	Janet Wu Heather Daniles, DO	Duration of Antimicrobial Therapy in Outpatient Pediatric CAP	CCHS adjusted the default antibiotic duration from 10 days to 5 days for the outpatient pediatric community-acquired pneumonia (CAP) order panel. The objective of this retrospective study was to compare the median duration of antibiotic therapy prescribed and clinical outcomes pre- and post-adjusted default duration. A total of 96 patients were included in the pre-group and 232 patients were included in the post-group. The median duration prescribed aligned with the default duration during that time (10 days in the pre-group vs. 5 days in the post-group). There were no differences in pediatrician follow-up appointments, emergency department visits, hospitalizations, and extensions or escalation of antibiotic therapy between the two groups.

Megan LoFaso – PGY1 Pharmacy Practice	Andrea Pallotta	Stephanie Bass, Heather Torbic, Olivia Marchonda	Review of crushed Antiretroviral therapy with a focus on dolutegravir + Descovy	This was a retrospective cohort study of a large database of patients in a health system. Adult PLWH unable to take medications by mouth receiving dolutegravir- or bictegravir-based ART and admitted to an intensive care unit between July 1, 2020 and June 30, 2022 were eligible for screening. Two-hundred thirty-two (232) patients were assessed for eligibility between July 1, 2020 and June 30, 2022; 179 patients were excluded. Fifty-three (N = 53) patients were included in the primary analysis population; of these patients 37 (69.8%) received a crushed regimen of containing dolutegravir and 16 (30.2%) received a crushed regimen containing bictegravir. In the whole population, 43.4% of patients received all crushed doses appropriately with 91 (14.5%) total missed doses. A median of 6.7% (IQR, 0 – 27.3) of ART doses were missed per patient. Of the patients that missed doses, a high percentage were intubated for > 5 days, a statistically significant finding. Four virologically suppressed patients receiving dolutegravir-based ART were able to maintain viral suppression after receiving short course crushed ART. In the three patients not virologically suppressed at baseline, two achieved virologic suppression at last follow up and one had a viral load of 785 copies/mL at week 13 after crushed therapy. Overall, these results show that while the majority of patients at our institution experience an interruption of therapy, this interruption is short. Also, this study offers further support on the crushing of dolutegravir and bictegravir-based ART through the small analysis of 7 patients which show that short courses can lead to or maintain viral suppression. Further trials should be conducted to validate the results of this study.
Gabriella Lorusso – PGY1 Pharmacy Practice	Danielle Marut	Grace Conroy, Christine Ahrens	Management of Vasospasms in aneurysmal Subarachnoid Hemorrhage	This was a retrospective, observational study that included patients admitted to the Cleveland Clinic Main Campus Neurological ICU who received pharmacological intervention for vasospasm related to aSAH from August 1st, 2017, to July 31st, 2022. There were 23 patients included in the analysis. The mean age of the population was 59.9 years ± 13.98 and the majority of the population was female (65.2%). Patients most frequently received a combination of all four treatment strategies included in the analysis. Of the 23 patients included, 8 (34.8%) received a combination of blood pressure augmentation, IV vasodilators, IVT vasodilators, and endovascular interventions. Blood pressure augmentation was most often utilized as the first line intervention (52.2%). The most administered medications were continuous infusions of norepinephrine and milrinone, which were each used at a frequency of 78.3%. The majority of patients had improved or the same Glasgow Coma Scale score from the start of therapy to discontinuation of therapy or discharge (60.9%), and there were no trends observed between a specific management strategy and improved or worsened ischemic and neurological changes. Overall, there was variability observed in the management strategies of vasospasm secondary to aSAH within the institution. These results highlight the need for additional randomized, prospective trials to better understand best practices in the management of vasospasm secondary to aSAH.
Vivian Nguyen – PGY1 Pharmacy Practice	Grace Conroy	Danielle Marut, Catherine Hassett, DO	Low-dose versus High-dose of Fludrocortisone in Hyponatremia Associated with Aneurysmal Subarachnoid Hemorrhage	Hyponatremia can occur in up to 73% of patients following aSAH. Guidelines inconsistently recommend the use of fludrocortisone (FCT) to prevent or correct hyponatremia. Our study aimed to assess the efficacy and safety of low-dose FCT compared to high-dose FCT. Our study screened 134 patients and included 48 patients, 24 in each group. Most patients were normonatremic with polyuria prior to FCT initiation. The low-dose group had a significantly lower modified Fisher's scale and a lower baseline urine output compared to the high-dose group. For the primary outcome, the low-dose group had a greater absolute change in serum sodium levels within the first 48 hours compared to the high-dose dose group (2 mEq/L [IQR 0.5 – 4.0] vs. 0 mEq/L [IQR -1.5 – 2.5], p=0.04). After adjustment, patients in the low-dose group were associated with an increase of 2.8 mEq/L [95% CI, 0.4 – 5.2, p=0.02] in sodium level after 48 hours compared to those in the high-dose group. Key secondary objectives included patients who required dose escalation after 48 hours, restoration of normonatremia within 48 and 72 hours, difference in amount of sodium and fluid supplementation within the first 48 hours, and new-onset development of hypokalemia. No differences in secondary outcomes were found, except that patients in the low-dose group received a significantly lower amount of sodium and fluid supplementation. This study suggested (1) providers might be using FCT more for prevention than treatment of hyponatremia, (2) there could be a ceiling effect to doses above 0.4 mg, and (3) larger prospective studies with well-balanced cohorts are needed to determine the clinical significance of the primary outcome finding.

Meaghan Rettele – PGY1 Pharmacy Practice	Danielle Marut	Grace Conroy; Adam Barron, MD	Hemodynamic effects of continuous infusion midazolam in refractory status epilepticus	Although there is a paucity of evidence describing the effects of therapies for refractory status epilepticus (RSE), the use of continuous infusion midazolam (cIV-MDZ) may be associated with less hemodynamic instability than other anesthetics. The primary objective of our evaluation was to determine the proportion of patients receiving cIV-MDZ that developed hemodynamic compromise, defined as the initiation or escalation of vasopressor requirements. Secondary objectives included comparing cIV-MDZ exposures and clinical outcomes in those that developed hemodynamic compromise to those that did not, including maximum cIV-MDZ dose and duration, intensive care unit (ICU) and hospital length of stay (LOS), seizure recurrence during hospitalization, and mortality. Out of one hundred and twelve patients evaluated, seventy-six patients developed hemodynamic compromise (67.9%) and thirty-six did not (32.1%). Patients that developed hemodynamic compromise received higher maximum doses of cIV-MDZ (mean 0.88 vs. 0.55 mg/kg/hr, P<0.001) and longer durations of cIV-MDZ (median 2.5 vs. 1.5 days, P<0.001). ICU and hospital LOS were longer in patients that developed hemodynamic compromise (median 13.7 vs. 8.9 ICU days [P=0.05] and 21.2 vs. 13.3 hospital days [P<0.01], respectively). Seizure recurrence and mortality rates did not differ significantly between groups (seizure recurrence 34.2% vs. 25% [P=0.33], mortality 23.7% vs. 19.4% [P=0.62]). Our results may be used to guide further studies seeking to optimize cIV-MDZ doses for efficacy while minimizing adverse effects.
Courtney Urzen – PGY1 Pharmacy Practice	Xhilda Xhemali	Kristen Neuhaus and Jennifer Hockings	Letermovir for the Prevention and Treatment of Cytomegalovirus Infection in Solid Organ Transplant Recipients	A total of 45 patients and 52 courses of letermovir were included in the study. Of the 45 prophylactic courses, 27% experienced breakthrough. Zero treatment courses experienced refractory infection. A total of 13.5% of all letermovir courses were discontinued due to therapy failure, with no letermovir resistance identified. No letermovir associated adverse effects leading to discontinuation were documented. Our study shows letermovir to potentially be an alternative option for SOT recipients who are unable to tolerate or who have resistance to traditional CMV therapeutics.
Maybeth James – PGY1 HSPAL	Chris Snyder	Jeff Ketz and Matt Campbell	Dextrose 50% bolus vs. Dextrose 10% bolus infusion for hypoglycemia and hyperkalemia	A total of 356 patients who received D10 and 382 patients received D50 were included in this analysis. This retrospective, cohort, non-interventional study found that patients receiving D50 had significantly less incidence of hypoglycemia within the first hour and through six hours after administration. Patients who received D50 were less likely to receive an additional dextrose dose within six hours to maintain glycemic control. While D10 was established as a safe alternative, there may be evidence to support D50 as the treatment of choice when drug shortages are not a concern. More data is needed to compare the two treatments at the optimal time window after administration. This study suggests that D50 may be preferred to D10 in the management of hypoglycemia. Hyperkalemia data was also reviewed and later determined to narrow the project in scope for purposes of publication and elimination of confounding factors.
Gilnou Pamphile – PGY1 HSPAL	Mike Militello	Ashley Kasper, Rigelsky, Rose, Tamara Parker-Davis	Evaluation of a nursing driven Bivalirudin EPIC calculator	This is an observational evaluation of time to therapeutic aPTTs in patients treated with bivalirudin using the nurse driven nomogram calculator compared to historical patients dosed by vascular medicine providers at CCHS. A total of 53 patients were included in the pre-nomogram group (January 1, 2022-September 26, 2022) and 43 patients in the post-nomogram group (September 27, 2022-December 31, 2022). The median time to therapeutic aPTT (hrs) in the pre-nomogram group was 6.93 (2.41-16.3) compared to the post-nomogram group 5.33 (2.32-12.9). The use of the bivalirudin nurse-driven nomogram was similar to provider bivalirudin dosing management in achieving therapeutic aPTTs.
Claire Lin – PGY1 Pharmacotherapy	Jess Ward	Mike Militello, Ben Hohlfelder. Dr. Kevin Hodges	Post-Cardiac Surgery Protamine Use	A retrospective matched cohort study was conducted to assess the impact of post-operative protamine administration on chest tube output (CTOP) and activated partial thromboplastin time (aPTT). All adult patients who received protamine once within 8 hours of ICU admission after cardiac surgery with CPB from January 1st, 2019 to January 1st, 2022 were included. Patients with heart/lung transplant, left ventricular device placement surgery, descending or distal aortic procedures, mechanical circulatory support requirement, hemophilia, Von Willibrand disease, lupus anticoagulant and severe thrombocytopenia on baseline (platelet < 100,000/uL) were excluded. Patients were stratified according to pre-treatment aPTT [minimally elevated aPTT (ME, 33 to ≤ 45 seconds), elevated aPTT (EL, > 45 seconds)] and matched 1:1 based on surgery type, age and time from ICU admission to protamine dose. After matching, 372 patients were included in the final analysis. Most patients underwent elective cardiac surgery with primary sternotomy. Average CTOP decreased within 2 hours of protamine administration by 15 mL/hr in the ME group and by 11 mL/hr in the EL group. Both groups had normalized aPTT within the same time frame. Elevated aPTT prior to protamine administration was not significantly associated with CTOP decrease in multivariable analysis. Protamine administration was associated with aPTT correction and CTOP decrease. No patients with aPTT >33 seconds experienced paradoxical anticoagulation.

Sarah Crisp PGY2 Pharmacotherapy - Large	Pooja Cerrato	Andrea Pallotta, Nabin Shrestha, Janet Wu, Christine Ahrens, Seth Bauer	Predictive Models for Vancomycin Troughs in Adults	Vancomycin is a first line treatment for Gram-positive infections. Predicting sub-therapeutic and supra-therapeutic troughs would limit complications. Four predictive models (original logistic regression, K-nearest neighbors, neural network, and extreme gradient boosting) based on age, creatinine clearance, and vancomycin indication were developed and tested to predict empiric vancomycin trough classifications (sub-therapeutic, therapeutic, and supra-therapeutic). Each of the models had poor vancomycin trough classifications for empiric regimens (accuracy from 55 to 58%). The models developed poorly classify empiric vancomycin trough levels, likely due to the higher proportion of therapeutic cases in the cohort. Additionally, the covariates incorporated may have different effects when discriminating between sub-therapeutic patients and others vs. supra-therapeutic patients and others. Additional studies are needed to develop more accurate models to appropriately manage vancomycin therapy using trough based monitoring.
Sarah Crisp PGY2 Pharmacotherapy – Small	Xhilda Xhemali	Hem/Onc Pharmacist (TBD)	ESBL Prevalence in Hematologic Malignancies	The goal of this quality assessment project was to determine the incidence of ESBL positive blood cultures in patients with hematologic malignancies at Cleveland Clinic Main Campus and describe common patient characteristics and empiric antibiotic therapy in the study population. The overall incidence of ESBL blood stream infections was 16% in this patient population. The majority of the patients had a bone marrow transplant (78.5%) which was most commonly an allogeneic transplant (88%). *E.coli* (43%) and *K. penumoniae* (36%) were the most commonly isolated bacteria, with CTX-M (74%) being the most common resistance gene reported. Patients also commonly had central lines present (98%) at the time of the positive blood culture which was most commonly a Hickman catheter (93%). The majority of patients were empirically initiated on piperacillin/tazobactam and then changed to effective therapy with meropenem.
Courtney Fornwald PGY2 Ambulatory Care – Large	Taylor Hermiller	Gia Russo-Alvarez, Elizabeth Zeleznikar, Nicole McCorkindale, Marcie Parker, Dr. Pantalone	Endocrinology/Primary Care Clinical Pharmacy Collaboration versus Standard Endocrinology care alone on A1c outcomes in patients with Type 2 Diabetes and A1c >9%	A retrospective, observational cohort study was conducted to assess if primary care pharmacists in collaboration with endocrinology results in a greater reduction of A1c in patients with type T2D and A1c >9% vs versus endocrinology alone. A total of 418 patients were included in the analysis (22 Endo/PharmD, 396 Endo). Patients were included if they had a follow-up A1c 6 months (+/- 90 days) from index date and completed at least one scheduled visit with an endocrinology provider during the study period. Patients managed by endocrinology/primary care PharmD collaboration were compared to those that received endocrinology care alone. The primary outcome compared the change in A1c between groups 6 months following the initial visit. Secondary outcomes evaluated the total number of completed visits and the percentage of patients who reached A1c levels of <6.5%, <7%, <8%, and <9% at 6 months. The change in follow-up A1c was not significantly different between groups at 6 months (-0.481 % (SE 0.396); p=0.6179). Endocrinology/primary care pharmacist collaboration patients had significantly more provider visits during the 6-month study period (5.3±2.3 vs 2.3±1.2; p <0.001). No significant difference was observed between A1c levels reached between groups at 6 months. This study shows the collaboration between primary care pharmacists and endocrinology providers was being underutilized, however was associated with a trend towards greater A1c reduction in patients with T2D and A1c >9%. Further investigation, after more patients undergo Endo/PharmD collaboration, is necessary to determine the impact of such collaboration on change in A1c and A1c goal attainment.
Antonietta Paneccasio PGY2 Ambulatory Care – Large	Gina Ayers	Anna Bondar, Emily Fargo, Marcie Parker	Pharmacist Interventions for Older Adults with Polypharmacy	A single-center, noninterventional, retrospective review was conducted to describe the drug-related problems (DRPs) identified and resolved by the board-certified geriatrics pharmacist in older adults with polypharmacy. Patients were included if referred to geriatric ambulatory clinic pharmacy services for polypharmacy and completed their initial visit with the pharmacist between September 2021 and August 2022. A total of 137 patients met inclusion for analysis; 82% of the study population had cognitive impairment present. During the 137 initial visits with the pharmacist, a total of 494 DRPs were identified and 54% of these were resolved during the initial visit. All visits resulted in at least one pharmacist identified intervention. The most common DRP identified was unnecessary drug therapy (38.6%). Of the 313 medications identified as eligible for deprescribing, 141 medications (45%) were deprescribed by the pharmacist during the initial visit; at least one medication was deprescribed during each initial visit. The results of this study emphasized the importance of comprehensive medication management for an older adult population predominantly with cognitive impairment.

Francesco Ferrante PGY2 Cardiology – Large	Jullianne Fallon	Emily McElhaney, Brad Williams, Keith Anderson	Pharmacist-led optimization of treatment of iron deficiency in heart failure patients	A total of 333 patients were screened in this study, including 181 patients in the pre-cohort and 152 in the post-cohort. Out of the 333 patients screened, 93 patients were included in each cohort. The most common reason for exclusion was a presence of left ventricular assist device and infection in the pre- and post-cohort, respectively. Baseline characteristics for each cohort were well balanced. The majority of patients were white males with a median age of 66.5 and New York Heart Association (NYHA) functional class III symptoms. The pre-cohort had a higher left ventricular ejection fraction at baseline compared to the post-cohort (25 % vs 23%, p = 0.04). Out of the 93 patients included in each cohort, 40 (43%) received iron studies in the pre-cohort compared to 76 (81.7%) in the post cohort (p < 0.001). Of the 40 patients in the pre and 73 patients in the post-cohort that received iron studies, 30 (65%) patients in the pre-cohort and 46 (63%) qualified for IV iron. Of the patients in this study who qualified for intravenous iron, 7 (58.3%) patients in the pre-cohort and 24 (57%) patients in the post cohort qualified based on ferritin levels < 100 ng/ml. Twenty-three (62.2%) patients in the pre- and 50 (65.8%) patients in the post-cohort would have qualified for IV iron based on a TSAT < 20%. Among the patients that qualified for IV iron therapy, 12 (40%) in the pre-cohort and 42 (91%) in the post-cohort received IV iron (p < 0.001). Iron formulations used were equally distributed among iron dextran (50%) and sodium ferric gluconate (50%) in the pre-cohort. In the post-cohort, sodium ferric gluconate was exclusively used. The median dose of IV iron received was 1,000 mg in both cohorts. Out of the patients that received IV iron, 9 (75%) and 23 (54.8%) received ≥ 1,000 mg of IV iron (p = 0.21)
Francesco Ferrante PGY2 Cardiology – Small	Mike Militello	Ashley Kasper, Jessica Ward	Assessment of Stroke Nomogram for time to therapeutic	An Epic SlicerDicer report was pulled for patients on a cardiovascular service who were ordered heparin stroke nomogram during September 2022. Patients were excluded if they received <24 hours of heparin from the stroke nomogram or were on a different heparin nomogram within the 24 hours prior to starting the heparin stroke nomogram. In total, 180 patients were ordered heparin off the stroke nomogram. Out of the 180 patients included, 84 patients were included in the analysis. Patients were majority male with a median age of 66 years and bodyweight of 79.8 kg. The median CHA_2DS_2-VASc score was 5. The services who made up a majority of orders were the heart failure service (33.3%) followed by the imaging (21.4%) and cardiothoracic (21.4%) services. Atrial arrhythmia was the most common indication for heparin (51.2%). Overall, the median time to the first therapeutic aPTT value was 14.5 hours. Patients $\geq$ 80kg were able to reach therapeutic anticoagulation earlier in the course of therapy compared to the entire population. Patients <50 years old were more likely to be subtherapeutic earlier in the course of therapy but least likely to be subtherapeutic later on the course of therapy. Patients were more likely to achieve sustained therapeutic anticoagulation with a bodyweight $\geq$ 80kg. Overall event rates were low with 8 patients having a chart reported bleeding event and 2 patients with a chart reports thromboembolic event. Out of the 8 reported bleeding events, 1 patients received 1 unit of blood product as a result of the bleeding event.
Megan Shulkosky PGY2 Critical Care - Large	Nicole Palm	Xhilda Xhemani, Jess Ward, Jenna Ferrante, Heather Schlick, TID Staff-possibly Dr. Brizindene	Evaluation of a Perioperative Fungal Prophylaxis Protocol Change in OLT	A single center, retrospective cohort study was designed to describe the impact of a fungal prophylaxis protocol change in orthotopic liver transplant recipients at Cleveland Clinic Main Campus. A total of 134 patients pre-protocol and 166 patients post-protocol were included. Prior to protocol implementation, 73% patients were prescribed clotrimazole, 13% fluconazole, 13% micafungin, and 1% nystatin. After protocol implementation, 63% were prescribed clotrimazole, 16% fluconazole, and 21% micafungin. In the post-protocol group, there was an adherence rate of 66% on POD0 and increased to 84% over the duration of prophylaxis. Prior to initiation of the antifungal protocol, 6.7% of patients developed an invasive fungal infection (IFI) while 3.6% of patients developed an IFI post-protocol (p=0.22). Median time to IFI was 8 days (IQR 2-19) pre-protocol and 15 days (IQR 6-17) post-protocol. Mortality and ICU length of stay were no different between groups. The results of this study show that implementation of a targeted antifungal prophylaxis post-liver transplant protocol can be a powerful strategy for promoting consistency in antifungal prophylaxis within a population at high risk for IFIs.

Megan Shulkosky PGY2 Critical Care - Small	Maureen Converse	Jess Ward, Ben Hohlfelder, Heather Torbic	Utility of the 4Ts score in excluding heparin-induced thrombocytopenia in Extracorporeal Membrane Oxygenation Patients	A QA/QI analysis was completed to evaluate the frequency and appropriateness of heparin-PF4 antibody testing and associated 4T scores in patients undergoing ECMO at Cleveland Clinic Main Campus. From April 2020 to July 2022, 26 VA ECMO and 25 VV ECMO patients with a PF4 test sent were included. When defining ECMO as a definite cause for thrombocytopenia, 60.8% of patients had a 4T score with a low probability of HIT, 35.3% had an intermediate probability, and 3.9% had a high probability. When defining ECMO as a possible cause of thrombocytopenia, 52.9% of patients had a 4T score with a low probability of HIT, 41.2% had an intermediate probability, and 5.9% had a high probability. Of the 56 patients, 7 (13.7%) had a positive PF4 and of those 7 with a positive PF4, 2 had a positive SRA and 1 had an indeterminate SRA. All patients who had a positive PF4 had a low or intermediate 4T score. The majority of patients had one PF4 test sent on ECMO (88.2%), while 9.8% had two tests sent and 2.0% had three PF4 tests sent. All patients who had multiple PF4 assays sent while on ECMO were HIT negative. The results of this analysis highlight the challenges of utilizing the 4T score in ECMO.
Darrick Emery PGY2 Critical Care – Large	Benjamin Hohlfelder	Stephanie Lombardi, Brad Williams	Risk of vasoplegia after LVAD implantation in patients receiving or not receiving preoperative RAAS inhibitors	Background/Rationale: Vasoplegia characterized by profound systemic vasodilation with normal to elevated cardiac index is a well-known complication of cardiac surgery, including LVAD implantation with an incidence between 30-49%. RAAS system inhibition preoperatively has been identified as an in-dependent predictor for post-cardiopulmonary bypass vasoplegia the limited data is available on the appropriate preoperative management of RASS inhibitors for patients undergoing LVAD implantation. Patients: Adult patients undergoing LVAD implantation from 1/2019 to 6/2022 were included (N=250). Patients with cardiogenic shock or hemorrhagic shock were excluded, resulting in 186 patients analyzed. Results: Vasoplegia, defined as persistent hypotension (MAP < 65) requiring vasopressors (0.2 mcg/kg/min NE-equivalents) for at least 6 hours postoperatively within a 24 hour period, incidence was 34%. The most common treatments for vasoplegia were corticosteroids (32%), followed by hydroxocobalamin (17%) and methylene blue (2%). No differences in rates of vasoplegia were observed for patients based on receipt of preoperative RAAS inhibitors 48 hours prior to LVAD implantation. Multivariable logistic regression analysis identified duration of cardiopulmonary bypass (OR 1.014; P=0.001) and preoperative renal dysfunction (OR 3.636, P=0.044) as factors independently associated with the development of vasoplegia. Conclusion: Withholding RAAS inhibitors preoperatively with the goal of decreasing the rates of vasoplegia post-LVAD implantation is not beneficial based on our retrospective analysis.
Darrick Emery PGY2 Critical Care - Small	Jason Yerke	Stephanie Bass, Mike Rudoni	Evaluation of MILU albumin use by indication	Background/Rationale: In 2019, a MICU ICU albumin order panel went live to assist with indication-specific dosing recommendations to guide appropriate use of albumin. The QA/QI analysis focused on HRS treatment, volume expansion, and “other” indication orders to determine practice patterns and develop recommendations for improvements to the order panel, if warranted. Patients: Adult patients with albumin orders placed for the selected indications including HRS treatment (N=70), volume expansion (N=51), and “other” indication (N=79) were analyzed. Results: Orders for albumin were most commonly placed by resident physicians during the 0700-1459 shift regardless of the indication selected. For the HRS indication, the order set successful directed providers to order 50 g of albumin per day. Renal replacement therapy (RRT) was initiated in 41% of patients receiving albumin therapy for HRS treatment and albumin therapy was continued during RRT in 17% of these patients. Patients receiving albumin for volume expansion received a median 500 mL of crystalloids within the preceding 24 hours prior to albumin orders being placed (5.4 mL/kg). The most common reasons for the “other” indication selection based on chart review were volume expansion (16%) and hypotension (29%). Conclusion: Pharmacists have opportunities to improve the use of albumin therapy in the MICU based on the findings of the analyses including recommendations to discontinue albumin therapy at RRT initiation, to consider administering crystalloids prior to albumin 5% therapies for volume expansion, and to direct providers to use albumin 5% for volume expansion or hypotension rather than the albumin 25% prompted when selecting the “other” indication. An alternative alert is recommended to notify providers using albumin 25% of the option to administer albumin 5% as the preferred concentration for volume expansion.

Amy Magdalany PGY2 ED – Large	Matt Campbell	Christine Ahrens, Gretchen Sacha	Assessment of Pharmacist Bedside Response on Tenecteplase Door-to-Needle Time for Acute Ischemic Stroke in Emergency Department Patients	This was a retrospective, multicenter cohort study of emergency department patients who received tenecteplase for suspected acute ischemic stroke in between January 11, 2022 and August 31, 2023 within a large integrated health-system. The primary outcome of this study was to compare the average door-to-needle (DTN) time with a pharmacist present at a stroke team activation versus no pharmacist present. Of the 240 patients meeting inclusion criteria, 146 patients (61%) had a pharmacist at the bedside (pharmacist present group) and 94 patients (39%) did not (no pharmacist present group). Patients were similar at baseline with regard to age, gender, weight, race, and past medical history. There was no difference in median DTN time between the pharmacist group and no pharmacist group (effect estimate -5.1 minutes; 95% CI: -13.7 to 3.5). Additionally, there were no differences in proportions of patients between groups who met goal DTN of ≤60 minutes (RR 1.1; 95% CI 0.9 to 1.3), ≤45 minutes (RR 1.2 95% CI 0.9 to 1.6), and ≤30 minutes (RR 1.3; 95% CI 0.8 to 2). In a multivariable linear regression model, pharmacist presence was associated with a non-statistically significant 6.9% reduction in DTN (95% CI 0.79 to 1.09) when adjusted for location and shift time.
Amy Magdalany PGY2 ED - Small	Elizabeth Wells		Epinephrine use for anaphylaxis in the Emergency Department	
Alyssa McIntire PGY2 ID – Large	Janet Wu	Katie Rivard, Thomas Fraser, Heather Daniels	Risk factors for antimicrobial discordant prescribing for otitis media	The rate of guideline concordant antimicrobial prescribing for acute otitis media (AOM) was 90% in the pediatric population and 54% in the adult population. A multivariable logistic model was performed to identify risk factors for guideline discordant antimicrobial prescribing in both the adult and pediatric populations. In the adult population, factors that impacted guideline discordant prescribing included use of the AOM order panel (OR 0.12, 95% CI 0.10-0.15, $p < 0.01$)), penicillin allergy (OR 1.46, 95% CI 1.16-1.83, $p = 0.001$), and Primary Care visit location (OR 1.79, 95% CI 1.44-2.23, $p < 0.01$). In the pediatric population, factors that impacted guideline discordant prescribing included use of the AOM order panel (OR 0.36, 95% CI 0.28-0.45, $p < 0.01$), penicillin allergy (OR 1.87, 95% Ci 1.42-2.44, $p < 0.01$). In both models, each additional day of antibiotic therapy was associated with a decreased odds of guideline concordance.
Alyssa McIntire PGY2 ID – Small	Stephanie Lombardi	Maureen Converse, Ben Hohlfelder, Andrea Pallotta, Dr. Fraser, Dr. Lang, Dr. Geube	Evaluation of Appropriateness of Prophylactic Aztreonam after Cardiothoracic Surgery	A retrospective quality assessment was performed with a primary objective of evaluating aztreonam restriction criteria concordance in cardiothoracic surgery patients receiving aztreonam for perioperative prophylaxis. Patients who underwent cardiothoracic surgery and received perioperative aztreonam prophylaxis at Cleveland Clinic Main Campus between July 1, 2022 and September 30, 2022 were included. Patients who received a heart-lung or lung transplant were excluded. Concordance was defined as patients who received aztreonam prophylaxis during cardiothoracic surgery in the setting of a procedure involving aortic graft material, left ventricular assist device implantation, or penicillin allergy (defined as IgE mediated, high risk allergy: hives, shortness of breath, hypotension, angioedema, anaphylaxis). A total of 414 patients were evaluated, in which 284 (69%) received aztreonam in concordance with restriction criteria. Patients most frequently received an aorta procedure (67%), valve repair and/or replacement (64%), and/or a CABG procedure (24%). A total of 115 (28%) had a documented history of a beta-lactam allergy in which 32% consisted of an IgE mediated reaction and 68% were deemed an intolerance. Fifty (43%) patients had a reported time of reaction of >10 years ago. Further, 32 (28%) patients with a history of a beta-lactam allergy had previously tolerated a beta-lactam, most commonly 1st generation cephalosporins or amoxicillin. This assessment shows that there are antimicrobial stewardship and allergy intervention opportunities to increase aztreonam restriction criteria concordance in patients receiving perioperative aztreonam after cardiothoracic surgery.
Kevin King PGY2 Informatics – Large	Alyssa Chen	Marc Willner, Nicole Palm, Jeff Ketz	Assessment of Insulin ICU Nomogram MAR Calculator Implementation into Electronic Medical Record	Results: The implementation of the MAR calculator resulted in a significant increase in blood glucose values within the target range (35.5% post-implementation vs. 31.0% pre-implementation). There were no significant differences in the occurrence of hypoglycemic events, but the rate of hyperglycemia decreased. Conclusions: The study demonstrated the benefits of transitioning from a paper-based nomogram to an EHR MAR calculator for insulin infusion management. However, concomitant medication administrations and initial blood glucose levels should be considered as potential confounders. Further research is warranted to explore the impact of these factors on glycemic control with this novel type of calculator.

Kevin King PGY2 Informatics – Small	Alaina Darby	Ashley Coccarelli, Bob Pang	Analysis of Ambulatory Renal Dosing Contexts and Development of a Renal Dosing Logic	<u>Methods:</u> Post-implementation descriptive study of CCHS ambulatory prescriptions in patients >= 18 years old for assessing proportion of orders that were making false-positive and false-negative recommendations for dialysis dosing. We excluded prescriptions generated where the order panel did not make a specific recommendation where creatinine clearance could not be calculated or order panels with CrCl logic >= 30 mL/min. Population definition: • Patients actually on dialysis, but met Epic criteria for low creatinine clearance due to lack of dialysis problem list documentation (**False-Negative**) • Patients actually not on dialysis, but met Epic criteria for dialysis dosing due to erroneous dialysis problem list documentation (**False-Positive**) <u>Results:</u> • False-Negative rate: 6/200 prescriptions (3.0%) • False-Positive rate: 9/65 prescriptions (13.8%) <u>Conclusions:</u> False negative and especially false-positive rates for dialysis dosing were found to be high. Adding the dosing features to ERX contexts would impact patient safety. Based on our review, it would not be appropriate to add renal dosing and dialysis logic to Epic medication records at this time.
Mary Keen PGY2 Informatics – Large	Marc Willner	Libby Dahl	Evaluation and Implementation of Drug-Disease Warnings	Utilization of drug-disease alerts can impact patient safety and hospital safety scoring, but implementation must be thoughtful and judicious to minimize workflow disruption and alert fatigue. After a multi-disciplinary pilot review, contraindicated-level drug-disease alerts were implemented across the enterprise. On evaluation after implementation, 65% of alerts occurred in relation to inpatient order mode. Of those 35% were on order entry, 28% on order verification and 28% on retro-diagnosis. Alert acceptance, defined as order removal due to alert firing, increased from <0.01% to 0.7%, however appropriateness of medication removal was not assessed in this project and alert success cannot be inferred from alert removal alone. Overall, 98% of alerts were overridden without reason or comment. Only 0.4% of alerts had comments entered and pharmacists were responsible for 73% of comments provided. The most common comment themes revolved around problem list hygiene (18%), patient pregnancy status (16%), and vitals or lab values supporting medication use despite an alert based on a diagnosis related to those labs (14%). Providers expressed concern related to irrelevant or inaccurate alerts, alert-severity level mismatch, and inappropriate medication discontinuations related to alerts, among others. Overall, drug-disease alert implementation is not ideal in the current state and optimization is desired. Further investigation and multidisciplinary discussions are ongoing to determine a plan for optimization and management of drug-disease alert curation going forward.

Mary Keen PGY2 Informatics - Small	Marc Willner	Rachel Carroll	Evaluation of Pharmacy Defaulting for Bedside Delivery Patients	Bedside delivery programs increase the number of patients that leave the hospital with discharge prescriptions in-hand but no evaluation of how the automatic defaulting of the bedside delivery pharmacy may impact prescription workflow has been undertaken. Thirteen bedside delivery pharmacies serving 11 locations were evaluated for this project however workflows were not standardized across the sites. Some of these differences were related to the capability to fill only bedside delivery prescriptions compared to a full complement of retail pharmacy services. Each bedside delivery pharmacy was evaluated for eligible CSNs, total prescription count and revenue, bedside delivery count and revenue, total facility discharges and discharge unit/expected bedside delivery pharmacy matching in the pre- and post-implementation period. There were no clear trends relating implementation of bedside delivery pharmacy defaulting to increased bedside delivery volume/revenue or total prescription volume/revenue across sites. Differences in workflow and documentation clearly contributed to incomplete capture of bedside delivery data and highlight areas for process improvement. There was also no clear impact on discharge department and bedside delivery pharmacy mismatching or changes in prevalence of mismatching post implementation. Additionally, mismatches cannot be automatically deemed to be “errors”. Given the variation in workflows between sites and lack of capture of completed work, projects are ongoing to assess standardization of workflows and increase overall bedside delivery prescription capture.
Connor Aossey PGY2 Oncology - Large	Mikhaila Rice	Joslyn Rudoni, Marissa Duco, Allison Winter	Rate of late-onset neutropenia in patients with lymphoma receiving chemotherapy plus subcutaneous rituximab hyaluronidase compared to intravenous rituximab	Late-onset neutropenia (LON) is a well described side effect of intravenous (IV) rituximab use, but LON rates have not been described with subcutaneous (SQ) rituximab-hyaluronidase. This retrospective analysis was designed to evaluate the rates of LON in patients with newly diagnosed Non-Hodgkin Lymphoma (NHL) treated with standard of care rituximab, cyclophosphamide, doxorubicin, vincristine and prednisone (R-CHOP), comparing patients who received SQ rituximab to those who received IV rituximab only. There were 120 patients included in each group, and baseline characteristics between groups were similar. Patients received a median of 6 cycles of chemotherapy, with those in the SQ group having received a median of 2 doses of IV rituximab followed by a median of 4 doses of SQ rituximab. Sixteen patients (13.3%) in the IV rituximab group experienced at least one episode of LON compared to 15 patients (12.5%) in the SQ group ($p = 0.847$). Secondary outcomes, including rates of grade 3 or higher neutropenia, febrile neutropenia (FN), hospitalization, and mortality did not differ significantly between groups. Additionally, in pre-specified subgroup analyses, LON rates were not different between formulations in patients with lower body mass index. The results of this study suggest that rates of LON between IV and SQ rituximab formulations are similar.

Connor Aossey PGY2 Oncology - Small	Danielle Cenin	Seema Patel	AutoBMT Mobilization Failure Rate	Autologous bone marrow transplant (autoBMT) is an important line of therapy for many different hematologic malignancies and can be beneficial in some autoimmune and genetic diseases. It is indicated for patients with hematologic malignancies such as multiple myeloma and lymphoma who have relapsed/refractory disease or for consolidation therapy after partial or complete response following initial chemotherapy. AutoBMT is better defined as high-dose chemotherapy with CD34+ stem cell rescue, with the goal to eliminate any residual disease. Prior to transplant, an adequate number of a patient's CD34+ cells must be collected via apheresis. This "stem cell rescue" restores the immune system and promotes the production of myeloid cells such as platelets, neutrophils and red blood cells. CD34+ cells are contained exclusively in the bone marrow with a minimal number circulating in the peripheral blood. Drugs such as filgrastim and plerixafor promote the overproduction and release of CD34+ cells from the bone marrow into the peripheral blood in a process known as mobilization. Filgrastim is a granulocyte colony-stimulating factor which promotes production of CD34+ stem cells in the bone marrow. Plerixafor is an inhibitor of CXC chemokine receptor 4, which prevents the binding of CD34+ cells to bone marrow and promotes CD34+ cell release. Filgrastim can be utilized alone or in conjunction with plerixafor for mobilization based on risk of mobilization failure. It is estimated 5-30% of patients fail to mobilize enough cells to proceed to autoBMT with filgrastim alone. The addition of plerixafor to mobilization regimens has improved mobilization success. A phase III clinical trial in multiple myeloma patients showed the addition of plerixafor resulted in significantly higher mobilization success, defined as at least 6 x 10^6 CD34+ cells/kg in 2 or less apheresis attempts, compared to placebo (71.6% vs 34.4%). Similarly in lymphoma, 59% of those who received plerixafor collected at least 5 x 10^6 CD34+ cells/kg in 4 or less apheresis attempts compared to 20% in the placebo group. Patient specific factors which likely contribute to mobilization failure include age, prior chemotherapy exposure, radiation exposure, prior failed mobilization attempts, bone marrow involvement, and thrombocytopenia. Cleveland Clinic's mobilization guideline is divided into recommendations for patients with multiple myeloma, lymphoma in complete remission, and lymphoma not in complete remission. All patients receive filgrastim, regardless of if they receive plerixafor or chemotherapy as part of their mobilization regimen. Multiple myeloma patients at high risk for poor mobilization receive both filgrastim and plerixafor upfront. If risk factors are not present, multiple myeloma patients receive upfront filgrastim alone and plerixafor is only administered if peripheral CD34+ is < 20 cells/µL on day 1 of apheresis. Lymphoma patients in complete remission receive both filgrastim and plerixafor upfront during mobilization. For lymphoma patients not in remission, chemotherapy is administered immediately followed by filgrastim alone. If apheresis yield is < 2 x 10^6 CD34+ cells/kg on day 1 or < 5 x 10^6 CD34+ cells/kg on day 5, plerixafor is added. All patients undergo a maximum of 4 days of collections. Collection goals vary based on disease state, but a minimum collection of 2 x 10^6 CD34+ cells/kg is required to proceed with autoBMT for all indications. 246 patients were included in the MM group and 100 were included in the lymphoma group. Most patients with lymphoma had DLBCL (42%) and most patient's in the MM group had MM (95.1%, 10 amyloidosis patients and 2 plasma cell leukemia patients were included in this group). We found that the median patient age at time of collection was 61 years for lymphoma and 62 years for MM. Most patients in both groups were male. 26.4% of patients with MM had a prior treatment history with radiation and 19% had a radiation history in the lymphoma group. Patients mobilized for lymphoma had a median of 43 days since their last dose of chemotherapy prior to mobilization in comparison to MM which was a median of 25 days, although the endpoint for MM is limited since record of last oral chemotherapy administration was scarce. Mobilization failure was more common with lymphoma, as we observed 14% of patients failed their first mobilization attempt. 3.3% of patients with MM failed their first mobilization attempt. There was not found to be an observed difference in rates of failure based on filgrastim biosimilar product utilized. Conclusions: Cleveland Clinic mobilization failure rates are in line with reported literature and adherence to the mobilization algorithm is around 80-85%. Most non-adherence was associated with plerixafor use.

				Lymphoma had more time between last chemotherapy and apheresis than multiple myeloma, MM was more likely to have prior radiation exposure, and lymphoma was exposed to more chemotherapy.
Lauren Burton PGY2 Oncology - Large	Danielle Cenin	Seema Patel	Age Based Comparison of Toxicity for Melphalan AutoBMT	While high-dose melphalan (200 mg/m^2) is the standard conditioning regimen for autologous hematopoietic stem cell transplant (aHSCT) in patients with multiple myeloma, older patients are at an increased risk for melphalan toxicities including delayed engraftment, bone marrow suppression, nausea, vomiting, diarrhea, and oral ulcerations. While some transplant centers dose-reduce melphalan to 140 mg/m^2 for older patients, Cleveland Clinic does not have a standard age-based dose-reduction. We evaluated engraftment and toxicity outcomes in 196 aHSCT stratified by age (≥ 65 years and < 65 years). Out of 188 evaluable patients, time to neutrophil and platelet engraftment in both age groups was 11 (p=0.642) and 17 days (p=0.666), respectively. There was no difference in engraftment outcomes when patients were stratified by age ≥ 70 years, Scr ≥1.5 mg/dL, and BSA ≥ 2.0 m^2. Older patients required more frequent use of patient controlled analgesia (PCA), however younger patients had higher MME requirements for mucositis pain. Median durations of nausea, vomiting, diarrhea, and febrile neutropenia were similar between groups. Our study suggests full-dose melphalan does not lead to delayed engraftment or increased toxicity in older patient populations. As mortality outcomes were not assessed in this study, future directions could assess treatment-related mortality and overall survival following full dose melphalan for aHSCT in patients ≥ 65 years and < 65 years.
Lauren Burton PGY2 Oncology - Small	Sowmya Takkellapati	Matt Brignola, Emily Chheng	Infliximab Medication Utilization Evaluation for Immune-Related Adverse Events	Immune checkpoint inhibitors (ICI) are a novel immunotherapy option in the treatment of many solid tumor malignancies. While immune checkpoint inhibitors have a strong antitumor effect, they can also lead to immune-related adverse events (irAEs). Steroids are the standard first line treatment for irAEs. As the severity of adverse events increases, alternative therapies such as infliximab are indicated for management. Currently, NCCN guidelines recommend infliximab for a variety of steroid refractory irAEs. At the Cleveland Clinic, infliximab-adba (Renflexis) is the preferred formulary product for adults. Infliximab is currently restricted for the treatment of severe, persistent steroid refractory irAEs from ICI therapy in the inpatient and outpatient settings. The project goal was to describe the prescribing practice of infliximab for steroid refractory irAEs and assess the accordance with NCCN guidelines. Fifteen patients were included in this evaluation with majority of patients on doublet immunotherapy for metastatic melanoma. Colitis/diarrhea was the most frequently experienced irAE in 76.5% of patients. Patients continued on steroids for a median of 91 days prior to starting infliximab. Eleven (84.6%) of patients were on an optimal initial steroid dose for colitis/diarrhea and 76.9% of these patients received an optimal maximum dose based on NCCN guidance for steroid dosing recommendations. Three (20%) of patients had a delay in infliximab administration with delays occurring due to history of infection and challenges with prior authorization. Following infliximab initiation, the median time to irAE resolution was 4 days. Moving forward, additional provider education is encouraged to ensure optimal infliximab use and clinical pharmacists have an opportunity to intervene in steroid management of irAEs.

Sharon Zhong PGY2 Oncology – Large	Heena Kurish	Robert Walchack, Jessi Edwards	Safety and Efficacy of MEC (mitoxantrone, etoposide, and cytarabine) in patient with relapsed/refractory AML	Background/Rationale: Acute myeloid leukemia (AML) is a rapidly progressing heterogeneous disease. Most patients develop relapsed or refractory (R/R) disease after receiving initial induction chemotherapy. Salvage chemotherapy followed by allogeneic hematopoietic stem cell transplantation (alloHSCT) is the only curative therapy for R/R AML. Mitoxantrone, etoposide, and cytarabine (MEC) is the current standard of care salvage chemotherapy regimen for R/R AML at Cleveland Clinic. Methods: A retrospective chart review was conducted of patients at least 18 years old with R/R AML treated with MEC from July 1, 2014 to September 30, 2022 at Cleveland Clinic Main Campus. The primary outcome was overall remission rate (defined as the sum of patients achieving complete response (CR) or complete response with incomplete hematologic recovery (CRi)). Univariate and multi-variate analyses assessed the effect of baseline covariates on achieving overall remission. Secondary outcomes included overall survival, event-free survival, relapse-free survival, and safety. Results: Sixty patients were included in the final analysis. Twenty (33.3%) patients achieved CR and 11 (18.3%) patients achieved CRi. Patients with bone marrow blasts ≤20% and peripheral blood blasts ≤30% at MEC initiation were more than twice as likely to achieve CR or CRi compared to those with a higher blast burden. The median overall survival was 7.7 months (95% CI: 5.3-12.6 months). Twenty-four (40.0%) patients proceed to alloHSCT post-MEC therapy. The majority of patients (91.7%) experienced febrile neutropenia. Conclusions: MEC is an effective salvage chemotherapy regimen for patients with R/R AML, especially among those with low disease burden at treatment initiation.
Sharon Zhong PGY2 Oncology – Small	Catherine Pierson	Lexi Plutt	Incidence of delayed methotrexate clearance in patients without a urine specific gravity parameter prior to initiation	Background/Rationale: In pediatric populations, is commonly used for treatment in ALL, NHL, and osteosarcoma. HDMTX Initial hydration recommendations by the Children's Oncology Group include D5-NaCl 0.2% with alkalinizer at 125 mL/m2 /hour until urine specific gravity ≤ 1.010 and pH is ≥ 7.0. In current practice, CCF Children's stopped measuring urine specific gravity ~2 years ago as prerequisite to starting HDMTX due to delays in lab reporting/chemotherapy initiation. Methods: A retrospective chart review was conducted of pediatric patients who received HDMTX at CCF Children's from 3/1/21 to 11/30/22 and received standard rapid hydration protocol prior to HDMTX (NaCl bolus 500 ml/m2 over 1 hour followed by sodium bicarbonate 40 mEq in D5-NaCl 0.2% 500 ml/m2 over 2 hours). The primary outcome was delayed MTX clearance. Secondary outcomes included toxicities (renal, hepatic, bone marrow suppression, oral mucositis). Results: 15 patients (51 cycles were included). 13 (25.5%) cycles had delayed MTX clearance. Most common toxicities observed were hepatotoxicity (N=7 cycles, 13.7%)- and mucositis (N=4 cycles, 7.8%). Ten cycles (19.6%) resulted in delay of subsequent chemotherapy (most common reason being BMS). Conclusion: Approximately a quarter of cycles had delayed methotrexate clearance despite appropriate adjustment of leucovorin and fluids

Jacob Link PGY2 Pediatrics – Large	Jessica Hoover	Chandni Patel, Erica McDonald, Katie Rivard	Evaluation of anticoagulation strategies in pediatric heart failure patients	Thrombosis is a major cause of morbidity and mortality within the pediatric heart failure population. With a paucity of data and lack of direction from current literature comes difficulty in determining the appropriate antithrombotic regimen for this patient group. Our objective was to describe the current antithrombotic practices among pediatric patients with heart failure at Cleveland Clinic Children's, identify time in therapeutic range (TITR) of monitored anticoagulants, and compare the characteristics of patients experiencing thromboembolism to those who did not. A single center, retrospective study evaluating children less than 18 years of age diagnosed with heart failure (I50.9) followed at Cleveland Clinic Children's from January 2012 to June 2022. This study included 146 patients with a median age at diagnosis of 0 days (IQR 0-297.5) and majority congenital cause of heart failure (n=115, 78.9%). Twenty-three patients (15.8%) experienced thrombosis. Aspirin and warfarin were the most commonly used agents. Time in therapeutic range was low, varying between a median of 23.8% with heparin to 56.3% with bivalirudin. The thrombosis cohort was observed to have a higher relative percentage of patients with lower ejection fractions, although some patients with adequate ejection fractions still experienced thrombosis. There is limited investigation exploring antithrombotic therapy in this group, making it difficult for providers to determine when these medications are required. Outside of few guideline recommendations based mainly on adult literature, clinical judgement is required when deciding to use thromboprophylaxis or not. Our study found optimization of therapeutic anticoagulation is needed, potentially opening up an area for pharmacist involvement. In addition, the varying use of thromboprophylaxis sheds light on the need for further research.
Jacob Link PGY2 Pediatrics - Small	Casey Moore	Kara Sosinski, Katie Rivard	Pediatric ED Preference List Standardization	Still in process, pending implementation. 23 antibiotic orders were developed for nursing to properly prepare and administration the correct dose and concentration of IV antibiotics to pediatric patients presenting to free-standing emergency departments without on-site pharmacy assistance.