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PROPOFOL BRIDGE IN CRITICALLY ILL PEDIATRIC PATIENTS TO FACILITATE EXTUBATION. Meghna Basnet, Dimitrios Savva. NewYork-Presbyterian Hospital Morgan Stanley Children's Hospital. New York, NY

Introduction: While mechanical ventilation can be a life saving measure for critically ill children, extubation of those who have remained on extended duration of ventilation in conjunction with higher exposure to sedatives, remains a challenging process. As extubation failure is associated with numerous negative consequences, optimization of sedation during the peri-extubation period is critical. Recently, short term infusions of propofol have been utilized to facilitate extubation due to its favorable pharmacokinetic properties of rapid induction of anesthesia, sensitive titrations, and fast recovery which allows for careful weaning of sedation after discontinuation of opioids and benzodiazepines. However, because of the absence of standard protocols, bridging practices remain variable in the PICU setting and are based on provider experiences and comfort level. Additionally, there is a lack of guidance as to standard infusion doses and the duration of infusion required before extubation is trialed. This project seeks to evaluate propofol as an effective and safe bridging agent for extubation in mechanically ventilated critically ill children and describe the practice patterns to establish an institutional protocol.

Methods: This was an IRB approved, retrospective, single-center, observational study of pediatric patients admitted to the NewYork-Presbyterian Hospital Morgan Stanley Children's Hospital intensive care unit from February 2020 to August 2023 who required mechanical ventilation for at least 48 hours and received propofol infusion for at least 4 hours during anticipated extubation.

Results: There was a total of 52 patients included in the data analysis. The median age, weight and duration of intubation were 2 (IQR: 0.75 – 4) years, 11.7 (IQR: 7.7 – 20.7) kilograms and 10 (IQR: 6 – 20) days, respectively. The majority of patients were intubated for respiratory infection (42.3%), followed by post non-cardiac surgery (26.9%), non-infectious respiratory failure (15.4%), lack of airway protective mechanisms (9.6%), and post cardiac surgery (5.8%). Five patients (9.6%) patients failed extubation, meaning they were re-intubated within 48 hours of extubation. None of the patients experienced propofol infusion syndrome. The median percent change in heart rate from baseline to lowest point during propofol infusion was 16.6% (IQR 7.6 – 25) and change in mean arterial pressure was 15.4% (IQR 7.0 – 22.4), with only one patient requiring fluid bolus and the initiation of a vasopressor. The median propofol infusion dose and duration were 100 (IQR: 75 – 150) mcg/kg/min and 13.75 (IQR: 9.75 – 20.79) hours respectively.

Conclusion: In a small cohort of critically ill children, mechanically ventilated for >48 h, and maintained on propofol infusion for >4 h in our pediatric intensive care unit, a short propofol infusion was found to be a feasible and safe bridge to extubation.

UTILIZATION OF INTRAVENOUS KETAMINE FOR REFRACTORY STATUS EPILEPTICUS IN A FREESTANDING CHILDREN'S HOSPITAL. Jennifer Berg, Jenny Steinbrenner. Nationwide Children's Hospital. Columbus, OH

Purpose: Ketamine is a noncompetitive N-methyl-D-aspartate agonist with evidence for use in refractory status epilepticus in adult and pediatric populations. Providers may initiate ketamine after a patient has failed two first-line benzodiazepine doses and evidence-based second-line agents, which include levetiracetam, fosphenytoin, and valproic acid. Currently, ketamine does not have a specific place in therapy amongst other third-line agents, such as pentobarbital and continuous midazolam. Current pediatric literature that supports loading doses of 1 mg/kg and a maximum infusion rate of 7 mg/kg/hr. Our institution has a dosing protocol that includes a bolus dose of 1 mg/kg and initiation of continuous infusions at 0.15 mg/kg/hr. The objective of this quality improvement project is to assess institutional utilization of ketamine for refractory status epilepticus.

Methods: This was a single-center retrospective medication use evaluation. Patients were included if they received ketamine for the indication of status epilepticus in the Emergency Department or Pediatric Intensive Care Unit from June 2013 through June 2023. Patients that received loading doses or continuous infusions of ketamine for other indications, such as pain, intubation, procedural sedation, or status asthmaticus were excluded. Patient demographics, admission data, and ketamine dosing data were collected by manual chart review. Descriptive statistics were utilized to report ketamine dosing and patient demographic data.

Results: 49 patients met inclusion criteria. The mean age was 4.6 years (range 4 weeks through 20 years old). The most common etiology of status epilepticus was trauma/arrest (33%) and 45% of patients had a previously diagnosed seizure disorder. The median hospital length of stay was 27 days. Over 70% of ketamine courses for refractory status epilepticus followed the institutional dosing protocol. All patients received a bolus dose of ketamine. The median bolus dose was 1 milligram per kilogram (range 0.5-2 mg/kg). 95% of patients received a continuous infusion with a median initial dose of 0.5 mg/kg/hr (range 0.3-2 mg/kg/hr). The median maximum continuous infusion dose was 4 mg/kg/hr (range 0.5-6.75 mg/kg/hr). 80% of patients received an adjunct continuous infusion to achieve burst suppression. Ketamine was discontinued for resolution of status epilepticus in 74% of cases, lack of efficacy in 18%, death in 6%, and adverse effect (sialorrhea) in 2% of cases.

Conclusion: The majority of cases followed institutional dosing protocol and deviations were overseen by neurology. Adverse effects were not significant. It would be appropriate to update the institutional dosing protocol to include a higher maximum continuous infusion dose.

OBSERVATIONAL COHORT STUDY OF NEONATAL OUTCOMES AFTER USE OF CEFOTAXIME COMPARED TO CEFTAZIDIME AND CEFEPIME. Deborah Bondi, Ernie Shippey, Gretchen Brummel. University of Chicago Medicine, Comer Children's Hospital. Chicago, IL

Introduction: The preferred cephalosporin in neonates has historically been cefotaxime; however, this was discontinued in the United States. Many neonatal intensive care units (NICUs) now utilize ceftazidime or cefepime. Prior literature suggests potential morbidities with these agents compared to cefotaxime. The aim of this study was to determine if there are any outcomes differences with the use of cefotaxime compared to ceftazidime and cefepime.

Methods: This was a retrospective study using the Vizient Clinical Database (January 2013 to June 2023) of subjects admitted to a NICU who received cefotaxime, ceftazidime or cefepime in the first two weeks of life for at least 24 hours. Subjects were excluded if they were admitted after the first 24 hours of life. Comparisons were made between cefotaxime and ceftazidime as well cefotaxime and cefepime. Data was evaluated using the Chi-squared test, Fisher's exact test, Student's t-test, Wilcoxon rank sum test, and One-way ANOVA test, as appropriate. $P \leq 0.05$ was considered statistically significant. A multivariate analysis assessed for significant associations with outcomes.

Results: A total of 50,618 neonates were included, with 34% receiving cefotaxime. Cefotaxime use steadily declined over the 10-year timeframe. The median gestational age for cefotaxime was 29.2 (IQR 24-37) weeks compared to 28.3 (IQR 24-36) and 29.7 (IQR 38-38) weeks for ceftazidime and cefepime, respectively. The median day of life (DOL) the study antibiotic was initiated was DOL 3 in all groups. Median cumulative days of study antibiotic were longer with cefepime (9 days) and ceftazidime (7 days) versus cefotaxime (4 days), although this was not significant. When compared to cefotaxime, development of culture-positive late onset sepsis (LOS) was significantly associated with both ceftazidime (OR 1.92 [95% CI, 1.82-2.08]; p<0.001) and cefepime (OR 1.72 [95% CI, 1.63-1.94]; p<0.001). There were also significant associations for each antibiotic when compared to cefotaxime for presumed culture-negative LOS, any Stage 2-3 necrotizing enterocolitis (NEC), medical NEC, and surgical NEC. There was a significant association with death with cefepime compared to cefotaxime (11.8% vs 8.8%; OR 1.32 [95% CI, 1.16-1.53]; p<0.001). Cefepime was also significantly associated with a longer length of stay compared to cefotaxime (median 60.1 days versus 41.4 days; p=0.021).

Conclusion: The use of both cefepime and ceftazidime demonstrated a significant risk of multiple morbidities in neonates, including the development of culture-positive LOS, presumed culture-negative LOS, and NEC when compared to cefotaxime. Additionally, cefepime demonstrated a significantly higher rate of death and longer length of stay. This study adds to the literature that use of broader gram-negative antimicrobials may be associated with clinically worse outcomes in neonates. Advocacy for drug manufacturers to resume production of cefotaxime in the Unites States should be considered.

IDENTIFICATION AND APPLICATION OF A STANDARD METHOD TO IDENTIFY TIMING AND COMPLETENESS OF INTERMITTENT IV DOSE INFUSION IN NEONATES. William Buss, Scott Denne, Riley Hospital for Children. Indianapolis, IN

Introduction: Fluorescein dye infusions at our center have suggested large differences in timing and completeness of intermittent intravenous neonatal dose delivery between different infusion component configurations. The clinical concerns of potential delays in dose infusion delivery have already been summarized by the 2016 FDA Syringe Pump Safety Communication. We designed a reproduceable process with sodium chloride marker drug to quantify expected timing and percent completeness of intermittent intravenous gentamicin dose infusion through two common NICU intravenous tubing and component configurations. Our aim was to shed further light on the impact of tubing and component configuration choices on dose delivery. This work was partially supported by a PPA Neonatal Small Grant.

Methods: Gentamicin 30 minute infusion scenarios for 1kg and 3kg representative patients were tested in triplicate with two different neonatal tubing/valve component configurations (Configurations A and B). The injection site for Configuration A was an inline split septum T connector within the main IV fluid flow path. The injection site for Configuration B was a Maxzero endcap on microbore tubing (side set) which met the main IV fluid just before the angiocath. We substituted sodium chloride 1mg/mL in an identical volume to the gentamicin dose infusing it over 30 minutes, and co-infused intravenous fluid at 4 mL/hr. and 10 mL/hr., respectively for the 1 and 3kg neonatal scenarios. Configuration B dose infusion was followed by 1.4 mL sterile water flush at the same rate. No added flush was used for Configuration A. Infused fluid was collected in a covered stirred beaker on a class II scale with weight recorded every 2 minutes. The delivered sodium concentration in this beaker was detected 'and recorded every 2 minutes for 90-120 minutes by a submerged ion-specific sodium electrode. Percent dose delivery (PDD) at 30, 45, and 60 minutes was calculated, and results were compared by student's T test to identify significant differences.

Results: In the 1kg scenario, Configuration A percent dose delivery was significantly better than B at 30 (72% vs. 9.9%) and 45 minutes (97.9% vs 42.5%, p=0.0001), and at 60 minutes (99.5% vs 88.9%, p=0.0002). With the 3kg scenario, Configuration A percent dose deliverywas significantly better than B at 30 (88.5% vs. 59%, p=0.0001) and 45 minutes (100.7% vs. 98.4%, p=0.0496), but not significantly different at 60 minutes (p=0.0882).

Conclusions: Percent dose delivery within 30 and 45 minutes was significantly better with configuration A compared to B under both the 1kg and 3kg conditions. These differences likely impact clinical practice; suggest the need for infusion process modification, and require further investigation. Our perception is that infusion setups more similar to Configuration B are commonly used in NICU settings. A current PPA member survey seeksto document these practices.

IMPLEMENTATION OF A MASS CASUALTY PHARMACY RESPONSE PLAN IN A PEDIATRIC LEVEL ONE TRAUMA CENTER. Meredith Diaz, Matthew Schmidt, Jennifer Hale. Monroe Carell Jr Children's Hospital at Vanderbilt. Nashville, TN

Introduction: Many pharmacy departments are involved in code and trauma response. However, there is little available information regarding pharmacy involvement in mass casualty incidents. Due to the increased demand of supplies and

personnel, and the unpredictability of these scenarios, an institutional pharmacy response plan may serve to decrease delays in patient care, minimize stress of staff members, and prevent discrepancies in care provided.

Methods: This study was conducted to evaluate the implementation of a mass casualty pharmacy response plan on pharmacist knowledge of appropriate action items during a mass casualty incident. A survey was administered prior to and after implementation of a standard operating protocol (SOP) and staff education concerning the new response plan. Questions regarding confidence utilized a scale of very confident (1) to not at all confident (5) and questions concerning degree of agreement utilized a scale of strongly agree (1) to strongly disagree (5).

Results: Pre-implementation (n=18) and post-implementation (n=13) survey responses were compared. Survey response was 45% pre-implementation and 33% post-implementation. The median years of pharmacy experience was greater in the pre-implementation group (11 v 7 years) as was the percentage of participants that were code/trauma response trained (100% v 77%) and residency trained (56% v 46%). Percentage of answers correct were greater in the post-implementation group than the pre-implementation group for all questions with a correct answer. Degree of agreement concerning frequency of mass casualty response training was stronger in the post-implementation group.

Conclusions: Implementation and staff education of a mass casualty pharmacy response plan resulted in increased pharmacist knowledge and confidence of appropriate action items during a mass casualty incident. Additionally, it increased staff agreement with providing routine mass casualty response training.

BETA-LACTAM THERAPEUTIC DRUG MONITORING IN NEONATAL AND PEDIATRIC PATIENTS. Laura Dinnes, Grace Lee, Taylor Gullickson, Erin Barreto, Brandi Smith, Greg Thurber. Mayo Clinic. Rochester, MN

Introduction: Neonatal and pediatric development affects the pharmacokinetics of antimicrobials. These changes are amplified in critically ill children which can render the therapeutic response to antimicrobials unpredictable. Beta-lactam antibiotics are uniquely susceptible to these pharmacokinetic changes as relatively hydrophilic small molecules. Subtherapeutic drug levels can occur from expanded volumes of distribution. Supratherapeutic levels can develop in patients with end organ dysfunction. Beta-lactam therapeutic drug monitoring (TDM), drug level testing, may optimize the effectiveness and safety of beta-lactam antibiotics. Herein we report on our experience of implementing beta-lactam TDM for children at our institution.

Methods: In August 2023, a beta-lactam TDM program was launched for select critically ill children at Mayo Clinic. Individuals considered for TDM included patients treated with cefepime, meropenem, or piperacillin/tazobactam for greater than 48 hours with an identified organism, or on any mode of kidney replacement therapy, mechanical circulatory support, or who were obese (e.g. >120kg or BMI percentile >95th). Uncommonly, general ward patients were considered for TDM at the discretion of the pediatric infectious diseases' specialists. Validated assays for these antimicrobials were performed locally once daily Monday to Friday. A two-level sampling strategy was performed with a peak one hour after the end of the infusion and a trough thirty minutes before the next dose. In cases where two levels were infeasible due to vascular access or limited blood volume, a trough level was prioritized. The empiric tough target range was set at cefepime 8-50 mg/L, meropenem 2-30 mg/L, and piperacillin 16-150 mg/L. Targets were tailored in cases of confirmed microbiology to achieve a concentration above the minimum inhibitory concentration of the organism for 100% of the dosing interval (100%T>MIC). Dose modifications were guided by TDM and tailored to the patient's clinical scenario.

Results: From August to December 2023, 37 trough concentrations were performed on 22 patients. Primary indications for beta-lactam TDM were extracorporeal membrane oxygenation (ECMO), continuous kidney replacement therapy (CKRT), and/or an identified pathogen with greater than 48 hours duration of the planned antimicrobial. Thirty-two (86%) levels were initial troughs during the antimicrobial course, and 5 (14%) levels were repeat troughs. Eighteen (56%) of the initial trough concentrations were within the therapeutic range. Among the trough concentrations outside of the therapeutic range, 5 (36%) levels were above goal, and 9 (64%) levels were below goal. Dose adjustments occurred in 13 patients, including 2 patients that had a level within the therapeutic range. Four (80%) of the repeat levels were in the therapeutic range.

Conclusion: Beta-lactam TDM was successfully implemented in critically ill pediatric and neonatal patients. Numerous patients experienced non-target concentrations which were improved with the use of a beta-lactam individualization approach.

IMPACT OF SARS-COV-2 ON PEDIATRIC ENOXAPARIN ANTI-XA LEVELS. Emily Hall, Beth Sawrey. WakeMed Health & Hospitals. Raleigh, NC

Introduction: Literature published regarding anticoagulation in SARS-CoV-2 related illness has guided prophylactic versus therapeutic dosing strategies in adult patients. Whitworth et al. described risk factors for thromboembolic events in pediatric COVID-19 patients including age ≥ 12 years of age, diagnosis of MIS-C, cancer and concurrent central venous catheter. Sochet et al. stated twice-daily thromboprophylactic dosing of enoxaparin appeared to be safe in children hospitalized for COVID-19. While these studies provided necessary data on-risk factors and bleeding risk in pediatric patients, both noted the need for more information on theoptimal dosing of enoxaparinin pediatric patients with SARS-CoV-2. The primary outcome was incidence of supratherapeutic enoxaparin anti-Xa levels. Secondary outcomes includedincidence of therapeutic and subtherapeutic enoxaparin anti-Xa levels, incidence ofbleeding, number of dose modifications to and weight-based dose needed toachievetherapeutic anti-Xa levels.

Methods: A single-center, retrospective cohort study was conducted at a large community hospital to assess the effect of SARS-CoV-2 infections on enoxaparin anti-Xa levels in children. Admitted pediatric patients from April 2015 to December 2022 who were 18 years old or less on enoxaparin, with at least one appropriately drawn enoxaparin anti-Xa level, were eligible for inclusion. The control arm included patients receiving prophylactic or therapeutic dose enoxaparin without a positive SARS-CoV-2 test and the study arm included patients receiving prophylactic or therapeutic dose enoxaparin with a concomitant SARS-CoV-2 infection. There were 31 patients within the SARS-COV-2 arm.31 patients from the non-SARS-CoV-2 cohort were randomly assessed and matched based on age, gender, and enoxaparin indication.

Results: The incidence of supratherapeutic initial enoxaparin anti-Xa levels in pediatric patients with SARS-CoV-2 infections (n=9) was higher than those without SARS-CoV-2 infections (n=2), p=0.04. The incidence of subtherapeutic initial anti-Xa levels was higher in the pediatric patients without SARS-CoV-2 infections (n=8) thanthose with SARS-CoV-2 infections (n=1), p=0.03. There was a statistically significant decrease in average weight-based dose needed to achieve therapeutic anti-Xa levels in the patients receiving prophylactic dosing in the SARS-CoV-2 arm (0.43 mg/kg) compared withinthe non-SARS-CoV-2 arm (0.54 mg/kg), p<0.01. The subgroup analysis of the obese SARS-CoV-2 patients (n=7) compared to non-obese SARS-CoV-2 patients (n=2) showed no statistical significance when assessing the incidence of supratherapeutic enoxaparin anti-Xa levels (p=0.13). The study sample was too small to make any meaningful assessments on correlation of infection severity, concomitant medications, or specific laboratory values with the incidence of supratherapeutic enoxaparin anti-Xa levels.
Conclusion: Although the primary outcome of this study was statistically significant, it is unclear the clinical significance due to small study size. Other risk factors, including obesity, may have contributed to required dose adjustments. Future studies are needed to determine optimal enoxaparindosing regimens in obese pediatric patients.

COMPARATIVE EFFICACY AND COST-EFFECTIVENESS OF INTRAVENOUS IRON THERAPIES IN OUTPATIENT PEDIATRIC PATIENTS. Emily Harvath, Elaina Szeszycki. Riley Hospital for Children. Indianapolis, IN
Introduction: Intravenous iron is a widely used treatment modality in the pediatric population when oral iron supplementation is inadequate, though little guidance is available for selection between iron formulations. Factors for consideration when selecting between products include infusion time, cost, side effect profile, and possibility of single, total-dose infusion. Though safety and efficacy of individual intravenous iron products has been well established in pediatric patients, limited data is available for comparative efficacy between formulations. This study will aim to compare efficacy and cost effectiveness between intravenous iron formulations in pediatric patients with iron deficiency anemia.
Methods: This retrospective observational study includes pediatric patients with iron deficiency anemia receiving outpatient infusion of iron sucrose (IS), iron dextran (ID), ferric carboxymaltose (FCM), or sodium ferric gluconate (SFG) between May 1, 2012 through May 1, 2022. The primary endpoint assesses improvement of iron deficiency anemia, defined as average change in hemoglobin. Secondary endpoints evaluate blood transfusion requirements, improvement in iron status, and cost effectiveness of each iron formulation using incremental cost effectiveness ratio. This study was approved by the Indiana University Institutional Review Board.
Results: A total of 258 patients were included in the final study population. Mean change in hemoglobin differed significantly between treatment groups 4 weeks after infusion (IS 1.6 vs FCM 2.9 vs SFG 1.7 vs ID 2.3 g/dL) and 12 weeks after infusion (IS 1.9 vs FCM 2.9 vs SFG 2.2 vs ID 1.8 g/dL). Secondary analysis found mean change in hemoglobin was only significant between iron sucrose and ferric carboxymaltose (4 week difference 1.3 g/dL [95% CI 0.6-1.9], 12 week difference 1 g/dL [95% CI 0.2-1.8]). Cost-effectiveness comparison of ferric carboxymaltose to other treatment groups yielded an incremental cost effectiveness ratio between $10,590 and $14,461 per additional responder versus the other formulations.
Conclusions: In outpatient pediatric patients, ferric carboxymaltose was associated with better efficacy for increasing hemoglobin than other available iron formulations, particularly compared to iron sucrose. However, ferric carboxymaltose was associated with a higher expense than other formulations.

PHARMACIST ROLE ON A MULTIDISCIPLINARY BRONCHOPULMONARY DYSPLASIA SERVICE. Anna Kissell. Children's Wisconsin. Milwaukee, WI
Introduction: BPD is a chronic lung disease that affects infants who are born prematurely. These patients require specialized care and benefit from being managed by a multidisciplinary team that attends to their medical needs. The level IV NICU at Children's Wisconsin created a multidisciplinary rounding team dedicated solely to the care of infants with BPD.
Methods: A pharmacist was both engaged in the development of guidelines for treatment of patients with BPD, and involved in planning the logistics of the new rounding team. After service go-live, weekly huddles to plan patient management were held with providers; these plans included pharmacist input and recommendations every week. Pharmacist interventions were tracked.
Results: The pharmacist created medication guidelines, both for mild-to-moderate BPD management and for severe BPD management, including sedation & paralysis. These guidelines were approved by all of the clinical stakeholders in the new service, including neonatologists and pulmonologists. The BPD service began accepting patients in October 2023 and was at its maximum capacity of 8 patients most weeks. The service expanded to a maximum of 16 patients in January 2024. Pharmacist interventions included promoting adherence to local BPD guidelines, developing weaning or escalation plans for sedatives and corticosteroids, optimizing medication dosing, and recommending vaccinations. Future directions include pharmacist engagement in medication-related system quality metrics that will be tracked for the patients on the service.
Conclusion: Pharmacists are a crucial part of the multidisciplinary team managing patients with BPD.

COMPARISON OF BUSULFAN CUMULATIVE AREA UNDER THE CURVE ANALYSIS METHODS FOR STANDARD OF CLINICAL CARE FOR NON-MALIGNANT PEDIATRIC HEMATOPOIETIC CELL TRANSPLANT PATIENTS. Susie Long, Christine Lee, Carl Anderson, Nicole Louden, Kristina Nelson, Cathryn Jennissen University of Minnesota - Masonic Children's Hospital. Minneapolis, MN
Introduction: Busulfan is an alkylating agent used in chemotherapy-based conditioning regimens before hematopoietic cell transplantation (HCT). Significant pharmacokinetic variability exists in pediatric patients receiving intravenous busulfan. Higher busulfan exposure is linked to toxicities, while suboptimal exposure increases the risk of disease relapse or graft rejection. Therapeutic drug monitoring is performed to optimally dose this narrow therapeutic index medication. Busulfan exposure is calculated, defined by the cumulative area under the curve (cAUC) over the treatment course, and the busulfan dose is adjusted in real-time using therapeutic drug

monitoring. The primary goal of this study was to compare the performance of the model-informed precision dosing (MIPD) for the accuracy of obtaining the patient-specific busulfan-targeted AUC compared to our historical standard.

Methods: This single-center, retrospective study assessed pediatric patients with non-malignant disorders who underwent allogeneic HCT at our institution from January 2014 to September 2023. Patients were eligible if less than 25 years old, were transplanted for a non-malignant diagnosis, received IV busulfan for their myeloablative conditioning regimen, and had busulfan plasma time-concentration data available for analysis. For patients in the historical control group (HIS), the initial dose of busulfan was determined by Long-Boyle or Bartelink model followed by AUC monitoring; AUC was determined by non-compartmental analysis estimation using the linear trapezoidal rule. For patients in the MIPD group, the initial busulfan dose was estimated by a population pharmacokinetic MIPD, with AUC monitoring utilizing Bayesian-based MIPD.

Results: There were no significant differences between groups regarding baseline characteristics (age, weight, gender, creatinine, or disease). The percentage of patients that achieved an AUC within 20% of the exposure target with the first PK collection was higher in the MIPD group 50% (19/38) versus the HIS group 34% (15/44) (not significant). A decrease in clearance with subsequent AUCs was noted across the treatment course for nearly all patients (n=66). For HIS patients, the average decrease in clearance between AUC1 and AUC2 was 6%, and 15% between AUC1 to AUC3. MIPD patients experienced an average decrease in clearance of 4% between AUC1 and AUC2 and 18% between AUC1 and AUC3. The number of dose changes was significantly higher in the HIS group (82%) compared to MIPD (40%) ($p<0.001$). The number of dose changes in the HIS group after AUC1 was 41/44(93%), AUC2 35/44(80%) and AUC3 30/44(68%) compared to MIPD group was AUC1 was 34/38(89%), AUC2 9/38(23%) and AUC3 4/38(11%).

Conclusion: The performance of Bayesian-based MIPD proved to be superior to our historical standard in achieving goal busulfan cumulative AUC earlier in the treatment course. Both dosing strategies tend to overestimate the first dose of busulfan. However, the MIPD dosing strategy resulted in only one dose change for most patients compared to three in our historical standard.

DESCRIPTION OF A PHARMACIST-LED NEONATAL PHARMACOTHERAPY ELECTIVE FOR NEONATOLOGISTS-IN-TRAINING. Katherine Malloy, Austin Rutledge. MUSC Shawn Jenkins Children's Hospital. Charleston, SC

Introduction: Physicians-in-training receive formal classroom education in pharmacology during their first years of medical school, but it is generalized and often not followed by direct clinical experiences. Some institutions have published reports of pharmacist-led rotations during physician residency or fellowship. Data from these experiences showed improved knowledge of pharmacotherapy for various disease states, confidence in practice, and understanding of the research process. However, these reports are limited, and few specifically address pediatric patients or neonates. We report our experience with a two-week clinical pharmacy elective for neonatology fellows.

Methods: Neonatology fellows in our NICU fulfill 13 months of patient care service and are allotted at least four weeks of elective experiences during fellowship. Beginning in the 2021-2022 academic training year, an elective experience with a neonatal pharmacy specialist was implemented and the rotation has since been completed by seven neonatology fellows in either their second or third year of training. Fellows participated in multidisciplinary rounds, meetings, and topic discussions. Topics included anti-infective spectrums of activity; common medication dosing and monitoring; pharmacokinetic principles; and pain management. Medication safety was emphasized throughout the rotation, including ordering, preparation, administration, and monitoring. Fellows explored the inpatient pharmacy focusing on the technology used to ensure safety and accuracy in medication preparation. Bedside administration practices such as smart pump technology and barcode administration were also reviewed. Afterwards, fellows received an anonymous online survey to assess perceived benefits of the elective, opportunities for improvement, and their likelihood to recommend the elective to future fellows.

Results: Feedback from the fellows was overwhelmingly favorable. Reported benefits included: improved understanding of parenteral nutrition, systems-based workflow for medication preparation and administration, pharmacokinetics, unnecessary medication use, dose optimization, and the role of a pharmacist. Suggested opportunities for improvement included: implementation of a formal knowledge assessment, incorporation of a structured curriculum to align with board examination content, and review of practice cases for dosing and drug concentrations. All respondents reported with a 99 or 100 regarding how likely they would be to recommend the elective to another fellow (100 being the most likely to recommend and zero being the least likely). One respondent, now a practicing neonatologist, reported considerations surrounding gentamicin and vancomycin dosing as well as awareness for medication side effects as skills gained from the experience.

Conclusion: Implementation of a two-week pharmacist-led, pharmacology elective for neonatology fellows was successful and highlights the feasibility of pharmacists serving as educational leads for physicians-in-training. Both disciplines noted benefits related to improved communication and understanding of team member roles. Future experiences may be enhanced by a more structured curriculum with core learning objectives, patient cases to practice learned skills, and a formal knowledge assessment.

EVALUATION OF PRESCRIPTIVE PRACTICES OF ANTIBIOTICS FOR PEDIATRIC COMMUNITY ACQUIRED PNEUMONIA. Alexis McDaniel. Holtz Children's Hospital, Jackson Memorial Medical Center. Miami, FL

Introduction: The Pediatric Infectious Diseases Society and Infectious Diseases Society of America recommend amoxicillin or ampicillin in vaccinated children for empiric treatment of community acquired pneumonia (CAP). For cases of complicated CAP, or incomplete vaccination, ceftriaxone is indicated. Despite guideline recommendations, our antimicrobial stewardship team has observed increased broad-spectrum prescribing, prompting a CAP quality initiative. The primary purpose of this review is to describe our prescribing practices for pediatric CAP, while focusing on adherence to guidelines and considering patient specific factors.

Methods: This single-center, retrospective chart review utilized third-party software to identify subjects admitted to an

academic, pediatric hospital between January and December 2023. Patients were identified if prescribed an antibiotic with a diagnosis of pneumonia. Patients were then randomly selected and screened for CAP, excluding those with hospital acquired pneumonia (HAP), other indications upon admission, or age over 18 years. The primary outcome was a composite of empiric and discharge regimens non-adherent to guidelines, based on pneumococcal (PCV) and Haemophilus influenzae (Hib) immunization, uncomplicated vs. complicated CAP, and patient specific factors. The secondary outcome was appropriateness of antibiotic selection, dose, duration for empiric and discharge regimens, and 30-day and 90-day readmission rates. Non-parametric, descriptive statistics were utilized.

Results: Initially, 297 patients were identified with 182 included for analysis. Twenty-eight patients were randomly selected, and five excluded for HAP or admission non-related to CAP. Patients were a median of 3.5 years old, 56.5% male, and 60.9% vaccinated with PCV and Hib. Comorbidities included pulmonary disease (26.1%), immunocompromised (21.7%), and beta-lactam allergy (17.4%). Common symptoms at presentation were hypoxemia (SpO_2 92% or less, 43.5%) and fever (38 degrees Celsius or greater, 73.9%), and two patients (8.6%) had complicated pneumonia. Overall, 17 patients (73.9%) had a regimen non-adherent to guidelines. Of these, 15 (65.2%) were empirically prescribed, and 8 (30.4%) were prescribed at discharge. Empiric broad-spectrum antibiotics were used inappropriately in 34.8% of patients, with ceftriaxone (47.8%), cefepime (30.4%), and vancomycin (30.4%) most commonly prescribed. While drug selection empirically was most commonly identified in discordance from guidelines, dose (20.0%) and total duration of therapy (25.0%) were the most inappropriate upon discharge. The incidence of inappropriate regimens prescribed at discharge decreased by 60% (18.4 new cases vs. 4.6 new cases per population) in charts with an infectious disease consult. No patients were readmitted within 30 days; one patient was readmitted within 90 days for viral pneumonia.

Conclusion: Overall, this review demonstrated discordance in treatment practice in comparison to guideline recommendations for pediatric CAP, even after assessing patient specific factors. The final review will assess 100 pediatric patients to obtain a clearer picture. However, these initial results demonstrate potential benefit of a CAP clinical treatment pathway.

IMPACT OF MENINGITIS PCR PANEL IN DECREASING ANTIBIOTIC THERAPY FOR PRESUMED NEONATAL MENINGITIS. Jennifer Pham, Shiyi Lan, Marta Ciolkowska, Isabel Xiao, Angelo Turla. University of Illinois Chicago College of Pharmacy. Chicago, IL

Introduction: Neonatal sepsis and meningitis pose significant threats if left untreated, with complications arising from lumbar puncture often occurring after initiation of antibiotic. This practice complicates meningitis diagnosis, as cerebrospinal fluid (CSF) culture results may be inconclusive. Conventional biomarkers such as complete blood count (CBC) and C-reactive protein (CRP) lack the specificity and sensitivity necessary for accurate neonatal meningitis diagnosis. Consequently, cases classified as culture-negative bacterial meningitis (CNBM) often undergo prolonged antibiotic therapy, lasting up to 14-21 days. Inappropriate or prolonged antibiotic use is associated with an increased risk of nosocomial infections, necrotizing enterocolitis (NEC), mortality, and the emergence of antibiotic-resistant organisms. This study aims to evaluate the impact of the FilmArray Meningitis Encephalitis PCR Panel (MEPCRP) on antibiotic duration and outcomes in neonates with CNBM. We hypothesized that implementing MEPCRP testing could result in a substantial 20% reduction in antibiotic use without increase in reinfection rates among neonates treated for CNBM.

Methods: This retrospective cohort study includes neonates treated for CNBM who underwent lumbar puncture after antibiotic therapy. Cohort 1 (PRE-Imp: 2017-2020) precedes MEPCRP implementation, while Cohort 2 (POST-Imp: 2020-2023) follows it. Primary outcomes are antibiotic duration and reinfection within 30 days. Secondary outcomes include mortality, hospitalization duration, central line placements, NEC, and early neurodevelopmental scores. Statistical analyses involve chi-square tests, t-tests, and regression analysis.

Results: This study comprised 150 neonates (50 in Cohort 1 and 100 in Cohort 2). Cohort 2 neonates were significantly older (mean gestational age [GA] of 37.2 ± 3.6 vs. 35.7 ± 5.3 weeks, p=0.04) and larger (mean birthweight [BW] of 2962 ± 881 vs. 2614 ± 1202 grams, p=0.04) than those in Cohort 1. Cohort 2 demonstrated significantly shorter antibiotic durations (mean 7.4 ± 2.4 vs. 13.6 ± 5.2 days, p<0.0001) and hospitalizations for antibiotic therapy (mean 7.6 ± 2.7 vs. 14.7 ± 5.5 vs days, p<0.0001) compared to Cohort 1. No reinfection occurred within 30 days. Cohort 1 experienced prolonged central line placements (median 8 vs 0 days, p<0.0001), higher vasopressor usage (10% vs 2%, p=0.04), and a higher immature-to-total neutrophil (IT) ratio (median 0.11 vs. 0.07, p=0.019). Factors associated with prolonged antibiotic therapy (> 10 days) included GA, BW, postmenstrual age, higher IT ratio, and the need for respiratory support. No significant differences were found in CRP, white blood cell (WBC) count, CSF WBC, length of hospitalization, mortality, NEC, or early neurodevelopmental scores.

Conclusion: MEPCRP testing significantly reduced antibiotic duration, central line placements, and associated hospital stays in neonates with CNBM without compromising outcomes. This diagnostic tool proves valuable in optimizing antibiotic use, reducing costs, and preventing adverse outcomes associated with prolonged antibiotic therapy in this vulnerable neonatal population.

SIGNIFICANT GASTROINTESTINAL-RELATED ADVERSE EFFECTS AFTER CHANGE FROM IVACAFTOR TO ELEXACAFTOR/TEZACAFTOR/IVACAFTOR. Carleigh Robinson, Nour Kadouh, Hanna Phan. University of Michigan. Ann Arbor, MI

Introduction: The management of cystic fibrosis (CF) has significantly advanced over the past two decades following the approval of the CF transmembrane conductance regulator (CFTR) modulators. Elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) is a triple-combination therapy modulator approved for patients ages 2 years and older with at least one F508del mutation or a CFTR gene mutation that is responsive based on in vitro data. Although typically well tolerated, common adverse drug reactions of ELX/TEZ/IVA include headache, respiratory tract infections, abdominal pain, rash, and increased transaminase levels. The purpose of this case series is to describe two cases in which transition from IVA to ELX/TEZ/IVA resulted in intolerable gastrointestinal related adverse effects and resolved with change back to IVA.

Methods: A retrospective chart review at a single CF center included patients with heterozygous F508del mutations who experienced significant gastrointestinal-related adverse effects after initiation of ELX/TEZ/IVA requiring intervention.

Results: Case 1 is a female person with CF who initiated ELX/TEZ/IVA at 8 years old, following 2 years of therapy with IVA. She experienced decreased appetite and constipation within the first month of ELX/TEZ/IVA therapy, followed by elevated AST, ALT, and vitamin B12 levels at 6- and 9-months post-initiation. Interventions included work-up for CF-related diabetes, adjustments to laxative therapy, and initiation of a digestive enzyme cartridge with enteral feeds. ELX/TEZ/IVA therapy was discontinued after approximately 9 months and the patient was restarted on IVA following stabilization of liver function tests, nearly 3 months post-ELX/TEZ/IVA discontinuation. After approximately one month of therapy with IVA, patient was tolerating enteral feeds, gained weight, and reported increased appetite and regular bowel movements. Case 2 is a male person with CF who initiated ELX/TEZ/IVA at 7 years old, approximately 3.5 years following therapy with IVA. He experienced increased constipation, resulting in hospital admission for the management of possible ileus. Patient also experienced weight loss and family reported decreased appetite while on therapy with ELX/TEZ/IVA. Interventions included adjustments to diet and bowel regimen (therapy with docusate sodium, sennosides and polyethylene glycol, which was discontinued due to significant behavioral changes). Constipation and appetite returned to baseline 3 weeks after transitioning from ELX/TEZ/IVA to IVA monotherapy.

Conclusions: Case 1 and Case 2 are examples of patients with heterozygous F508del mutations who experienced to gastrointestinal-related side effects due to therapy with ELX/TEZ/IVA that resolved with change back to IVA. These cases can assist clinicians in the management of off-label adverse effects experienced by ELX/TEZ/IVA.

MEDICATION USE EVALUATION OF HYALURONIDASE ADMINISTRATION AT LE BONHEUR CHILDREN'S HOSPITAL.

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Introduction: Hyaluronidase is a therapy used for irritant and vesicant infiltration. It works by diffusing the extravasated medication over a larger area and increasing capillary permeability to facilitate absorption of the medication. It is administered as five intradermal or subcutaneous injections into the extravasation site as soon as possible and preferably within one hour after extravasation is recognized. This evaluation assesses adherence to our institution guidelines and determines the time from order placement to administration to patient.

Methods: This is a single center, retrospective chart review of the electronic medical record of pediatric patients who received Hyaluronidase for infiltration from January to May 2023. Data collection includes age, gender, hospital location, infiltrated medication, timing of infiltration, timing of hyaluronidase preparation, and timing of hyaluronidase administration. Appropriate use will be determined by comparing data to our institutional guideline. This study was IRB approved.

Results: 52 patients were included in this data analysis. 25 male (48%) and 27 (52%) female patients were analyzed. 29 (56%) of patients were located on general medicine floors while 23 (44%) patients were in the intensive care unit. The mean time of infiltration to hyaluronidase administration was 56.6 minutes. 65% of hyaluronidase was administered within 1 hour of extravasation, 19% of hyaluronidase was administered within 1 hour and 30 minutes and 10% was administered within 2 hours. Vancomycin (35%), parenteral nutrition (27%), and intravenous fluids containing D10 (13%) were the most common medications resulting in infiltration.

Conclusions: At our institution, hyaluronidase is used to for medication extravasation and is generally given within the desired one-hour time frame. Further analysis is needed to evaluate and assess the clinical effects of timely administration and will be completed in the next phase of this study.

CHANGES IN REAL-WORLD DISPENSING OF ADHD STIMULANTS IN YOUTH FROM 2019 TO 2021 IN CALIFORNIA.

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Introduction: Attention-deficit/hyperactivity disorder (ADHD) is one of the most common pediatric neurobehavioral disorders in the U.S. Stimulants, classified as controlled substances, are commonly used for ADHD management. We conducted an analysis of real-world stimulants dispensing data to evaluate the pandemic's impact on young patients (≤ 26 years) in California.

Methods: Annual prevalence of patients on stimulants per capita across various California counties from 2019 and 2021 were analyzed and further compared across different years, sexes, and age groups. New patients initiating simulants therapy were also examined. A case study was conducted to determine the impact of socioeconomic status on patient prevalence within different quintiles in Los Angeles County using patient zip codes. Logistic regression analysis using R Project was employed to determine demographic factors associated with concurrent use of stimulants with other controlled substances.

Results: Methylphenidate was primarily prescribed to patients aged 6-17, while among young adults, the top stimulants dispensed were mixed amphetamine salts. There was a notable reduction in prevalence of patients ≤ 26 years old on stimulants during and after the pandemic per 100 000 people (777 in 2019; 743 in 2020; 751 in 2021). These decreases were more evident among the elementary and adolescent age groups. The most prevalent age group on stimulants were adolescents (12-17 years) irrespective of the pandemic. A significant rise in the number of female patients using stimulants was observed, increasing from 107 957 (35.2%) in 2019 to 121 241 (41.1%) in 2021. New patients initiating stimulants rose from 102 754 in 2020 to 106 660 in 2021, with 33.2% being young adults. In Los Angeles County, there was an increasing trend in patient prevalence from Q1 to Q5 income quintiles among patients ≥ 6 years. Consistently each year, the highest average income quintile exhibited the highest per capita prevalence. Age was associated with higher risk of concurrent use of benzodiazepines (OR, 1.198 [95% CI, 1.195-1.201], P<0.0001) and opioids (OR, 1.132 [95% CI, 1.130-1.134], P<0.0001) with stimulants.

Conclusion: Our study provides real-world information on dispensing of ADHD stimulants in California youth from 2019 to 2021. The results underscore the importance of optimizing evidence-based ADHD management in pediatric patients and young adults to mitigate disparities in the use of stimulants.

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