## Abstract Title
Effects of a pharmacist-driven methadone stewardship for the treatment of neonatal abstinence syndrome in a tertiary children’s hospital

## Background
Lack of a standardized opioid wean protocol for the treatment of Neonatal Abstinence Syndrome (NAS) has the potential to increase the length of the wean and stay for neonates in the intensive care unit (NICU). The purpose of this study is to assess the impact of a pharmacist-driven methadone stewardship on the length of opioid wean in days for NAS treatment.

## Methodology
This IRB-approved, retrospective study evaluated the length of methadone weans utilized for NAS treatment in the NICU at a tertiary care pediatric hospital. The NAS stewardship program consisted of a pharmacy surveillance system rule, a clinical practice guideline, and provider and pharmacist education. The new NAS guideline was implemented in February 2020. The pre-intervention period was defined as patients admitted to the NICU between July 2019 - December 2019. The post-intervention period was defined as patients admitted to the NICU from March 2020 - May 2020. The primary objective was to assess the impact of pharmacist-driven methadone stewardship on the duration of opioid treatment in days. Secondary outcomes included the number of patients that received a complete loading dose defined as 0.05 - 0.1 mg/kg/dose every 6 hours for 4 doses, the incidence of deviation from opioid wean, the length of hospital stay in days, and the total volume of methadone wasted.

## Results
Pending

## Conclusions
Pending
### Background
The Golden Hour, although a new concept in the field of neonatology, has been used for many years in the treatment of adult sepsis patients. This concept is now being investigated in the treatment of neonates in the first 60 minutes of life. This first hour of life is important to morbidity of neonates because during this 60 minute time frame they are at risk for long-term detrimental disabilities, or even death.

### Methodology
Inborn neonates directly admitted from the delivery room to the NICU and given ampicillin, gentamicin, or ceftazidime within one hour of birth will be included in this study. Exclusion criteria are the decision to use antibiotics after one hour of birth, admission from any other location than the delivery room at Medical Center of Trinity, and the use of any other antibiotics. The time to administration of antibiotics was evaluated during April 2019. A root cause analysis was performed for administration times that fell outside of the golden hour. Fall outs were found to be within pharmacy, registration, and nursing. An action plan that included education, the importance of the golden hour, verifying stat medications, and submitting admission orders upon arrival in the NICU was implemented. Prospective data collection will occur from March 1, 2020 - April 30, 2020 and will focus on the primary outcome of improving antibiotic administration within the golden hour. The secondary outcomes will include decreased length of stay and time off of respiratory support.

### Results
Pending

### Conclusions
Pending
### Methodology

This is a prospective, survey-based study evaluating the meds-to-beds process at a single academic medical center. Patients were considered for inclusion if they were being discharged from units covered by pediatric services and were receiving at least one medication through the meds-to-beds program. A 10-question survey was developed to be given to caregivers, or patients if they were at least 18 years of age, at the time of medication delivery. The primary outcome is overall satisfaction with the service. Secondary outcomes include satisfaction in comparison to using standard outpatient pharmacy services, ability to obtain all medications through meds-to-beds, perceived effect of meds-to-beds on ease of hospital discharge, satisfaction with pharmacist counseling, when provided, and elements of pharmacy technician workflow. All statistical analysis is descriptive in nature.

### Results

Surveys were collected from September 24, 2019 to February 28, 2020. During this time, 139 patients receiving prescription deliveries were considered for inclusion in the study. Thirty-seven deliveries were excluded, with the primary reasons being medication delivery to someone other than the caregiver, medications being picked up from the pharmacy prior to delivery, and caregivers declining the survey. Of the 102 surveys completed, 101 (99%) reported being happy with the service. Forty-three participants reported previous use of our institution’s outpatient pharmacy, and 28 of those (65%) rated the meds-to-beds service as better in comparison. Ninety-eight patients (96%) were able to receive all medications needed through this service. Reported reasons for inability to receive all prescriptions were medications not being in stock or requiring a specialty pharmacy. Ninety-nine participants (97%) reported the meds-to-beds service eased their discharge process. Eighty-four survey takers (82%) stated a pharmacist provided education prior to discharge, and 67 of these (80%) reported being happy with the counseling provided.

Complete technician documentation was recorded for 37 (36%) of the 102 meds-to-beds deliveries assessed through the survey. The mean number of prescriptions filled was 2.81 ± 2.44 and the mean time between meds-to-beds request and delivery was 46.92 ± 39.88 minutes. Encountered issues included errors on prescriptions requiring correction (n=2) and availability of insurance information or coverage issues (n=3).

### Conclusions

Overall satisfaction was very high among patients and caregivers surveyed who received medications through the meds-to-beds service. Two-thirds of participants who had previously used standard outpatient pharmacy services rated prescription delivery as better in comparison. The majority of participants also stated that this service eased their discharge process. These results support the success of the meds-to-beds program in achieving its goals of simplifying the transition from hospital to home and improving patient experience. Limitations to this study include a lower number of surveys collected compared to the anticipated number of deliveries during the study period and incomplete technician documentation for many encounters. Because of these limitations, the study may not encompass all patients who had prescriptions sent to our outpatient pharmacy with the intention of receiving meds-to-beds or all issues encountered. Proposed improvements based on this study include creating a more user-friendly documentation system for tracking prescription issues and medication delivery, optimizing the efficiency of technician workflow related to this service, and increasing overall utilization of prescription delivery by improving communication between the outpatient pharmacy and inpatient pharmacists and providers. Results will be presented to pharmacy department leadership in support of creating a new pharmacy technician position dedicated to the meds-to-beds service for our children’s hospital.
**Abstract Title**
Effect of fixed vs. weight-based morphine dosing on withdrawal symptoms and adjunctive pharmacologic therapy in infants with neonatal abstinence syndrome

**Background**
Neonatal Abstinence Syndrome (NAS) is a major health concern impacting thousands of neonates across the United States. The management of NAS involves the use of non-pharmacologic and pharmacologic therapies. The most common first-line pharmacologic therapies utilized in the management of withdrawal symptoms include morphine, methadone and buprenorphine. Adjunctive second-line agents are typically phenobarbital and clonidine. The NAS morphine dosing protocol at our institution was recently adjusted from a fixed dose to a weight-based dose in an attempt to provide a more consistent approach. The fixed dosing protocol utilized oral morphine at a dose of 0.04 mg every 3 hours for Finnegan Neonatal Abstinence Scoring Tool (FNAST) scores of 8 or greater in three consecutive scoring periods or 12 or greater in two scoring periods within 24 hours. The new protocol provides a starting morphine dose of to 0.04 mg/kg/dose every 3 hours. Initiation and adjustment of morphine is now based on the occurrence of three consecutive scores of 8 or greater or two consecutive scores of 12 or greater. The purpose of this study was to assess the effectiveness of an updated approach to oral morphine dosing for the management of NAS patients.

**Methodology**
This was a retrospective electronic chart review of patients admitted to the Golisano Children’s Hospital of Southwest Florida Neonatal Intensive Care Unit (NICU) from January 1, 2017 to October 31, 2019. Patients were included if they were less than or equal to 28 days of age and had a diagnosis of NAS with maternal substance use confirmed by maternal urine drug screen, umbilical cord drug screen, or infant urine/meconium drug screen. Patients were excluded if they were delivered at less than 37 weeks’ gestation or if there were any concurrent acute or complex medical diagnoses. The primary outcome was to compare time to symptom capture using fixed dosing versus weight-based dosing of morphine. Time to symptom capture was defined as the point in time at which FNAST scores have remained less than 8 for a period of 24 hours.

**Results**
A total of 60 patients met inclusion criteria. Patients receiving weight-based oral morphine experienced a faster time to symptom capture at a median of 2.75 days in comparison to 3.6 days in the fixed dosing group (p = 0.013). There was no statistically significant difference observed in regards to length of stay between groups, however, there was a trend towards a shorter stay on average in the weight-based group (20.7 ± 9.9 vs. 23.8 ± 11, p = 0.252). There was a significant difference in days of morphine treatment in favor of the weight-based dosing group with a median of 9.1 days versus 14.5 days in the fixed dosing group (p = 0.039). Differences between groups for days of total treatment and use of adjunctive pharmacological therapy were not statistically significant but trended in favor of the weight-based dosing group.

**Conclusions**
Results show that implementation of a weight-based oral morphine dosing approach improved time to symptom capture and reduced total days of morphine treatment required. Although there were no statistically significant differences observed in regards to length of stay, total treatment days, and use of adjunctive pharmacological therapy, there was a decrease in each with patients receiving weight-based dosing.

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<td>Practice Site</td>
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<td>Abstract Title</td>
<td>Pediatric Vortioxetine Exposures Reported to the National Poison Data System, 2013 – 2019</td>
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### Background
Antidepressants are among the most commonly used drug classes in the United States. Vortioxetine is a novel multimodal antidepressant approved in the United States in 2013 for the treatment of major depressive disorder in adults that is an antagonist at the 5HT3, 5HT7, and 5HTD1 receptors, a partial agonist at the 5HT1B receptor, an agonist at the 5HT1A receptor, and an inhibitor of the 5HT transporter. Recent studies demonstrate its safety and efficacy in children and adolescents at doses similar to those used in adults. Limited information exists regarding toxicity from vortioxetine exposures. To date, the epidemiology and toxicity of pediatric vortioxetine exposures has not been analyzed.

### Methodology
This retrospective review will characterize the frequency, clinical manifestations, treatments, duration of effects, and medical outcomes of pediatric vortioxetine exposures in patients ≤ 6 years from 2013 to 2019 using a data set generated from the National Poison Data System (NPDS). Cases will be excluded if they involve substances in addition to vortioxetine, if age or medical outcome are not documented, if the case was not followed to outcome, or if confirmed that no exposure took place. Data collected will include age, weight, gender, reason for ingestion, amount ingested, time of ingestion, chronicity of exposure, time to onset of symptoms, clinical effects, therapies used, medical outcome, and duration of effects.

### Results
Pending

### Conclusions
Pending
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<td><strong>Practice Site</strong></td>
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<tr>
<td><strong>Abstract Title</strong></td>
<td>Evaluation of safety and efficacy outcomes for pediatric patients receiving magnesium sulfate infusions for an acute asthma exacerbation without telemetry monitoring</td>
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<tr>
<td><strong>Background</strong></td>
<td>According to the Center for Disease Control and Prevention, asthma is considered the most prevalent chronic lung disease of childhood. For severe exacerbations that are unresponsive to first line therapy after one hour or for life-threatening exacerbations, adjunct therapies, including intravenous magnesium sulfate, are recommended. The primary objective of this study is to determine that a 20-minute infusion of magnesium sulfate is as safe as the pre-protocol infusions in incidence of infusion related adverse events. The secondary objective of this study is to determine that a 20-minute infusion of magnesium sulfate is as effective as the pre-protocol infusions in efficacy.</td>
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<td><strong>Methodology</strong></td>
<td>This study will be a retrospective chart review of pediatric patients who had an acute asthma exacerbation and received an infusion of magnesium sulfate at St. Joseph's Children's Hospital. This study will compare a pre-protocol implementation period occurring August 2010 through February 2014 against a post-protocol implementation period occurring August 2014 through February 2019. Patients will be evaluated for magnesium sulfate infusion related reactions and data will be reviewed on patients from time of first dose of magnesium sulfate to one hour after completion of infusion.</td>
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<td><strong>Results</strong></td>
<td>There was a total of 781 patients included in the study: 381 in the 60-minute infusion group and 400 in the 20-minute infusion group. Incidence of infusion related respiratory depression in the pre-protocol group was 0.79% and in the post-protocol group was 2%. Incidence of infusion related hypotension in the pre-protocol group was 0.79% and in the post-protocol group was 1.26%. Neither respiratory depression nor hypotension resulted in a statistically significant outcome (p=0.149, p=0.516 respectively). There was a statistical significance favoring the 20-minute infusion group with respect to length of stay (p=0.007). Furthermore, there was a statistical significance favoring the 60-minute infusion group with respect to change in asthma scores (p=0.018). We did not observe a statistical significance with respect to number of magnesium doses and change in oxygen saturation between the two groups.</td>
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<tr>
<td><strong>Conclusions</strong></td>
<td>This study found that there was no statistically significant difference in incidence of infusion related adverse events in efficacy between pediatric patients who received magnesium sulfate over 20 minutes compared to 1 hour. The study found a statistically significant difference in length of stay and change in asthma scores between patients receiving magnesium sulfate over 20 minutes compared to 1 hour. The findings suggest that administration of magnesium sulfate over 20 minutes for an acute asthma exacerbation without implementation of telemetry monitoring is safe. A prospective study evaluating the safety and efficacy of magnesium sulfate infusions with more consistent monitoring parameters would aid in solidifying the findings.</td>
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### Background

Pain management in hematologic and oncology patients is a critical aspect of care throughout all stages of treatment commonly requiring the use of opioids. This often results in adverse events including pruritus, nausea, vomiting, and constipation. Naloxone, an opioid receptor antagonist, competitively displaces compounds from μ-opioid receptors. Concurrent use of naloxone is believed to minimize undesired adverse effects related to opioids, while minimally influencing their analgesia efficacy. At Wolfson Children’s Hospital (WCH), naloxone infusions at 0.25 mcg/kg/hour are utilized concurrently in pediatric hematologic and oncology patients on morphine patient controlled analgesia (PCA) infusions in an effort to reduce these undesired effects. The purpose of this study is to evaluate the efficacy of low-dose naloxone infusion in the reduction of opioid-related side effects and potential effects on analgesia in pediatric hematologic and oncology patients.

### Methodology

This was a retrospective chart review conducted at WCH including pediatric hematologic and oncology patients ranging from 1 to 21 years of age. Patients were excluded if they had known hypersensitivity to morphine/naloxone, renal failure, or were actively receiving intravenous chemotherapy during PCA infusion. Patients were separated into two groups: those who received morphine infusion alone, and those who received morphine infusion with continuous naloxone. The primary endpoint was the number of incidences of opioid-related side effects (pruritus, nausea, vomiting and/or constipation) between the two comparison groups. Secondary endpoints included pain scores and maximum daily dose of morphine (mg/kg).

### Results

A total of 46 patients were evaluated; 21 received continuous morphine PCA alone (pre-implementation) and 25 received continuous morphine PCA (post-implementation) with low-dose naloxone infusion of 0.25 mcg/kg/hour. Baseline characteristics were skewed, as there was a higher number of oncology patients in the group who received morphine PCA alone than those concurrently receiving naloxone (86% vs 32%). More interventions were needed for side effect management in the pre-implementation group than the post-implementation group, though this difference was not significant. There was a significant reduction in the need for antiemetic interventions for patients in the post-implementation group (1.38 ± 1.16 vs 0.68 ± 0.9, p=0.0259). Secondary outcomes demonstrated higher total daily dose of morphine (mg/kg) was needed (1.58 ± 0.69 vs 1.97 ± 0.85 (MME), p=0.1015) as well as a higher median pain score in patients in the post-implementation group (1 vs 5, p=0.0047).

### Conclusions

Concurrent low-dose naloxone infusions of 0.25 mcg/kg/hour may reduce the need for antiemetic therapy while on continuous morphine PCA, though at a possible risk to analgesia. There was no true benefit seen in the reduction of need for antiemetic or laxative therapies. Further investigation is necessary to analyze effectiveness of low-dose naloxone infusions.
## Abstract Title
Development and assessment of a post-operative pain management protocol for pediatric orthopedic patients

## Background
Pain management following orthopedic surgery is often inadequately controlled in the pediatric population. This multifactorial gap in pain management stems from genetic variations, difficulty of pain assessment in this population, and fear among healthcare providers for over-sedation. The purpose of this project is to develop a nurse driven pain management protocol for post-operative pediatric orthopedic patients in order to achieve adequate pain control.

## Methodology
The development and assessment of the protocol contains three phases. During phase I (pre-implementation), a retrospective analysis assessing pediatric post-operative pain management in orthopedic patients from September 2018 to September 2019 was completed. Using the results of the study, we were able to detect a need to maximize intravenous opioid dosing, and offer a hydromorphone alternative for patients that were not responsive to the initial post-operative doses of morphine. During phase II (implementation), nurses were initially assessed via survey on their comfort level of managing pain in the post-operative orthopedic population. They were then educated on the new protocol. During phase III (post-implementation), nurses will be re-surveyed to assess their experience using the protocol. Also, preliminary results will be gathered to determine the protocol's effect on pain management. Validation of the new protocol will be determined by assessment of pain scores. Success will be defined as pain scores below 4 throughout the duration of the in-patient stay.

## Results
Pending

## Conclusions
Pending
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### Practice Site
Wolfson Children’s Hospital/Baptist Health

### Abstract Title
Evaluation Of Potassium Replacement Protocol In Post-Operative Pediatric Cardiovascular Intensive Care Unit Patients

#### Background
Severe hypokalemia in pediatric cardiac surgery patients is a common occurrence during the immediate postoperative phase. Replacement of potassium for the treatment of hypokalemia varies between enteral and intravenous (IV) dosage forms and can vary greatly between institutions. One study by Rhodes and colleagues demonstrated a substantial decrease in the need for supplemental IV or enteral potassium after the introduction of potassium into post-operative fluids. Wolfson Children’s Hospital has recently implemented a protocol outlining the supplementation of potassium in post-operative fluids within the pediatric cardiovascular intensive care unit (PCVICU). This study will determine the number of potassium boluses received during the immediate postoperative period in patients admitted to the PCVICU post-cardiac surgery along with the rate of adherence to the current potassium replacement protocol.

#### Methodology
This was a retrospective chart review conducted at Wolfson Children’s Hospital. Subjects were obtained from surgery case records and divided between pre-protocol and post-protocol implementation. Data was obtained from January 2018 to June 2018 and July 2018 to July 2019 for the pre and post groups respectively. The aim of this study was to compare the number of potassium replacements during the first 24 hours of post-cardiac surgery care in patients admitted to the PCVICU pre and post potassium replacement protocol. Secondary outcomes include deviations or non-adherence, number of IV replacements in patients requiring diuretics, and an average total daily dose (mEq/kg) of potassium during the first 24-hour period post-op.

#### Results
A total of 171 patients were evaluated; 105 patients were included in the pre-protocol group and 66 patients in the post potassium replacement protocol group. The number of potassium chloride boluses was significantly reduced from an average of 1.72 boluses to 0.98 boluses ($p = 0.001$) in the first 24 hour postoperative period.

#### Conclusions
The potassium replacement protocol significantly reduced the number of boluses required during the first 24 hour postoperative period following cardiac surgery.
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**Practice Site**  | St. Joseph's Children's Hospital  
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**Abstract Title**  | Evaluation of pharmacist-led transition from targeted trough monitoring to AUC24 monitoring for vancomycin in pediatric patients  
---|---  
**Background**  | Recommended vancomycin dosing practice used serum trough concentrations to guide therapy, which stems from the assumption that trough levels serve as a surrogate marker for the area under the curve (AUC). However, there is inter-individual variability between a measured trough concentration and the actual AUC value. A novel approach, Bayesian-guided dosing, uses population response to therapy to inform clinicians on a specific individual’s response to current therapy; then calculates an optimal dosing regimen based on the specific patient’s exposure profile. Recently, St. Joseph's Children's Hospital acquired a new precision dosing software, DoseMeRx, which utilizes Bayesian-guided dosing and AUC24 monitoring for vancomycin. Despite the vast clinical experience with vancomycin, there are still major gaps in knowledge regarding the most appropriate dosing approach for optimizing patient therapy.  
---|---  
**Methodology**  | This study is a retrospective chart review of patients comparing vancomycin dosing practices from September 1st through December 31st, 2018 to patients managed by a pharmacist-led vancomycin precision dosing software from September 1st through December 31st, 2019 at St. Joseph's Children's Hospital. The primary objective was to evaluate dosing efficacy by comparing the proportion of patients who achieve target trough versus target AUC24 for vancomycin in pediatric patients. The secondary outcomes include time to achieve target trough or target AUC, incidence of nephrotoxicity and/or ototoxicity, and number of supratherapeutic or subtherapeutic troughs or AUC values.  
---|---  
**Results**  | There was a total of 88 patients included in the study: 49 patients in the trough monitored group and 39 patients in the AUC24 monitored group. Baseline characteristics were similar between both groups with no statistically significant differences. This study found a statistically significant increase in the proportion of patients who achieved initial goal AUC24 in the post-group compared to those who achieved initial goal trough in the pre-group (12.2% to 41%, p = 0.003) and in the proportion of patients who achieved overall AUC24 goal during therapy compared to those who achieved overall goal trough in the pre-group (36.7% to 69.2%, p = 0.003). The time to goal decreased overall from 2.79 days in the pre-group to 1.59 days in the post-group (p = 0.019). There were also significantly fewer dose manipulations (p = 0.003) and less subtherapeutic targets in the post-group when compared to the pre-group (p = 0.001). Lastly, there was no difference in the number of supratherapeutic pharmacokinetic values, incidence of nephrotoxicity or ototoxicity, or duration of treatment between the groups.  
---|---  
**Conclusions**  | Using Bayesian-guided dosing, this study demonstrated improved incidence of pharmacokinetic parameter attainment with AUC24 monitoring compared to traditional trough monitoring in pediatric patients on vancomycin. This study contributes information regarding vancomycin dosing efficacy in a minimally studied population. However, additional research on a larger scale is needed to determine whether AUC24 versus trough monitoring is best to evaluate the therapeutic efficacy and safety of vancomycin in pediatrics.
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<tr>
<td>Abstract Title</td>
<td>Evaluation of dexamethasone vs prednisone/prednisolone use in acute asthma exacerbations</td>
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**Background**
General management of acute asthma exacerbations include the use of corticosteroids, which are associated with favorable effects including reduced relapse rates, hospital readmissions, and use of β2-agonist bronchodilators. While pediatric asthma guidelines endorse steroid use for acute asthma exacerbation, there is no consensus regarding preferred steroid. There is limited evidence comparing outcomes between steroids, specifically prednisone/prednisolone versus dexamethasone. The purpose of this study is to compare 14 day retreatment rates between all patients who receive prednisone/prednisolone for 5 days or dexamethasone for 2 days for acute asthma exacerbation, regardless of disposition.

**Methodology**
This was a single center, retrospective, chart review comparing outcomes between dexamethasone and prednisone/prednisolone in pediatric patients. Included patients were 1-18 years old, diagnosed with acute asthma exacerbation per ICD-10 codes, and seen in the emergency department (ED) or admitted to the general pediatric unit. Patients were excluded if they were admitted to the intensive care unit, had pre-existing conditions including chronic lung disease and sickle cell disease, had recent systemic steroids, or did not receive steroid dosing per facility standard dosing (dexamethasone 0.6 mg/kg daily x 2 or prednisone/prednisolone 2 mg/kg/day x 5). The primary outcome was need for subsequent asthma related hospital visit (retreatment) within 14 days of initial presentation. A subgroup analysis was performed evaluating the primary outcome for patients admitted to the hospital separately from those seen in the ED. Secondary outcomes included need for additional steroids within 14 days of treatment and impact of dexamethasone’s administration timing on need for retreatment.

**Results**
A total of 544 patients were evaluated; 270 patients received dexamethasone and 274 received prednisone/prednisolone. The 14-day retreatment rate for patients who received dexamethasone was 3.4% compared to 4.7% for those who received prednisolone (p=0.429). A subgroup analysis comparing retreatment between groups based on disposition also showed no difference (0% vs 3.4%, p=0.571 and 3.8% vs 5.4%, p=0.441). There was no difference between groups for need for additional steroids (3.4% vs 3.7%, p=0.873) and timing of dexamethasone administration had no impact on retreatment.

**Conclusions**
This study found no correlation between steroid choice and retreatment rate. Based on current available evidence, dexamethasone or prednisone/prednisolone may be utilized for an acute asthma exacerbation at provider discretion.