Dexamethasone versus Prednisone/Prednisolone for the Treatment of an

Acute Asthma Exacerbation in the Pediatric Population

**Principal Investigator:** Jessica Hoover, Pharm.D.

**Co-investigators:**

Shannan K Eades, Pharm.D.

Pediatric Pharmacy Clinical Specialist

Memorial Hermann- Texas Medical Center

Children’s Memorial Hermann

Department of Pharmacy

**Contact Information:**

Jessica Hoover

Memorial Hermann- Texas Medical Center

6411 Fannin

Houston, TX 77030

(409) 289-0064

**Funding:** This study will not be funded, it will be performed entirely by the investigators and utilize only those resources available at the location.

**Study location:** Children’s Memorial Hermann Hospital

6411 Fannin

Houston, TX 77030

**Objective:** To compare efficacy and safety outcomes between children receiving a two-dose regimen of dexamethasone and children receiving a multidose regimen of oral prednisone/prednisolone for the treatment of acute asthma exacerbations not requiring admission to the intensive care unit.

**Specific aims:**

1. To determine if Asthma Assessment Scores differ between groups.

2. To determine if use of adjunctive medications, length of stay, transfer to the intensive care unit, and 7- and 30-day hospital readmission rate differ between groups.

3. To determine if gastrointestinal tolerance after corticosteroid administration differs between groups.

**Introduction/Background:**

Asthma exacerbations are the second most common reason for pediatric hospital admissions in the United States each year. 1 Asthma exacerbations are a leading cause of ED visits, hospitalizations and missed school days in children. Current guidelines published by the Global Initiative for Asthma and the National Institutes for Heath recommend treatment with systemic corticosteroids in combination with beta-agonist therapy to treat acute asthma exacerbations.2,3 Traditionally prednisone and prednisolone have been used to manage exacerbations (recommended dosing 1-2 mg/kg/day for a total of 3-5 days). 3,4

Prednisone/prednisolone has a short half-life of 12 to 36 hours thus requiring once or twice daily dosing for 5 days or longer. National Heart Lung and Blood Institute (NHLBI) guidelines recommend 3-10 day courses to treat acute asthma exacerbations. This prolonged treatment course and other side effects including poor palatability and nausea/vomiting with the oral tablet or syrup may reduce patient adherence. Additionally it is estimated that up to 28% of patients do not fill their corticosteroid prescription, and an unknown number of patients do not complete their corticosteroid course.4 Dexamethasone has been proposed as a steroid option given its longer half-life of 36-72 hours, which allows for a shorter 2-dose treatment duration and better palatability of the oral tablets.

Recently, Children’s Memorial Hermann Hospital began to utilize a two-dose regimen of oral dexamethasone to treat acute asthma exacerbations. The focus of this study is to ensure that the efficacy and safety outcomes are the same for patients receiving a two-dose regimen of dexamethasone versus a multidose regimen of oral prednisone/prednisolone in the treatment of acute asthma exacerbations in children not requiring intensive care unit admission.

**Methods:**

*Population:*

Inclusion Criteria: Pediatric patients aged 4-17 years of age who were hospitalized for an acute asthma exacerbation and received therapy with either dexamethasone or prednisone/prednisolone at Children’s Memorial Hermann Hospital from January 1, 2014 to December 31, 2015 will be reviewed for inclusion.

Exclusion Criteria: Patients will be excluded if they are

* >18 years of age
* Pregnant
* Required initial management in the intensive care unit
* Received corticosteroid therapy due to a secondary diagnosis (e.g., croup or anaphylactic shock)
* Received therapy with both dexamethasone and prednisone/prednisiolone
* Received therapy with racemic epinephrine

*Study Design:*

This will be a retrospective, observational study. No interventions will be used and patients will not be prospectively assigned to groups. We will simply observe the care that patients have already received and analyze the data we collect based on past admissions.

*Data Retrieval:*

Data Source: Data will be collected from the electronic medical record. Subjects will be identified through ICD-9 codes for an acute asthma exacerbation from January 1, 2014 to December 31, 2015. Data will be recorded on a Microsoft Word Document. The medical record of each subject who meets the inclusion criteria will be reviewed and the following parameters will be collected:

Data Collection:

1. Clinical characteristics: age, gender, weight, height, asthma severity (intermittent, mild persistent, moderate persistent, severe persistent)
2. Admit diagnosis
3. Length of hospitalization
4. Asthma Assessment Score
5. Medication
   1. Dexamethasone dose (mg), duration of therapy, dosing interval (days and hours)
   2. Prednisone/prednisolone dose (mg), number of doses, duration of therapy, dosing interval (days and hours)
   3. Total albuterol (mg), ipratropium (mg), magnesium (mg), terbutaline (mg)
6. 7- and 30-day hospital readmission
7. Transfer to the ICU during admission
8. Episodes of nausea/vomiting after corticosteroid administration

*Data storage:*

All data will be stored in a locked office on a locked computeronly accessible to the principle investigator. Data will be de-identified upon being entered into the database.

*Definitions:*

* Acute Asthma Exacerbation: previous diagnosis of asthma with any of the following clinical features: dyspnea, wheeze, acute cough, increased work of breathing, increased requirement of β2-agonist from baseline, or oxygen saturation (SaO2) of less than 95%.13

**Outcomes:**

*Primary endpoint:*

The main outcome measured will be Asthma Assessment Score.

Secondary endpoint:

Additional outcomes measured will be use of adjunctive medications for asthma exacerbation, length of hospitalization, 7- and 30-day hospital readmission, and transfer to an ICU after admission.

*Statistical analyses:*

1. The student’s t-test will be used to compare continuous data following a normal distribution between groups. Wilcoxon’s rank sum will be used to compare continuous data following a non-normal distribution and ordinal data between groups. Chi-squared test/Fischer’s exact test will be used as appropriate to compare categorical data between groups.

*Potential Risks:*

The only potential risk for subjects is loss of confidentiality; however, this risk will be minimized by de-identifying data and storing the database in a password protected file in a locked office.

**Informed consent:**

As this is a retrospective study using medical records from Memorial

Hermann-Texas Medical Center and patient information will be de-identified; a waiver of informed consent will be filed with this application.

**Recruitment and Advertising/ Compensation/Specimens and Cell Lines:**

Patients will not be recruited, and there will be no advertising or compensation for this study. As this is a retrospective, observational study, there will be no specimens or samples involved.

**Expedited Review:**

This study is being submitted for expedited review, since it is retrospective and observational in its design.

**References:**

1. Yu H, Wier LM, Elixhauser A. Hospital Stays for Children, 2009. HCUP Statistical Brief #118. August 2011. Rockville (MD): Agency for Healthcare Research and Quality.
2. Global Initiative for Asthma (GINA). 2014. Global Strategy for Asthma Management and Prevention. Available from www.ginasthma.org
3. National Asthma Prevention Program. Expert Panel Report III: Guidelines for the Diagnosis and Management of Asthma. NIH Publication 08-4051. Bethesda, MD: National Heart, Lung, and Blood Institute 2007
4. Carroll CL, Sala KA. Pediatric status asthmaticus. Crit Care Clin 2013; 29: 153-166.
5. Altamimi S, Robertson G, Jastaniah W, et al. Single-dose oral dexamethasone in the emergency management of children with exacerbations of mild to moderate asthma. Pediatr Emerg Care. 2006; 22: 786-793
6. Gordon S, Tompkins T, Dayan PS. Randomized trial of single-dose intramuscular dexamethasone compared with prednisolone for children with acute asthma. Pediat Emerg Care. 2007; 23: 521-527.
7. Gries DM, Moffitt DR, Pulos E, et al. A single dose of intramuscularly administered dexamethasone acetate is as effective as oral prednisone to treat asthma exacerbations in young children. J Pediatr. 2000; 136: 298-303.
8. Keeney GE, Gray MP, Morrison AK, et al. Dexamethasone for acute asthma exacerbations in children: a meta-analysis. Pediatrics 2014; 133: 493-499.
9. Klig JE, Hodge D, Rutherford MW. Symptomatic improvement following emergency department management of asthma: a pilot study of intramuscular dexamethasone versus oral prednisone. J Asthma. 1997; 34: 419-425.
10. Qureshi F, Zaritsky A, Poirier MP. Comparative efficacy of oral dexamethasone versus oral prednisone in acute pediatric asthma. J Pediatr. 2001; 139: 20-26.
11. Scarfone RJ, Loiselle JM, Wiley JF, et al. Nebulized dexamethasone versus oral prednisone in the emergency treatment of asthmatic children. Ann Emerg Med. 1995; 26: 480-486.
12. Greenberg RA, Kerby G, Roosevelt GE. A comparison of oral dexamethasone with oral prednisone in pediatric asthma exacerbations treated in the emergency department. Clin Pediatr. 2008; 47: 817-823
13. Cronin JJ, McCoy S, Kennedy U, et al. A randomized trial of single-dose oral dexamethasone versus multidose prednisolone for acute exacerbations of asthma in children who attend the emergency department. Ann Emerg Med. 2015; 66: 1-9

**Appendix 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-Assessment Score | Post-Assessment Score | Score |
| Respiratory Rate | Normal or  Above Tachypnea Threshold | Normal or  Above Tachypnea Threshold | 0-Normal  1-Above tachypnea threshold (RR>40: 1-5 yo, RR>30: >5 yo) |
| Accessory Muscles | Normal or  Retractions/Substernal/Subcostal/Intercostal  Neck or Abdominal Muscles | Normal or  Retractions/Substernal/Subcostal/Intercostal  Neck or Abdominal Muscles | 0-Normal  1: Retractions, Substernal, Subcostal, Intercostal  2-Neck or Abdominal Muscles |
| Air Exchange | Normal or  Localized Decreased or  Multi Areas Decreased | Normal or  Localized Decreased or  Multi Areas Decreased | 0-Normal  1: Localized Decreased  2: Multi Areas Decreased |
| Wheezes | None/End Expiratory  Entire Expiratory  Entire Expiratory and Inhalation | None/End Expiratory  Entire Expiratory  Entire Expiratory and Inhalation | 0: None/End Expiratory  1: Entire Expiratory  2: Entire Expiratory and Inhalation |
| Room Air Oxygen Saturation | ≥90%  <90% | ≥90%  <90% | 0: ≥90%  1: <90% |

Pre-Asthma Assessment Score:

Post Treatment Score:

Treatment Recommendation: Nebulizer treatment or metered dose inhaler treatment