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Effect of Social Determinants of Health on Pediatric Hospital Asthma Utilization

A. Study Purpose and Rationale

Asthma is the most common childhood chronic disease in the United States, affecting nearly 8% of children under 18 years of age (CDC 2015). More than 6 million children in the United States have an asthma diagnosis, and the majority of these occur in school aged children and young teenagers. Uncontrolled asthma is associated with a large cost to families and societies: asthma is estimated to cause 13.8 million missed school days per year (Zahran 2018), and the total yearly cost of asthma in the United States has been projected at $81.9 billion (Nurmagambetov 2018).

In the United States, minority populations and low-income families disproportionately bear the burden of asthma morbidity. Asthma is significantly more common among non-Hispanic black and Hispanic children than it is among non-Hispanic white children (CDC 2015), and the differences in mortality are staggering: the asthma death rate for black children aged 0-14 is nearly eight times greater than the death rate for white children (Gorina 2012). Asthma is also significantly more common among children living in low-income families than among children living above the Federal Poverty Level (CDC 2015). The reasons for these disparities are complex, but include exposure to airborne allergens such as tobacco smoke, cockroaches, and dust mites; disparities in access to health care; and disparities in the use of asthma controller medications (AAFA 2005).

Socioeconomic characteristics have been shown to be associated with increased rates of pediatric asthma hospital admissions across a variety of settings (Akinbami 2009, Getahun 2005, Goodman 1998). Higher rates of hospitalization for asthma have been found in black children, as well as children living in zip codes with lower median household income. Similarly, black children and children with public insurance have been shown to have higher rates of re-hospitalization for asthma after discharge (Kenyon 2014, Parikh 2017). Although this data suggests that there may be differences in their hospital courses in terms of acuity of illness, there is little data on other metrics of hospital utilization including length of stay, need for ICU stay, and subspecialty consults.

The Washington Heights Inwood Network (WIN) for Asthma program was established in 2006 in order to reduce the burden of asthma in the Washington Heights and Inwood neighborhoods, which had childhood asthma rates that were four times higher than the national average. Since 2006, the community health workers have helped more than 1200 families to have comprehensive asthma education, a home environment assessment, identification of potential

environmental triggers, and referrals to clinical/social services. It is the goal of this study to better document the impact of social risk factors on hospital utilization for patients with asthma.

B. Study Design and Statistical Analysis

This is a retrospective cohort study to assess predictors of hospital utilization for patients with asthma. The study population will consist of a convenience sample of pediatric patients with an initial asthma admission at MSCHONY over an 18-month period (October 1, 2016- April 1, 2018), who enrolled in WIN for Asthma.

Patients are recruited into the WIN for Asthma program in multiple ways, one of which is during their initial asthma hospitalization at MSCHONY. Patients and their parents are approached during their asthma hospitalization by trained Community Health Workers (CHWs) who enroll interested families in the program. Parents fill out initial intake surveys that assess their social and environmental needs and then are paired with CHWs to help address these specific needs. Initial intake surveys include questions on race/ethnicity, income, insurance status, primary language, educational attainment, in-home exposures (smoking, mold, cockroaches), and access to primary care. Social risk factors will be categorized as follows:

- Access to Primary Care: Excellent or Very Good; Poor or Satisfactory
- Race/ethnicity: Hispanic, non-Hispanic white, non-Hispanic black, other
- Income: 0-50% of Federal Poverty Level, 50-100% of Federal Poverty Level, >100% of Federal Poverty Level
- Primary Language: Spanish, English, other
- Educational Attainment: $<8^{th}$ grade, $8\text{-}12^{th}$ grade, high school graduate, college graduate, post-graduate
- In-House exposures: No/Yes Smoking, No/Yes Mold, No/Yes Cockroaches

Our primary outcome will be length of stay at MS-CHONY (in hours). We will work with the DISCOVERY team to pull the following categorical secondary outcome data:

- Need for intensive care unit
- Subsequent ED visit at MSCHONY for asthma within 7 days
- Subsequent ED visit at MSCHONY for asthma within 30 days
- Readmission to MSCHONY for asthma within 7 days
- Readmission to MSCHONY for asthma within 30 days
- Pulmonary consults
- Rapid response team activation

We also plan to obtain data on BMI and gestational age, which are known medical comorbidities of asthma and will be used to assess for confounders.

To assess the primary outcome (continuous), unpaired t-tests (for 2 groups) and pairwise T-tests (for >2 groups) will be used to compare the risk factor groups with length of stay. A statistical significance is defined as a p-value of <0.05.

To assess secondary outcome data (categorical), multiple logistic regression will be used to compare the social risk factors with need for ICU stay, subsequent 7- and 30-day ED visit and readmission rates, pulmonary consults, and rapid response team activation. A statistical significance is defined as a p-value of <0.05.

A power analysis was done for the primary outcome, using a p <0.05 and a power of 80% to determine the effect size based on our estimated number of patients. It is estimated that we will have approximately 150 patients enrolled in WIN for Asthma during their initial asthma hospitalization over this 18-month time period, approximately 50% of whom will have “excellent” or “very good” primary care (75 per group). The standard deviation of length of stay is estimated at 0.75 days. Based on this information, the study will be powered to detect a difference of 0.35 days difference in mean length of stay.

C. Study Procedure

No procedures will be performed for this study.

D. Study Drugs

No drugs will be given for this study.

E. Medical Devices

No medical devices will be used for this study.

F. Study Questionnaires

No questionnaires will be evaluated for this study.

G. Study Subjects

No study subjects will be enrolled in this study as it is a retrospective chart review

H. Recruitment of Subjects

No study subjects will be recruited for this study.

I. Confidentiality of Study Data

Care will be taken to ensure that the PHI information and data analysis is conducted in a manner that minimizes the risk of inadvertent disclosure of personal information. Only MRNs without associated names or initials will be used in this study. All MRN information will be stored electronically on a password-protected Columbia University computer located in the Vanderbilt Clinic, Room 417 in the MC Domain 3959 O Drive, or on an encrypted flash drive. Only the Principal Investigator and other Investigators listed on the IRB will have access to this data. There will be no hard copies of the data. All results will be presented in aggregate with no identifying information.

J. Potential Conflict of Interest

There are no conflicts of interest to report.

K. Location of the Study

New York Presbyterian Vanderbilt Clinic - Office 417.

L. Potential Risks

Risks to participants are minimal for this study, as this is a retrospective chart review of hospital utilization. Data will be analyzed in a de-identified manner in a password-protected file at all times.

M. Potential Benefits

There are no direct benefits to study participants. However, there is the potential benefit of understanding the patients in this program and acquiring knowledge about their background and identified needs.

N. Alternative Therapies

There is no alternative option to carry out this study.

O. Compensation to Subjects

Not applicable.

P. Costs to Subjects

Not applicable.

Q. Minors as Research Subjects

The researchers are interested in understanding the population of children with an asthma admission to CHONY in order to explore opportunities for improved

patient outreach and support. To study this population, we will focus only on those children who participated in WIN for Asthma and were referred at the point of admission.

R. Radiation or Radioactive Substances

Not applicable.

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