

Original Article

Burden of Obesity on Pediatric Inpatients with Acute Asthma Exacerbation in the United States

Yusuke Okubo, MD, MPH^{a,b}, Kotaro Nochioka, MD, PhD^{a,c}, Hiroshi Hataya, MD^b, Hiroshi Sakakibara, MD^b, Toshiro Terakawa, MD^b, and Marcia Testa, PhD, MPhil^d *Boston, Mass; and Tokyo, Japan*

What is already known about this topic? Obesity could be a potential risk factor of morbidity and mortality for pediatric patients with asthma; however, the effects of obesity on asthma in children were inconsistent in the previous studies.

What does this article add to our knowledge? Obesity contributed to a higher odds ratio of mechanical ventilation, and a gap of hospital charges between obese and nonobese inpatients with pediatric asthma in 2012.

How does this study impact current management guideline? More attention should be paid to control weight for pediatric patients with asthma, because obesity could be a risk factor of morbidity and an economically complicating factor for pediatric patients with asthma.

BACKGROUND: Obesity and asthma are common health problems in the United States.

OBJECTIVE: The objective of this study was to evaluate the clinical and economic burdens of obesity on hospitalized children with acute asthma exacerbation in 2012.

METHODS: Hospital discharge records of patients aged 2 to 18 years with a diagnosis of asthma were obtained from the 2012 Kids' Inpatient Database, wherein the data were compiled by the Agency for Healthcare Research and Quality. The discharge records were weighted to estimate the number of hospitalizations because of asthma exacerbations in the United States. To classify whether the patient was obese or not, we used the International Classification of Diseases, Ninth Revision, Clinical Modification code 278.0x. We compared the odds of using noninvasive or invasive mechanical ventilation, mean total charges for inpatient service, and length of hospital stay between obese and nonobese patients.

RESULTS: A total of 74,338 patient discharges were extracted. Of these, 3,494 discharges were excluded because of chronic medical conditions. Using discharge weight variables, we estimated a total of 100,157 hospitalizations with asthma

exacerbations among children aged between 2 and 18 years in 2012. Obesity was significantly associated with higher odds of using mechanical ventilation (odds ratio 1.59, 95% CI 1.28-1.99), higher mean total hospital charges (adjusted difference: \$1588, 95% CI \$802-\$2529), and longer mean length of hospital stay (0.24 days, 95% CI 0.17-0.32 days) compared with nonobesity.

CONCLUSIONS: These findings suggest that obesity is a significant risk factor of severe asthma exacerbation that requires mechanical ventilation, and obesity is an economically complicating factor. © 2016 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2016;■:■-■)

Key words: Asthma; Cost; Invasive; Ventilation; Obesity

Asthma and obesity are the most common chronic illness and public health problems of children in the United States. The prevalence of obesity is increasing, and several studies have demonstrated an association between obesity and asthma in children.¹⁻⁸

Obesity could be a potential complicating factor with respect to the treatment and control for asthma. Obese children with asthma exhibited a poor control pertaining to asthma and greater need of albuterol and oral corticosteroids for acute exacerbation, were hospitalized more often, showed a decreased response to inhaled corticosteroids, and had a lower quality of life compared with nonobese children with asthma.⁹⁻¹² Obese children with severe asthma recovered more slowly from severe asthma exacerbation in the pediatric intensive care unit compared with nonobese children with severe asthma.¹³ However, several studies demonstrated the inconsistent results,¹⁴⁻¹⁶ and the association between obesity and severity of acute exacerbation remains unclear.

This study aimed to investigate the association between obesity and the use of mechanical ventilation for inpatients with asthma exacerbation based on the 2012 Kids' Inpatient Database (KID). In addition, we evaluated the incremental hospitalization

^aQuantitative Methods, Harvard T.H. Chan School of Public Health, Boston, Mass

^bDepartment of General Pediatrics, Tokyo Metropolitan Children's Medical Center, Fuchu, Tokyo, Japan

^cClinical Effectiveness, Harvard T.H. Chan School of Public Health, Boston, Mass

^dDepartment of Biostatistics, Harvard T.H. Chan School of Public Health, Boston, Mass

No funding was received for this work.

Conflicts of interest: The authors declare that they have no relevant conflicts of interest.

Received for publication March 25, 2016; revised May 25, 2016; accepted for publication June 7, 2016.

Available online ■■

Corresponding author: Yusuke Okubo, MD, Tokyo Metropolitan Children's Medical Center, 2-8-29 Musashidai, Fuchu, Tokyo 183-8561, Japan. E-mail: sunning_dale@yahoo.co.jp.

2213-2198

© 2016 American Academy of Allergy, Asthma & Immunology

<http://dx.doi.org/10.1016/j.jaip.2016.06.004>

Abbreviations used

AD- Atopic dermatitis or eczema

AR- Allergic rhinitis

DISCWT- Discharge weight variables

FA- Food allergy

ICD-9CM- International Classification of Diseases, Ninth Revision, Clinical Modification

KID- Kids' Inpatient Database

LOS- Length of stay

OR- Odds ratio

OSA- Obstructive sleep apnea

charges and length of hospital stay between obese and nonobese patients, compared with the charges and length of stay in 2000 and 2003.^{17,18}

METHODS**Study population and participation**

We conducted a retrospective cohort study comprising hospitalized patients with asthma exacerbation aged between 2 and 18 years based on a national representative database (KID) for the year 2012, wherein the data were compiled by the Agency for Healthcare Research and Quality.^{19,20} KID is a large national all-payer hospital pediatric discharge database. It is designed to generate robust national estimates of annual pediatric hospitalizations and present hospital use, outcome, and cost for children aged 20 years or younger. The KID sampling frame was constructed based on all the short-term, nonfederal, general, and specialty hospitals in the United States that had more than 3 million pediatric discharges from 44 states that participated in the Healthcare Cost and Utilization Projects. Discharge weight variables (DISCWT) in KID were developed using American Hospital Association target universe as the standard to produce national or regional estimates of pediatric hospitalizations.¹⁷⁻²⁰ We used DISCWT for all statistical analyses in this study to obtain the national estimates of hospitalizations in the United States.

Hospitalization discharge records were extracted from the KID database in 2012, and hospitalizations with acute asthma exacerbation were identified using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM) code (493.xx) in the primary diagnosis field, and weighted to estimate the number of hospitalizations for the United States. Children with chronic medical conditions other than asthma and obesity (congenital heart, kidney, pulmonary, endocrine, hematologic, gastrointestinal, and neurologic diseases; cancer or leukemia; and autoimmune disease) were excluded.

Measurements of variables

Obesity was identified using ICD-9CM codes 278.0x in the secondary diagnosis fields in the discharge records. These codes captured obesity unspecified (278.00), overweight (278.01), and morbid obesity (278.02). Age categories (2-6 years, 7-12 years, or 13-18 years), gender (male or female), race/ethnicity (black, Hispanic, white, or others [Asian and Pacific Islanders, Native Americans, and other race/ethnicity]), primary payer information (private or self-pay, Medicare or Medicaid, no insurance or no information), comorbidities of obstructive sleep apnea (OSA), allergic rhinitis (AR), atopic dermatitis or eczema (AD), and food allergy (FA) were collected as binary or categorical covariates.

Outcomes

The outcomes of interest were total charge for inpatient service in 2012 US dollars, length of hospital stay, and use of mechanical ventilation (noninvasive or invasive). Use of mechanical ventilation was identified by the ICD-9 procedure codes 93.90 and Clinical Classification Software code 216.

Statistical analysis

Descriptive statistics, including mean \pm SD, and frequencies for continuous and categorical data were analyzed for all patients with obesity. A two-sample *t*-test and χ^2 test were used to compare characteristics of obese and nonobese patients. We conducted a multivariable logistic regression to identify the association between obesity and the use of mechanical ventilation. Multiple linear regression was used to assess the relationships between obesity and mean total charge for inpatient services and length of hospital stay. For the adjustment, we added all variables listed above (age, gender, race/ethnicity, primary payer information, comorbidities of OSA, AR, AD, FA, types of admission, and hospital size) into the logistic and linear regression models. For the analysis, the log transformations of total charges and length of hospital stay were necessary to ensure the validity of the error-term normality assumption. Results were adjusted for covariates and reported with 95% confidence intervals. Two-sided *P* < .05 was considered statistically significant for all tests. Data were analyzed using Stata version 14.1 (StataCorp LP, College Station, Tex).

RESULTS

We identified a total of 74,338 patient discharges for acute asthma exacerbations in 2012. Of these, 3,494 discharges were excluded because of chronic medical conditions other than asthma and obesity. Data were analyzed from the remaining 70,844 discharges. Using DISCWT, we estimated a total of 100,157 hospitalizations with asthma exacerbations among children aged between 2 and 18 years in the entire United States, 2012. The patient characteristics for obesity are summarized in Table I. Obesity accounted for 3.58% of all hospitalized children. Obese children had a higher mean age than nonobese children. Compared with white children, the proportion of obesity was significantly greater in black and Hispanic children (*P* < .001), and black children had the highest proportion of obesity. There was a statistically significant difference in the proportion of obese patients with respect to gender, race/ethnicity, and primary payer information. Obese children had higher frequencies of comorbidities such as OSA, FA, AD, and AR.

We used a multivariable logistic regression to analyze the odds of using a mechanical ventilator, comparing obese and nonobese children. The crude odds ratio (OR) of noninvasive or invasive mechanical ventilation comparing obese and nonobese children was 3.22. After adjusting for covariates, the OR remained significant (OR 1.59, 95% CI 1.28-1.99, *P* < .001).

To identify total charges for inpatient service and length of stay (LOS) in hospitals, multiple linear regression analyses were performed with and without adjustment for covariates. Crude analysis showed that mean total charges for inpatient service among obese children were \$3445 higher than those for inpatient service among nonobese children (95% CI \$2471-\$4576, *P* < .001). After adjustment for covariates, the difference was \$1588 (95% CI \$802-\$2529, *P* < .001). Based on crude analysis, the LOS for obese children was 0.41 days longer than

Download English Version:

<https://daneshyari.com/en/article/5647326>

Download Persian Version:

<https://daneshyari.com/article/5647326>

[Daneshyari.com](https://daneshyari.com)