Hospital Charges of Potentially Preventable Pediatric Hospitalizations

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ABSTRACT

OBJECTIVES: Reducing the number of preventable hospitalizations represents a possible source of health care savings. However, the current literature lacks a description of the extent of potentially preventable pediatric hospitalizations. The study objectives are to (1) identify the charges and (2) demographic characteristics associated with potentially preventable pediatric hospitalizations.

METHODS: Secondary analysis of the 2006 Kids' Inpatient Database (weighted N = 7,558,812). *International Classification of Diseases, Ninth Revision, Clinical Modification* codes for 16 previously validated pediatric ambulatory care-sensitive (ACS) conditions identified potentially preventable hospitalizations; seven additional conditions reflected updated care guidelines. Outcome variables included number of admissions, hospitalization days, and hospital charges. Demographic and diagnostic variables associated with an ACS condition were compared with regression analyses by the use of appropriate person-level weights.

RESULTS: Pediatric ACS hospitalizations totaled $4.05B in charges and 1,087,570 hospitalization days in 2006. Two respiratory conditions—asthma and bacterial pneumonia—comprised 48.4% of ACS hospital charges and 46.7% of ACS hospitalization days. In multivariate analysis, variables associated with an ACS condition included: male gender (odds ratio [OR] 1.10; 95% confidence interval [95% CI] 1.07–1.13); race/ethnicity of black (OR 1.22; 95% CI 1.16–1.27) or Hispanic (OR 1.12; 95% CI 1.06–1.18); and emergency department as admission source (OR 1.37; 95% CI 1.27–1.48).

CONCLUSIONS: Respiratory conditions comprised the largest proportion of potentially preventable pediatric hospitalizations, totaling as much as $1.96B in hospital charges. Children hospitalized with an ACS condition tend to be male, non-white, and admitted through the emergency department. Future research to prevent pediatric hospitalizations should examine targeted interventions in the primary care setting, specifically around respiratory conditions and minority populations.

KEYWORDS: ambulatory care-sensitive conditions; hospital charges; Kids' Inpatient Database; preventable hospitalizations

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WHAT'S NEW

We determined nationally representative estimates of the charges of potentially preventable pediatric hospitalizations. Respiratory conditions are responsible for almost one-half of potentially preventable pediatric hospitalizations.

INTRODUCTION

AS CONCERNS ABOUT health care spending gain prominence in the American discourse, health care providers and legislators need to examine areas in which health care expenditures can be reduced without compromising the quality of care. Analysis of pediatric hospitalizations (ie, patients 0–17 years of age) in the 2006 Kids' Inpatient Database (KID) showed $81.8B in hospital charges, 24.5 M hospitalization days, and 6,578,068 admissions. One solution to limit health care spending involves reducing the number of preventable hospitalizations.[1] Timely and adequate access to primary care can potentially prevent hospitalizations by offering prompt attention to acute conditions that mitigates the clinical outcome.

National estimates of potentially preventable pediatric hospitalizations provided by Russo et al[2] revealed a total hospital cost of $737 million in 2004. However, they only examined 4 conditions: short-term diabetes complications, asthma, gastroenteritis, and urinary tract infections. Friedman and Basu[3] estimated hospital costs for preventable readmissions during a 6-month interval at approximately $730 million but encompassed both adult and pediatric patients from 4 states. They analyzed readmissions rather than the cost of the initial preventable admission.

The current literature lacks a thorough description of the charges of potentially preventable hospitalizations at the national level for the pediatric population. We expand on the number of potentially preventable conditions to capture a broader picture of the total financial burden and describe the demographic characteristics associated with preventable hospitalizations. Knowledge of the financial burden and the vulnerable population affords healthcare workers and legislators a better understanding of the magnitude of the problem and may guide

the development of targeted interventions to better address the issues.

The objectives of this project are to determine the hospital charges incurred by potentially preventable pediatric hospitalizations at the national level and the demographic characteristics associated with preventable hospitalizations.

METHODS

We performed a secondary analysis of the 2006 KID. The KID belongs to a family of databases developed as part of the Healthcare Cost and Utilization Project (HCUP), which represents a federal−state−industry partnership managed by the Agency for Healthcare Research and Quality.

The KID is an administrative dataset and represents the only all-payer inpatient care database for children in the United States. The 2006 version contains discharge data from 38 states with 3,131,324 available records, based on a sample of pediatric discharges from 3739 U.S. community hospitals (defined as short-term, nonfederal, general and specialty hospitals, excluding hospital units of other institutions) and 45 dedicated children's hospital. The KID contains more than 100 clinical and nonclinical variables for each hospital stay, which includes primary and secondary diagnoses, primary and secondary procedures, admission and discharge status, patient demographics, expected payment source, total charges, length of stay, and hospital characteristics.

The KID is publicly available, subject to a data use agreement. Measures were taken to remove personal identifying information from the KID. More information regarding the KID and usage restrictions can be found at the HCUP website.[4] Because the data are deidentified and publicly available, the study received exempt status from the Institutional Review Board of the University of Arkansas for Medical Sciences.

AMBULATORY CARE-SENSITIVE CONDITIONS

Potentially preventable pediatrics hospitalizations were defined through the use of ambulatory care-sensitive (ACS) conditions. Hospitalization for an ACS condition is considered to be a measure of access to appropriate primary health care.[5] Although not all admissions for these conditions are avoidable, timely ambulatory care could temper the disease course and thus prevent progression to where hospitalization is medically indicated. A disproportionately high rate of ACS conditions may reflect problems in access to timely primary care.[6] ACS conditions have been previously described for use as a measure of potentially preventable hospitalizations.[5,7,8] We also included non-ACS conditions, simply defined as conditions that were not ACS, which served as a means of comparing hospital and demographic characteristics between potentially preventable and nonpotentially preventable hospitalizations.

The pediatric-specific ACS conditions used in this analysis were determined by a previous study in which a panel of primary care physicians recommended adopting 19 of 24 for pediatric use, excluding congestive heart failure, chronic obstructive pulmonary disease, pelvic inflammatory disease (PID), hypertension, and hypoglycemia.[7,8] Failure to thrive was included, whereas angina was excluded based on works from other authors.[5,7] We retained PID because we thought this ACS condition could arise in the adolescent population. We added (with *International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM], codes in parentheses) an additional failure to thrive diagnosis (783.41) and immunization preventable diseases—diphtheria (032), varicella (052), measles (055), rubella (056), hepatitis B (070.2 and 070.3), and mumps (072)—that were not included in the original set of ACS conditions. We also limited inclusion of an admission to only those where the primary diagnosis was an ACS condition.[5,8,9]

Admissions for ACS conditions were identified by 3-, 4-, or 5-digit ICD-9-CM codes, with the exception of skin grafts with cellulitis, which was defined by 2 diagnosis-related group codes. Hospitalizations for dehydration (276.5) were grouped with gastroenteritis with the assumption that the majority of dehydration cases were secondary to gastroenteritis.[10] Similar to Billings et al,[5] patients with bacterial pneumonia and a secondary illness of sickle-cell anemia were excluded from our analysis, a reduction of 1.0% or 1268 weighted admissions for bacterial pneumonia. Collapse of the 3 diabetes diagnoses into one category and 2 tuberculosis categories into one group, consolidation of gastroenteritis and dehydration, and retaining PID resulted in our final 16 categories of ACS conditions. A detailed listing of the diagnoses with their respective ICD-9-CM codes and additional ACS condition-specific exclusion criteria can be found in the Appendix.

STUDY POPULATION

The unit of analysis within the KID is the hospital discharge rather than the patient. Thus, a single patient admitted multiple times within the same sampling year will have each discharge counted as a separate one. Inclusion criteria for this study included any hospital discharge in which the patient was age ≥3 months (≥90 days) and ≤17 years of age at the time of admission. The threshold of 3 months removed neonatal admissions as well as young infants who typically have a lower threshold for hospital admission. We limited the total number of hospitalization days at ≤30 days as a means of removing outliers to avoid skewing results from admissions likely complicated by extraneous factors. Removing such outliers reduced ACS and non-ACS admissions by 0.2% and 1.4%, respectively.

Elective admission types for ACS and non-ACS hospitalizations were excluded because of the possibility that these admissions were for routine workup rather than treatment. Because traumas do not fit within the concept of ACS hospitalizations, we excluded trauma-center admission types for ACS and non-ACS hospitalizations. ACS and non-ACS hospitalizations with an admission type "other" were excluded because of the lack of clarity of the