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Impact of hepatitis A vaccination on health care utilization in the United States, 1996–2004

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Abstract

Background: Since 1996, hepatitis A vaccine has been recommended for persons at risk for infection and children living in communities with the highest disease rates. In 1999, this recommendation was expanded to include all children in 17 states with high incidence compared to a national baseline period. Reported hepatitis A incidence has decreased substantially since 1999; however, comprehensive data on changes in hospital and outpatient utilization have not been reported.
Objective: To analyze a health insurance claims database to examine impacts of the hepatitis A vaccination program on medical visits and associated expenditures.
Methods: We conducted a retrospective study of the 1996–2004 Medstat MarketScan databases, which include enrollees of more than 100 health insurance plans offered by approximately 40 large employers each year, using 1996 and 1997 as the pre-vaccination baseline. Trends in rates of medical care visits were analyzed using Poisson regression method.
Results: From the pre-vaccination era to 2004, hospitalizations due to hepatitis A declined by 68.5% (from 0.81 to 0.26 per 100,000 population, $P < 0.001$) and ambulatory visits declined by 41.5% (from 12.9 to 7.5 per 100,000 population, $P < 0.001$). Ambulatory visits declined in all age groups, with the greatest declines among children <18 years old. Declines were greater among enrollees who resided in the 17 vaccinating states (58.5%) than those in non-vaccinating states (32.7%, $P < 0.001$). After adjusting to the US population, using data derived from a privately insured population, total estimated direct medical expenditures for hepatitis A-related hospitalizations and ambulatory visits declined by 68.1%, from an average of $29.1 million in 1996 and 1997 to $9.3 million in 2004.
Conclusions: Since the introduction of the hepatitis A vaccination program, hospitalizations, ambulatory visits, and their associated expenditures due to hepatitis A disease have declined substantially among all age groups across the US. Greater declines were seen in the 17 states with vaccination recommendations for hepatitis A.
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Keywords: Hepatitis A; Vaccination; Health care utilization; Medical expenditure

1. Introduction

In 1995, highly effective hepatitis A vaccines became available in the United States for use among persons aged 2 years and older, providing an opportunity to substantially reduce hepatitis A incidence and potentially eliminate indigenous transmission of the hepatitis A virus in the US. In 1996,

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the Advisory Committee on Immunization Practices (ACIP) recommended hepatitis A vaccination for selected high-risk populations, such as men who have sex with men and users of illicit drugs [1]. At that time vaccination was also recommended for children at highest risk of infection, such as American Indian/Alaska Native children and children living in communities with high rates of hepatitis A infection. In 1999, recommendations were strengthened to specify routine 2-dose vaccination for all children (≥2 years of age) living in 11 states where average annual hepatitis A incidence rates during a 10-year baseline period (1987–1997) were ≥20 cases per 100,000 population (twice the national average) [2]. The ACIP also recommended that routine 2-dose vaccination be considered for children living in 6 other states where average annual hepatitis A incidence rates were 10–20 cases per 100,000 population [2]. Since 2005, 2-dose hepatitis A vaccination is now routinely recommended for all 1–2 year old children in all states [3].

From 1980–1999, approximately 111,800 cases of hepatitis A were estimated to have occurred per year; [4] more than half of the estimated infections occurred among children. Each year in the United States, an estimated 100 persons died as a result of acute liver failure attributed to hepatitis A. Following recommendations for hepatitis A vaccination of children, hepatitis A rates have declined in all age groups, to an estimated 24,000 in 2004 (CDC, unpublished data). However, the impact of vaccination on hepatitis A-related health care utilization has not been documented.

We used MarketScan databases of insured persons to describe the patterns of hepatitis A hospitalizations and ambulatory visits and their associated medical expenditures in the United States. In addition, we stratified the analyses by age, by state vaccination recommendations (17 vaccinating states versus others), by type of health insurance plan, and by gender. We evaluated these factors for 1996 through 2004. We also estimated the in-plan hepatitis A vaccination coverage in 2004.

2. Materials and methods

2.1. Data source and study population

Data were obtained from the 1996–2004 MarketScan® databases [5], which contain approximately 40 self-insured employers each year, including large private employers and state governments. Together, these employers offer more than 100 health insurance plans, and data are available for more than 500 million claims for employees, retirees, and their dependents. All states (excluding Alaska and Hawaii) are included, as is Washington, DC. Medicare-eligible retirees with employer-provided Medicare Supplemental plans are included. More than 4 million covered lives per year are represented. The databases contain patient demographics, provider characteristics, dates of services for ambulatory and hospital visits, length of stay in hospital, payments, diagnostic codes (ICD-9-CM), procedure codes (CPT'98) and other variables. Total payments reported in MarketScan databases represent actual amounts paid by insurance company and patient to providers (e.g., physicians and hospitals). The study population consisted of all enrollees covered from January 1996 to December 2004.

This study used secondary data without identifiers, therefore it did not require approval by any organization's Institutional Review Board, and consent was not required.

2.2. Data analysis

Analyses were performed with SAS 8.0 statistical package (SAS Institute Inc., Cary, NC). We conducted Poisson regression to assess changes in hepatitis A-related hospitalization and ambulatory visit rates over time. *P*-values of ≤0.05 were considered significant. As the pre-vaccination baseline, we combined data for 1996 and 1997 to account for possible variation in trends for those two pre-vaccine years.

2.3. Rates of hepatitis A-related hospitalizations and ambulatory visits

The study sample consisted of all inpatient admissions and ambulatory visits during January 1996–December 2004 with hepatitis A diagnosis codes (ICD-9 codes 070.0 and 070.1) listed as the primary diagnosis. We excluded all cases with CPT codes indicating hepatitis A vaccination, assuming that the diagnosis was miscoded.

We conducted stratified analyses of ambulatory visits by age group, state group (vaccinating or non-vaccinating), insurance plan type, and gender. The sample size was too small to conduct stratified analyses for hospitalization.

We created six age groups: 0–17, 18–34, 35–44, 45–54, 55–64, and over 65 years. In 1999, the ACIP recommended that routine vaccination of children be implemented in 11 states (Alaska, Arizona, California, Idaho, Nevada, New Mexico, Oklahoma, Oregon, South Dakota, Utah, and Washington) and that it be considered in an additional six states (Arkansas, Colorado, Missouri, Montana, Texas, and Wyoming) [2]. Ambulatory visit rates in these 17 states (vaccinating states) were compared with those in the remaining states where there is no recommendation for statewide vaccination of children (non-vaccinating states).

We compared rates of ambulatory visits for hepatitis A between capitated and non-capitated (i.e., fee-for-service) insurance plans. Two types of insurance plans were categorized as capitated (health maintenance organizations [HMO], and capitated or partially-capitated point-of-service [capitated POS]) and five as non-capitated (basic/major medical, comprehensive, exclusive provider organization [EPO], non-capitated point-of-service [non-capitated POS], and preferred provider organization [PPO]).

We used a multivariate Poisson regression model to compare the hepatitis A-related ambulatory visit rates in 1996 and 1997 to those for 2004. The covariates included