Hospitalizations at Nonfederal Facilities for Lower Respiratory Tract Infection in American Indian and Alaska Native Children Younger than 5 Years of Age, 1997-2012

Bethany A. Weinert, MD, MPH, and M. Bruce Edmonson, MD, MPH

Objectives To evaluate hospitalizations at nonfederal facilities for lower respiratory tract infection (LRTI) in American Indian/Alaska Native (AI/AN) children and to compare associated rates and risk factors in AI/AN children and white children.

Study design We used Kids' Inpatient Database samples from 1997-2012 to identify discharges in non-Hispanic AI/AN and white children ages <5 years with a principal or secondary diagnosis code indicating LRTI. To address systematic underreporting and misclassification of race in administrative databases, population rates were estimated by deriving race- and year-specific denominators from hospital births.

Results During the study period, LRTI-associated discharge rates (per 1000) declined for white children (from 14.8 to 10.9; $P < .001$ for trend). For AI/AN children, rates varied widely by census region and were highest in the West, where they ranged from 38.6 in 1997 to 26.7 in 2012 ($P = .35$ for trend). Discharges in AI/AN children were associated with low household income, Medicaid insurance, and rural residence. In a case-cohort analysis of infants hospitalized with LRTI in 2012, discharge rates were higher for AI/AN infants than for white infants only in the West (72.8 vs 22.2; aOR, 2.5; 95% CI, 1.8-3.4).

Conclusions Among young children who use nonfederal hospitals, LRTI-associated hospitalizations occur at substantially higher rates for AI/AN children than for white children. These hospitalizations occur at rates that are particularly high for AI/AN infants in the West, where rates are comparable with those reported for Indian Health Service enrollees. *(J Pediatr 2016;175:33-9)*.

See editorial, p 10

American Indian/Alaska Native (AI/AN) children enrolled in the Indian Health Service (IHS) suffer disproportionately higher morbidity and mortality from lower respiratory tract infections (LRTIs) than other children in the US.[1-9] As recently as 2008, LRTI-associated hospitalizations occurred in AI/AN children enrolled in the IHS at rates comparable with those seen in developing countries.[3,5] The rate for infants enrolled in the IHS was >3 times higher than in industrialized countries.[3,5]

Most information about LRTI-associated hospitalizations in AI/AN children is based on IHS data; there is little information available about rates in the broader population of AI/AN children in the US. Of the 5.2 million people (1.7% of the US population) who self-identified as AI/AN either alone or in combination with ≥1 other races in the 2010 US Census,[10] only about 2 million were enrolled in the IHS.[11] There are only 50 IHS and tribe-operated hospitals nationally, and most of these are located in western states[12] where IHS enrollment is higher and LRTI-associated hospitalization rates in enrolled children are believed to be particularly high.[5-7,11] As a result, a sizeable proportion of AI/AN children has not been represented in previous studies of racial disparities in LRTI-associated hospitalization rates.

To address this knowledge gap, we used a large, national discharge database to describe LRTI-associated hospitalizations of AI/AN children at nonfederal (and non-IHS) hospitals. We sought to determine whether the rates of LRTI-associated hospitalization previously reported for children enrolled in the IHS are similarly elevated for AI/AN children who receive care outside the IHS. Our first objective was to examine national trends in associated hospitalization rates by race and region over the period 1997-2012. Our second objective was to compare information about LRTI-associated hospitalizations in AI/AN children and white children. Our third objective was to investigate relationships between socioeconomic factors and racial disparities on the risk of LRTI-associated hospitalization in children.

AI/AN	American Indian/Alaska Native
HCUP	Healthcare Cost and Utilization Project
IHS	Indian Health Service
KID	Kids' Inpatient Database
LRTI	Lower respiratory tract infection

From the Department of Pediatrics, University of Wisconsin School of Medicine and Public Health, Madison, WI

B.A.W. was supported by a National Research Service Award from the Health Resources and Services Administration (T32HP10010) to the University of Wisconsin Department of Family Medicine and Community Health. The authors declare no conflicts of interest.

http://dx.doi.org/10.1016/j.jpeds.2016.03.019

Methods

This retrospective study analyzed hospital discharge information from 1997, 2000, 2003, 2006, 2009, and 2012 in the Kids' Inpatient Database (KID), a public use administrative dataset maintained by the Healthcare Cost and Utilization Project (HCUP) under the sponsorship of the Agency for Healthcare Quality and Research.[13] For each data year, a KID sample was constructed from: (1) a 10% random sample of discharge records for uncomplicated births; and (2) an 80% random sample of discharge records for all other pediatric inpatient stays in each nonfederal, short-term general and specialty hospital in each participating state. From 1997 to 2012, the number of participating states increased from 22 states (accounting for 53.2% of the AI/AN population based on 2000 US Census data[10]) to 44 states (96.8%, based on 2010 census data[10]).[13] Additional states with substantial AI/AN populations that were added to KID samples during the study period included Texas (2000), Oklahoma (2006), New Mexico (2009), and Alaska (2012).[10,13] For 2012, the KID contained information on almost 3.2 million (unweighted) discharges of persons <21 years of age from 4179 US hospitals. The KID includes discharge-level information on patient demographics, admission source, payers, hospital-assigned diagnostic and procedural codes, length of stay, total hospital charges, and discharge disposition.[13] Information on hospital location in the 2012 KID was limited to US Census region and could not be aligned with IHS-defined administrative regions because the sampling design precludes analysis at the state level.[14] The states included in each US Census region are shown in the **Figure**. By accounting for its complex sampling design and incorporating sampling weights, each KID sample can be used to generate national estimates for stays at short-term nonfederal hospitals by children and adolescents in the US.[15]

IHS and tribally operated hospitals were not included in KID because of their federal status. These hospitals are not the only type of facility available to IHS enrollees, however. A proportion of hospital care for IHS enrollees is provided as contracted care at nonfederal hospitals when direct IHS services are unavailable.[11,12] A contract health hospital is a nonfederal hospital that can accept IHS payment for services; at these hospitals, the IHS is considered "payer of last resort" and is accepted only if a form of health insurance (eg, Medicaid) is unavailable as the primary payer.[16] In 2013, 24.8% of all hospital discharges funded by the IHS were associated with stays at nonfederal contract health hospitals.[11] The KID includes hospitalizations that represent IHS contracted health care. As a result, there is some overlap between discharges captured in KID and in IHS databases.[4,5,7]

The *International Classification of Diseases, 9th edition, Clinical Modification*[17] discharge diagnosis codes were used to define LRTI, respiratory failure, and asthma. According to previously published methods,[4,5,7] we used a principal or secondary diagnosis of LRTI to define a LRTI-associated discharge (any one of 15 diagnoses for 1997-2006 and 25 diagnoses for 2009 and 2012). LRTI was defined by codes for pneumonia (480.x—486.x), influenza with pneumonia (487.0), bronchiolitis (466.0, 466.1), empyema (510.x), pulmonary mycobacteria (031.0), pulmonary tuberculosis (011.x), pulmonary anthrax (022.1), whooping cough (033.x), pulmonary syphilis (095.1), pleurisy with effusion (511.1), pulmonary abscess (513.x), and rheumatic pneumonia (517.1).[4,5] Respiratory failure, a measure of LRTI illness severity, was defined by diagnosis codes 518.81, 518.82, 518.84, or 799.1.[18] Asthma, a potential comorbid

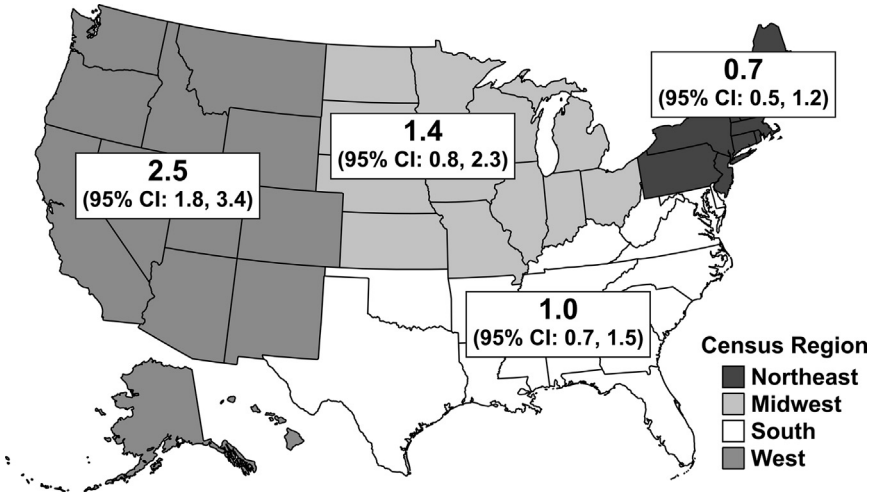

Figure. aORs for LRTI-associated hospitalization in AI/AN vs white infants, by US Census Region, 2012. ORs were adjusted for sex, household income, rural-urban residence, and primary expected payer.