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Original Research

Racial disparities in vaccination for seasonal influenza in early childhood

M. Anandappa [a], E. Adjei Boakye [b], W. Li [a], W. Zeng [c], T. Rebmann [a], J.J. Chang [a,*]

[a] Department of Epidemiology and Biostatistics, College for Public Health and Social Justice, Saint Louis University, Saint Louis, MO, USA

[b] Saint Louis University Center for Health Outcomes Research (SLUCOR), Saint Louis University, Saint Louis, MO, USA

[c] Department of Chemistry, College of Arts and Sciences, Saint Louis University, Saint Louis, MO, USA

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ABSTRACT

Objectives: Influenza vaccination is the best protection against infection and severe complications of disease, such as hospitalization and death. Therefore, it is important to accurately estimate vaccination coverage and to evaluate the role of race/ethnicity. This study examines racial disparities in influenza vaccination among children using a nationally representative sample.

Study design: This study used cross-sectional data from the 2009–2014 National Immunization Survey for children aged 19–35 months (n = 98,186) in the United States.

Methods: The outcome variable was receipt of influenza vaccination (yes/no) and exposure variable was race/ethnicity. Weighted multivariate logistic regression was used to estimate the odds ratio and 95% confidence intervals (CIs) for the effect of race/ethnicity on receipt of the influenza vaccine.

Results: The overall vaccination rates were 81.6% for non-Hispanic whites, 79.2% for Hispanics, 80.5% for non-Hispanic blacks, and 80.7% for non-Hispanic mixed/other. In the adjusted model, compared with non-Hispanic white children, Hispanic children were 13% less likely to receive influenza vaccination within the last 12 months (adjusted odds ratio [aOR] = 0.87; 95% CI: 0.80–0.94). In addition, children aged 24–29 months (aOR = 0.48; 95% CI: 0.44–0.52) and 30–35 months (aOR = 0.33; 95% CI: 0.30–0.36) were significantly less likely to receive influenza vaccination within the last 12 months compared with those who were 19–23 months old.

Conclusions: There were differences in influenza vaccination rates among different racial groups. Hispanic children had the lowest vaccination rates. Findings from our study have significant implications for targeted interventions to increase the overall vaccination rate for children in the United States.

* *Corresponding author*. Department of Epidemiology, College for Public Health and Social Justice, Saint Louis University, 3545 Lafayette Ave, Saint Louis, MO 63104, USA. Tel.: +1 314 977 8130; fax: +1 314 977 3234.
E-mail address: jjchang@slu.edu (J.J. Chang).

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Introduction

Influenza can cause mild to severe illness and at times can lead to death.[1] Although influenza seasons vary in severity, over 85 influenza-related pediatric deaths were reported in 2015.[2] Additionally, about 20,000 children younger than 5 years are hospitalized because of influenza complications each year.[3] Severe influenza complications are most common in children younger than 2 years.[3] Furthermore, hospitalization due to influenza costs $10.4 billion a year in direct medical expenses, and an additional $16.3 billion is lost in annual earnings.[4] Excluding physician services, the mean hospitalization charge is about $26,172.[5]

Owing to the high risks and costs involved with influenza and influenza-related complications in children, the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Pediatrics (AAP) recommend influenza vaccinations each season for all healthy and high-risk children aged 6 months and older, and all household contacts and out-of-home caregivers of children aged 6 months and older.[6,7] Getting vaccinated for influenza is one of the most effective ways of preventing illness and disease spread. Although some of the influenza vaccinations such as live attenuated influenza vaccine are losing their effectiveness since 2013, the inactivated influenza vaccine is still highly potent, especially among children.[8] The efficacy of inactivated influenza vaccine among children varies from year to year and depends on the age of the child but has been found to be between 66% and 91%.[9] Vaccinating children is imperative because studies have shown that an increase in vaccine uptake in children results in lower morbidity in adults.[11] Still, despite the ACIP and AAP recommendations and the demonstrated efficacy of influenza vaccine, immunization levels remain well below the national Healthy People 2020 targets for all priority groups.[12–14]

Influenza is a vaccine-preventable disease that has a costly impact—the price of doctor's visits, hospitalizations, and premature deaths; these can be avoided with an increase in children's influenza vaccination rates.[15] Knowing who and where to target is essential to strengthen the uptake of children's influenza vaccination rates. There is a dearth of research investigating racial disparities in influenza vaccination among young children. Schuller et al.,[16] using the 2008 National Immunization Survey (NIS; $n = 25{,}256$), found that compared with white children, Hispanic children were more likely to receive the influenza vaccination but blacks were less likely. There have been changes in the healthcare environment and policies such as the Affordable Care Act[17] since this study was conducted, and therefore, a new study is warranted to confirm if the findings are still varied. In addition, Uwemedimo et al.[18] found that black children were more likely to be vaccinated than Latino children. However, the study was based on a small sample from New York City, and therefore, the findings are not generalizable to the U.S. population. Therefore, our aim was to examine racial disparities in influenza vaccination among children using a nationally representative sample.

Methods

Data source

This cross-sectional study was based on data from the 2009 to 2014 NIS conducted by the National Center for Immunization and Respiratory Diseases of the Centers for Disease Control and Prevention.[19] The NIS contains information on immunization rates for children, demographic, and socio-economic information pertaining to the mother and provider information regarding vaccine availability and delivery. The NIS is an ongoing, national, random-digit-dial telephone survey of households with children 19–35 months old at the time of interview in all 50 states, the District of Columbia, and some U.S. territories. The NIS sample is stratified by two sample frames and 58 estimation areas that are provided by Marketing Systems Group. Before 2011, the survey included only landlines, but from 2011, both landlines and cell phones are used. The household telephone survey is followed by a survey mailed to the immunization providers identified during the telephone survey and for which permission was granted. An adult most knowledgeable about the child's vaccinations was interviewed. If that person was not available during the interview, 'a call back' was scheduled on a later date to reach the knowledgeable person. After three attempts, a toll-free 800 number is provided for the person to call to schedule an interview. Only children with healthcare provider–verified data were included in the study. The response rate for landline ranged from 61.5% to 63.9% and for cell phone, ranged from 25.2% to 33.5%. Details about the NIS data source and methodology have been described elsewhere.[20] The NIS was approved by the National Center for Health Statistics Research Ethics Review Board; this study did not require separate institutional review board approval.

Measures

The outcome variable was influenza vaccination in the last 12 months. The child's age at immunization was determined by identifying the age a child was when he/she received the influenza vaccination based on parental/guardian recall. We then used the highest cutoff point (23, 29, 35 months) from the three age groups as the child's age at the time of survey interview. Then we subtracted the age the child received the influenza vaccination from the child's age at the time of survey interview. If the result was $\leq$12, then the child was deemed to have received an influenza vaccination within the past 12 months. Influenza vaccination status was dichotomized as yes or no. The primary exposure of interest was the race/ethnicity of the child. Race/ethnicity was grouped into four categories: Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic other (including multiple races/ethnicities). Variables potentially related to influenza vaccination based on previous literature[16,21–23] were included in our study. These included child's age in months (19–23, 24–29, or 30–35); gender; health insurance (yes/no); census region (northeast, midwest, south, and west); mother's age in years (<30, or $\geq$30); marital status (married or not married); education (less than