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PNEUMOCOCCAL SEROTYPE 5 COLONIZATION PREVALENCE AMONG NEWLY ARRIVED UNACCOMPANIED CHILDREN 1 YEAR AFTER AN OUTBREAK—TEXAS, 2015

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Abstract

In 2014, an acute respiratory illness outbreak affected unaccompanied children from Central America entering the United States; 9% of 774 surveyed children were colonized with *Streptococcus pneumoniae* serotype 5. In our 2015 follow-up survey of 475 children, serotype 5 was not detected, and an interim recommendation to administer 13-valent pneumococcal conjugate vaccine to all unaccompanied children was discontinued.

Keywords

unaccompanied children; *Streptococcus pneumoniae*; colonization; outbreak; 13-valent pneumococcal conjugate vaccine

Unaccompanied children are those <18 years of age who entered the United States without legal immigration status and without a parent or legal guardian available to provide care. When unaccompanied children from Central America are apprehended by US Customs and

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Border Protection, they are referred to the Office of Refugee Resettlement (ORR) for placement in ORR-funded care provider programs.[1] Most children are released to sponsors (ie, qualified parents, guardians, relatives or other adults) in the United States.

During June to July 2014, an outbreak of acute respiratory illness affected unaccompanied children 9–17 years of age in 4 ORR-funded programs and a centralized processing center, preceded by a surge in border crossing that strained the capacity of the US Customs and Border Protection and ORR facilities. The illnesses were caused by multiple pathogens, including *Streptococcus pneumoniae* (pneumococcus) serotype 5, which was isolated from 6 of 14 hospitalized children with blood cultures. A pneumococcal colonization survey conducted in July 2014 among nonhospitalized children at the 4 affected programs found that serotype 5 was the most frequently isolated serotype [9% (70/774) of surveyed children].[2] Serotype 5 is rarely isolated in the United States[3] but is included in the 13-valent pneumococcal conjugate vaccine (PCV13). To aid in controlling transmission of pneumococcus, 1 dose of PCV13 was recommended for all unaccompanied children.[4] This recommendation went beyond the routine US recommendation, which targets children <5 years of age[5] and remained in effect after the outbreak had ceased. In 2015, we conducted a follow-up pneumococcal colonization survey to estimate the prevalence of pneumococcal serotype 5 colonization among newly arrived unaccompanied children and to determine whether continued PCV13 vaccination was still warranted for all unaccompanied children.

METHODS

In August 2015, a cross-sectional survey was conducted at 6 ORR-funded programs in Texas. Of the 4 programs surveyed in 2014, only 1 participated in the follow-up survey; the other facilities were no longer operating. Thus, additional programs were selected based on convenience. Children with or without upper respiratory illness who were not known to have active or suspected communicable diseases (eg, varicella, tuberculosis) and had not yet received PCV13 or received PCV13 within 72 hours of the survey were eligible.

The survey included nasopharyngeal specimen collection; brief structured interviews to assess upper respiratory symptoms and antibiotic exposure; and collection of demographics, transit history and PCV13 vaccination history after arrival to the United States from program records. We assessed representativeness of the surveyed population compared with children referred to ORR-funded programs during Fiscal Year (FY) 2015. This was done by using information from a centralized database for unaccompanied children in ORR-funded programs from October 1, 2014 (beginning of fiscal year), to August 27, 2015 (end of survey period). The 2014 survey methods have been described. Briefly, nasopharyngeal swabs and additional data on children's demographics and transit history were collected from assenting nonhospitalized children in the 4 programs.

Laboratory procedures were similar to the 2014 survey. Nasopharyngeal specimens were collected from the child's posterior nasopharynx using flocked swabs, which were immediately placed in 1.0 mL skim milk-tryptone-glucose-glycerol transport medium and placed in a cooler. Within 4–6 hours, specimens were vortexed and kept at −70°C and transported on dry ice to the *Streptococcus* Laboratory in Atlanta for culture. Supplemented

Todd Hewitt broth containing 0.5% yeast extract and 1.0 mL rabbit serum was used for an enrichment step followed by subculture onto blood-agar plates.[6] Optochin susceptibility and bile solubility testing were conducted on any alpha-hemolytic colonies potentially identifiable as pneumococcus. If more than 1 potential pneumococcal colony morphology was identified per plate, representatives of each colony type were tested. Serotypes were obtained by the Quellung reaction. PCV13-serotypes (serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F) were classified as vaccine type; all other serotypes, including nontypeable, were classified as nonvaccine type.

Pneumococcal colonization and serotype distribution were compared with the 2014 results. χ^2 test or Fisher's exact test were used for categorical variables. The Brown-Mood median test was used for continuous variables. Prevalence ratios with 95% confidence intervals were calculated to assess factors associated with vaccine-type colonization.

The survey protocol was reviewed at the Centers for Disease Control and Prevention and determined to be part of public health response; therefore, institutional review board review was not required. Verbal assent in Spanish was obtained from all included children. Consent for participation was obtained from ORR as the temporary custodian of the children.

RESULTS

A total of 495 of 501 (99%) eligible children were enrolled during the 2015 survey; 4 did not assent, and 2 declined specimen collection after assent. Compared with unaccompanied children referred during FY 2015, surveyed children were more likely to be male [80% (397/495) versus 68% (20477/29,960); $P < 0.001$] and to originate from El Salvador [41% (202/495) versus 29% (8697/29960)] and Honduras [25% (126/495) versus 17% (5076/29960)] and less likely to originate from Guatemala [34% (165/495) versus 46% (13866/29960)]. The demographics of the 2014 survey participants were closer to those of children referred during FY 2015 (male 65%, country of origin: El Salvador 27%, Honduras 26% and Guatemala 46%).

Median age of surveyed children was 16 years (range 7–17), similar to the FY 2015 population (range 5–17; $P = 0.90$). Self-reported fever, cough and sore throat were present in 2%, 14% and 11% of surveyed children, respectively. Antibiotic use within the previous 30 days was reported by 3% of children.

Of 495 samples collected, 475 (96%) had adequate bacterial growth. Of those, 125 (26%) were colonized with pneumococcus, similar to the 2014 survey [24% (185/774); $P = 0.30$]. However, colonization with vaccine-type pneumococci was significantly more prevalent in 2014 [13% (103/774) of surveyed children] compared with 2015 [6% (28/475); $P < 0.0001$; Fig. 1]. Of serotypes contained in PCV13, serotype 5, the most frequently isolated serotype in 2014 [9% (70/774)], was not isolated from any specimens in 2015 ($P < 0.0001$); vaccine-type colonization prevalence excluding serotype 5 was similar between the 2 years [4% (33/774) in 2014 versus 6% (28/475) in 2015; $P = 0.40$].

None of the factors reviewed (eg, gender, country of origin, duration of travel, presence of upper respiratory symptoms) were associated with prevalence of vaccine-type colonization.

DISCUSSION

The 2015 colonization survey conducted 1 year after an outbreak of acute respiratory illness among unaccompanied children did not detect *S. pneumoniae* serotype 5, despite serotype 5 being the most frequently isolated serotype during the 2014 outbreak.

We believe that outbreak control interventions in 2014, which included resolution of crowding,[2] may have interrupted transmission of serotype 5 among unaccompanied children. *S. pneumoniae* serotype 5 is considered to be one of the most outbreak-prone serotypes while being a rare cause of colonization in nonoutbreak settings.[7,8] The high prevalence of serotype 5 colonization in 2014 was likely because of ongoing transmission during the outbreak, whereas the 2015 results are more reflective of baseline (nonoutbreak) serotype 5 prevalence. Reports from other colonization surveys conducted during and after outbreaks have also shown similar patterns. For example, pneumococcal colonization assessments conducted among healthy contacts during a serotype 5 pneumococcal pneumonia outbreak in a military compound in Israel showed a rapid decrease of serotype 5 colonization from 24% to less than 1% at 24 days after public health interventions (ie, antibiotic prophylaxis and sending the trainees home).[9]

Our investigation has some limitations. First, the sampling methods used in the 2014 and 2015 surveys were different: the 2015 survey sampled newly arrived children at ORR-sponsored facilities, and the 2014 survey was conducted in facilities from which hospitalized cases of acute respiratory illness were reported, including 3 temporary facilities that could not be included in the 2015 survey. Second, the 2015 survey participants may not be representative of the general population of unaccompanied children: compared with children referred during FY 2015, males were overrepresented in the 2015 survey and children from Guatemala were underrepresented, which might have been a result of our not including children entering the United States through Arizona. Historically, Arizona has had the second largest number of border crossings after Texas,[10] and approximately 80% of children apprehended in Arizona and referred to ORR care from October 1, 2014, to August 27, 2015, were from Guatemala (ORR, unpublished data). However, gender and country of origin were not associated with differences in vaccine-type colonization, and serotype 5 was not isolated from these subgroups in the 2015 survey. In addition, country of origin was not associated with serotype 5 colonization in the 2014 survey.[2] Therefore, we believe that our survey results can still be used to guide PCV13 policy for the general population of unaccompanied children.

The 2015 survey results demonstrated significant reduction in serotype 5 colonization prevalence, suggestive of reduced transmission of serotype 5 among newly arrived unaccompanied children. Supported by these findings, Centers for Disease Control and Prevention recommended discontinuation of the interim recommendation to administer PCV13 to all unaccompanied children, with routine PCV13 to continue only for children <5 years of age. This recommendation was implemented on September 17, 2015.

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References

1. Office of Refugee Resettlement. [Accessed February 21, 2016] Unaccompanied children's services. Available at: http://www.acf.hhs.gov/programs/orr/programs/ucs
2. Tomczyk S, Arriola CS, Beall B, et al. Multistate outbreak of respiratory infections among unaccompanied children, June 2014–July 2014. Clin Infect Dis. 2016; 63:48–56. [PubMed: 27001799]
3. Moore MR, Link-Gelles R, Schaffner W, et al. Effect of use of 13-valent pneumococcal conjugate vaccine in children on invasive pneumococcal disease in children and adults in the USA: analysis of multisite, population-based surveillance. Lancet Infect Dis. 2015; 15:301–309. [PubMed: 25656600]
4. Nyangoma EN, Arriola CS, Hagan J, et al. Epidemic Intelligence Service, CDC; Centers for Disease Control and Prevention. Notes from the field: hospitalizations for respiratory disease among unaccompanied children from Central America—multiple States, June–July 2014. MMWR Morb Mortal Wkly Rep. 2014; 63:698–699. [PubMed: 25121713]
5. Nuorti JP, Whitney CG. Centers for Disease Control and Prevention (CDC). Prevention of pneumococcal disease among infants and children—use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine—recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2010; 59(RR-11):1–18.
6. da Gloria Carvalho M, Pimenta FC, Jackson D, et al. Revisiting pneumococcal carriage by use of broth enrichment and PCR techniques for enhanced detection of carriage and serotypes. J Clin Microbiol. 2010; 48:1611–1618. [PubMed: 20220175]
7. Sleeman KL, Griffiths D, Shackley F, et al. Capsular serotype-specific attack rates and duration of carriage of *Streptococcus pneumoniae* in a population of children. J Infect Dis. 2006; 194:682–688. [PubMed: 16897668]
8. Gounder PP, Bruce MG, Bruden DJ, et al. Effect of the 13-valent pneumococcal conjugate vaccine on nasopharyngeal colonization by *Streptococcus pneumoniae*—Alaska, 2008–2012. J Infect Dis. 2014; 209:1251–1258. [PubMed: 24273178]
9. Balicer RD, Zarka S, Levine H, et al. Control of *Streptococcus pneumoniae* serotype 5 epidemic of severe pneumonia among young army recruits by mass antibiotic treatment and vaccination. Vaccine. 2010; 28:5591–5596. [PubMed: 20599301]
10. U.S. Customs and Border Protection. Stats and Summaries. 2016. U.S. Border Patrol Southwest Border Family Units and UAC Apprehensions (FY 2015–FY 2016).

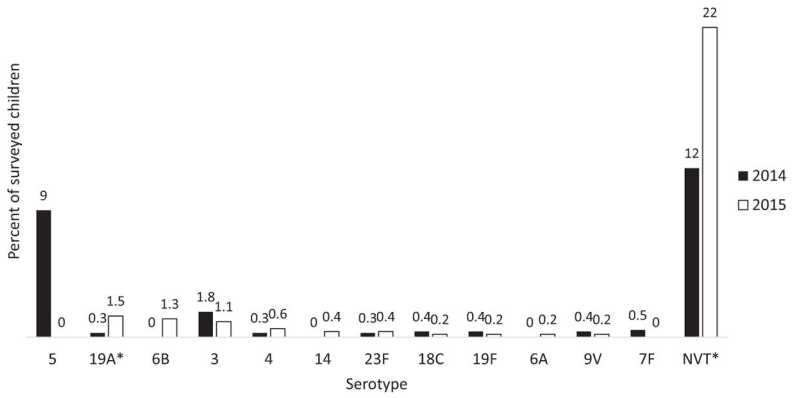

FIGURE 1.

Percentage of nasopharyngeal specimens positive for specific PCV13 serotypes and nonvaccine serotypes among unaccompanied children with adequate specimens, by serotype and year (n = 774 in 2014, n = 475 in 2015). NVT indicates nonvaccine serotypes. *$P <$ 0.05.