

Invasive Disease Caused by Nontypeable *Haemophilus influenzae*

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] CDC *Haemophilus influenzae* expert, Dr. Elizabeth Briere, is here today to talk with me about Nontypeable *Haemophilus influenzae*. Welcome, Dr. Briere.

[Elizabeth Briere] Thank you for having me.

[Sarah Gregory] Dr. Briere, tell us about NTHi.

[Elizabeth Briere] *Haemophilus influenzae*, or Hi, are bacteria that can cause a variety of infections in children and adults. These can range from localized infections of the ear, eye, or sinuses, to more serious and invasive infections, like pneumonia, bacteremia, and meningitis. The bacteria are differentiated by their protective capsule into 6 different serotypes -- identified as A through F. Non-typeable Hi are strains that don't have a capsule; they are sometimes also called nonencapsulated strains.

People are probably most familiar with Hi serotype b, or Hib, because there is a vaccine to help protect against disease caused by Hib. Before the vaccine was introduced, Hib was the leading cause of bacterial meningitis in children less than 5 years of age in the United States. Currently there are no vaccines for the other strains of Hi.

[Sarah Gregory] So, is non-typeable Hi a serious problem in the United States?

[Elizabeth Briere] Let's look at the bigger picture with this pathogen. Since the dramatic decline in Hib disease in the post-vaccine era, the epidemiology of invasive Hi has shifted; non-typeable Hi has emerged as the most common cause of invasive disease in all age groups. But I think it's important to look at the numbers. In the pre-vaccine era, Hib incidence rates were more than 20 per 100,000 children less than 5 years of age. The overall annual rate of non-typeable Hi in the United States right now is very low, less than 1.5 cases per 100,000 population. However, we do see higher incidence rates in the extremes of age—less than 1 year and greater than 65 years.

Although non-typeable Hi most often causes non-invasive disease, such as otitis media and sinusitis, it can cause severe invasive disease, especially in neonates and older adults. In fact, an analysis of surveillance data in the United States found non-typeable Hi was associated with higher mortality rates than in encapsulated disease in infants less than 1 year of age and in adults. And adults and children with non-typeable Hi had significantly longer hospital stays than those with encapsulated strains. Multiple studies suggest that certain underlying conditions, including chronic obstructive pulmonary disease and diabetes, may increase the risk of developing non-typeable Hi disease in adults.

[Sarah Gregory] Would you give us some possible reasons for this emergence of non-typeable Hi?

[Elizabeth Briere] We don't know exactly why, but there are some hypotheses; more data is needed to know for sure. One possible explanation is vaccine-mediated strain replacement. And what I mean by that is, with the success of the Hib vaccination program and dramatic decreases

in Hib disease to almost zero, vaccine pressure may have contributed to disease replacement by other Hi strains. Improved detection of non-typeable Hi may be another reason, possibly due to increased serotyping of isolates and improved serotyping methods, such as real-time PCR. Serotyping allows for the differentiation between the encapsulated and the nonencapsulated, or non-typeable, strains. And CDC encourages state and local public health departments to serotype all invasive Hi isolates in order to monitor changes in the epidemiology in the post-vaccine era. With the decreases in Hib disease, it is possible that more states are conducting serotyping of isolates, therefore improving detection of non-typeable disease. In recent years, significant improvements have been made in both the sensitivity and the specificity of PCR assays used for the detection of Hi and differentiation between encapsulated and nonencapsulated strains. These improvements also may contribute to increased detection of non-typeable Hi.

[Sarah Gregory] Dr. Briere, what are likely public health responses to non-typeable Hi?

[Elizabeth Briere] Invasive Hi disease is a nationally notifiable disease so all confirmed non-typeable cases should be sent to the National Notifiable Disease Surveillance System within 14 days of initial report to the state or local health department. Currently, there is no vaccine to protect against non-typeable or any other non-b Hi disease. We are unaware of any data showing evidence of secondary transmission of non-typeable or other non-b disease; therefore, CDC does not recommend chemoprophylaxis around cases of non-typeable or other non-b Hi disease.

[Sarah Gregory] How about a quick summary of the Hi article recently published in the EID Journal?

[Elizabeth Briere] Colleagues from Radbound University Medical Center summarized surveillance of invasive Hi disease in the Netherlands between 1992 and 2013. They also completed a review of literature on invasive nontypeable Hi disease during 2000-2014; though they summarized all surveillance studies that were written in English, recorded invasive cases after the introduction of Hib vaccine, covered a surveillance period of 4 or more years, and reported serotype-specific data. The authors conclude that the number of non-typeable Hi cases is increasing worldwide and propose possible explanations for the increase. I encourage the listeners to read the paper for details that we don't have time to summarize today.

[Sarah Gregory] Thank you Dr. Briere.

Dr. Elizabeth Briere has been talking to us about Nontypeable *Haemophilus influenzae*. You can read the entire article, "Invasive Disease Caused by Nontypeable *Haemophilus influenzae*," in the October 2015 issue of Emerging Infectious Diseases online now at cdc.gov/eid.

I'm Sarah Gregory for Emerging Infectious Diseases.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO.