Background

Haemophilus influenzae (Hi) bacteria

- Gram-negative bacteria
- Can cause severe invasive disease; can be fatal
- Most common presentations:
  - Meningitis
  - Bacteremia
  - Bacteremic pneumonia
- Transmission:
  - Respiratory droplets from patients or asymptomatic carriers
  - From mother to child during birth
- Hi bacteria can be encapsulated, with 6 known serotypes (a, b, c, d, e, f)
- Serotype a: Hi influenza a
- Unencapsulated Hi bacteria are called nontypeable (NT)
- Currently, vaccines are only available to prevent Hib
- Hib vaccine was introduced in the 1980s and reduced Hib incidence among children aged <5 years by >99%.1-4
- There are no vaccines for other Hi serotypes or nontypeable strains.

Case definition:

• Isolation of Hi from a normally sterile site
• Bacteremic pneumonia: clinical pneumonia and Hi isolated from blood and no localized clinical presentations of serotype a disease are in progress
• Bacteremia: Hi isolated from blood and no localized clinical presentations
• Meningitis: clinical diagnosis of meningitis or Hi isolated from cerebrospinal fluid
• EsPECially among children
• Bacteremic pneumonia: clinical pneumonia and Hi isolated from blood or pleural fluid
• Isolates were serotyped via slide agglutination and real-time PCR.

Statistical Methods

- Observed ABCs cases were used to estimate national incidence rates per 100,000, standardized for race and age.
- Case-fatality rates were calculated using cases with known outcomes as the denominator.

Methods

Data source: Active Bacterial Core surveillance (ABCs)

- Part of the CDC's Emerging Infections Program
- Active surveillance- and population-based surveillance system for 8 invasive bacterial pathogens, including Hi
- 10 surveillance sites across the US, covering a population of ~43 million, representing 13.5% of the US population in 2014.
- Case definition:
  - Isolation of Hi from a normally sterile site
  - Meningitis: clinical diagnosis of meningitis or Hi isolated from cerebrospinal fluid
  - Bacteremia: Hi isolated from blood and no localized clinical syndrome
  - Bacteremic pneumonia: clinical pneumonia and Hi isolated from blood or pleural fluid
  - Isolates were serotyped via slide agglutination and real-time PCR.

Statistical Methods

- Observed ABCs cases were used to estimate national incidence rates per 100,000, standardized for race and age.
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Results

Figure 1. Annual estimated incidence of Hi influenzae, United States, 1999-2014

Figure 3. Estimated U.S. incidence of Hi influenzae by age group and serotype, 2009-2014

Figure 4. Clinical syndromes of invasive Hi disease by age group, 2009-2014

Figure 5. Change in average annual incidence of Hi serotypes, 1999-2004 vs. 2009-2014

Table 1. Annual estimated U.S. incidence of all Hi influenzae by age group and race, 2009-2014

Table 2. Change in average annual incidence of Hi serotypes, 1999-2004 vs. 2009-2014

Table 3. Clinical presentations of serotype a disease are in progress

Results, cont.

- 89% of Hi patients were hospitalized
- Median duration of hospitalization: 6 days (range: 0-157 days)
- Hib disease
  - 22 Hib cases in children <5 were reported to ABCs in 2009-2014
  - 45% meningitis, 24% bacteremic pneumonia, 14% bacteremia, 19% other presentations
  - Vaccination ratios: 9% too young, 27% age-appropriately vaccinated, 32% unvaccinated (most only missing the booster dose)

Conclusions

- Hib vaccine mainly affects the extreme age groups (<5 and ≥65 years)
- Case fatality is highest in older adults and increases with increasing age
- American Indian/Alaska Natives have highest burden of Hi:
  - Especially among children
  - Nontypeable Hi causes the highest incidence across all ages
  - Hib incidence remains very low
  - Most Hib cases are unvaccinated or under-vaccinated
  - Changes in invasive Hi disease since 1999-2000:
    - Nontypeable incidence continues to increase
    - Serotype a Hi most common; incidence increased slightly
    - Serotype a increased substantially
    - Incidence of other serotypes decreased
- Analyses to further describe the epidemiology and clinical presentations of serotype a disease are in progress

References

3. CDC. MMWR 2002.
4. CDC. MMWR 1996.
5. www.cdc.gov/abcs/index.html

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Contact

Heidi M. Soeters, PhD, MPH
Epidemiologist
heidi.soeters@cdc.gov
404-639-1300

National Center for Immunization and Respiratory Diseases
Division of Bacterial Diseases / Meningitis and Vaccine Preventable Diseases Branch