Direct and Indirect Impact of 13-valent Pneumococcal Conjugate Vaccine (PCV13) on Invasive Pneumococcal Disease (IPD) Among Children and Adults in the U.S.

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**Background.** The proportion of enteric fever cases caused by *Salmonella enterica* subspecies *enterica* serovar Paratyphi A (S. Paratyphi A) has recently been increasing in Asian counties, which is a public health concern. In 2015, an unusual increase in S. Paratyphi A infection among Japanese travelers returning from Myanmar was noted, while there is little information on this uptrend in Myanmar.

**Methods.** Isolates from travelers who returned with enteric fever from 2005 to 2015 were analyzed in order to determine country-specific notification rates (epidemiological investigation). The notification rate was defined as cases returning from each country per 100,000 Japanese travelers who visited to the country. S. Paratyphi A isolates collected from 2001 to 2015 were analyzed by whole-genome sequencing (molecular investigation).

**Results.** Yearly notification trends indicated that enteric fever was potentially endemic to Myanmar (5–16 cases/100,000 travelers); the trends were similar to those observed in India (4–21 cases/100,000 travelers). A rapid increase in S. Paratyphi A infection occurred from 2012–2014 (2–4 cases/100,000 travelers) to 2015 (13 cases/100,000 travelers). A phylogenetic tree, constructed based on analysis of 105 S. Paratyphi A isolates (33 and 30 related to Myanmar and Cambodia, and 42 controls), revealed that most Myanmar- and Cambodia-related isolates formed clusters in the same lineage (Figure 1). Additionally, Myanmar-related isolates from 2015 harbored identical plasmid type 1 and were genetically closely related (each isolates had 0–10 single-nucleotide polymorphisms (SNPs), mostly within 0–7 SNPs) (Figure 2), yielding a wider SNP range than outbreak-associated isolates from Cambodia in 2013 (within a SNP distance of 0–6).  

**Conclusion.** Epidemiological trends and molecular typing suggested a possible outbreak of S. Paratyphi A infection occurred in Myanmar in 2015. The recent uptrend of S. Paratyphi A infection in Myanmar is important for travelers and clinicians since infection cannot be prevented by typhoid vaccination.

Figure 1. Polygenic tree of 105 S. Paratyphi A isolates

Figure 2. SNP analyses of S. Paratyphi A isolates from Myanmar in 2015 (A) and Cambodia in 2013 (B).

**Disclosures.** All authors: No reported disclosures.

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**Table: Symptoms, signs, laboratory findings**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Number (%) abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever (temperature &gt;100.4)</td>
<td>36/36 (100%)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>15/20 (75%)</td>
</tr>
<tr>
<td>Headache</td>
<td>37/48 (80%)</td>
</tr>
<tr>
<td>Rash</td>
<td>18/36 (50%)</td>
</tr>
<tr>
<td>WBC count &lt; 6,000</td>
<td>11/26 (31%)</td>
</tr>
<tr>
<td>Bilirubin ≥1.5</td>
<td>3/36 (8%)</td>
</tr>
<tr>
<td>AST &gt;50</td>
<td>25/58 (43%)</td>
</tr>
</tbody>
</table>

**Comparing pediatric vs. adult cases.**

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**2491. Murine Typhus: a Common Cause of Acute Febrile Illness with Potential for Serious Complications**

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**Background.** Individual cases and outbreaks of murine typhus have been documented in South Texas. We report 90 cases from Hidalgo County, Texas, enumerating complications and comparing results in children and adults.

**Methods.** We reviewed records of 101 patients in three hospitals in Hidalgo County, Texas, who had positive typhus serology (IgG or IgM titer ≥1:128) during 2013–2015 and were categorized as suspected, probable or confirmed murine typhus cases in accord with CDC definitions. We excluded 11 cases because a concurrent infection may have confounded our tabulation of manifestations or there was insufficient information to make a clinical diagnosis.

**Results.** The majority presented with typical typhus: fever, headache, myalgias and fatigue. Rash, thrombocytopenia and elevated hepatic transaminases were frequent (Table). Clinical complications in 25 cases (28%) caused a less typical syndrome, including bronchiolitis, pneumonia, pancreatitis, cholecystitis, mesenteric adenitis, myositis, rhombomylitis, meningitis and septic shock. Procalcitonin was >0.5 in 10 of 14 (71%) cases. Once the diagnosis was suspected, patients were treated with doxycycline with a rapid response in every case. Generally fever disappeared within 24–36 hours of the first dose.

**Conclusion.** Murine typhus is a common endemic infection in South Texas. Although most patients had a typical syndrome, the disease is multisystem, and complications appeared in 28% of cases. Procalcitonin was usually elevated. Rats and opossums are common reservoirs for *Rickettsia typhi*, and a search for cases of murine typhus is necessary.

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2493. Invasive Pneumococcal Disease in Massachusetts Children 6 Years Following Introduction of PCV13

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Background. A second generation 13-valent pneumococcal conjugate vaccine (PCV13) replaced PCV7 in the childhood immunization schedule in Massachusetts (MA) beginning in April 2010.

Methods. Cases of invasive pneumococcal disease (IPD) in children <18 years of age were detected through an enhanced surveillance system in MA since 2001. All cases in children and Streptococcus pneumoniae (SP) isolates, when available, are submitted to Department of Public Health (MDPH) and parents/physicians are interviewed for confirmation of demographic and clinical data. All available isolates are confirmed as SP by Quellung reaction.

Results. Three-hundred thirty-seven IPD cases have been identified in MA children between 4 January 2010 and 03.31.2017 (Figure). Thirty-five (10.4%) were in children >5 years old. Among children under 2, incidence of IPD declined to 6.8/100,000 children (95% CI 4.6–14.6) for the first time since the implementation of PCV13. Bacteremia was the most common clinical presentation (62.9%) followed by meningitis (n=15), meningitis (n=12) and other sites of infection (n=9). Whereas the number of yearly cases were similar for ST3 (12, 10, 13) and ST19A (8, 16, 6), the numbers for 19F increased slightly (3, 8, 10).

Conclusion. Four to 6 years after PCV13 was introduced, PCV13 ST (especially ST 3, 19A and 19F) accounted for about 25% of IPD in children. For all of the PCV13 ST, over half of these IPD cases occurred in children who had received ≥2 doses of the recommended PCV schedule; 25% of cases occurred in children who had not received any doses but were of the age at diagnosis that at least 2 PCV doses were recommended. An underlying condition was noted in 18. For PCV13 ST, the types of IPD were pneumococcal (n = 39), mastoiditis (n = 15), bacteremia (n = 15), meningitis (n = 12) and other sites of infection (n = 9). Whereas the numbers of yearly cases were similar for ST3 (12, 10, 13) and ST19A (8, 16, 6), the numbers for 19F increased slightly (3, 8, 10).

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