

PNEUMOCOCCAL AND OTHER BACTERIAL MENINGITIS PATHOGENS IN CHILDREN FROM URBAN NEPAL 2005-2016

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INTRODUCTION

- Bacterial meningitis is an important cause of mortality and morbidity in children throughout the world. *Streptococcus pneumoniae*, *Haemophilus influenzae* type b (Hib), and *Neisseria meningitidis* are the major causes of childhood meningitis and are vaccine preventable.
- Nepal introduced Hib vaccine in 2009 and 10-valent pneumococcal conjugate vaccine (PCV10) in 2015.
- We examined meningitis pathogens among children admitted to Patan hospital in Kathmandu, Nepal during 2005-2016 and assessed the impact of PCV10 on pneumococcal meningitis.

METHODS

- Invasive Bacterial Disease (IBD) Surveillance was undertaken of admitted children <14 years in Patan Hospital since 2005.
- All children with any suspicion of IBD (excluding wheezing alone or acute gastroenteritis alone) had blood samples collected and cultured. All children with suspected meningitis had CSF samples collected for cell count, biochemistry and culture.
- From 2005-2006 and mid-2009 to 2016, data were collected from all admitted children with suspected IBD. From 2007 to mid-2009 only those with any positive culture or >5 white blood cells in cerebrospinal fluid (CSF) were recorded.
- In all years, CSF samples were tested for *S. pneumoniae* using Binax NOW immunochromatographic test if patient age was >1 month and CSF white cell count was >5 cells/mm³.
- *S. pneumoniae* serotypes were determined by the Quellung reaction.
- PCR of CSF for *S. pneumoniae*, Hib, and *N. meningitidis* was implemented in 2005, but the criteria for testing varied over the 2005-2016 period.

RESULTS

- The study profile of children <14 years admitted to Patan Hospital from 2005 to 2016 is given in Figure 1.
- The most prevalent pathogen during the study period was *S. pneumoniae*, which was identified in 52 cases (5%), followed by Hib with 13 cases (1%; none since Hib vaccine introduction).
- In the 16 months since PCV10 use, 7 CSF were Binax-positive, all from PCV-unvaccinated children, while 0 were culture-positive, compared with 45 pneumococcal positive cases by Binax, PCR, or culture in the 124 months prior to PCV introduction.
- Figure 2 shows the changes overtime in number of pneumococci identified in meningitis cases.
- 57% of *S. pneumoniae* isolates prior to PCV10 introduction were serotypes in the vaccine, serotype 1 being the most common.

FIGURE 1
Study profile of children <14 years admitted to Patan Hospital from 2005-2016

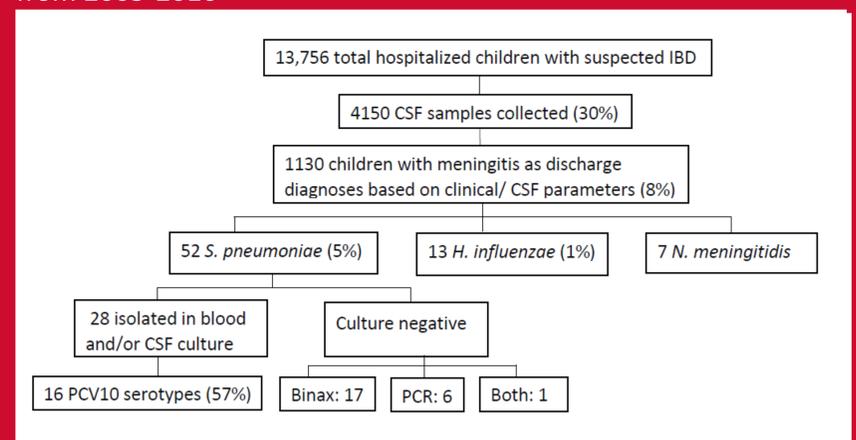
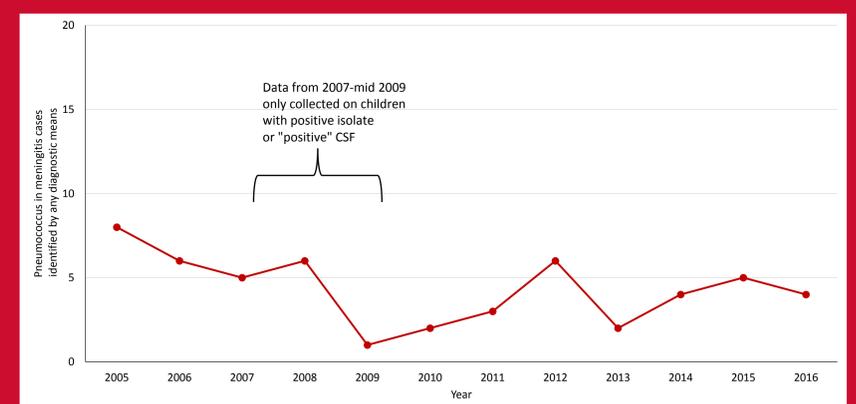


FIGURE 2
Number of meningitis cases identified as pneumococcal from CSF (culture, Binax or PCR) or blood (culture) from 2005 to 2016



CONCLUSION

- *S. pneumoniae* is the leading cause of meningitis in children in Kathmandu, Nepal.
- Early results from Nepal suggest a decline in pneumococcal isolates from CSF after the introduction of PCV10 in 2015.
- Ongoing monitoring of PCV impact on vaccine serotype *S. pneumoniae* meningitis and residual serotype disease is important.

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This work is made possible with support from Gavi, the Vaccine Alliance