Epidemiological change of pediatric community-acquired pneumonia before and after introduction of pneumococcal conjugate vaccine era in Japan

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Background
Community-acquired pneumonia (CAP) is a serious cause of morbidity and one of the leading causes of hospital admission in children. *Streptococcus pneumoniae* is considered to be the most important pathogen identified from children aged <5 years with bacterial pneumonia. Introduction of the pneumococcal conjugate vaccine (PCV) has been shown to provide significant protection against childhood CAP in European and American countries. However, publications detailing the etiology of CAP are scarce in Asian countries. The heptavalent pneumococcal conjugate vaccine (PCV7) was introduced in Japan in February 2010 and switched to the 13-valent vaccine (PCV13) in November 2013.

Methods
To clarify the epidemiologic and microbiologic change of CAP before and after the introduction of PCV in Japan, a population-based surveillance study was conducted to cover CAP cases in children, admitted to hospitals in Chiba city, Japan. Patients with a positive blood culture or cultured sputum dominant for pathogenic bacteria were diagnosed as bacterial pneumonia. Serotype and antibiotic susceptibility testing of isolated pneumococcal strains were examined.

Results
Annual CAP hospitalization rates in children <5 years of age decreased from 17.6 (pre-PCV period) and 14.5 (PCV7 period) to 13.0 during the April 2015 to March 2016 period and to 10.2 per 1,000 per year during the April 2016 to March 2017 period.
was a 42% reduction in CAP hospitalization from the pre-PCV period following the introduction of PCV13. There were also significant reductions in the proportion of patients with pneumococcal pneumonia (14.1% in pre-PCV versus 5% in PCV13 periods, p < 0.05) and the PCV13 covered serotypes (78.0% in pre-PCV versus 25.0% in PCV13 periods, p < 0.05). The penicillin low sensitive pneumococcal strains (MIC $\geq 2 \mu g/ml$) declined and the serotypes changed from PCV7 serotypes to non-PCV13 serotypes.

Conclusion
The prevalence of CAP in Chiba city showed a significant reduction after the introduction of PCV13. Declines in pneumococcal pneumonia and vaccine serotypes led to an improvement in penicillin susceptibility. Continuous surveillance is necessary to determine the effectiveness of PCV13 and for detection of emerging pneumococcal serotypes.