Streptococcus pneumoniae AOM isolates from Hungary, over a 6-year period

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Background: Otitis media (AOM) is the main reason for antibiotic prescription in children in developed countries, with S. pneumoniae as one of the major pathogens. The conjugate vaccines were shown to have an effect also on the incidence and serotype distribution of AOM. PCV7 was inserted in the national immunisation programme in 2009 in Hungary as a voluntary vaccine, replaced by PCV13 in 2010, which was made a mandatory vaccine in July 2014. In this study, we wanted to survey the serotype arrangement of AOM isolates parallel to vaccine uptake.

Material/methods: 497 pneumococci from middle ear specimens were referred to the National Center for Epidemiology, between November 2008 and December 2014. The gender ratio was 287 males (57.7%) and 210 females (42.3%). 365 patients were <5 years old (=73.4%); age range was <1 month – 88 years. Species identification was based on routine methods and PCR detection of lytA gene. To determine the serotype, a combination of conventional serology (Pneumotest Latex Kit and Quellung test) and PCR was used. MICs were determined with Etest, according to the EUCAST guidelines. PFGE was performed for the 19A isolates.

Results: Forty-four different serotypes were found in all. The most prevalent serotypes were the following: 3 (n=130), 19A (n=117), 19F (n=33), 15A (n=17), 11A (n=14), 7F (n=14), 15C (n=13), 15B (n=11). Serotypes 3 and 19A together represented 49.7% of strains. For the whole study period, the vaccine coverage would be 13.9% for PCV7 and 69.8% for PCV13. Penicillin resistance was 5.6% (n=27), while 31.1% were intermediate. Erythromycin and clindamycin resistance was 34.9% and 16.6%, respectively. Serotype 19A had high MICs for both penicillin (25/27 penicillinR isolates) and macrolides, while serotype 3 was fully sensitive to the antibiotics. Higher penicillin MICs were associated also with the PCV7 types. All isolates were sensitive to meropenem. PFGE analysis is not completed, but the majority of 19A isolates seem to belong to a few major clones, and ST-320 is among the clonal linages, with the highest penicillin MICs, mostly isolated in North-Eastern-Hungary.

Conclusions: Vaccination status of patients is not known, however, based on the national data, following the introduction of pneumococcus vaccination, vaccination rate increased immediately above 80% in 2009 and reached 95% by 2014. Accordingly, a shift in serotype prevalence in AOM was also
observed: PCV7 serotypes represented 37.4% of all strains in the first 2 years of the study, and this ratio dropped to 7.3% by 2014. Meanwhile serotype 3 has always been frequent, serotype 19A started increasing in 2011, peaked in 2013 with 30.3%, but dropped back to 15.6% by 2014. Both 6A and 6B disappeared by 2013-2014, but 6C turned up. It seems that PCV13 is successful in the elimination of the PCV types.