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Paper Poster Session

Epidemiology of brain infections

Decrease in incidence of bacterial meningitis in 1995-2014, Finland

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Background: Bacterial meningitis remains important cause of morbidity and mortality worldwide. Epidemiology of this disease is changing due to introduction of vaccines and secular trends. We described the contribution of specific bacterial pathogens to total disease burden and assessed long-term trends in incidence of common causes of bacterial meningitis in 1995-2014 in Finland.

Material/methods: : A case of bacterial meningitis was defined as isolation of *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Streptococcus agalactiae*, *Listeria monocytogenes* or *Haemophilus influenzae* from cerebrospinal fluid and reported to the National Infectious Disease Register during 1995-2014. To evaluate trends, we calculated pathogen- and age- specific annual incidence rates. Case fatality proportion was estimated within 30 days of sampling date (2004-2014). Denominator data were obtained from the Population Information System. We tested possible changes in incidence rates (Poisson regression), case fatality (chi-square) and age distribution of cases (Wilcoxon rank-sum). We calculated proportion of bacterial meningitis caused by vaccine preventable serotypes or serogroups (10- and 13-valent conjugate pneumococcal vaccines (PCV10, PCV13), tetravalent meningococcal serogroup ACYW vaccine and new meningococcal serogroup B-meningococcal vaccines, and *H. influenzae* type b (Hib) vaccine).

Results: *Streptococcus pneumoniae* and *Neisseria meningitidis* accounted for 78% of 1361 bacterial meningitis cases. In children <2 years, *Streptococcus agalactiae* caused 40% of cases. Estimated case fatality ranged from 5% to 14% (overall: 10%), without trend. Most of the fatal cases were related to pneumococcal meningitis, however *Listeria monocytogenes* had highest case fatality. The mean age of cases rose from 32 years in 1995-2004 to 37 years in 2005-2014 (p value 0.0004). In 1995-2014, annual incidence rates ranged from 1.9 to 0.7/100,000, with a significant declining trend (annual decrease, 4%; 95% Confidence Interval (CI) 3-5%), mainly due to reduction in incidence rate of *N. meningitidis* (9%; 95%CI: 7-10%) and *S. pneumoniae* (2%; 95%CI: 1-4%). Decreasing trend in the incidence rates was observed among all age groups, except among 2-4 year olds and people over 65 years. For the remaining three bacteria, we did not identify any trends in incidence rates. In 2004-2014, vaccine serotypes among children < 2 years accounted for: 74% (PCV10) and 79% (PCV13) of *S. pneumoniae*; 4% (MenACYW) and 96% (MenB) of *N. meningitidis*; 0% of *H. influenzae* cases.

Conclusions: Rates of bacterial meningitis decreased during the study. The disease affected mostly young children and older adults, and the case fatality was unchanged. The recent decline in incidence rate of pneumococcal meningitis was likely associated with introduction of PCV10 into infant immunization programme. Despite no vaccination programme, there was a significant decreasing trend in incidence rate of meningococcal meningitis. These data provide baseline information for identifying priorities for prevention strategies and may help in formulating clinical guidelines to improve treatment and outcome of bacterial meningitis.