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# Changing epidemiology of Invasive Pneumococcal Disease in the Stockholm area due to the introduction of a 7-valent conjugate vaccine in 2007

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**Abstract**

The use of the heptavalent conjugate vaccine (PCV-7) against invasive pneumococcal disease (IPD) which initiated in 2007 was bound to bring changes in the incidence of IPD in the Stockholm area. A vaccine like this, including 7 of the 90 known serotypes that cause the disease, has been known to lead to significant decrease in the incidence of those seven serotypes, but in some cases this result is leveled off by the increase in the incidence of some serotypes not included in the vaccine, a phenomenon known as serotype replacement. An analytical description of the serotype behavior in each age group, a meta-analysis and a Poisson model were used in this study in order to identify signs of this replacement and to estimate the vaccine efficacy. The rate of IPD decreased significantly for the vaccinated group (0-2 years), with relative risk (RR): 0.54 and p-value ($p<0.01$), while herd immunity effect was also apparent. Males also proved to be more prone to the disease than females, especially for the younger age group (RR): 1.81 ($p<0.01$). Serotypes 3, 7F, 19A, 22F and 38 not included in the vaccine, have increased their incidence significantly in the post-vaccine period, but the extent of serotype replacement is not as clear as one would expect. The reasons behind this are the narrow 3-year post-vaccine period, the initiation of a new 13-valent vaccine in 2010 which included serotypes 3, 7F and 19A and the peculiar distribution serotype 1 presents which acts as an outlier in our results.

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