The pneumococcal vaccine effect on the epidemiology of community acquired bacteremia (CAB) among children in Israel during the years 2004-2016

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BACKGROUND:

Pneumococcal vaccine PCV-13 was introduced in mid- 2010 to the routine Israeli immunization program. As a result, epidemiology of CAB among children in Israel is changing.

METHODS:

Retrospective study, analyzing data of children aged 0-18 years who were hospitalized in a tertiary medical center serving northern Israel with CAB between the years 2004-2016. The initial database included 2363 cases of bacteremia based on blood cultures taken from children within the first 48 hours of admission. Immunosuppressed patients due to chronic disease or drug treatment, preemies, referrals from another hospitals, and contaminations - were excluded. S. pneumoniae proportion among bacteremia cases and the rate per 1000 hospitalized children were compared between pre and post pneumococcal vaccination introduction.

RESULTS:

During the study period, 275 CAB events were identified (CHART 1). Pneumococcal bacteremia rate per 1000 hospitalized patients decreased significantly from 1.59 to 0.6 ($p < 0.001$). The number of bacteremia cases caused by other pathogens did not significantly change, except for Group A streptococcus, whose incidence increased in the post-vaccination era (CHART 2).

CHART 1 - All cases - Distribution by pathogens

CHART 2 - cases pre-vaccination VS. post-vaccination

In the post-vaccination period, there was a significant reduction in pneumococcal bacteremia caused by strains covered by PCV-13. However, pneumococcus is still a common pathogen mainly due to types not included in the vaccine. The proportion of penicillin resistant pneumococcal isolates decreased dramatically (50.9% to 5.3%) while there were no other significant changes in antibiotic resistance. During the study period, there was a steady decline in the incidence of all bacteremia cases.

Surprisingly, in 2015 - 2016 the number of cases increased - mainly due to Brucella outbreak (15 cases in 2015-2016 compared to 3 in 2010-2014) (CHART 3).

CHART 3 - Bacteremia cases by years

CONCLUSIONS:

This study demonstrates that the introduction of PCV-13 had a double positive effect:

- 1 - a sharp decrease in cases of bacteremia due to pneumococcal infection.
- 2 - significant decrease in pneumococcal resistance to antibiotic treatment.

There was an overall decline in CAB, but this trend was reversed in the years 2015-2016, due to a Brucella outbreak.