Background and Aim

• The U.S. routine infant pneumococcal vaccination program began with the 7-valent pneumococcal conjugate (PCV7) in 2000, followed by the 13-valent pneumococcal conjugate (PCV13) in February 2010.
• There have been reductions in antimicrobial resistance of invasive pneumococcal disease (IPD) post-PCV13.[1]
• PCV13 have induced direct protection in vaccinated children and indirect protection across all-age groups.[3]
• PCV13 use could have reduced antimicrobial resistance by reducing the overall number of cases of pneumococcal disease and by reducing incidence of some pneumococcal serotypes, such as serotype 19A, commonly known to be resistant to antibiotics.[2]
• If compliance to national guidelines on antibiotic use could have reduced all-cause antibiotic consumption in the US population, then it could have also reduced the incidence of antimicrobial resistance strains.[3]
• We compared trends of the overall IPD incidence, the incidence of IPD due to strains non-susceptible to penicillin and cephalosporins and the use of parenteral broad spectrum penicillins and cephalosporins for any cause in all healthcare settings. Both antibiotic classes are the most commonly used to treat IPD

Methods

• Data sources consisted of publications from the U.S. Active Bacterial Core (ABC) surveillance for invasive Streptococcus pneumoniae disease (annual reports[4], and Tomczyk et al.[5]), the U.S. Census Bureau[6] and the QuintilesIMS National Sales PerspectivesTM database[7].
• First, we summarized all-cause IPD incidence for all-ages from 2005 through 2013 as reported by ABC.[4]
• Second, we calculated trends in penicillin and cephalosporin non-susceptible IPD incidence for all ages based on age-specific non-susceptible annual IPD reported by Tomczyk et al.[5] and U.S. population census data.[6] We projected total number of non-susceptible cases and back calculated IPD incidence for all ages.
• Third, using the QuintilesIMS National Sales PerspectivesTM (NSP) database[7], we estimated the all-cause, national, consumption of parenteral penicillin and cephalosporin in the U.S. The NSP accurately tracks prescription pharmaceutical sales market through major classes of trade and channels of distribution in the U.S. In this study, consumption is reported in annual number of vials.

Results

• Following the introduction of PCV13 in 2010 In the US, there was a 25% reduction in all-cause all-ages IPD incidence (14.3 to 10.7 per 100,000 population) from 2009 to 2013 (not shown). During the same period, penicillin non-susceptible IPD incidence for all-ages dropped 61% (1.54 to 0.60 cases per 100,000 population).
However, the national annual parenteral use of broad spectrum penicillin for any cause remained flat (60 million vials in 2009, 59 million vials in 2013). (Figure 1)

• Similarly, cephalosporin non-susceptible IPD incidence for all-ages dropped 55% (2.20 to 0.98 cases per 100,000 population) from 2009 to 2013. Nevertheless, the national annual parenteral use of cephalosporins for any cause remained overall flat during the same period (74 million vials in 2009, 77 million vials in 2013). (Figure 2)

Results (cont.)

• PCV13 implementation has been followed by a drop of 25% in all-cause IPD incidence for all ages and drops of 61% and 55% in penicillin and cephalosporin non-susceptible IPD incidence for all ages, respectively. These drops in non-susceptible IPD cannot be explained by changes in the national consumption of parenteral use of broad spectrum penicillins and cephalosporins for any cause as they both remained overall flat between 2009 through 2013. PCV13 infant vaccination therefore emerges as the main driver of the observed reductions in penicillin and cephalosporin non-susceptible IPD, mostly due to reductions in IPD caused by serotype 19A.[1,5]

Conclusions

References

4. CDC. Active bacterial core surveillance report [ABC]. Streptococcus pneumoniae. 2005-2013
5. Tomczyk S. et al. CID 2016:62 (1 May); 135-137
6. U.S. Census Bureau. www2.census.gov/ }

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