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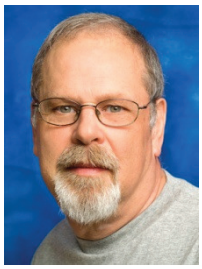

Evolution of serotypes, invasive diseases and resistance

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Pneumococcal disease is a multi-endpoint disease which includes invasive pneumococcal diseases (IPD), mucosal non-invasive diseases (eg. otitis media and pneumonia), carriage and spread (related to indirect or herd protection) and antibiotic resistance. These outcomes are often influenced by various competing or synergistic forces. The two main forces when it comes to antibiotic resistant *S. pneumoniae* serotypes are antibiotic use and vaccination coverage.

The effect of both antibiotics and vaccine on prevalence of antibiotic nonsusceptible *S. pneumoniae* is through interaction in its nasopharyngeal niche.

Not all antibiotics are equal in their ability to prevent antibiotic-nonsusceptible *S. pneumoniae* strains and not all serotypes are equally adapted to coverage and thus spread in the community.

The result of adaptation of *S. pneumoniae* to carriage, antibiotic use and vaccination determine the prevalence of antibiotic-resistant serotypes in the community. The disease-potential of the various serotypes then, determines the dynamics of disease epidemiology by the antibiotic-resistant strains.

The resulting rates show the overall dynamics of antibiotic-resistant pneumococcal diseases. This peculiar epidemiology will be discussed using recent examples for recent implementation of vaccination in antibiotic-using communities