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Pneumococcal Transmission Dynamics in Canada: 2010–2019

Streptococcus pneumoniae is a bacterium that causes a wide range of diseases, notably invasive pneumococcal disease, community acquired pneumonia, and acute otitis media. It primarily spreads through oral contact and respiratory secretions. Between 20% and 60% of healthy children and 10% of healthy adults in Canada are transiently colonized with *S. pneumoniae*. Currently, most children in Canada receive three or four doses of the 13-valent pneumococcal conjugate vaccine, which aims to protect vaccine recipients from severe disease caused by 13 serotypes of *S. pneumoniae*. Higher valency pneumococcal conjugate vaccines, which cover 15 and 20 serotypes of *S. pneumoniae*, are being considered for use in pediatric populations by advisory groups globally. In addition to preventing severe disease, the 13-valent pneumococcal conjugate vaccine prevents *S. pneumoniae* colonization. The herd effects necessitate the development of a dynamic transmission model to capture the transmission dynamics of *S. pneumoniae* to inform future vaccine recommendations. We developed an age-structured compartmental model that describes pneumococcal transmission dynamics in the Canadian population using a modified 'Susceptible-Infectious-Susceptible' framework. Our model contains additional compartments that incorporate *S. pneumoniae* serotype groupings and vaccination status. We fit our model to the annual incidence of invasive pneumococcal disease by serotype group between 2010 and 2019 in Canada using Latin hypercube sampling.