Potential Impact of Routine Use of 13-valent Pneumococcal Conjugate Vaccine on Hospitalizations for Pneumonia Among Older Adults in Canada

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BACKGROUND

- Publicly funded routine pediatric programs with the 13-valent pneumococcal conjugate vaccine (PCV13) were implemented across Canada by mid-2011.
- Based on results from a randomized clinical efficacy trial, PCV13 was subsequently licensed for the prevention of vaccine-type (VT) pneumonia in adults, in addition to V1-type pneumococcal disease (IPD) in July of 2015.
- Despite demonstrated efficacy against VT community-acquired pneumonia (CAP) and VTIPD in adults aged ≥65 years, there is currently no recommendation for a publicly funded PCV13 program for this age group; the vaccine is recommended for use on an individual basis.
- Lack of population-based recommendation is due to perceived low preventable disease burden and expectation of its further reduction by the ongoing herd effect from the pediatric program.
- However, recently reported 2010–2015 data from a sentinel surveillance study of VT-CAP in Canada, along with the National Microbiology Laboratory IPD surveillance report for 2016, suggest that disease reduction from the herd effect may be leveling off, leaving a persistent and substantial burden of potentially preventable pneumococcal disease in older adults.1

OBJECTIVE

- To evaluate the potential impact of routine PCV13 immunization program for Canadian adults aged ≥65 years on hospitalizations for CAP.
- We constructed a mathematical model based on Canadian-specific burden of disease estimates, published estimates of PCV13 effectiveness, and duration of vaccine protection. Model assumptions are summarized in Table 1.
- The model estimates the number of hospitalizations and corresponding hospital days potentially averted during a 5-year period from PCV13 mass vaccination of adults aged ≥65 years.
- Hospitalizations potentially averted were estimated as the product of: - the size of the Canadian population aged ≥65 years, - incidence of all-cause CAP, - proportion of CAP that is PCV13-type, - PCV13 effectiveness against VT-CAP, and - the duration of protection for PCV13 over a 5-year time horizon.
- A 5% annual all-cause mortality rate in the overall population was assumed.
- We assumed that the rates of all-cause CAP, the proportion of VT-CAP, and PCV13 effectiveness remained constant over the 5-year assessment period.
- Vaccination coverage was assumed to be 100%.
- We estimated hospital days averted as the product of hospitalizations averted and median length of stay.

METHODS

- Based on model assumptions, routine use of PCV13 in Canadian adults aged ≥65 years would lead to an annual rate reduction of 62 (95% CI 11–77) hospitalizations per 100,000 persons, per year.
- Applied to the entire Canadian population of older adults, this reduction would avert an estimated 172,276 (95% CI 303,217–211) hospitalizations and 138,192 (95% CI 24,298–173,690) hospital days over a 5-year period (Table 2).

RESULTS

- While PCV13-type disease in Canadian older adults is seemingly negligible (5% of all-cause CAP in our analysis), given the large burden of all-cause CAP, this proportion actually represents a meaningful remaining disease burden.
- Despite herd effects from the publicly funded pediatric program, routine PCV13 immunization of this population could result in considerable additional reduction in pneumonia hospitalizations.

LIMITATIONS

- All-cause CAP incidence was obtained from a retrospective administrative database, and it may be an underestimate of the true disease burden.
- The proportion of VT-CAP is an assumption, based on extrapolation of 2010-2013 results of a Canadian sentinel surveillance study.
- Duration of vaccine protection was assumed not to exceed 5 years.

REFERENCES