Serotype-specific trends in population based surveillance for invasive and respiratory pneumococcal disease in adults, Toronto, 2000-2010

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Abstract

OBJECTIVES: TIBDN has performed population-based surveillance for invasive pneumococcal disease (IPD) in residents of Toronto/Peel (pop 4.1M) since 1995. From 2002, respiratory tract isolates have been collected and the population area expanded. PCV7 was licensed for children in Canada in 2001 and publicly-funded routine vaccination began in January 2005.

METHODS: Serotyping and broth microdilution susceptibility testing to CLSI standards is performed on one isolate per IPD/respiratory case. Clinical data are collected from patient/physician interview and chart review.

RESULTS: From 2000 to 2010, 7993 adult (≥15 years) cases of IPD were identified. Older adults (≥65 years) accounted for 48% of IPD (1856/3895) and 46% (1873/4098) of RPD. The rate in older adults decreased from 34 to 22/100000/y from 2002 to 2005, then increased to 26/100000/y in 2010. The rate of IPD stayed constant for adults under 65 years (5.3/100000/year in 2002 and 4.8/100000/year in 2010). From 2002 to 2010, the proportion of isolates from serotypes not in PCV7 but in PCV13 increased from 17% to 49% in IPD and 19% to 25% in RPD. The rate of IPD due to serotypes included in the PCV13 vaccine increased from 1 to 2/110000/year in adults ≥65 years and from 5.3 to 11.8/100000/year for those ≥65 years. Non-PCV13 (NPCV) serotype disease increased from 1.2 to 2.1/100000/year in adults <65 years and from 9.9 to 11.2/100000/year in those ≥65 years. From 2002 to 2010, the proportion of disease due to PCV7 serotypes decreased from 57% to 10% for IPD and from 45% to 16% for RPD. The proportion of isolates resistant to erythromycin, benzylpenicillin, trimethoprim-sulfamethoxazole, ceftriaxone, and levofloxacin from community and nosocomial/nursing-home adult IPD and respiratory isolates from 2005 to 2010. Broth microdilution susceptibility testing was interpreted to EUCAST standards (non-mening/non-pneumonia cases).

CONCLUSIONS: Since introduction of routine pediatric PCV7 vaccine, the incidence of adult IPD due to PCV7 serotypes has decreased while that of PCV13 and NPCV isolates has increased. In 2010, serotype distribution differed for IPD and RPD and for nursing-home acquired and nosocomial cases.

Methods

From 1995 to 2010, population based surveillance for invasive pneumococcal disease was conducted in metropolitan Toronto and Peel region (popn ~4M). From 2002 to 2010, all respiratory tract isolates from hospital laboratories were also collected. Serotype is determined using latex pneumococcal antisera (Statens Serum Institute, Denmark) and demographic and clinical data was obtained from Statistics Canada. Demographic and clinical data were collected from review of health records and interviews with patients and attending physicians.

Results

From 2000 to 2010, 3895 cases of IPD and 4098 respiratory isolates of S. pneumoniae were identified. Older adults (≥65 years) comprised 48% of IPD cases and 46% of respiratory isolates. S. pneumoniae isolates from IPD cases (3424 from blood, 66 from CSF, 69 from pleural fluid, 25 from sputum, 22 from abscesses and 7 from other sterile sites), and 3570 (87%) of respiratory isolates (2816 sputum, 747 BAL, 7 other) were available for serotyping and antimicrobial susceptibility testing.

In 2009/10, serotypes S. pneumoniae 19A and 19F were the most common serotypes causing adult IPD. Serotypes 3, 19A and 19F were most commonly identified in adult respiratory isolates. The most common non-conjugate vaccine serotypes were 11A in respiratory isolates and 22F in IPD.

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From 2002 to 2010, the rate of IPD due to serotypes included in PCV13, but not PCV7, increased from 0.3 to 11.8/100000/year in adults ≥65 years and from 5.3 to 11.8/100000/year for those ≥65 years. Non-PCV13 (NPCV) serotype disease increased from 1.2 to 2.1/100000/year in adults <65 years and from 9.9 to 11.2/100000/year in those ≥65 years. From 2002 to 2010, the rate of IPD stayed constant for adults aged 15 to 64 years (5.3 in 2002 and 4.8/100000/year in 2010).

CONCLUSIONS: Since introduction of routine pediatric PCV7 vaccine, the incidence of adult IPD due to PCV7 serotypes has decreased while that due to PCV13/NPCV and non-conjugate vaccine serotypes has increased.

• In 2010, serotypes included in PCV7 comprised 17% of IPD and 15% of respiratory isolates; serotypes included in PCV13 comprised 41% of IPD and 41% of RPD. Serotype distribution differs for IPD and RPD and for nursing-home acquired and nosocomial cases.

• Serotype distribution differs between sterile site and respiratory isolates, and between community, nursing home and hospital acquired disease.

• Serotypes associated with isolates acquired in nursing homes and hospitals (6A, 6B, 19F, 17F, and 34) have higher levels of antimicrobial resistance than serotypes associated with community-acquired disease.

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