Re-establishment of Susceptibility to Respiratory Fluoroquinolones (FQ) in Streptococcus pneumoniaeia in Toronto, Canada

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Abstract (revised)

Background: FQ resistance (FQR) emerged in S. pneumoniae (SPN) in the 1990’s, shortly after the introduction of ciprofloxacin (Cipro). FQR increased from 1995 to 2002, and was associated with older age, recent use of FQ, and hospital/nursing home-acquired infection. We examine trends in FQR in SPN in Toronto since 2002.

Methods: From 1995-2007, TIBDN collected all SPN isolated from sterile sites from residents of Toronto-Peel (pop 4M) from 2002-2007, all respiratory tract isolates were also collected, and the population area expanded. Broth microdilution susceptibility testing to CLSI standards is performed on all isolates. Popn FQ use was obtained from IMS Health Canada. Demographic and medical data were collected from consenting patients. From 1995-2006, FQ use increased from 67 to 87 scripts/1000pop/yr; Lev use from 0 to 12.6 scripts/1000pop/yr, and Mox use from 0 to 10.7 scripts/1000pop/yr.

Results: From 1995 to 2007, outpatient fluoroquinolone use increased from 67 to 97 prescriptions/1000pop/year. Per capita outpatient fluoroquinolone use during the study period is shown in Figure 1. Formulary restrictions in the provincial drug benefit resulted in a decrease in ciprofloxacin use between 2000 and 2001. Total FQ use increased by 31% from 1995 to 2007.

Figure 1. Rate of outpatient fluoroquinolone prescriptions by year

Between 2000 and 2007 there were 3217 cases of pneumococcal bacteremia and 2655 patients with respiratory isolates of S. pneumoniae reported to the study. 91% of these isolates were available for susceptibility testing. Levofloxacin and moxifloxacin resistance rates appear to be decreasing in both sterile site (Lev P=0.02, Mox P=0.06) and respiratory (Lev P<0.03, Mox P=0.69) isolates (Figure 2). In 2006/7 there were no moxifloxacin-resistant sterile site isolates.

Figure 2. Levofloxacin (yellow) and moxifloxacin (blue) resistance in respiratory and sterile site isolates of S. pneumoniae. In 2006/7 there were no moxifloxacin-resistant sterile site isolates.

Conclusions: Despite increasing use of FQ since 1995, in 2006 and 2007 all sterile site isolates of S. pneumoniae were susceptible to moxifloxacin. Mox R continues to decrease despite increasing moxifloxacin use.

Introduction:

The Toronto Invasive Bacterial Diseases Network (TIBDN) has performed population-based surveillance for invasive pneumococcal disease in metropolitan Toronto and Peel region since January 1, 1995. The emergence of fluoroquinolone resistance in S. pneumoniae from 1995 to 2002 was associated with older age, recent use of FQ, and hospital/nursing home-acquired infection. We examined trends in fluoroquinolone resistance in SPN in Toronto since 2002 and re-examined these previously identified risk factors.

Methods:

From 1995 to 2006, all sterile site isolates of pneumococci identified through population-based surveillance for pneumococcal disease in Metropolitan Toronto and Peel region were collected. From 2002 to 2006, all respiratory tract isolates from hospital laboratories were also collected. Both broth microdilution antimicrobial susceptibility testing was performed to CLSI standards. Population fluoroquinolone use was obtained from IMS Health Canada. Demographic and clinical data were collected from review of health records and interviews with patients and attending physicians. Details of previous antibiotic treatment has been collected since 2000.

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