Lack of Emergence of gyrA Mutant *S. pneumoniae* (SP) Isolates Despite Increased Fluoroquinolones (FQ) Usage

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Background: Newer FQs including levofloxacin (Levo) and moxifloxacin (Moxi) have been widely used to treat respiratory infections. As a result, emergence of FQ resistance (FQR) in *S. pneumoniae* is a concern. We examined FQ usage, and the prevalence of FQR and QRDR mutations in pneumococci in Canadian isolates.
Methods: Since 1987, CBSN has been characterizing sterile and respiratory pneumococcal isolates submitted from throughout Canada. Levo preferentially targets parC, whereas Moxi preferentially interacts with gyrA. We sequenced QRDR regions of all FQR isolates and a stratified sample of FQ susceptible isolates. Population FQ use was obtained from IMS Canada.
Results: Total FQ use increased from 48 Rx/1000 pop in 1993 to 97 Rx/1000 in 2007. Ciprofloxacin (Cipro) use increased from 27-62 Rx/1000 over the same time period. Levo use increased from 1 Rx/1000 in 1998 to 13 Rx/1000 in 2004, then decreased to 9 Rx/1000 in 2007. Moxi use increased from 0.35 Rx/1000 in 2000 to 18 Rx/1000 in 2007. 29761 isolates were available for testing. Cipro R rates increased from 0.5% in 1993 to 2.6% in 2002 then decreased to 1.7% in 2007. Levo R rates increased from 0 in 1993 to 1.8% in 2002 then decreased to 1.0% in 2007. Moxi R rates increased from 0.3% in 2002 to 0.9% in 2006, then decreased to 0.6% in 2007. The prevalence of isolates with parC only mutations increased from 0.5% in 1993 to 4.4% in 2000, then decreased to 2.5% in 2006. The prevalence of isolates with both parC and gyrA mutations increased from 0 in 1993 to 1.5% in 2005, then decreased to 0.7% in 2006. The first gyrA only mutant was detected in 1998; the prevalence of gyrA only mutants since then has remained less than 0.1% with (3/2224 isolates in 2006).
Conclusion: Despite increasing use of respiratory FQs, FQR in pneumococci is stable or decreasing in Canada. The prevalence of isolates with parC mutations is decreasing. Isolates with mutations in gyrA alone remain extremely rare, suggesting that Moxi exerts minimal selective pressure for resistance.