Association between fluoroquinolone consumption in hospitalized patients and fluoroquinolone susceptibilities: An 8 year analysis from an inner city hospital

Cosmina Zeana, MD, MPH*; Vikas Gupta, Pharm.D., BCPS†; Xiaowu Sun, PhD‡; Frances Petersen-Fitzpatrick, RPh, MPH*; James Dunne MS, MT*; Peter Lao, MS RPh*; Frank Palmieri, PhD, RPh*

Bronx Lebanon Hospital Center (BLHC), Bronx, NY; †CareFusion-BD MedMined Services, CareFusion-BD, San Diego, CA
Contact: FPALMEIR@bronxleb.org

Background

- Evidence suggests that there is a link between hospital antimicrobial use and pathogen resistance due to the rapid evolution of the bacterial genome under the selective pressure of antibiotics.
- Increasing resistance has been associated with poor clinical outcomes as well as increased length of hospital stay and hospital costs. (1,2)
- There is a paucity of literature about the relationship between changes in antimicrobial use and susceptibilities to antimicrobials of hospital-onset (HO) isolates, as most evaluations were done using overall antibiogram data that includes isolates collected during the admission period.
- Fluoroquinolone (FQ) use at Bronx Lebanon Hospital Center (BLHC) was reduced by 61% over a 8 year period

Methods

- FQ use data and susceptibility of AMB and HO Gram negative organisms to FQ were obtained from MedMined Surveillance Advisor (CareFusion-BD, San Diego, CA).
- FQ use was evaluated by days of therapy per 1000 days at risk for an 8 year period (July-December 2007, calendar years 2008-2014, and January-June 2015).
- Change in FQ susceptibilities during the same time period was evaluated for non-duplicate AMB and HO E. coli (EC), K. pneumoniae (KP), P. mirabilis (PM) and P. aeruginosa (PSA) isolates obtained from patients admitted to BLHC from July 2007 to June 2015. Non-duplicate AMB and HO isolates were defined as below:
  - AMB: the first isolate from a species during the 30 day period collected in the non-inpatient setting.
  - HO isolates: the first isolate from a species during the 30 day period collected after day 3 of an admission or within 14 days of discharge.
- Pearson correlation coefficient was used to assess the relationship between FQ use and changes in HO isolate susceptibilities.

Objective

- To evaluate if reduction of inpatient FQ use is associated with improvement in FQ susceptibilities among hospital-onset (HO) non-duplicate isolates over an 8 year period.

Results

- Over the 8 year period, FQ use decreased from 111.5 (July-Dec 2007) to 43.6 (Jan-June 2015) DOT/1000 DAR (-0.96, p<0.001), a 61% reduction in use. During that time period, susceptibilities to FQ in HO isolates were 38 and 49 (EC), 30 and 64 (KP), 37 and 56 (PM), and 53 and 63 (PSA) percent.
- All correlations between FQ reduction and improvement in susceptibilities were statistically significant as follows: -0.91 (p<0.001) for EC, -0.96 (p<0.001) for KM, -0.89 (p<0.001) for PM, and -0.77 (p<0.008) for PSA.

Discussion

- Multiple studies have documented the declining susceptibilities of gram negative organisms to FQ (4). In this study, we evaluated the effect of a hospital-based, multifaceted approach to decrease FQ use over an 8 year period on FQ susceptibilities of HO Gram negative organisms.
- FQ use (primarily ciprofloxacin) has been reduced by 61% over the study period through a series of antibiotic stewardship initiatives including IV to PO transition with hard stop, UTI and pneumonia guidelines and education.(5) A significant improvement in susceptibilities to FQ in HO Gram negative bacteria was noted. Susceptibilities to FQ in HO organisms were used instead of overall antibiogram data as these bacteria would be most affected by the change in antibiotic usage.

Conclusion

- This study shows that a sustained, progressive reduction in inpatient FQ use is associated with significant improvements in susceptibilities to FQ of HO gram negative pathogens.
- The use of non-duplicate HO isolates is a better measure of changes in antimicrobial susceptibilities related to hospital antimicrobial use than overall inpatient isolates.

References

2. Roberts RR et al Hospital and Societal costs of antimicrobial-resistant infections in a Chicago teaching hospital: Implications for antibiotic stewardship 2005 CID 40:49-57
5. Palmieri F et al Implementation of strategies to impact quinolone use: Results from a 7.5 year evaluation from an inner city hospital 2010 IDSA Poster Session