Effect of a pharmacist-led antimicrobial stewardship (AMS) program on outpatient fluoroquinolone prescribing in the elderly

Katie LaRue  
*Providence Medical Group, Katie.Larue@providence.org*

Chelsea Mannebach  
*Providence Medical Group, Chelsea.Mannebach@providence.org*

Bonnie Jiron  
*Providence Medical Group, Bonnie.Jiron@providence.org*

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Katie LaRue, PharmD, Chelsea Mannebach, PharmD, BCPS, BCACP and Bonnie Jiron, PharmD, BCACP

Background

- Approximately 10% of adult outpatient visits result in an antibiotic prescription, making up approximately 60% of all antimicrobial prescribing.¹
- The Society of Infectious Diseases Pharmacists and American Pharmacists Association state that pharmacists have a vital role in antibiotic stewardship in the outpatient setting.²
- The US Food and Drug Administration (FDA) and Infectious Diseases Society of America (IDSA) have published warnings for the following related to fluoroquinolone (FQ) use:³,⁴
  - Two-fold increased risk of aortic dissection
  - Hypoglycemia risk that could lead to coma
  - Mental health side effects, including agitation and delirium that can be seen with one dose
  - Tendonitis and tendon rupture
  - Clostridium difficile (OR ≥ 3.9) with FQ exposure

Purpose

- To introduce an outpatient antimicrobial stewardship program.
- To determine the impact of provider education with feedback on prescribing habits related to FQ use in elderly patients.

Outcomes

Primary Outcome

- Change in number of FQ prescriptions written for patients ≥ 65 years of age in the primary care setting between March 2018 and March 2019, and March 2019 and 2020.

Secondary Outcomes

- Percentage of appropriate FQ prescriptions written in each study period, determined by disease-specific guidelines. 15% of FQ prescriptions from each study period identified from the primary outcome were included.
- Percentage of providers identifying 5 out of 5 risks associated with FQ therapy before and after education.
- Provider comfort level discussing risks and benefits of FQ therapy with patients before and after education.
- Provider-identified barriers to antimicrobial stewardship in the outpatient setting.

Methodology

- Institutional Review Board (IRB)-approved
- Pre- and post-intervention study
- Study Population
  - Patients ≥65 years old who received a prescription for an oral FQ at an Oregon or Southwest Washington Providence Medical Group (PMG) clinic
- Exclusion criteria
  - Prescription from a PMG medical resident-staffed clinic or hospital-based clinic
  - FQ administered via topical, intravenous, otic, or ophthalmic route
  - FQ continued from a different encounter
  - Patient is enrolled in hospice, palliative care, is a patient, or is pregnant

Pre-intervention

- Data collected for March 2018 and March 2019
- Individualized provider reports developed
- 15% of patients from each study month reviewed for secondary outcomes

Intervention

- Clinic pharmacists provided education on FQ risks and appropriate uses
- Individualized provider reports for March 2018 and 2019 given to providers
- Update provider pre- and post-education surveys conducted

Post-intervention

- Data collected for March 2020
- Individualized provider reports for March 2020 emailed to providers
- 15% of patients from final study month reviewed for secondary outcomes

Preliminary Results

**Figure 1: Primary Outcome (n=606)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of FQ Prescriptions Written for Patients ≥65 Years of Age in PMG Primary Care Clinics Each Year in March</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>272</td>
</tr>
<tr>
<td>2019</td>
<td>200</td>
</tr>
<tr>
<td>2020</td>
<td>134</td>
</tr>
</tbody>
</table>

**Table 1: Secondary Outcomes and Patient Characteristics**

<table>
<thead>
<tr>
<th>Encounter Type</th>
<th>March 2018</th>
<th>March 2019</th>
<th>March 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age (years)</td>
<td>79 (65–102)</td>
<td>76 (65–96)</td>
<td>77 (66–92)</td>
</tr>
<tr>
<td>Average CTR (mg/dL)</td>
<td>82.9 (13–138)</td>
<td>55.6 (12–102)</td>
<td>67 (26–106)</td>
</tr>
<tr>
<td>Telephone</td>
<td>14 (34.1%)</td>
<td>13 (40.6%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>Office visit</td>
<td>22 (53.7%)</td>
<td>18 (56.3%)</td>
<td>6 (33.3%)</td>
</tr>
<tr>
<td>MyChart</td>
<td>2 (4.9%)</td>
<td>1 (3.1%)</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (11.1%)</td>
</tr>
<tr>
<td>Medication prescribed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>34 (82.9%)</td>
<td>26 (81.3%)</td>
<td>13 (73.2%)</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>6 (14.6%)</td>
<td>5 (15.6%)</td>
<td>5 (27.8%)</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>1 (2.5%)</td>
<td>1 (3.1%)</td>
<td>0</td>
</tr>
<tr>
<td>Indication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cystitis</td>
<td>32 (78%)</td>
<td>15 (46.6%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0</td>
<td>1 (3.1%)</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>Diarrheal illness</td>
<td>2 (4.9%)</td>
<td>5 (15.6%)</td>
<td>2 (11.1%)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>2 (4.9%)</td>
<td>2 (6.3%)</td>
<td>3 (16.6%)</td>
</tr>
<tr>
<td>Other indication with guideline-directed antibiotic use</td>
<td>3 (7.3%)</td>
<td>2 (6.3%)</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>Other indication without guideline-directed antibiotic use</td>
<td>3 (7.3%)</td>
<td>2 (6.3%)</td>
<td>1 (5.6%)</td>
</tr>
<tr>
<td>% FQ therapy appropriate</td>
<td>1 (2.4%)</td>
<td>2 (6.3%)</td>
<td>5 (27.8%)</td>
</tr>
<tr>
<td>% FQ therapy inappropriate</td>
<td>40 (97.6%)</td>
<td>30 (93.7%)</td>
<td>13 (72.2%)</td>
</tr>
</tbody>
</table>

**Figure 2: Provider Survey Results (n=118)**

<table>
<thead>
<tr>
<th>Provider comfort level discussing risks and benefits of FQ therapy with patients</th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00%</td>
<td>6.80%</td>
<td>84.10%</td>
</tr>
<tr>
<td>10.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.00%</td>
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<td></td>
</tr>
<tr>
<td>40.00%</td>
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<tr>
<td>50.00%</td>
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<tr>
<td>60.00%</td>
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<td></td>
</tr>
<tr>
<td>70.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90.00%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

- There was a reduction in FQ prescriptions written for patients ≥65 years of age each March during the study period.
- There was an increase in the percentage of appropriate FQ prescriptions written.
- These results are consistent with prior AMS publications focusing on provider education and/or provider reporting.

Provider Support

- Tools to aid providers in selecting appropriate antimicrobial therapies and communicating effectively with patients about the risks and benefits of antimicrobial agents are imperative.
- While a specific medication class and population was focused on during this intervention, ongoing provider support is needed, such as:
  - Education on appropriate antibiotic indications, doses and durations
  - Communication techniques for providers to discuss risks, benefits, and appropriate of antimicrobial therapy with patients
  - Techniques to aid in antimicrobial stewardship, such as delayed prescribing
  - Enhanced reporting tools to offer provider-specific feedback on antimicrobial prescribing habits at a regular frequency, such as seasonally or quarterly

Study Limitations

- Unable to control for providers who were new to, or left, PMG during study years.
- Large viral pandemic during post-intervention study period likely altered prescribing practices.
- Small number of patients were reviewed for appropriateness of FQ prescriptions.
- Available reporting tools require manual chart review to accurately report FQ prescriptions per provider and appropriateness of each prescription.

Preliminary Conclusions

- Education on outpatient AMS in a narrow-focused topic and patient population positively impacted prescribing.
- Ongoing support for AMS in the outpatient setting is needed and important.

Future Directions

- Finalize data collection and perform statistical analysis.
- Present study findings to clinical pharmacy department, pharmacy resident community, and PMG AMS workgroup.
- Develop system-level outpatient AMS program similar to existing inpatient AMS program.

References


Disclosure Statement

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of the presentation:

Katie LaRue: nothing to disclose
Bonnie Jiron: nothing to disclose
Chelsea Mannebach: nothing to disclose