



# Evaluation of Fluoroquinolone vs. Non-Fluoroquinolone Treatment of Acute Uncomplicated Diverticulitis in a Large Academic Medical Center

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## Abstract

**Aim:** The purpose of this study is to answer if re-visits to the hospital are similar between the uses of a Fluoroquinolone (FQ) or Non-Fluoroquinolone (NFQ) antibiotic regimen in the treatment of AUD.

**Materials and Methods:** This retrospective cohort study included adult patients managed with antibiotics in the Emergency Department (ED) or inpatient setting for AUD. The primary outcome evaluated the rate of re-visits to the ED or hospitalization for AUD within thirty days of discharge in patients who were initially managed with either a Fluoroquinolone (FQ) or Non-Fluoroquinolone (NFQ) antibiotic regimen.

**Results:** Rates of re-visit to the ED or re-admission within thirty days of discharge were not statistically significant in the FQ vs. NFQ groups [10% vs. 7%,  $p=0.45$ ]. Duration of treatment in patients who had a re-visit also did not show statistical significance ( $p=0.44$ ). The most common duration of treatment was five to ten days, which is the current treatment recommendation, based on our institution's guideline.

**Conclusion:** Based on the findings of this study, we concluded that no difference was found in re-visits to the ED or inpatient setting for AUD within thirty days of discharge in patients who were managed with either a FQ or NFQ antibiotic regimen.

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## Introduction

The American Gastroenterological Association (AGA) 2015 guidelines suggest that antibiotics be used selectively rather than routinely in patients with Acute Uncomplicated Diverticulitis (AUD) [1]. However, common practice in various institutions includes antibiotic treatment in addition to the recommended bowel rest and analgesia [2]. Currently, the underlying pathophysiology behind diverticulitis is not well understood, and cure of the disease without antibiotic treatment has been demonstrated [2]. Several randomized controlled trials have not found significant benefit for treatment of AUD with antibiotics, and recent studies have questioned whether antibiotics provide any benefit in the treatment of AUD [3,4]. Using antibiotics for AUD when an infectious process is not known increases risk of bacterial resistance and side effects for patients.

At WVU Medicine, we established an inpatient intra-abdominal infections guideline in 2013 that recommends fluoroquinolone-sparing antibiotics as preferred options for diverticulitis. Our preferred antibiotics include amoxicillin/clavulanate monotherapy or a combination therapy with trimethoprim/sulfamethoxazole and metronidazole [5]. An alternative regimen is a combination therapy of levofloxacin and metronidazole. Fluoroquinolones are restricted to our hospital's approved criteria, for example, when preferred antibiotics for intra-abdominal infections cannot be used [5]. There are several reasons to restricting fluoroquinolones at our institution. First, fluoroquinolone resistance rates have been increasing [6]. Second, fluoroquinolones have many adverse reactions, including *Clostridium difficile* infections and tendonitis [7,8]. Furthermore, the FDA has recently announced additional warnings to the use of fluoroquinolones regarding increased risk of aortic aneurysms, mental health changes, and hypoglycemia [8]. Our study will aim to answer if re-visits to the hospital are similar between the uses of a Fluoroquinolone (FQ) or Non-Fluoroquinolone (NFQ) antibiotic regimen in the treatment of AUD.

## Methods

This was an Institutional Review Board (IRB)-approved retrospective cohort study from October 2013 to January 2018 including all adult patients managed with antibiotics in the Emergency Department (ED) or inpatient setting. An ICD 9/10 diagnosis code for “diverticulitis of large intestine without perforation or abscess without bleeding” was used to gather a patient list. Exclusion criteria were patients who had a CT-confirmed complicated diverticulitis, who had no CT scan, were immunodeficient, had a history of Crohn’s disease, ulcerative colitis, or colon cancer, or had any change in antibiotic regimen during the initial course of treatment (i.e., switching from a NFQ regimen to a FQ regimen a few days later due to side effects).

The primary outcome evaluated the rate of re-visit to the ED or inpatient setting for AUD within thirty days of discharge in patients who were initially managed with either a FQ or NFQ antibiotic regimen. The secondary outcome compared duration of treatment of a FQ and NFQ antibiotic regimen in patients who had a re-visit to the ED or inpatient setting within thirty days of discharge from initial management.

Patient demographics, such as gender, age, and weight, were analyzed using descriptive statistics. Baseline data and primary and secondary outcomes were analyzed using Fisher’s Exact and Chi-Square Tests.

## Results

A total of 200 patients were included in this study. Patients were randomly selected in a reverse chronological order. A total of 100 patients were included in each group. Demographics in the FQ and NFQ groups were similar (Table 1). Majority of the patients were female (60% vs. 40% respectively) with a median age of fifty-four and median weight of ninety kilograms in both groups. Looking at baseline data in Table 2, the majority of patients in both groups were managed in the ED ( $p < 0.0001$ ). Only a small number of patients in both groups (5% vs. 14%) had blood cultures drawn, of which none resulted in positive cultures ( $p = 0.99$ ). Furthermore, a majority of the patients were managed with antibiotics for five to ten days ( $p = 0.0007$ ), which is the recommendation provided in our institution’s inpatient intra-abdominal guidelines.

Re-visits to the ED or inpatient setting within thirty days of discharge were not statistically significant in both the FQ and NFQ groups [10 vs. 7,  $p = 0.45$ ] (Table 3). Duration of treatment in patients who had a re-visit to the ED or inpatient setting within thirty days of discharge was also not statistically significant [ $p = 0.44$ ] (Table 4).

## Discussion

The results of this study show that there is no difference in re-visits to the ED or inpatient setting in patients treated with a FQ or a NFQ for AUD. A majority of the patients were managed in the

**Table 1:** Basic demographics.

	Fluoroquinolone n=100	Non-fluoroquinolone n=100
<b>Gender</b>		
Female, n	60	63
Male, n	40	37
<b>Median age, years (range)</b>	54 (24 to 85)	54 (18 to 95)
<b>Median weight, kg (range)</b>	90 (49 to 136)	90 (39 to 138)

**Table 2:** Baseline characteristics.

	Fluoroquinolone n=100	Non-fluoroquinolone n=100	p-value
<b>Service</b>			
ED, n	88	63	<0.0001
Inpatient, n	12	37	
<b>Blood cultures</b>			
Cultures drawn, n	5	14	0.99
Positive cultures, n	0	0	
<b>Days of therapy</b>			
<5, n	1	1	0.0007
5 to 10 days, n	90	71	
>10 days, n	9	28	

**Table 3:** Primary outcome.

Fluoroquinolone, n n=100	Non-fluoroquinolone, n n=100	p-value
10	7	0.45

**Table 4:** Secondary outcome.

	<5 days	5 days to 10 days	>10 days	p-value
<b>Antibiotic Regimen</b>				
Fluoroquinolone, n(%) n=10	4 (40)	1 (10)	5 (50)	0.44
Non-fluoroquinolone, n(%) n=7	4 (57)	2 (29)	1 (14)	

ED, showing that acute uncomplicated diverticulitis cases do not necessarily need to be managed in the inpatient setting. In addition, blood cultures were rarely drawn since it is not well understood whether AUD is an infectious process or not.

There were several limitations of this study. First, it is challenging to determine patient compliance with their prescribed antibiotics, whether they had purchased their prescriptions or completed the prescribed course of therapy. Some patients presented to the ED or inpatient setting within five days of starting antibiotics. A second limitation, being a retrospective cohort study, is information bias, as there was lack of documentation of patients initially treated at an outside facility and visited our institution for their second visit, and we were unable to assess patients who followed up at an outside facility for recurrent symptoms within thirty days of discharge from our institution. Finally, our study was unable to meet power due to small sample size. Randomized controlled trials utilizing a larger sample size are needed to show the difference between FQ and NFQ antibiotic regimens for AUD and to also evaluate a cause and effect between the initial regimen and re-visits to the hospital.

## Conclusion

Patients treated with a FQ antibiotic regimen or an NFQ antibiotic regimen are anticipated to have similar outcomes and re-visits to the ED or inpatient setting. Based on the findings of this study, we concluded that non-fluoroquinolone antibiotic regimens should be used as preferred antibiotics for AUD due to the adverse effects, resistance patterns, and warnings of fluoroquinolone antibiotics.

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