

Cautious use of fluoroquinolones in respiratory infections

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Key words:

- Fluoroquinolones
- Moxifloxacin
- Sinusitis
- Exacerbations
- Chronic bronchitis

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Fluoroquinolones are broad-spectrum antibiotics (effective for both gram-negative and gram-positive bacteria) that play an important role in treatment of serious bacterial infections, especially hospital-acquired infections and others in which resistance to older antibacterial classes is suspected (Table 1).¹ Because the use of broad-spectrum antibiotics promotes the spread of multidrug-resistant strains and the development of *Clostridium difficile* infections, it is recommended to minimizing its use in less severe infections.

The American Thoracic Society (ATS) guidelines recommend fluoroquinolones not be used as a first-line agent for community-acquired pneumonia (CAP),² instead recommending macrolide or doxycycline as first-line agents. The Drug-Resistant *Streptococcus pneumoniae* Working Group recommends fluoroquinolones be used for the ambulatory treatment of CAP only after other antibiotic classes have been tried and failed, or in cases with demonstrated drug-resistant *Streptococcus pneumoniae*.³ Fluoroquinolones are included in the ATS guidelines for the treatment of hospital-acquired pneumonia.⁴

Recently the FDA has announced that it is requiring changes in the labeling of systemic fluoroquinolones (**black box warning**) to warn that the risk of serious adverse effects. "An FDA safety review has shown that fluoroquinolones when used systemically (i.e. tablets, capsules, and injectable) are associated with disabling and potentially permanent serious side effects that can occur together. These side effects can involve **the tendons, muscles, joints, nerves, and central nervous system**". As of 2016, the FDA recommended that "serious side effects associated with fluoroquinolone

TABLE 1. Generations of common fluoroquinolones.

Ciprofloxacin	2 nd generation	500 mg/tab
Ofloxacin	2 nd generation	200 mg/tab
Pefloxacin	2 nd generation	400 mg/tab
Levofloxacin	3 rd generation	500 mg/tab
Moxifloxacin	4 th generation	400 mg/tab
Prulifloxacin	4 th generation	600 mg/tab

TABLE 2. Alternatives to fluoroquinolones for acute sinusitis and acute exacerbations of chronic bronchitis due to bacterial pathogen and their cost in Greece*.

Drug	Usual adult dose	Total Cost
Amoxicillin	500 mg PO tid, x 5-7 days	Amoxil caps 18, € 3.29
Amoxicillin/clavulanate	875/125 mg PO bid x 5-7 days	Augmentin 12 tab, €5.94
Doxycycline ^{1,2}	100 mg PO bid, 5-7 days	Vibramycin tab 8, €1.94

¹for penicillin-allergic patients, ²200 mg/d is an alternative

* According to: <http://www.galinos.gr/web/drugs/main/home>. Cost of moxifloxacin (avelox) 5 tab , 400 mg, € 12.30.

antibacterial drugs generally **outweigh the benefits for patients with acute sinusitis, acute bronchitis, and uncomplicated urinary tract infections** who have other treatment options. For patients with these conditions, fluoroquinolones should be reserved for those who do not have alternative treatment options.⁵

Acute sinusitis in adults and acute exacerbation of chronic bronchitis (AECB) are often viral. In acute bacterial sinusitis which is generally caused by *Streptococcus pneumoniae*, *Haemophilus influenzae*, or *Moraxella catarrhalis* can be treated with amoxicillin or **amoxicillin/clavulanate** (Table 2). The addition of clavulanate improves coverage of beta-lactamase-producing strains of *H. influenzae* and *M. catarrhalis*. A respiratory fluoroquinolone (levofloxacin or moxifloxacin) is an alternative for penicillin-allergic patients. Monotherapy with a **macrolide** (erythromycin, clarithromycin, or azithromycin) or **trimethoprim/sulfamethoxazole** is generally **not recommended** because of increasing resistance among pneumococci. **Doxycycline** is an option for adults who are allergic to penicillin, but resistance to doxycycline has increased, particularly among isolates of *S. pneumoniae*.⁶⁻⁸

Bacterial AECB is generally caused by *H. influenzae*, *S. pneumoniae*, or *M. catarrhalis* and can be treated with the same antibacterial drugs used to treat acute bacterial sinusitis. In patients with severe COPD, ***Pseudomonas aeruginosa*** can be a cause of AECB and use of an intravenous antipseudomonal agent, such as **cefepime or piperacillin/tazobactam**, should be considered.⁹

Quinolones are contraindicated if a patient has epilepsy, QT prolongation, pre-existing CNS lesions, or CNS inflammation, or the patient has suffered a stroke.¹⁰ They are best avoided in the athlete population.¹¹

Taken together the practicing **clinician should be cautious** when prescribing fluoroquinolones, and the

most common moxifloxacin, while there is an alternative choice.¹²

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