

# Quantification of QTc Prolongation Due to Antimicrobial Exposure: A Clinical Review

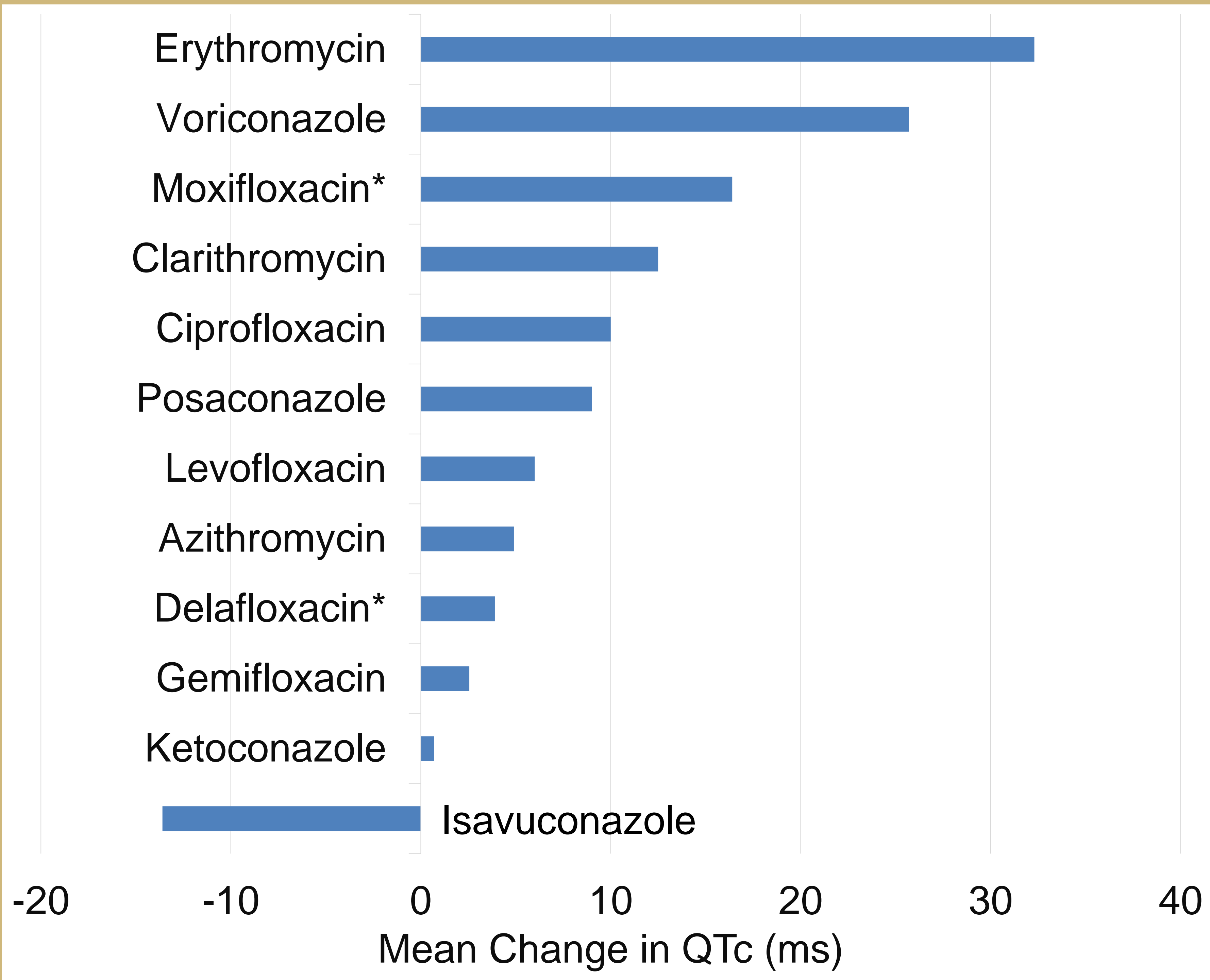
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**BACKGROUND** Torsade de Pointes is a life-threatening arrhythmia associated with prolongation of the QT corrected (QTc) interval. A QTc interval over 500 milliseconds (ms) is predictive of increased risk for Torsade de Pointes.

**STUDY AIM** To quantify the QTc prolongation after exposure to 14 commonly used antimicrobials in the macrolide, fluoroquinolone, and azole antifungal classes.

**METHODS** A literature review of PubMed and EMBASE databases was performed in June 2020 using MeSH terms for each antimicrobial in combination with QTc prolongation and/or Torsade de Pointes. Data was extracted and weighted means of QTc prolongation after exposure to a single antimicrobial was determined.

## RESULTS



- Studies reviewed, n=85
- Patient populations showed greater changes to QTc compared to healthy volunteers
- QTc prolongation among macrolides: erythromycin > clarithromycin > azithromycin
- QTc prolongation among fluoroquinolones: moxifloxacin > ciprofloxacin > levofloxacin > delafloxacin > gemifloxacin
- QTc prolongation among azole antifungals: voriconazole > posaconazole > ketoconazole > isavuconazole

Antimicrobial	N	Mean change in QTc ms±SD
Erythromycin	200	32.3±13.6
Clarithromycin	203	12.5±3.8
Azithromycin	339	4.9±6.4
Moxifloxacin*	487	16.4±12.0
Ciprofloxacin	11	10±20
Levofloxacin	186	6.0±5.6
Gemifloxacin	788	2.56±24.5
Delafloxacin*	52	3.9
Fluconazole <sup>‡</sup>	0	No data
Ketoconazole	15	0.7±4.3
Itraconazole <sup>‡</sup>	0	No data
Isavuconazole	69	-13.6±4.9
Posaconazole	302	9.0±6.3
Voriconazole	226	25.7±9.3

Table. Mean change and standard deviation to QTc from exposure to each antimicrobial in patient populations.  
\*data from healthy volunteers  
‡ no high-quality data available

Figure. Mean change in QTc in ms for each antimicrobial in patient populations.  
\*data from healthy volunteers

High-quality data defined as prospective or retrospective studies exclusive of case reports

**CONCLUSIONS** QTc prolongation due to antimicrobial exposure varies considerably within classes. Quantifying the degree to which an antimicrobial will prolong the QTc can help clinicians in assessing individual patient risk for QTc prolongation and Torsade de Pointes.

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