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Editorial Board Member, Arka Chatterjee, FACC, MD, Associate Professor, Medicine - Cardiovascular Disease, University of Arizona College of Medicine Banner University Medical Center - Tucson, Tucson, AZ 85719, United States. arkachatterjee2608@gmail.com

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## Survey concerning internal medicine physicians and prolonged QT interval: Knowledge and treatment practices

Elizabeth Wendl, Nelson Telles, Geoff C Wall

**ORCID number:** Elizabeth Wendl 0000-0002-7403-4989; Geoff C Wall 0000-0002-8668-9966.

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**Elizabeth Wendl**, Department of Medical Education, Internal Medicine Residency Program, Iowa Methodist Medical Center, Des Moines, IA 50311, United States

**Nelson Telles**, Department of Cardiology, Internal Medicine Residency Program, Iowa Methodist Medical Center, Des Moines, IA 50311, United States

**Geoff C Wall**, Department of Pharmacy Practice, Drake University College of Pharmacy and Health Sciences, Des Moines, IA 50311, United States

**Geoff C Wall**, Internal Medicine Residency Program, Iowa Methodist Medical Center, Des Moines, IA 50311, United States

**Corresponding author:** Geoff C Wall, BCPS, FCCP, PharmD, Professor, Department of Pharmacy Practice, Drake University College of Pharmacy and Health Sciences, 2507 University Ave, Des Moines, IA 50311, United States. [geoff.wall@drake.edu](mailto:geoff.wall@drake.edu)

### Abstract

Prolongation of the QT interval is associated with adverse cardiac events specifically Torsades de pointes (TdP). There are multiple mediations that have a known, possible, or conditional risk for prolonged QT interval, but general practitioners' knowledge of these medications is unknown. We conducted a survey to assess internal medicine (IM) providers' knowledge of risk factors and medications associated with prolonged QT as well as provider experience and comfort when treating patients with prolonged QT. A 17-question, anonymous survey was constructed in 2019 and distributed to IM providers and residents at a tertiary care center. Questions included demographic information, 6 Likert-scale questions gauging provider experience with prolonged QT, and 10 multiple choice clinical vignettes to assess clinical knowledge. Data was analyzed descriptively. Knowledge was assessed *via* clinical vignettes and compared by level of training. Forty-one responses were received out of a total of 87 possible respondents (47.1% response rate). About 70% of respondents see patients with acquired prolonged QT once monthly or more. 95% rarely see congenital prolonged QT. When presented with QTc drug issues, 73% of providers seldom or sometimes consulted pharmacy, but about half used online resources. The average correct score on the clinical vignettes was 5.59/10, with the highest scores seen in attending physicians in their first five years of practice (6.96/10). Our survey suggests that IM providers commonly encounter QT prolonging drugs. Educational efforts to improve knowledge of drug and patient risk factors for TdP may be needed.

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**Core Tip:** Knowledge of drugs that prolong the QTc interval and patient risk factors varies significantly among internal medicine physicians and trainees.

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## INTRODUCTION

In 1966 Dessertenne<sup>[1]</sup> first described the electrocardiogram (ECG) morphology of a ventricular tachycardia that had a peculiar undulating or twisting appearance which he termed Torsades de pointes (TdP). In the over 50 years since this paper was published drug-induced TdP, which may be fatal, has been described for numerous drugs. Indeed, in past years drug induced TdP has been a cause of boxed warnings by the FDA as well as the withdrawal of several drugs from the United States market<sup>[2]</sup>. One of the leading markers of drug induced TdP is the prolonging of the QT interval on the ECG. This measurement (reported in milliseconds) is corrected *via* formula to account for heart rate and is often used as a harbinger of increasing TdP risk<sup>[3-4]</sup>. With their training in pharmacology and its application to the bedside, pharmacists are often sought out for their opinion on the appropriateness of QTc prolonging medication and often seek to counsel prescribers on the risk of drug induced TdP, often by assessment of drug-drug interactions<sup>[5]</sup>. Despite this resource little is known of the background knowledge and attitudes of groups of physicians regarding QTc prolonging medications, especially in various stages of their training. To explore this we designed and administered a survey that aimed to determine the knowledge and attitudes of attending physicians and physician trainees.

## METHODS

A 17-question, anonymous survey was jointly constructed by an internal medicine (IM) physician, a clinical cardiologist and clinical pharmacist. This survey was distributed in 2019 using Qualtrics ([www.qualtrics.com](http://www.qualtrics.com), Qualtrics XM, Seattle, WA, United States). Questions included demographic information, 6 Likert-scale questions gauging provider exposure and comfort with their knowledge of prolonged QT, and 10 multiple choice clinical vignettes. The clinical vignettes covered knowledge of risk factors and medications that prolonged QT as well as treatment of congenital and acquired prolonged QT. This survey was distributed *via* an email invitation to all IM providers and residents as well as psychiatry providers and residents at a tertiary care center in the Midwest. Data was analyzed by evaluating trends and using means to determine provider comfort with prolonged QT identification and treatment. Knowledge was assessed by clinical vignettes and compared by level of training. After data analysis, psychiatry providers and residents were excluded from final data analysis due to low response rate. Descriptive statistics were used in this study. Our Institutional Review Board exempted this study.

## RESULTS

After excluding 4 responses from psychiatric staff and residents, a total of 87 surveys were sent of which 41 responses were received [41 responses out of a total of 87 possible respondents (47.1% response rate)]. This included 18/52 IM providers and



23/35 IM residents. **Table 1** lists the characteristics of our cohort, and **Table 2** lists abbreviated responses to select survey questions. Only 2 respondents reported never having seen patients taking QT prolonging medications; while 17/41 (27%) providers saw such patients weekly or daily. However, 95% participants reported rarely seeing patients with congenital prolonged QT. When presented with patient care issues surrounding prolonged QT, 71% (29/41) of providers seldom or sometimes consulted pharmacy, 99% seldom or never consulted cardiology, and ~50% sometimes used online resources. Thirty-four percent (14/41) reported consulting online resources weekly or daily. We gave examples of types of online resources, but did not ask which types respondents used. The average number correct on the clinical vignettes was 5.59/10 (56%), with the highest scores seen in attending physicians in their first five years of practice [mean 6.96/10 (69%)]. There were no statistically significant differences between the correct responses on the clinical vignettes based on level of training. However, in general, attending physicians generally seemed more familiar with medications prolonging QT while residents were more familiar with patient risk factors prolonging QT.

## DISCUSSION

Drug induced QT prolongation can be a harbinger of the TdP which can be lethal. As more drugs enter the market with the propensity to cause QTc prolongation, the chances for a serious cardiac adverse reaction in patients also increases. This behooves prescribers and pharmacists to be aware of the patient risk factors for TdP, including congenital prolonged QT syndrome, and the medications which prolong the QTc and increase this risk. To our knowledge this is one of the only reports of a dedicated assessment of this subject in general IM physicians and their trainees. A previous report from 2005 from the U.S. is similar to ours surveyed a variety of health care practitioners who attended Grand Rounds Conferences at 12 hospitals<sup>[6]</sup>. In this 20 question survey the median number of correct answers from respondents was 10 (50%) which is similar to our outcomes. This survey also included a problem having respondents manually measure a QTc and found that only 43% did so correctly. Although our survey did not repeat this measure we did find that roughly similar numbers in the knowledge assessment of QTc prolongation. Congenital Long QT syndrome is somewhat rare with a prevalence of 1/2500 live births<sup>[7]</sup>. It may be less surprising then that our respondents did not encounter it frequently. Somewhat more surprising was the relatively low level of pharmacist consultation indicated by our survey. Our health system is a large tertiary teaching hospital where pharmacy services are decentralized and well established. Perhaps the relatively high use of online resources may explain this finding. Certainly, we feel our findings suggest that an educational activity to discuss QT prolonging drugs, and patient risk factors for TdP may be a worthwhile effort given the low scores on our vignettes. Our study has some limitations, chief of which is the small sample size. However, we did receive a high number of overall responses. Also, we only surveyed IM physicians and trainees in our health-system. The application of this information to other geographic areas or other subspecialties of medicine is unknown. Finally although an academic clinical pharmacist and a staff cardiologist designed the vignettes it is possible that errors in designing or writing these problems led to respondents choosing the incorrect answer.

## CONCLUSION

Our survey indicates that our IM physicians often encounter patients receiving QT prolonging medications. They only occasionally consult clinical pharmacists for this problem and use online resources at least half the time. The results of the vignettes suggest a knowledge gap concerning these issues that we plan to address with an interdisciplinary educational program. It would be worthwhile to repeat this study in a larger academic institution to obtain a larger sample size and consider sampling other specialties such as family medicine and psychiatry.

Table 1 Survey participant level of training

| Training status     | n (%)     |
|---------------------|-----------|
| PGY-1               | 12 (29.2) |
| PGY-2               | 6 (13.3)  |
| PGY-3               | 6 (13.3)  |
| Attending physician | 17 (37.7) |

Table 2 Abbreviated responses to select survey questions

| Question                              | Never, n (%) | Seldom, n (%) | Sometimes, n (%) | Often, n (%) | Daily, n (%) |
|---------------------------------------|--------------|---------------|------------------|--------------|--------------|
| See patients with QTc prolonging drug | 2 (4.4)      | 11 (29.2)     | 15 (33.3)        | 10 (22.2)    | 2 (4.4)      |
| See patients with congenital long QT  | 20 (44.4)    | 19 (46.3)     | 1 (2.2%)         | 1 (2.2)      | 0            |
| Consult pharmacy                      | 11 (24.4)    | 16 (44.4)     | 13 (28.8)        | 1 (2.2)      | 0            |
| Consult cardiology                    | 20 (44.4)    | 21 (49.0)     | 0                | 0            | 0            |
| Consult online reference              | 1 (2.2)      | 8 (17.7)      | 18 (43.9)        | 10 (22.2)    | 4 (8.8)      |

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