

Incidence of administration of QT-prolonging medications in pediatric patients

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BACKGROUND

- QTc interval prolongation is a serious side effect that can be caused by many commonly administered medications.
- A higher risk for cardiac events is seen with greater QTc prolongation.
 - An increased risk for torsades de pointe (TdP) exists with a QTc of 500 milliseconds or larger.
- The CredibleMeds website categorizes medications into three risk categories according to the risk for QTc prolongation and subsequent TdP.
 - Conditional risk: associated with TdP but only under certain conditions or by creating conditions that facilitate/induce TdP.
 - Possible risk: can cause QT prolongation but lack evidence for a risk of TdP when taken as recommended.
 - Known risk: prolong the QT interval and are associated with a known risk for TdP, even when taken as recommended.
- Several studies have shown the considerable proportion of adult patients receiving medications with the propensity to prolong the QTc interval.
 - Within an institution's inpatient cardiac units, 32% of adult patients were receiving QT-prolonging medications upon admission, and 2% were receiving two or more (1). Among patients admitted to an institution's emergency department who triggered a QT alert upon ECG, 77% of patients were receiving one or more QT-prolonging medications (2).
 - The inpatient cardiac units reported amiodarone as the most frequently prescribed QT-prolonging medication to adults, but also reported erythromycin and methadone (1). Ondansetron was the most frequently prescribed QT-prolonging medication in the emergency department, and macrolide antibiotics were also highlighted (2).
- While there is a fair amount of research investigating the frequency in adults, the frequency of administration in the pediatric population is not known.

OBJECTIVES

- To calculate the frequency of administration of QT-prolonging medications to pediatric patients in the inpatient setting and subsequently stratify and analyze the medications in each risk category.
- To identify the number of patients at increased risk for QTc prolongation due to the receipt of multiple QT-prolonging medications.

METHODS

- Retrospective review of all medications administered to patients less than 18 years of age admitted to a children's hospital
- Data collected from May 2018 to May 2019
- All medications administered were classified according to the CredibleMeds risk categories (conditional, possible, or known risk for TdP) or as no known risk
- Primary outcome: the overall incidence of administration of drugs with the propensity to prolong the QTc interval
- Secondary outcomes:
 - The incidence of administration of drugs in each risk category
 - The most frequently prescribed medications in each risk category
 - The number of patients prescribed more than one QT-prolonging medication

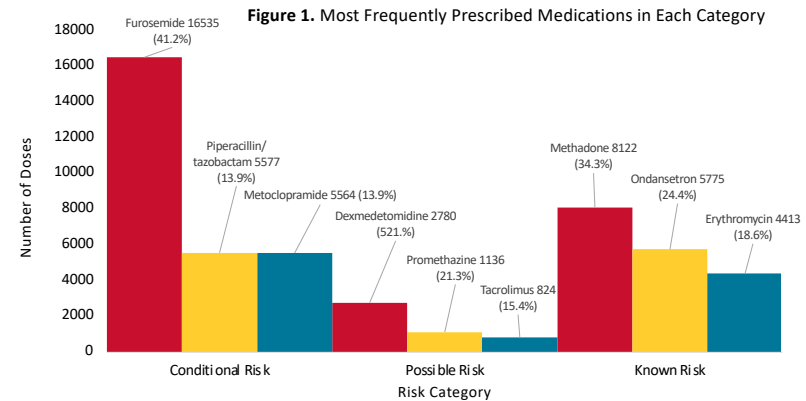
RESULTS

Table 1. Incidence of QT-Prolonging Medication Doses and Patients Affected

Category of Doses	Number of Doses	Percent of Doses
All Medications	487,395	100%
Medications with Potential to Prolong QTc interval	69,116	14.2%
Medications with Conditional Risk for TdP	40,113	8.23%
Medications with Possible Risk for TdP	5,335	1.09%
Medications with Known risk for TdP	23,668	4.86%
Total Number of Patients	Number of Patients Receiving Multiple QT-Prolonging Medications	Percentage of Patients Receiving Multiple QT-Prolonging Medications
	11,117	12.3%

Table 2. Incidence of QT-Prolonging Medication Doses Per Inpatient Unit

Unit	Number of QT-Prolonging Doses Administered	Total Number of Doses Administered	Incidence of QT-Prolonging Medication Administration
PICU	33720	185036	18.2%
NICU	12392	163439	7.58%
ED	4165	30567	13.6%
General Pediatrics	16556	97038	17.1%
SSA Pediatrics	8211	47711	17.2%
SSB Pediatrics	3420	21835	15.7%
SSC Pediatrics	18	74	24.3%
SSD Pediatrics	4907	27418	17.9%
Specialty Pediatrics	1000	5815	17.2%
Cardiac Surgery/Cardiology	2	18	11.1%
Hematology/Oncology	363	2688	13.5%
Infusion/Testing	605	2780	21.8%
Psychiatric	30	329	9.12%



DISCUSSION AND CONCLUSIONS

- Similarly to adult patients, the frequency of administration of QT-prolonging medications in pediatric patients has been shown to be substantial.
- The QT-prolonging medications commonly prescribed to adults revealed similarities to those seen in the pediatric population.
- Further investigation is needed to determine the clinical significance of the incidence of the administration of medications with the potential to prolong the QTc interval.
- The American Heart Association and American College of Cardiology have released recommendations for the management of drug-induced QTc prolongation, but the technology and labor requirements have presented challenges to implementation (1).
- Future studies are necessary to determine the utility and feasibility of a standardized protocol for the monitoring and management of patients after the administration of QT-prolonging drugs.

REFERENCES

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