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Drug-Induced QT Prolongation: A Stepwise Approach

When a clinical scenario presents itself in which drug-induced QT prolongation/torsades de pointes is a concern, consider a stepwise approach to gather data to inform decision-making and mitigate risk. Use clinical judgment; specific recommendations based on high-level data are lacking.

1. **Assess drug risk**.
   - Consult product information or www.crediblemeds.org regarding risk of torsades de pointes. Drugs may have one of the following levels of risk:
     - **known** risk (clearly associated with torsades).
     - **possible** risk (can cause QT prolongation, but unclear torsades risk when used as directed).
     - **conditional** risk (i.e., poses risk only in certain patients or clinical situations [e.g., electrolyte disturbance, long QT syndrome, high dose, drug interaction]).[4]
   - Screen for drug-drug interactions that could increase risk.[2]
   - Assess risk of QT prolongation/torsades de pointes of alternative medications.[2]

2. **Assess patient risk**.
   - Does the patient have **long QT syndrome** or a history of **torsades de pointes**?[1]
   - Does the patient have structural heart disease (e.g., heart failure with reduced ejection fraction, left ventricular hypertrophy), recent myocardial infarction, a family history of long QT syndrome or sudden death, or a personal history of symptoms suggestive of torsades de pointes (e.g., palpitations, syncope)?[1-4]
   - Does the patient have impaired kidney or liver function, or untreated thyroid disease?[2]
   - Does the patient have potentially modifiable risk factors for QT prolongation (e.g., hypokalemia, hypomagnesemia, hypocalcemia, bradycardia)?[2]
   - Does the patient have demographic risk factors for QT prolongation (e.g., female sex, age >65 years)?[2]
   - Consider use of a risk score:[2]
     - Tisdale Risk Score for QT Prolongation (validated in cardiac intensive care): https://www.mdcalc.com/calc/10293/tisdale-risk-score-qt-prolongation.
     - MedSafety Scan: https://medsafetyscan.org/.

3. **Mitigate risk**.
   - **Avoid** QT prolonging drugs if the patient has long QT syndrome or a history of torsades de pointes.[1,2,4]
     - Also consider alternatives for patients with higher risk (e.g., Tisdale score ≥7; ≥2 QT-prolonging drug plus a risk factor; one QT-prolonging drug plus multiple risk factors).[4]

- **Correct** modifiable risk factors:
  - Correct potassium, magnesium, and calcium to normal or toward the upper limit of normal (e.g., potassium >4 mEq [mmol]/L; magnesium 2 mg/dL [0.822 mmol/L]).[2-4]
  - If appropriate, stop or reduce the dose of medications that can cause bradycardia or electrolyte loss (e.g., diuretics).[2]
- **Dose** QT-prolonging medications appropriately.
  - adjust dose for kidney and liver function.[3]
  - use lowest effective dose.[1]
  - adhere to dosing recommendations to reduce risk (e.g., citalopram, escitalopram, ondansetron).[1,5]
  - administer intravenous QT-prolonging drugs at the recommended rate.[4]
- Manage **drug-drug interactions.**
  - Avoid drugs that inhibit the metabolism of the patient's QT prolonging medication(s).[3]
  - Avoid, if possible, concomitant use of more than one QT-prolonging medication.[4]
- Consider **ECG monitoring** in higher risk patients (e.g., Tisdale score ≥7; ≥2 QT-prolonging drugs plus a risk factor; one QT-prolonging drug plus multiple risk factors), or in the event of symptoms.[2,4]
  - Consider ECG at baseline, then when the drug reaches steady state (i.e., four to five half-lives after initiation or dosage increase), and then in the event of symptoms.[2]
    - Also consider ECG periodically (e.g., every three to six months) in high-risk patients (e.g., high-risk drug[a] plus additional QT prolonging drug or risk factors).[2,3]
    - In hospitalized patients, consider monitoring every eight to 12 hours after starting or increasing the dose.[4]
  - Weigh the risks and benefit of adding a QT-prolonging medication if the QTc interval is >450 ms for males or >460 ms for females.[1,4] Generally stop the drug if the QTc interval increases by >60 ms compared to baseline or exceeds 500 ms.[1,4]
    - Be aware of limitations of automated QT interval reports (e.g., in patients with bundle branch block or ventricular rhythm); manually calculate as appropriate (e.g., with Bazett's formula).[6]
- **Educate** all patients prescribed a potentially QT-prolonging drug to report symptoms (e.g., palpitations, syncope, lightheadedness, dizziness).[2]

a. A **high-risk drug** could be considered one with drug with a QT caution, warning, or contraindication in the product labeling.[2]

Abbreviations: ms = millisecond; QTc = QT interval corrected for heart rate.

Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.

References

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