How many patients need QT interval monitoring in critical care units? Preliminary report of the QT in Practice Study

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“...For patients who receive QT-prolonging drugs in hospital units with continuous ECG monitoring, TdP should be avoidable if there is an awareness of individual risk factors and the ECG signs of drug-induced long-QT syndrome.”

Background
The QT interval is an indirect measure of ventricular repolarization. QT interval prolongation associated with increased risk of syncope and sudden cardiac death due to Torsade de Pointes (TdP). Monitoring the QT interval is particularly important for patients who are at increased risk of TdP. These include older and female patients as well as those with heart disease, (particularly left ventricular hypertrophy, ischemia, or low left ventricular ejection fraction), bradycardia, electrolyte abnormalities, acquired or genetic metabolic impairments, genetic risk of QT prolongation, and patients administered proarrhythmic medications that prolong the QT interval.

The American Heart Association (AHA) in collaboration with other professional organizations recommends QT interval monitoring of hospitalized patients with the following conditions:

• Treatment with or overdosage of a QT-prolonging medication
• Cardiac rhythm disturbances causing severe bradycardia or long QT intervals
• Severe electrolyte disorders such as hypokalemia or hypomagnesemia

These recommendations are intended to facilitate the efforts of clinicians to appropriately incorporate QT interval monitoring for critically ill patients and reduce their risk of syncope and sudden death due to TdP.

Purpose
This primary aim of this prospective study was to determine the proportion of critical care patients who met the AHA’s indications for QT interval monitoring. This study also evaluated the predictive value of the specified AHA indications for QT interval monitoring to identify patients who developed QT interval prolongation while monitored in critical care settings.

Methods
A total of 154 critical care beds in 5 adult critical care settings were continuously observed for a 2-month interval at a single, large, level 1 academic medical center. Data were obtained for a total of 1039 patients. Continuous QT interval monitoring data were acquired from the Philips Healthcare IntelliVue Patient Monitoring System, which presented the median of 5 QTc measurements every 5 minutes as the value for display, alarm, and trending. Clinically significant prolonged QT intervals were defined as QTc intervals > 500 milliseconds that persisted for at least 15 minutes. Patient data were abstracted from medical charts to identify those who met AHA indications for QT interval monitoring.
Results
The majority of patients (n = 717; 69.0%) had at least 1 indication for QT interval monitoring. The most common reason for monitoring was treatment with a QT-prolonging medication (57.4%) while hypokalemia and hypomagnesemia were documented for 32.0% and 15.1% patients, respectively (Figure 1). Women were significantly more likely to require monitoring for treatment with a QT-prolonging medication (P = 0.001), hypokalemia (P = 0.001), or hypomagnesemia (P = 0.26) compared with men (Figure 1). A higher rate of QT prolongation > 500 milliseconds that lasted for 15 minutes or longer was evident for patients with at least 1 of the AHA criteria for QT monitoring compared with those with no AHA indications (Figure 2). Notably, patients with ≥ 3 AHA indications for monitoring were 9 times more likely to experience QT prolongation compared with patients with no AHA indications (P < 0.005). The positive predictive value (PPV) of the AHA indications for QT interval monitoring was 31.2% while the negative predictive value (NPV) was 91.3%.

Conclusions
This study demonstrates that the majority of patients admitted to a hospital critical care unit have at least 1 AHA indication for monitoring QT interval with the most common reason attributed to treatment with QT-prolonging agents. This study highlights gender differences with respect to AHA indications for QT monitoring. Women are significantly more likely than men to require monitoring due to administration of QT-prolonging medications, hypokalemia, and hypomagnesemia. These findings suggest that women are at increased risk of QT interval prolongation and TdP compared with men. We find QT prolongation to be common (24%), with Torsade de Pointes representing 6% of in-hospital cardiac arrests. Predictors of QT prolongation in the acutely ill population are similar to those previously identified in ambulatory populations. Acutely ill patients with QT prolongation have longer lengths of hospitalization and nearly three times the odds for mortality than those without QT prolongation. (Crit Care Med 2012; 40:000–000).

References:

Proportion of patients with AHA indication for QT interval monitoring

QT interval prolongation in patients with and without AHA indications for monitoring

Figure 1

Figure 2

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