COVID-19 positive patients on hydroxychloroquine, chloroquine and azithromycin:

These medications have proarrhythmic potential – prolonging the QT/QTc, torsade de pointes or even sudden cardiac death. Patients admitted for COVID-19 will have a 12-lead ECG obtained and then will be triaged as a low, moderate, or high risk for torsades.

**Low Risk**

**QTc <470 for Male and <480 for Females**

Typically a 12-lead is obtained periodically during therapy. Nursing should be aware of the patient’s baseline and most recent QTc prior to administering QT prolonging medications.

Continuous cardiac monitoring may be used if other cardiac concerns are present, but it is not required. If patient is on continuous cardiac monitoring, nursing should review QTc prior to administration of every dose, 2 hours after administration of each dose, and reviewed with every focused assessment (does not need to be documented unless changed).

**Moderate Risk**

**QTc 470-499msec for Males and 480-499msec for Females**

Continuous cardiac monitoring should be ordered. Nursing should review QTc prior to administration of every dose, 2 hours after administration of each dose, and reviewed with every focused assessment (does not need to be documented unless changed).

**High Risk**

**QTc greater than or equal to 500msec or congenital long QT syndrome**

These medications are not recommended for use in this population.
QT, QTc, and QTc delta Refresher:

**QT** is the total time from ventricular depolarization to ventricular repolarization. When measuring the strip, QT is measured from the start of the Q wave to the end of the T wave (Figure 1).

**QTc** is a measurement of the QT corrected for heart rate – longer QTc in bradycardia and shorter in tachycardia. QTc is an average measured over multiple heart beats. ΔQTc (QTc delta) is a continuous view of change from the patient’s baseline QTc – it updates every 15 seconds. Philips automatically identifies the baseline as the first 5-minute value after connecting to monitoring. Philips view at central station / how to identify the current QT, QTc, and Δ QTc is viewable at the right of the waveforms (Figure 2).

**Alarms** are defaulted off for QTc and ΔQTc as identified with the symbol in Figure 3. Alarms should be turned on for the appropriate patients and the default high alarm limit is set at 500msec.

If patient is viewable in the Central Monitoring Center and connected to an MX40 (telemetry box), contact the CMT monitoring to initiate alarms. If the patient is connected to a bedside monitor (hardline) – the QT analysis and alarms will need to be adjusted at the bedside monitor.

To identify QT values on saved strips – top of strip shows QTc, ΔQTc, and QT in msecs. When using e-calipers you can calculate QT in seconds. Nursing should review these measurements as part of the routine and focused assessment, as well as prior to and post administration of QT prolonging medications and notify providers following order or minimally using the chart below.
Philips Monitoring Limitations:

Sometimes a long QTc is not accurate or instead a “Cannot Analyze QT” INOP message will appear and a “?” will appear in the measurements. These are related to:

T-Wave detection limitations

- Flat T-wave  
- Atrial fibrillation or atrial flutter  
- Prominent U-waves

Troubleshooting: Philips defaults QT analysis through all 5 leads. In this case a single lead that has good T-wave amplitude, no visible fibrillation or flutter, and no predominant U or P-waves.

QRS changes

- Widened QRS

Troubleshooting: When a long QTc is assessed, review the QRS to ensure it is not the cause. If the QRS is wide, use the Wide QRS adjusted QTc formula: QTc-(QRS-100msec).

Rhythm and rate limitations

- Tachycardia above 150  
- Bigeminy rhythm  
- Paced rhythm

Troubleshooting: A reliable QTc measurement through Philips will not be possible if these are sustained rhythms.

QTc baseline is recalculated when monitoring is interrupted. When there is a break in monitoring (i.e. leads off) the baseline monitoring is interrupted. Once the leads are reconnected, the monitor sees this as if you have hooked up a new patient and will gather QT lead information over 5 minutes and set a new baseline. The ΔQTc will be manually calculated by subtracting the baseline (found on initial 12-lead ECG obtained prior to beginning the medication) from the current Philips or 12-lead ECG QTc reading. Use the Philips delta to inform your assessment of changes but do not rely on that as the source of truth.
Notify Provider if 12-lead ECG or if Continuous Cardiac Monitoring Shows the Following:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Anticipated Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Torsades is present</td>
<td>Medication should be discontinued</td>
</tr>
<tr>
<td>If QTc is equal to or above 500msec</td>
<td>A 12-lead should be obtained</td>
</tr>
<tr>
<td></td>
<td>Medication may be discontinued</td>
</tr>
<tr>
<td></td>
<td>Cardiology may be consulted</td>
</tr>
<tr>
<td>If ΔQTc is greater than or equal to 60msec (but does not exceed a QTc of 500msec):</td>
<td>Continuous cardiac monitoring will be initiated if not already ordered</td>
</tr>
<tr>
<td>□ This may be obtained by a 12-lead between doses</td>
<td>Provider may continue medication but should document</td>
</tr>
<tr>
<td>□ This may be from continuous cardiac monitoring</td>
<td>that patient is at significant increased risk of Torsades</td>
</tr>
<tr>
<td>□ Use the original 12-lead obtained from prior to initiation of medication to calculate the change from baseline</td>
<td>and that benefit outweighs the risks</td>
</tr>
<tr>
<td>If continuous cardiac monitoring is being used for QTc monitoring and it cannot be calculated (even after troubleshooting using above methods) or if QTc appears long but patient also has a wide QRS.</td>
<td>Provider will need to change patient to routine 12-lead ECGs for continued administration</td>
</tr>
<tr>
<td>If related to wide QRS, use the Wide QRS adjusted QTc formula: QTc - (QRS-100msec) first to identify if QTc is prolonged.</td>
<td></td>
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</tbody>
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