Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letters

Inpatient Use of Ambulatory Telemetry Monitors for COVID-19 Patients Treated With Hydroxychloroquine and/or Azithromycin

Coronavirus disease-2019 (COVID-19) has led to a rapid increase in hospital admissions, placing stress on health care systems that have a finite number of hospital beds, health care providers (HCPs), and medical supplies. Preliminary data suggest that hydroxychloroquine (HCQ) and azithromycin (AZM) may improve the clinical course in patients with COVID-19 (1,2). However, HCQ ± AZM may increase the risk for arrhythmias and sudden cardiac death due to QT prolongation (3,4). Given the widespread use of HCQ ± AZM, it is challenging to monitor all of these inpatients on telemetry. Performing serial electrocardiograms (ECGs) for QTc monitoring increases HCP exposures and personal protective equipment (PPE) use.

We placed Mobile Cardiac Outpatient Telemetry (MCOT) (BioTelemetry, Malvern, Pennsylvania) on patients receiving HCQ ± AZM for COVID-19 on non-telemetry floors. Following a baseline ECG, subsequent ECGs were cancelled. Telemetry technicians applied the MCOTs and linked them to the device phone. Patients had bidaily QTc measurements while receiving HCQ ± AZM. An electrophysiologist received "urgent alerts" and bidaily reports from BioTelemetry. A QTc >500 ms and any arrhythmias generated "urgent alerts." If a patient was discharged to complete HCQ ± AZM as an outpatient or remained hospitalized after completing HCQ ± AZM, the MCOT was removed, sterilized, and reused.

In 1 week, 117 consecutive COVID-19-positive patients on HCQ ± AZM without telemetry monitors received an MCOT. The average age was 60.2 ± 14.9 years (range 27 to 93 years); 40.5% were women, 52.1% had hypertension, 28.2% had diabetes, 0.9% had heart failure, and 5.1% had coronary artery disease. All patients were treated with HCQ 400 mg bidaily for 1 day followed by 200 mg bidaily for 4 days. A total of 51 (43.6%) patients also received ≥1 doses of intravenous AZM 500 mg. In total, 40 (34.2%) patients also received ≥1 other QT-prolonging medications. Over the course of 295 total patient days, there were 28 urgent alerts for 18 (15.4%) patients. Atrial fibrillation with a rapid ventricular response was the most common (n = 15; 53.6%). There were 5 (17.9%) alerts for QTc >500 ms (**Table 1**). An electrophysiologist was contacted for urgent events within 3 to 5 min. Of the 28 urgent alerts, 12 did not warrant intervention (e.g., first-degree atrioventricular block).

From a baseline mean QTc of 437.1 ± 22.2 ms, the average increase in maximum QTc for the entire population was 12.9 ± 23.4 ms (**Table 1**). The maximum QTc was similar in patients treated with HCQ versus HCQ + AZM (448.6 ± 33.7 ms vs. 451.9 ± 29.2 ms; p = 0.58). The change in maximum QTc from baseline was also similar (10.5 ± 20.8 ms vs. 16.1 ± 26.3 ms; p = 0.66). HCQ was discontinued in 1 patient after 3 days due to QTc prolongation from 460 to 565 ms.

This study demonstrates that when hospital admission rates exceed the capacity of telemetry beds, the MCOT may be used to monitor for arrhythmias and assess the QTc. In 2017, the MCOT, which consists of a sensor and monitor network that communicate via Bluetooth, was approved by the U.S. Food and Drug Administration for QTc measurement, analysis, and reporting. Once gathered, the data is forwarded to the monitor for analysis. After each use, the MCOT may be rapidly "redeployed" to another patient.

In our experience, 28 "urgent alerts" were communicated in near real-time to an electrophysiologist, of which 16 alerts resulted in management changes. In addition to the "urgent alerts," the MCOT afforded electrophysiologists the ability to monitor for QTc changes. Although HCQ ± AZM may put

patients at higher risk for drug-induced arrhythmias, none of our patients had arrhythmias that led to medication discontinuation. The MCOT also allowed for better utilization of HCPs and resources. By eliminating the need for serial ECGs, we reduced both HCP exposures and PPE use.

The limitations of MCOT include that the device was never approved to measure QTc for patients with atrial fibrillation or flutter, QRS >160 ms, and T-wave <5% of the peak QRS amplitude. The single-center, nonrandomized study design and a healthy population from a cardiac standpoint are other limitations. The MCOT must be used with caution in patients with significant cardiac disease.

In conclusion, innovative management of COVID-19 patients treated with HCQ ± AZM is needed given the limited healthcare resources. The MCOT may be utilized for arrhythmia and QTc monitoring while reducing both HCP exposures and PPE use.

TABLE 1 MCOT Urgent Alerts and QTc Measurement of the Study Cohort

Urgent Alerts (n = 28)	
Atrial fibrillation with a rapid ventricular response	15 (53.6)
QTc >500 ms	5 (17.9)
First-degree atrioventricular block	4 (14.3)
Nonsustained ventricular tachycardia	2 (7.1)
Ventricular bigeminy	1 (3.6)
Supraventricular tachycardia	1 (3.6)

QTc Measurements				
QTc Parameters	Overall (N = 117)	HCQ (n = 66)	HCQ + AZM (n = 51)	p Value
Baseline QTc	437.1 ± 22.2	438.0 ± 23.9	435.8 ± 19.9	0.591
Maximal QTc	450.0 ± 31.7	448.6 ± 33.7	451.9 ± 29.2	0.575
Maximal QTc–baseline QTc	12.9 ± 23.4	10.5 ± 20.8	16.1 ± 26.3	0.201
Final QTc	441.2 ± 28.7	440.0 ± 32.1	443.3 ± 23.6	0.54
Final QTc–baseline QTc	4.1 ± 23.4	2.0 ± 23.0	7.5 ± 23.2	0.201

Values are n (%) or mean ± SD.
AZM = azithromycin; HCQ = hydroxychloroquine; MCOT = Mobile Cardiac Outpatient Telemetry; QTc = corrected QT.

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The Need for Quality and Unbiased Data in Infective Endocarditis

We read with great interest the paper by Pericàs et al. (1) on enterococcal infective endocarditis (EIE) in a recent issue of the *Journal*, and we completely agree that quality data from large studies is lacking (but necessary). Infective endocarditis (IE) is an uncommon and severe disease, and collaborative studies help us to better understand the natural history of infection and improve decision making. For this, data must be as reliable as possible. In this regard, some aspects of the study caught our attention.

First, the total number of EIE was huge. However, although authors claim that most participating centers were reference hospitals for cardiac surgery, the average number of annual episodes of EIE per center was 1.6. Even considering that not all 2015 and 2016 cases had been included in the analysis, the figure