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normal resting value. The typical situation where this phenomenon is important is in patients admitted for an acute myocardial infarction and multivessel disease, especially when cardiogenic shock is present. Performing immediate percutaneous coronary intervention (PCI) of a nonculprit lesion supplying a normally contracting segment offers no potential immediate benefit (i.e., resting myocardial perfusion and regional wall motion will not improve). In contrast, additional catheter manipulation and immediate multivessel PCI at the acute stage translated in higher death rates than PCI of the culprit lesion only as demonstrated in the CULPRIT-SHOCK (The Culprit Lesion Only PCI versus Multivessel PCI in Cardiogenic Shock) trial (4). Staged procedures for nonculprit stenoses might prevent a future event and will likely increase hyperemic flow, but are unlikely to improve resting flow or regional wall motion (5).

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [JACC author instructions page](#).

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## Out-of-Hospital Cardiac Arrest and Acute Coronary Syndrome Hospitalizations During the COVID-19 Surge



The New York (NY) metropolitan area was the epicenter of the coronavirus disease-2019 (COVID-19) pandemic. Ambulatory care was dramatically curtailed, emergency departments (EDs) were overwhelmed, and patients were advised to stay home (1). A reduction in patients presenting with acute coronary syndromes (ACS) during the crisis was reported (2). If patients were staying home with ACS, a delay in presentation with worsening symptoms or a rise in out-of-hospital sudden cardiac arrest (OHCA) would be expected. A 58% increase in OHCA early in the COVID-19 outbreak was reported in Italy (3).

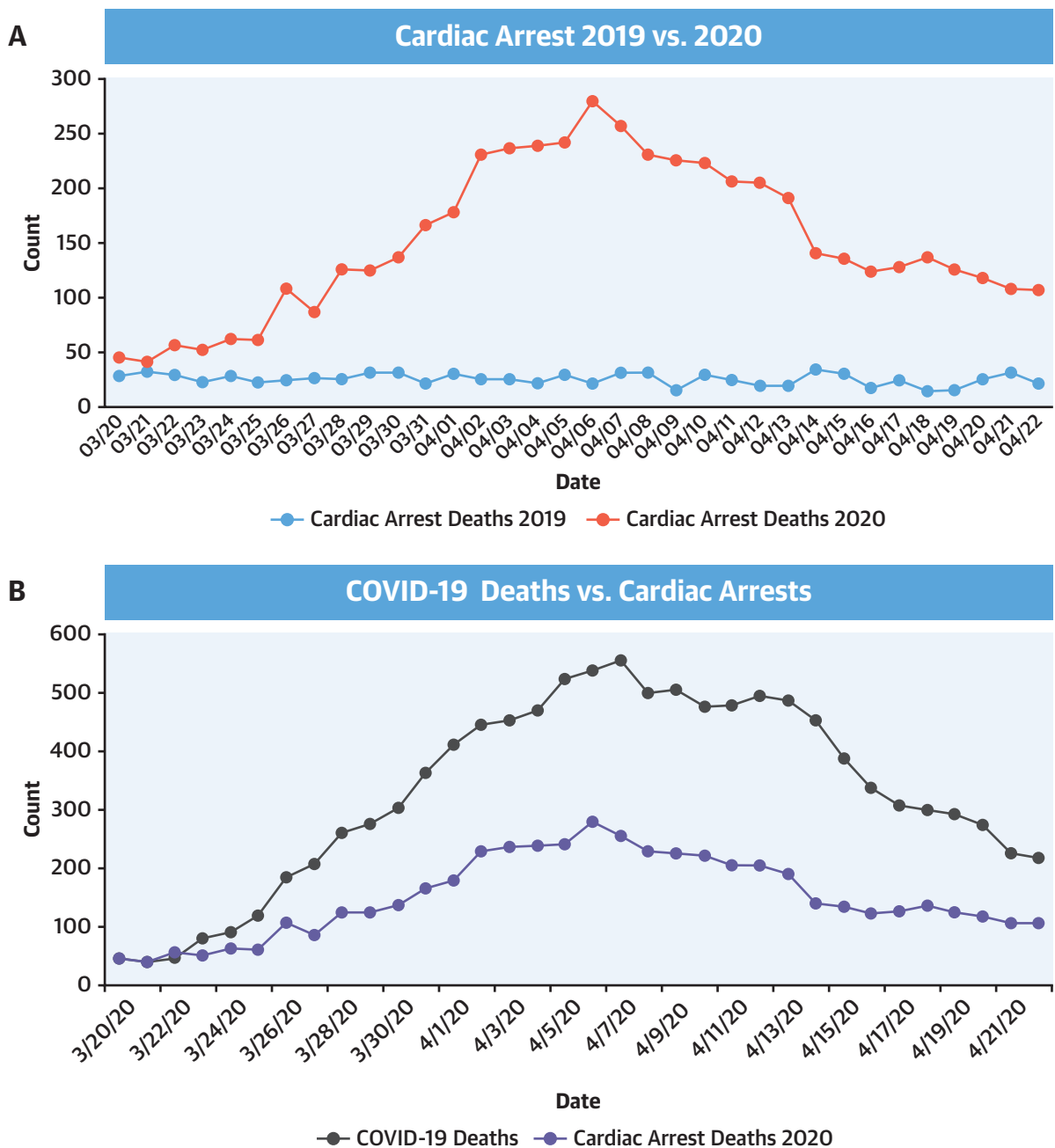
This study reports the change in OHCA in NY City (NYC) during the surge and compares it to ACS admission across the larger geographic area serviced by Northwell Health.

This study was approved by the Northwell Institutional Review Board. For March 20 to April 22, 2019 and 2020, the number of daily OHCA and the number of pronounced deaths on the scene (DOS) from the Fire Department of New York (FDNY) were reviewed. The FDNY defines OHCA as a witnessed case of unresponsiveness occurring suddenly or a case in which an individual is found unresponsive for an unknown time by the bystander initiating the call. For the same time periods, the numbers of admissions for ACS (ST-/non-ST-segment elevation myocardial infarction and unstable angina) at 13 Northwell hospitals were identified.

Between March 20, 2019 and April 22, 2019, there were 2,242 OHCA, with a steady daily incidence (Figure 1A). Of those, 861 (38%) were DOS. During the same period of 2020, there were 7,249 OHCA, with 5,139 (71%) DOS. This represents a 4.97-fold increase in OHCA and almost doubling of DOS (38% vs. 71%). OHCA follow a bell-shaped curve, peaking on April 6, 2020, with 366 calls and 280 deaths. COVID-19-related NYC deaths followed a similar curve, with 11,474 COVID-19 deaths peaking on April 7 (4) (Figure 1B).

For the period from March 20, 2019 to April 22, 2019, there were 2,084 Northwell hospital admissions with a primary diagnosis of ACS. During the COVID-19

**FIGURE 1** NYC Cardiac Arrest and COVID-19 Deaths Trends During the Surge



**(A)** Daily incidence of sudden cardiac arrest during the COVID-19 surge in New York City, compared with historic controls in 2019. **(B)** COVID-19 related mortality versus out-of-hospital sudden deaths in the New York metropolitan area for period March 20, 2020, to April 22, 2020. COVID-19 = coronavirus disease-2019.

surge, the admissions due to ACS were 911, representing a 56.3% reduction.

Myocardial ischemia is a common cause of OHCA in the United States (5). Our findings show a 4.97-fold increase in OHCA with a concomitant halving of ACS hospitalizations. The cause of these findings is likely

multifactorial. Certainly, some OHCA are directly related to COVID-19 infection itself. Similar to the Baldi et al. report (3), our data show that COVID-19 deaths correlated with OHCA (Spearman rank correlation coefficient: 0.954;  $p < 0.0001$ ). However, the COVID-19 outbreak affected access to health

care. The public was encouraged to stay home. Northwell Health experienced a dramatic decrease in ACS. This decrease correlated with the increase in OHCA. Patients unwilling or unable to access care most likely stayed home. Limitations of this study include its retrospective nature and the inherent limitation in how OHCA is defined. However, the definition did not change during this report. Although the Northwell Health network does not care for the identical population as reported by the FDNY, it is the largest health care provider in the NY metropolitan area, caring for approximately 30% of all patients, and should be representative of care in the region.

During the peak of the COVID-19 outbreak in NY, a marked increase in OHCA reported by the FDNY paralleled a more than halving of ACS hospitalizations across a large health care network. Although it is impossible to determine a direct relationship between these 2 findings, challenges in access to, and fear of seeking care may, in part, explain the observed results. Patients need to be educated and encouraged to seek care for emergent conditions despite the COVID-19 pandemic.

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## P2Y<sub>12</sub> Inhibitor-Based Monotherapy



### Optimal Duration and Ideal Agent

Angiolillo et al. (1) and Dangas et al. (2), in their respective pre-specified substudies, conclude that in the TWILIGHT (Ticagrelor With Aspirin or Alone in High-Risk Patients After Coronary Intervention) trial, after initial 3 months of ticagrelor plus aspirin among patients after complex percutaneous intervention (PCI), continuation of ticagrelor monotherapy was associated with lower incidence of bleeding without increasing ischemic events, compared to continuing ticagrelor plus aspirin and these findings were also consistent among diabetic patients.

However, 61.6% of the diabetic patients and 63.6% of the patients who underwent complex PCI presented with acute coronary syndrome. Current guidelines recommend the use of dual antiplatelet therapy with aspirin and P2Y<sub>12</sub> inhibitors in such patients for a minimum of 12 months, and when dual antiplatelet therapy duration was reduced to 3 months the risk of myocardial infarction and definite/probable stent thrombosis increased substantially (hazard ratio: 2.08; 95% confidence interval: 1.10 to 3.93) (3,4).

Second, amid head to head comparison, prasugrel was superior to ticagrelor in reducing the incidence of death, myocardial infarction, or stroke at 1 year (5). This result was driven by a significant reduction in recurrent myocardial infarction. Furthermore, the patients who received ticagrelor discontinued the medication earlier and more frequently than the patients who received prasugrel (15.2% and 12.5%, respectively;  $p = 0.03$ ), mostly due to dyspnea. So, it would be intriguing to know whether prasugrel-based monotherapy is better than ticagrelor-based monotherapy or not.