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EDITORIAL COMMENT

# COVID-19 and Cardiovascular Health



## This Is a Public Service Announcement\*

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The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), or coronavirus disease 2019 (COVID-19) pandemic, has infected >40 million people, leading to >1 million fatalities worldwide. The collateral damage of SARS-CoV-2 has been felt in the forms of economic recession, unemployment, and political strife in the United States and elsewhere. In addition to the direct cardiopulmonary effects of COVID-19, the pandemic has posed serious indirect challenges to cardiovascular care. From a public health perspective, reports of significant declines in acute coronary syndrome hospitalizations in Northern California (1), as well as reduced ST-segment elevation myocardial infarction (STEMI) activations throughout parts of the United States (2), suggest an indirect consequence of the pandemic on population health and behavior, the sequelae of which are yet to be understood.

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In an observational study in this issue of the *Journal*, Wadhera et al. (3) performed a retrospective analysis of data from the National Center for Health Statistics (NCHS). The primary objective of this investigation was to evaluate how population-level deaths due to cardiovascular causes changed in the United States after the onset of COVID-19. Wadhera

et al. (3) analyzed NCHS data between January 1 and June 2, 2020, defining March 18 as the pandemic onset. They then compared death rates following the demarcated onset date to the preceding 3-month time period of early 2020 and to a similar timeframe in 2019 as a historical control. After excluding all COVID-19-related mortalities, Wadhera et al. (3) found significant national increases in population-level deaths attributable to ischemic heart and hypertensive diseases, particularly in states that experienced an early surge of COVID-19 cases (e.g., New York). Interestingly, national rates of death due to heart failure, cerebrovascular disease, or other circulatory diseases were not significantly changed.

Dr. Wadhera et al. (3) should be commended for their efforts to study and disseminate these important data that contribute to the growing recognition of the downstream repercussions of COVID-19—specifically, its indirect influence on national cardiovascular public health. As highlighted in their discussion, prolonged delays in outpatient testing, procedures, and follow-up may impose unanticipated burdens on the access to and delivery of care with uncertain long-term implications. The following 4 concepts from this paper merit further discussion: 1) attribution of death in the COVID era; 2) a reminder of the natural history of untreated cardiovascular disease; 3) considerations for governance, health policy, and public messaging; and 4) identification and protection of vulnerable peoples.

### ATTRIBUTION OF DEATH

The NCHS operates within the Centers for Disease Control and Prevention and possesses an operating budget of approximately U.S. \$160 million. National health statistics are collected from a variety of sources, including survey instruments, medical records, and the National Death Index (4). In this analysis, any death certificates marking COVID-19 as an underlying cause were excluded. Ideally, the study cohort would

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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 [Author Center](#).

include only patients not infected by the virus. However, the investigators rightly point out that these data sources may be prone to misclassification error—if, for example, COVID-19 existed as a contributing cause of death but was not necessarily listed as its underlying cause. Certainly, the determination of proximate cause of death from medical record certificates is imperfect and should be acknowledged as an inherent limitation of the data source.

Furthermore, depending on the geographic district, local governance, and available resources, there may be patients who died before definitive testing for SARS-CoV-2, particularly in the early U.S. experience. In an analysis of emergency medical services data from New York City, Lai et al. (5) showed an increase in out-of-hospital cardiac arrests at the pandemic peak compared to the prior year (3,989 in 2020 vs. 1,336 in 2019;  $p < 0.001$ ). The data from Lai et al. (5), in addition to the broader findings presented here by Wadhwa et al. (3), support the notion of excess fatalities due to unattended comorbid illnesses. However, ascertainment of the underlying etiology of death remains problematic without ubiquitous post-mortem data. Regardless, this simply provides further impetus for policymakers to expand the capability and availability for widespread, rapid-return testing for COVID-19.

## NATURAL HISTORY OF DISEASE

The fundamental question that this study seeks to address is this: what happens to patients who either do not seek or do not receive expedited medical care during a public health crisis? Are there more patients with STEMI staying at home and not receiving timely revascularization? In New York City alone, Wadhwa et al. (3) identified a marked increase in deaths attributable to ischemic heart disease (2.39; 95% confidence interval [CI]: 1.39 to 4.09) during the pandemic relative to 2019. Increased death rates from hypertensive (2.64; 95% CI: 1.52 to 4.56) as well as circulatory system diseases (1.65; 95% CI: 1.20 to 2.27) were also observed. Furthermore, ischemic heart and hypertensive disease mortalities intensified in other states such as New Jersey, Michigan, and Illinois. Although it may not be possible to determine causal association based on these survey data, the overall 11% and 17% nationwide increases in ischemic heart and hypertensive disease deaths in 2020 relative to 2019 cannot be ignored. Collectively, these data offer a retrospective reminder of what could transpire for acutely ill patients who elect to shelter in place while enduring the natural history of their disease processes. Going forward, the collection of patient-level

data through collaborative initiatives such as the North American COVID-19 STEMI Registry (6) will be essential to better characterize these adverse public health outcomes.

## PUBLIC MESSAGING

By mid-March 2020, local and state governments implemented stay-at-home mandates in conjunction with closures of schools, public gatherings, and nonessential businesses to mitigate disease spread. In anticipation of surges in acute care hospitalizations, health care systems cancelled routine ambulatory visits, nonurgent diagnostic testing, and elective procedures. These temporary measures were enacted to prevent the medical system from being overwhelmed, as has been observed in other countries such as Italy. Under such circumstances, it is conceivable to envision the catch-22 that may materialize for select individuals. Patients with unstable cardiac conditions who would ordinarily seek urgent evaluation in an emergency department may avoid doing so for fear of viral transmission. What does the person with critical aortic stenosis and recent syncope elect to do during this unprecedented time?

Public policy makers and health care providers face a comparable dilemma in how to advise older patients with cardiac and other accrued comorbidities. Inherently, these patients are considered higher risk for morbidity and mortality if infected by COVID-19 and, therefore, should be cautioned to maximally avoid person-to-person contact. However, this same cohort is at high risk for death and disability if they do not seek immediate medical attention when indicated. To address this challenge, hospital systems have broadly adopted changes in clinical workflows including a rapid growth of telemedicine, pre-procedural COVID screening, reconfigurations of clinical spaces, and increased personal protective equipment for health care workers. Despite these measures, recurring national and international viral surges may have enduring consequences on patients' perceptions of risk when seeking medical care.

## PROTECTION OF THE VULNERABLE

From this publication, we see the importance for continued study of the ancillary effects of COVID-19, whether they be related to cardiovascular health, mental health, substance abuse, domestic violence, or homelessness. A heightened understanding of these downstream health implications should inform future public policy decisions and messaging strategies. Priority should be given to those investigative efforts that address how the most vulnerable

populations in our society are differentially affected—for example, underserved minorities, nursing home residents, and rural communities with limited access to care. Pre-existing racial or socioeconomic disparities may be accentuated in the COVID era (7), and this timely study provides a pre-emptive glimpse of the deleterious health outcomes already witnessed across the country. Furthermore, it is possible that we will inherit a population of COVID survivors with long-term lung injury, cardiomyopathy, and venous thromboembolic disease. This is the public service announcement conveyed by Wadhera et al. (3): as the pandemic ensues, the cardiovascular community will

need to be fully prepared to address these direct and indirect consequences of COVID-19.

#### AUTHOR DISCLOSURES

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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