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Letter to the editor

STEMI during the COVID-19 Pandemic - An Evaluation of Incidence

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ABSTRACT

The COVID-19 pandemic has dramatically changed the practice medicine on a global scale during the year 2020. With fewer patients presenting to hospitals with the diagnosis of STEMI, healthcare workers are wondering what is causing this decline. This piece presents data from two medical centers and addresses several possible causes to explain this phenomenon. It was found that there was a statistically significant decrease from January to March 2020 in number of presenting STEMI diagnoses.

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In December of 2019, a case of pneumonia of unknown cause in Wuhan, China was reported to the WHO Country Office. Since that time, SARS-CoV-2 (commonly referred to as “Coronavirus” or COVID-19) has been declared a global pandemic. As a precautionary measure, many hospital systems have canceled all elective procedures while states are encouraging stay-at-home measures for patients and their families. Such measures have resulted in a dramatic decrease in the number of patients presenting to the hospital for non-COVID related complaints. Anecdotally, it seemed that the incidence of ST elevation myocardial infarctions (STEMIs) has decreased significantly since the start of this pandemic, raising the question of why this change may be occurring. Through this piece, we postulate several reasons to explain this change and provide local data to support a decline in incidence in recent months [Table 1](#).

Reports from interventional cardiologists in Europe and Asia are providing data to validate the speculation of American physicians. A recent preliminary publication from the Spanish Society of Cardiology estimates drops in PCI procedures for STEMI by as much as 40%, with similar findings seen in Hong Kong [1, 2]. Europe and Asia have been combatting the COVID-19 epidemic for far longer than the United States. The relatively recent introduction of Coronavirus to the United States not only means that hospitals have had less time to “feel the effects” of COVID-19, but has also provided the opportunity for American physicians to learn and prepare from international data.

To further investigate the perceived change in incidence of STEMIs, we investigated the number of cardiac catheterization cases indicated for STEMI from January to March for the past three years (2018 - 2020) at Wake Forest Baptist Medical Center and High Point Medical Center in North Carolina, USA. We included all cases of STEMI catheterizations based on case description. We calculated population level means and 99.9% confidence intervals using previous years' data, and compared those to this year's data in order to determine whether this year showed deviation from previous norms.

Through these analyses, it was determined that the months of February - March of 2018 and 2019 had 34.25 cases/month on average. In February and March 2020, there were, on average, 31 cases/month, representing a 9.5% drop in cases from the 2018 and 2019 monthly averages. Additionally, there was a 14.6% drop in cases between January 2020 and March 2020, marking the first time in two years in which March had fewer recorded cases than January. Further, our data demonstrates that the population mean number of STEMI cases in March is 40.5 cases/month (99.9% CI [37.0, 44.0]). This year's March case number falls below the lower bound limit of the CI at 35 cases.

Our data shows a decrease in the number of STEMI cases this year even in a state without a significantly high case burden of COVID-19.

There are many reasons that may explain the declining incidence of STEMI in the United States. Considering the implementation of stay-at-home and shelter-in-place orders in the majority of states, as well as most jobs and universities shifting to online platforms, life-style changes present a possible explanation. A de-

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Table 1
STEMI cases by month, 2018–2020.

Year	# of STEMI cases (jan.)	# of STEMI cases (feb.)	# of STEMI cases (mar.)	Total # of STEMI cases by year
2018	42	26	42	110
2019	35	30	39	104
2020	41	27	35***	103

*** signifies a value that lies below the 99.9% CI when compared to the average number of cases in March of the previous two years.

crease in commutes intuitively correlates with lower anxiety and fewer activities to promote atherosclerotic plaque rupture.

Government implemented orders and slowing economies have also dramatically reduced the activity of major technological producers of greenhouse gasses, particularly vehicles on roads. This change has likely resulted in a significant decrease in air pollution, which, according to the American Heart Association, should improve cardiac health [3].

Patients may also be less inclined to present to hospitals due to fear of contracting COVID-19, which has been exacerbated by the gravity of media coverage. For many patients with risk factors for STEMI, they may dismiss their chest pain as benign relative to the risk of contracting coronavirus at a hospital. An increase in the incidence of late presenting MIs with CHF and sudden cardiac death would lend validity to this claim. Furthermore, the overwhelming effect of COVID-19 on the healthcare system may be causing healthcare workers to fail in recognizing and diagnosing MIs, artificially decreasing the incidence during this time.

Whereas the aforementioned mechanisms apply broadly on an international scale, an explanation for decreased MI incidence unique to the United States may be changes to the American diet. The COVID-19 pandemic has resulted in the closure of many businesses and non-essential services in an effort to mitigate the spread of disease. Restaurants in particular have been affected, resulting in significant impacts on the American diet. Therefore, the decreased incidence of MIs may in part be attributable to decreased access to fast food and unhealthy salt-rich and fatty foods. According to data collected in 2015–16, the CDC found that 39.8% of adults aged 20 and over were classified as obese [4]. With restaurant closures and fear of leaving the home, Americans may in fact be improving their cardiac health by controlling fluid and salt intake, decreasing their consumption of fried foods, and eating more grains, fruits, and vegetables.

In conclusion, we showed a statistically significant decrease in STEMI cases in March 2020 when compared to previous year's data. Our incidence may be less prominent than the data from Spain and Hong Kong for several key reasons. First the United States had ample time to prepare and learn from international responses. Further, as previously mentioned, North Carolina has not been particularly affected by this pandemic. As of April 1st, 2020, the state as a whole had a cumulative total of 1700 cases [5]. Our findings may be more pronounced in states more significantly affected by COVID-19. Further studies could evaluate how Cardiac Catheterization Lab volumes rebound following the COVID-19 pandemic. Additionally, examining the time of symptom onset to hospital presentation of STEMI prior to, during, and following the COVID-19 pandemic can be of significance to support these claims. At this time, we are only able to speculate regarding the clear and obvious decline of presenting and treated MIs.

Declaration of Competing Interest

Edan Zitelly, Noah Newman, and David Zhao have no conflicts of interest to declare.

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