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## **Reduction in ST-Segment Elevation Cardiac Catheterization Laboratory Activations in the United States during COVID-19 Pandemic**

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**Short Title:** STEMI activations during COVID-19 Pandemic

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Short tweet: 38% reduction in STEMI activations in the US during early days of COVID-19 pandemic

**Keywords:** ST-elevation myocardial infarction, COVID-19

The COVID-19 Pandemic has significantly impacted the US healthcare system. To preserve resources, including personal protective equipment (PPE) and hospital beds to care for COVID-19 patients, the Centers for Disease Control and Prevention (CDC) recommended deferral of elective cardiac procedures (1), including coronary angiography and percutaneous coronary intervention for stable coronary artery disease.

Timely reperfusion by means of primary percutaneous coronary intervention (PPCI) is the standard of care for STEMI patients (2). The Society for Cardiac Angiography and Interventions (SCAI) and American College of Cardiology (ACC) continue to recommend PPCI as the standard treatment of STEMI patients during the current pandemic (3). However, anecdotal reports suggest a decline in PPCI volumes in the US and around the world (4).

To determine if a decrease in PPCI is occurring in the US in the COVID-19 era, we analyzed and quantified STEMI activations for 9 high-volume (>100 PPCI per year) cardiac catheterization laboratories in the US from January 1, 2019 to March 31, 2020. Participating hospital systems included 1-Minneapolis Heart Institute, Minneapolis, MN, 2- Beaumont Hospital Royal Oak, Royal Oak, MI, 3- The Christ Hospital, Cincinnati, OH, 4- Massachusetts General Hospital, Boston, MA, 5- UMass Memorial Medical Center, Worcester, MA, 6- Iowa Heart, Des Moines, IA, 7- Northwell Health Hospital, Manhasset, NY, 8- Prairie Cardiovascular, Springfield, IL, and 9- Swedish Medical Center, Seattle, WA

In this study, March 1, 2020 was identified as the beginning of the “After COVID” (AC) period when US social life and medical operations were significantly affected (March 1<sup>st</sup> also was the day that New York City (NYC), the epicenter of US COVID cases, reported its first COVID-19 case). Social distancing was recommended by the federal government on March 15<sup>th</sup>. The “Before COVID” (BC) period was comprised of the 14 months leading up to the epidemic in

the United States (January 1, 2019 to February 29, 2020). We now compared the BC and AC monthly total and average number of STEMI activations for each hospital.

A mixed model with random intercepts corrected for time as a continuous variable was used to estimate the percent change in STEMI activations in BC versus AC period. The model estimate showed a decrease in STEMI activations of 38% (95% CI: 26, 49;  $p < 0.001$ ). All sites combined reported >180 STEMI activations every month (mean of 23.6 activations/month) in the BC period. In contrast all sites combined reported only 138 activations (mean of 15.3 activations/month) in the AC period (**Figure 1**).

Our preliminary analysis during the early phase of the COVID pandemic shows an estimated 38% reduction in US cardiac catheterization laboratory STEMI activations, similar to the 40% reduction noticed in Spain (4). *A priori*, given potential heightened environmental and psychosocial stressors, and a higher case of STEMI induced by viral illness (e.g. similar to influenza) (5) or mimickers such as COVID-19 myopericarditis an increase in STEMI activations would have been expected. Potential etiologies for the decrease in STEMI PPCI activations include avoidance of medical care due to social distancing or concerns of contracting COVID-19 in the hospital, STEMI misdiagnosis, and increased use of pharmacological reperfusion due to COVID-19. As the pandemic continues, we plan to continue to follow this early signal and investigate its causes. It is particularly crucial to understand if patient-based anxiety is decreasing presentation of STEMI patients to the US hospital system.

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**FIGURE LEGEND.****Figure 1. STEMI activations during COVID-19 Pandemic**

**(A) Top left panel:** Map of the United States (US) showing the 9 high-volume STEMI centers participating in this registry (yellow stars). **(B) Lower left panel:** Bar chart displaying average number of STEMI activations per site per month before and after COVID-19 pandemic impacted the US healthcare system. **(C) Right panel:** Bar chart displaying total number of STEMI activations per month (blue: 2019 red: 2020)

