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## Cardiac Catheterization Laboratory Volume Changes During COVID-19—Findings from a Cardiovascular Fellows Consortium

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1. Wang SY, Giugliano RP. Non-vitamin K antagonist oral anticoagulants for atrial fibrillation in obese patients. *Am J Cardiol* 2020;00:1–8.
2. Lip GYH, Banerjee A, Boriani G, Chiang CDE, Fargo R, Freedman B, Lane DA, Ruff CT, Turakhia M, Werring D, Patel S, Moores L. Antithrombotic therapy for atrial fibrillation: CHEST guidelines and expert panel report. *Chest* 2018;154:1121–1201. <https://doi.org/10.1016/j.amjcard.2020.06.008>

### Cardiac Catheterization Laboratory Volume Changes During COVID-19—Findings from a Cardiovascular Fellows Consortium



In regards to the cardiac catheterization laboratory and the anticipated surge of COVID-19, the Center for Disease Control and Prevention (CDC) recommended deferral of elective cardiac catheterization procedures to limit resource utilization.<sup>1</sup> In our study, we sought to understand if there was a change in procedural volumes during the pandemic.

The Cardiovascular Fellows Consortium was formed by trainees across the United States who collaborated through social media as a response to the COVID-19 pandemic. Through the consortium, we collected all cardiac

procedures performed by invasive cardiology including cardiac catheterizations, coronary angiograms, and percutaneous coronary, endovascular, and structural interventions. These data were collected at 12 fellowship training sites across the United States, between March 1 and April 15, 2020, and compared with the corresponding time period in 2019. Data were obtained through an electronic query of each site’s laboratory database without accessing patient data. These cases were performed at the discretion of each site’s respective institution and the treating physicians. Participating sites included (1) Beaumont Hospital Royal Oak, Royal Oak, MI, (2) Detroit Medical Center (DMC), Detroit, MI, (3) Henry Ford Hospital, Detroit, MI, (4) Beaumont Hospital Dearborn, Dearborn, MI, (5) Spectrum Health, Grand Rapids, MI, (6) Lenox Hill Hospital, New York City, NY, (7) Metro Health, Cleveland, OH, (8) University of Arkansas for Medical Sciences, Little Rock, AR, (9) Ochsner-Louisiana State University, Shreveport, LA, (10) University of Colorado Health, Aurora, CO, (11) Beaumont Hospital Troy, Troy, MI, and (12) DMC Sinai Grace, Detroit, MI. Characteristics were summarized using descriptive statistics, that is, the percentage for categorical variables. The percent change was calculated and expressed as a median change with interquartile range (IQR). Analysis was performed with Stata 15 (StataCorp, College Station, TX) and Microsoft Excel for Mac version 16.35.

Between March 1 and April 15, 2020, a total of 2,548 procedures were performed at the 12 sites, whereas 4,671 procedures were performed during the same time period in 2019 (Figure 1). The median change in volume in 2020 compared with 2019 was –47% (IQR: –58% to –48%). The case volume decreased at 11 of the 12 sites (Figure). The largest decline occurred between April 1 and April 15, 2020 at all sites except 1 with a median change in case volume of -80% (IQR –86.2% to –72.5%).

The COVID-19 pandemic has seemingly changed our healthcare system for the foreseeable future. With the limitations in allocated resources, elective procedures are being deferred. This is suggested from our study findings which show a decline in cardiac catheterization laboratory procedures in the majority of participating sites during the COVID-19 pandemic. Our findings align with observations made in Spain which showed a 48% decline in diagnostic procedures.<sup>3</sup> Additionally, a decline in patients presenting with acute coronary syndrome (ACS) has been reported, which also contributes to the overall reduction in cardiac catheterization laboratory volume.<sup>4,5</sup> Thus, with fewer patients receiving cardiac care, hands-on training in the cardiac catheterization laboratory may be limited.

The COVID-19 pandemic occurred in the last quarter of the academic year when FITs are expected to consolidate case-based learning, technical skills, and clinical judgment in preparation for

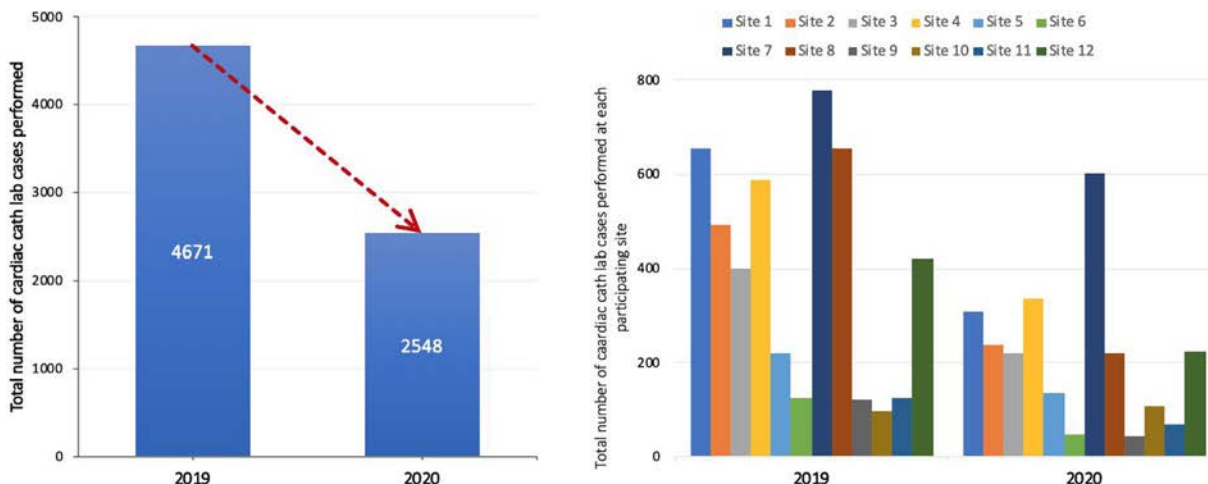


Figure. Comparison of total number of cases performed in the cardiac catheterization laboratories (cath lab) for each participating site in the study period (March 1- April 15) between the years 2020 vs. 2019.

advancement in their careers. The Accreditation Council for Graduate Medical Education has recognized the reduction in patient volume in addition to the redeployment of training staff to support critical services.<sup>2</sup> Due to these changes, there is a concern among fellows that the time period away from the cardiac catheterization laboratory may impede their ability to hone their skill set.

In summary, there appears to be an overall decline in the number of cardiac catheterization laboratory procedures performed during the COVID-19 pandemic consistent with previously published studies 3 to 5.

## Disclosures

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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1. Nasca TJ, CDC. *Coronavirus Disease 2019 (COVID-19)* [Internet]. Centers for Disease Control and Prevention; 2020. <https://www.cdc.gov/coronavirus/2019-ncov/>.
2. Nasca TJ, CDC. *ACGME Response to the Coronavirus (COVID-19)*. 2020. <https://acgme.org/Newsroom/Newsroom-Details/ArticleID/10111/ACGME-Response-to-the-Coronavirus-COVID-19>.
3. Rodriguez-Leor Oriol, Cid-Alvarez B, Ojeda S, Martin-Moreiras J, Rumoroso JR, Lopez-Palop R, Serrador A, Cequier A, Romaguera R, Cruz I, Prado P, Moreno R. Impact of the COVID-19 pandemic on interventional cardiology activity in Spain. *Rec Interv Cardiol* 2020;2:82–89.
4. Garcia S, Albaghdadi MS, Meraj PM, Schmidt C, Garberich R, Jaffer FA, Dixon S, Rade JJ, Tannenbaum M, Chambers J, Huang P, Henry T reduction in ST-segment elevation cardiac catheterization laboratory activations in the United States during COVID-19 pandemic. *J Am Coll Cardiol* 2020;75. (in press). <https://doi.org/10.1016/j.jacc.2020.04.011>.
5. De Filippo O, D'Ascenzo F, Angelini F, Bocchino PP, Conrotto F, Saggietto A. Reduced rate of hospital admissions for ACS during COVID-19 outbreak in northern Italy. *N Engl J Med* 2020;383:88–89. <https://doi.org/10.1056/NEJMc2009166>.

<https://doi.org/10.1016/j.amjcard.2020.06.009>

## Prevalence and Outcomes of Acute Ischemic Stroke Among Patients ≤50 Years of Age With Laboratory Confirmed COVID-19 Infection

The COVID-19 epidemic has led to an unprecedented disruption in health care systems worldwide. Concerns have been recently raised about young patients with COVID-19 presenting with large ischemic strokes.<sup>1</sup> Data on stroke in COVID-19 patients remain

limited to a few case reports.<sup>1</sup> In this focused analysis, we investigated the incidence and outcomes of acute ischemic stroke in young adults using a multinational database.

We queried the TriNetx Research Network to select patients <50 years of age with laboratory confirmed COVID-19 infection between January 20, 2020 to April 24, 2020. Patients were identified as COVID-19 positive if they had a billable code for COVID-19 and had an associated positive laboratory confirmation of the infection (eTable-1). TriNetX is a global federated health research network providing access to statistics on electronic medical records (diagnoses, procedures, medications, laboratory values, genomic information) from patients in predominately large healthcare organizations. The TriNetx database (COVID-19 Research Network) is a network of 37 global healthcare organizations (36% based in the United States [US] and 64% outside of the US). The diagnosis of acute ischemic stroke was established via validated international classification of diseases 10th revision diagnosis codes.<sup>2</sup> Descriptive statistics were presented as frequencies with percentages for categorical variables and as mean ± standard deviation for continuous measures. Baseline characteristics were compared using a Pearson chi-squared test for categorical variables and an independent-samples *t* test for continuous variables. All-cause mortality was displayed in the 2 cohorts using the Kaplan Meier method, and statistical significance of the differences between the 2 groups were assessed with the Log-Rank Test.

A total of 9,358 COVID-19 positive patients age ≤50 years of age were identified in the database, of whom 33.2% were hospitalized for severe symptoms. The incidence of acute ischemic stroke was 64/9,358 (0.7%). Compared with patients who did not experience a stroke, those with acute ischemic strokes were older (39.3 ± 9.0 vs 36.7 ± 8.5 years, *p* < 0.001), but had similar proportions of females (60.9% vs 60.4%, *p* = 0.93). They, however, had higher prevalence of key comorbidities: hypertension (61.0% vs 11.7%); diabetes (32.8% vs 6.5%); heart failure (15.6% vs 1.5%), nicotine dependence (34.4% vs 5.9%); obesity (46.9% vs 17.4%); chronic obstructive

