Hospital Volumes of 5 Medical Emergencies in the COVID-19 Pandemic in 2 US Medical Centers

Amid the coronavirus disease 2019 (COVID-19) pandemic, there have been anecdotal reports of a reduction in non–COVID-19 emergent diseases, including ischemic stroke and myocardial infarction (MI), and a general drop in emergency department volumes. The concern is that patients, wary of contact with individuals with COVID-19, are reluctant to seek care, even in the face of acute, life-threatening conditions. Using data from 2 academic medical centers, we assessed the association of the COVID-19 pandemic with the incidence of 5 medical emergencies: acute MI, ischemic stroke, nontraumatic subarachnoid hemorrhage (ntSAH), ectopic pregnancy, and appendicitis.

Methods | The online databases of Stanford University Medical Center and NewYork-Presbyterian/Weill Cornell Medical Center (NYP) were queried using International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) codes to determine the number of patients with each diagnosis per month. Diagnoses of acute MI were extracted with ICD-10 code I21, ischemic stroke with I63, ntSAH with I60, ectopic pregnancy with O00, and appendicitis with K35. The monthly diagnosis total was divided by the number of days in each month to arrive at an average daily count. For acute MI, ischemic stroke, and ntSAH, patients younger than 18 years were excluded. Diagnoses were tallied between March 1, 2018, and May 22, 2020.

Interrupted time-series single-group analysis was performed to assess if pre–COVID-19 trends in case volumes differed significantly from post–COVID-19 trends. Segmented Poisson regression models were constructed to analyze trends in both periods and approximate an effect size, while accounting for the gradient of the underlying time trend. The start date of the COVID-19 era was selected to be March 1, 2020, corresponding to the first observed case in New York City. Data analysis was conducted using R, version 3.5.3 (The R Foundation) and Stata, version 14.2 (StataCorp). The significance level for all statistical tests was set at .05, and all tests were 2-sided. This study was deemed exempt by the institutional review boards of Stanford University School of Medicine and Weill Cornell Medicine because no identifiable patient data were used.

Results | The average numbers of cases per day before and after the start of the COVID-19 pandemic as well as adjusted relative risks (RRs) are detailed in the Table. After accounting for underlying trends, we estimated a 39% reduction in the daily volume of acute MI cases at NYP (RR, 0.61; 95% CI, 0.52-0.72; \( P < .001 \)) and a 26% reduction at Stanford (RR, 0.74; 95% CI, 0.68-0.80; \( P < .001 \)) (Figure, A). There was a 49% reduction in the daily volume of ischemic stroke cases at NYP (RR, 0.51; 95% CI, 0.45-0.56; \( P < .001 \)) and a 16% reduction at Stanford (RR, 0.84; 95% CI, 0.79-0.89; \( P < .001 \)) (Figure, B). The daily volume of ntSAH cases decreased by 33% at NYP (RR, 0.67; 95% CI, 0.47-0.93; \( P = .03 \)) and by 21% at Stanford (RR, 0.79; 95% CI, 0.64-0.98; \( P = .03 \)) (Figure, C). There was a 42% reduction in the daily volume of appendicitis cases at NYP (RR, 0.58; 95% CI, 0.46-0.74; \( P < .001 \)) but no significant difference at Stanford (Figure, D). No difference in the daily volume of ectopic pregnancy cases was noted at either institution.

Discussion | We identified significant drops in the daily caseload of 4 common medical emergencies following the onset of the COVID-19 pandemic. The association was more prominent at NYP than at Stanford, likely reflecting the increased severity of the pandemic in New York City. Study limitations include potentially limited generalizability, given the setting of 2 tertiary care centers, and reliance on the accuracy of ICD-10 codes.

Recent data suggest that deaths resulting from COVID-19 account for only half of the excess number of at-home deaths during the pandemic. The combination of fewer patients presenting with medical emergencies and an increased number of non–COVID-19–related at-home deaths is concerning. Fear of exposure to patients with COVID-19 may lead individuals to defer care for acute conditions.

Table. Trends in Hospital Volume of 5 Emergency Medical Conditions Before and After the Start of the COVID-19 Pandemic

<table>
<thead>
<tr>
<th>Institution</th>
<th>Condition</th>
<th>Mean daily count</th>
<th>Time series analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre–COVID-19</td>
<td>Post–COVID-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relative risk (95% CI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>( P ) value</td>
</tr>
<tr>
<td>Stanford</td>
<td>Acute MI</td>
<td>10.95</td>
<td>9.25</td>
</tr>
<tr>
<td>Stanford</td>
<td>Ischemic stroke</td>
<td>22.19</td>
<td>19.93</td>
</tr>
<tr>
<td>Stanford</td>
<td>ntSAH</td>
<td>2.10</td>
<td>1.50</td>
</tr>
<tr>
<td>Stanford</td>
<td>Appendicitis</td>
<td>2.53</td>
<td>2.26</td>
</tr>
<tr>
<td>Stanford</td>
<td>Ectopic pregnancy</td>
<td>0.58</td>
<td>0.52</td>
</tr>
<tr>
<td>NYP</td>
<td>Acute MI</td>
<td>3.64</td>
<td>2.29</td>
</tr>
<tr>
<td>NYP</td>
<td>Ischemic stroke</td>
<td>9.09</td>
<td>4.93</td>
</tr>
<tr>
<td>NYP</td>
<td>ntSAH</td>
<td>0.92</td>
<td>0.61</td>
</tr>
<tr>
<td>NYP</td>
<td>Appendicitis</td>
<td>2.04</td>
<td>1.06</td>
</tr>
<tr>
<td>NYP</td>
<td>Ectopic pregnancy</td>
<td>0.68</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Abbreviations: COVID-19, coronavirus disease 2019; MI, myocardial infarction; ntSAH, nontraumatic subarachnoid hemorrhage; NYP, NewYork-Presbyterian.
Figure. Association of the COVID-19 Pandemic With the Daily Caseload of 4 Medical Emergencies

Trends in diagnoses of acute MI (A), ischemic stroke (B), ntSAH (C), and appendicitis (D). COVID-19 indicates coronavirus disease 2019; MI, myocardial infarction; ntSAH, nontraumatic subarachnoid hemorrhage; NYP, NewYork-Presbyterian.
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Editor’s Note

Deferral of Care for Serious Non–COVID-19 Conditions: A Hidden Harm of COVID-19

The harms of the coronavirus disease 2019 (COVID-19) pandemic have been innumerable, including illness, death and disability, unemployment and devastation of small businesses, hunger, educational losses, and amplification of racial and social inequities. In this issue of JAMA Internal Medicine, 2 articles shed light on another cost: deferral of care for serious non–COVID-19 conditions, such as myocardial infarction and stroke.

Blecker et al1 and Bhambhvani et al2 examined admissions to hospitals in New York and California during the pandemic and found dramatic reductions in presentations for non–COVID-19 conditions compared with prior years. These included medical emergencies, such as appendicitis, for which the true incidence was unlikely to have changed. There was also a decrease in admissions for exacerbations of chronic disease, such as heart failure. Bhambhvani et al2 found greater reductions at a hospital in New York than one in California, suggesting that deferral of care may be associated with the intensity of the surrounding epidemic.

It is possible that certain types of care can be forgone without harm; indeed, in some cases, patients may have been receiving unnecessary care. Other forms of care have been successfully transformed during the pandemic, such as through increased use of remote visits and home blood pressure monitoring. Some drops may be due to fewer exposures to other transmissible infections. However, there can be little doubt that deferral of care for stroke and other emergencies leads to harm and contributes to the rise in at-home deaths during the pandemic.

What could drive patients to defer essential care? Many may be concerned about putting themselves or their families at risk of COVID-19, especially in viral epicenters. Some may be forced to defer care because of lost income, loss of employer-based insurance, or primary caregiving responsibilities for children or older adults. Others could be affected by grief, anxiety, or depression, making it harder to seek care.

What can be done? Patients need to feel that hospitals and clinics are safe for them. Social distancing markers, universal screening, and wearing of masks could help people feel safe returning to the hospital.3 The importance of seeking urgent and preventive care (eg, age-appropriate immunizations, cancer screening) should be publicized by departments of health and reinforced by primary care clinicians and triage lines. The pandemic can provide an opportunity for us to teach patients which parts of medical care are of highest value and encourage them to seek that care, as we simultaneously maximize our use of non-hospital-based options for health care delivery.

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