



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## A snapshot of emergency department volumes in the “epicenter of the epicenter” of the COVID-19 pandemic



NYC Health + Hospitals/Elmhurst (Elmhurst) was one of the first and hardest hit hospitals in the coronavirus disease 2019 (COVID-19) pandemic, prompting politicians to dub it the “epicenter of the epicenter” of the crisis [1]. Emergency department (ED) clinicians anecdotally noted increased patient volumes as early as late February 2020, which rose precipitously before dropping to strikingly low levels, though patients who continued to present generally seemed more seriously ill than usual. This paper quantifies Elmhurst ED volumes from early March to late May 2020 and compares them to corresponding 2019 volumes; we also examine rates of admission from the Elmhurst ED to the hospital as a proxy for symptom severity in patients who continued to present. Overall, we hope to share our experiences from early in the pandemic so other facilities can prepare for what may be to come.

Analysis of ED volumes demonstrated a surge in mid-March, followed by a decline (Fig. 1). Volumes began to rise around March 9, 2020 compared to the corresponding dates in 2019. The daily volume peaked on March 18 at 377 visits, a volume 68% greater than on the corresponding Wednesday of 2019. After this peak, volumes declined, leveling off around the week of April 12. Between April 12 and May 23, the mean daily volume was 78.6, whereas during the corresponding time period in 2019 it was 225.3, representing a statistically significant 65% decrease ( $p < 0.0001$ ). In addition, the percentage of ED visits admitted to the hospital each day began to rise in late March 2020 as compared to 2019 (Fig. 2). The maximum admission rate occurred on April 2, when 59.22% of ED visits were admitted, a 249% increase over the corresponding Thursday in 2019. The admission rate then trended down through April and May but remained significantly higher on average than in 2019.

Whereas decreased ED volumes were observed throughout the early COVID-19 pandemic in the country as a whole [2], Elmhurst experienced a two-stage trend. First, a surge in volumes may have been due to a combination of asymptomatic individuals requesting testing as panic about the pandemic spread, mildly symptomatic individuals seeking care for other respiratory tract infections due to worries about having COVID-19, and actual infections with COVID-19. The striking speed

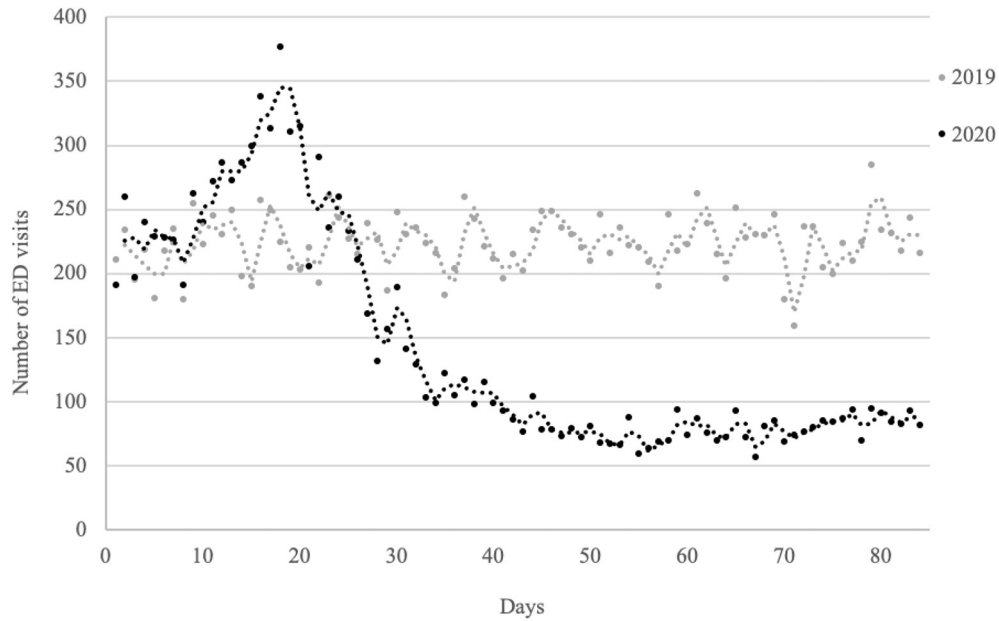
and magnitude of this surge serve as a warning as the pandemic spreads: clearly, EDs can quickly become overwhelmed if they are not adequately prepared, and these data provide some quantification of how much preparation (e.g., stockpiling of personal protective equipment) may be warranted.

As the peaking ED volumes became clear in mid-March, mitigation strategies were deployed at Elmhurst, contributing to the rapid decline in reported volumes after March 18. On March 18, a COVID-19 testing tent was placed at the entrance to the ED, and patients arriving at the hospital self-selected to either the ED or the testing tent. Beginning March 19, an ED provider was placed at the ED entrance to evaluate each incoming patient, triaging some to the ED and some to an alternate location for testing and/or treatment after a medical screening exam. This strategy may prove useful in other locations as a way of mitigating surging ED volumes.

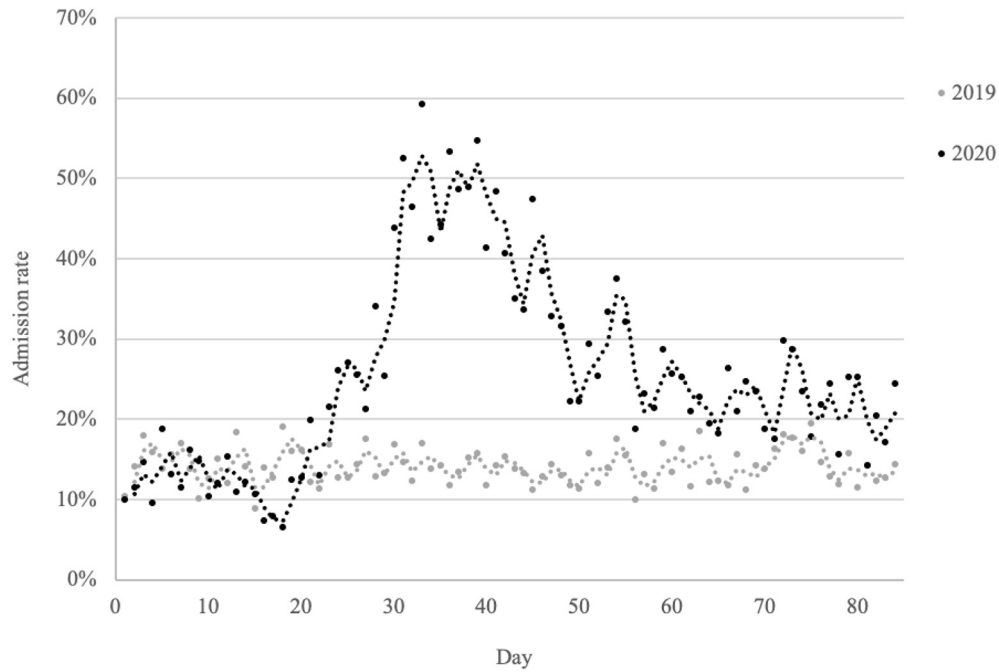
The striking decrease in Elmhurst ED volumes then observed during April and May mirrors the trend seen throughout the country [2]. Stay-at-home orders limiting accidents and the spread of disease likely resulted in the decreased presentations of superficial injuries and mild viral infections that have been recorded [2], but interviews suggest that public fear of contracting COVID-19 by going to the hospital played a role as well [3]. Patients have reported delaying seeking care due to fear of COVID-19, even as they experienced concerning symptoms such as prolonged convulsions or acute cardiac symptoms [4,5]; bearing out these accounts, studies have reported elevated symptom-to-door times among patients with time-sensitive cardiac conditions [6,7].

Such delayed care seeking may be resulting in clinicians' perception that patients continuing to arrive in the ED during the pandemic are more critically ill than usual, a perception supported by our data. Assuming ED clinicians did not significantly change their standards for admission, the elevated admission rates from late March through late May 2020 suggest that patients who presented to the Elmhurst ED during this time were generally more severely ill as compared to 2019. Decreased presentations of minor illnesses, severe complications of COVID-19 infection, and delayed care seeking for early or mild symptoms of serious conditions, causing progression to more critical symptoms, may together account for this increased acuity.

This perception of the hospital as a dangerous place during the pandemic must be addressed to encourage patients to seek care appropriately. Moreover, EDs must prepare for surges in volumes as the COVID-19 pandemic spreads. We hope others can apply these lessons learned early at Elmhurst.



**Fig. 1.** Daily Emergency Department (ED) Volumes, March 3–May 25, 2019 and March 1–May 23, 2020. Two-day moving averages are superimposed over data. Notable dates for reference: Day 1 (first day of data) = March 3, 2019 / March 1, 2020; Day 9 (beginning of “peak”) = March 11, 2019 / March 9, 2020; Day 43 (beginning of “trough”) = April 14, 2019 / April 12, 2020; Day 84 (last day of data) = May 25, 2019 / May 23, 2020.



**Fig. 2.** Daily Emergency Department Admission Rates, March 3–May 25, 2019 and March 1–May 23, 2020. Two-day moving averages are superimposed over data. Notable dates for reference: Day 1 (first day of data) = March 3, 2019 / March 1, 2020; Day 33 (peak) = April 4, 2019 / April 2, 2020; Day 84 (last day of data) = May 25, 2019 / May 23, 2020.

### Presentations

None.

### Declaration of Competing Interest

None.

### Acknowledgements

None.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### References

- [1] Correal A, Jacobs A, Jones R.C. 'A tragedy is unfolding': inside New York's virus epicenter. *The New York Times*. Available from: <https://www.nytimes.com/2020/04/09/nyregion/coronavirus-queens-corona-jackson-heights-elmhurst.html>. Published Apr 9 2020. Updated Aug 5 2020. Accessed Aug 12 2020.
- [2] Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 pandemic on emergency department visits - United States, January 1, 2019–May 30, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69(23):699–704. <https://doi.org/10.15585/mmwr.mm6923e1>.

- [3] Wong LE, Hawkins JE, Langness S, Murrell KL, Iris P, Sammann A. Where are all the patients? Addressing COVID-19 fear to encourage sick patients to seek emergency care. *NEJM Catalyst*. May 14 2020. <https://doi.org/10.1056/CAT.20.0193> Accessed Jul 21 2020.
- [4] Lazzarini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G. Delayed access or provision of care in Italy resulting from fear of COVID-19. *Lancet Child Adolesc Health*. 2020;4(5):e10–1. [https://doi.org/10.1016/S2352-4642\(20\)30108-5](https://doi.org/10.1016/S2352-4642(20)30108-5).
- [5] Zaleski AL, Taylor BA, McKay RG, Thompson PD. Declines in acute cardiovascular emergencies during the COVID-19 pandemic [published online ahead of print, 2020 May 24]. *Am J Cardiol*. 2020. <https://doi.org/10.1016/j.amjcard.2020.05.029> S0002-9149(20)30538-5.
- [6] Tam CF, Cheung KS, Lam S, et al. Impact of coronavirus disease 2019 (COVID-19) outbreak on ST-segment-elevation myocardial infarction care in Hong Kong, China. *Circ Cardiovasc Qual Outcomes*. 2020;13(4):e006631. <https://doi.org/10.1161/CIRCOUTCOMES.120.006631>.
- [7] Toner L, Koshy AN, Hamilton GW, Clark D, Farouque O, Yudi MB. Acute Coronary Syndromes undergoing percutaneous coronary intervention in the COVID-19 era: comparable case volumes but delayed symptom onset to hospital presentation [published online ahead of print, 2020 May 7]. *Eur Heart J Qual Care Clin Outcomes*. 2020. <https://doi.org/10.1093/ehjqcco/qcaa038> qcaa038.

Nicola Feldman MS

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

Corresponding author.

E-mail address: [nicola.feldman@icahn.mssm.edu](mailto:nicola.feldman@icahn.mssm.edu)

Rikki Lane MD

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

Laura Iavicoli MD

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

Veronica Delgado PA, MS

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

Phillip Fairweather MD

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

Stuart Kessler MD

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

Suzanne Bentley MD, MPH

*Icahn School of Medicine at Mount Sinai, 1 Gustave L. Levy Place, New York, NY 10029, USA*

*NYC Health + Hospitals/Elmhurst, Department of Emergency Medicine, 79-01 Broadway, Elmhurst, NY 11373, USA*

3 August 2020