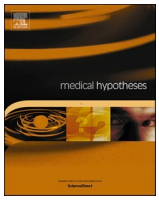

Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Medical Hypotheses 156 (2021) 110678

Contents lists available at ScienceDirect

Medical Hypotheses

journal homepage: www.elsevier.com/locate/mehy



Letter to Editors

# Estimate of benefit attributable to wearing masks in Chicago during the early days of the pandemic

ARTICLE INFO

*Keywords*
COVID-19
Face masks
Public safety
Benefit
Cost savings
Chicago

*To the Editor:*

Although face masks are believed to prevent transmission of SARS-CoV-2, there is limited evidence supporting this belief [1]. Time-dependent processes that are influenced by viral infection may be used to assess prevention of viral transmission. Because COVID-19 presentations to emergency departments in Chicago are reportable, their time course is ideally suited for such assessment.

As a rule, presentations of influenza-like illnesses to emergency departments in Chicago decline according to an empirical first-order process [2], the parameters of which are calculable from even limited paired data. Deviation from the theoretical 'decay' of those data, especially deviation that occurs coincident with, for example, the mandated wearing of face masks, can then be used for causal inference (Fig. 1).

COVID-19 data from all Chicago hospitals were obtained through portals of the Chicago Department of Public Health, https://www.chicago.gov/city/en/sites/covid19/home/covid-dashboard.html and https://data.cityofchicago.org/browse?limitTo=datasets&sortBy=alpha&tags=covid-19. **Panel A** of the figure shows the 7-day moving average of COVID-19 presentations for the period March 1, 2020 through November 13, 2020 [2]. Because reporting by all hospitals was not consistent until May 1, presentations prior to that date are not considered. **Panel B** of the figure shows the time course of COVID-19 presentations from peak through nadir (corresponding to the dashed enclosure, **Panel A**). The decline is biphasic, with the initial phase being the slower of the two. Here, the initial decline is treated as background, the rate constant of which is 0.028 $d^{-1}$. The more rapid decline is attributed to the wearing of face masks, which became mandatory May 1 (arrow, **Panel B**). Considered in this fashion, the difference between reported COVID-19 presentations and the background rate (gray area, **Panel B**) provides an estimate of benefit conferred by the public safety measure, *i.e.*, 13,934 fewer COVID-19 presentations to Chicago emergency departments. At Northwestern Memorial, a hospital representative of those in Chicago, 47% of COVID-19 presentations were admitted, 13% were held for observation, and 40% were discharged. The median expense for admitted patients was ~$24,000; for observed patients, ~$8,000; and for discharged patients, ~$2,000. Thus, even if the 13,934 presentations that were prevented had all been patients who were ultimately discharged, the cost avoidance was ~$28,000,000. Notwithstanding the expenses associated with their purchase, distribution and wearing, this estimate suggests face masks did indeed provide significant benefit during the early days of the pandemic. It is possible that other measures, *e.g.*, all manner of physical-distancing, and/or seasonal influences [2] may have contributed to the rather abrupt decrease in COVID-19 presentations early in the pandemic. But because the mandated wearing of face masks in the urban environment was the most obvious and coordinated healthcare measure, it is likely that it, above all other possible influences, was responsible for the effect.

## Funding

This work was supported by funds to GSR from the Department of Pathology, Feinberg School of Medicine, Northwestern University.

## Consent statement/Ethical approval

Not required.

## Declaration of Competing Interest

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.

https://doi.org/10.1016/j.mehy.2021.110678
Received 30 March 2021; Received in revised form 28 July 2021; Accepted 10 September 2021
Available online 13 September 2021

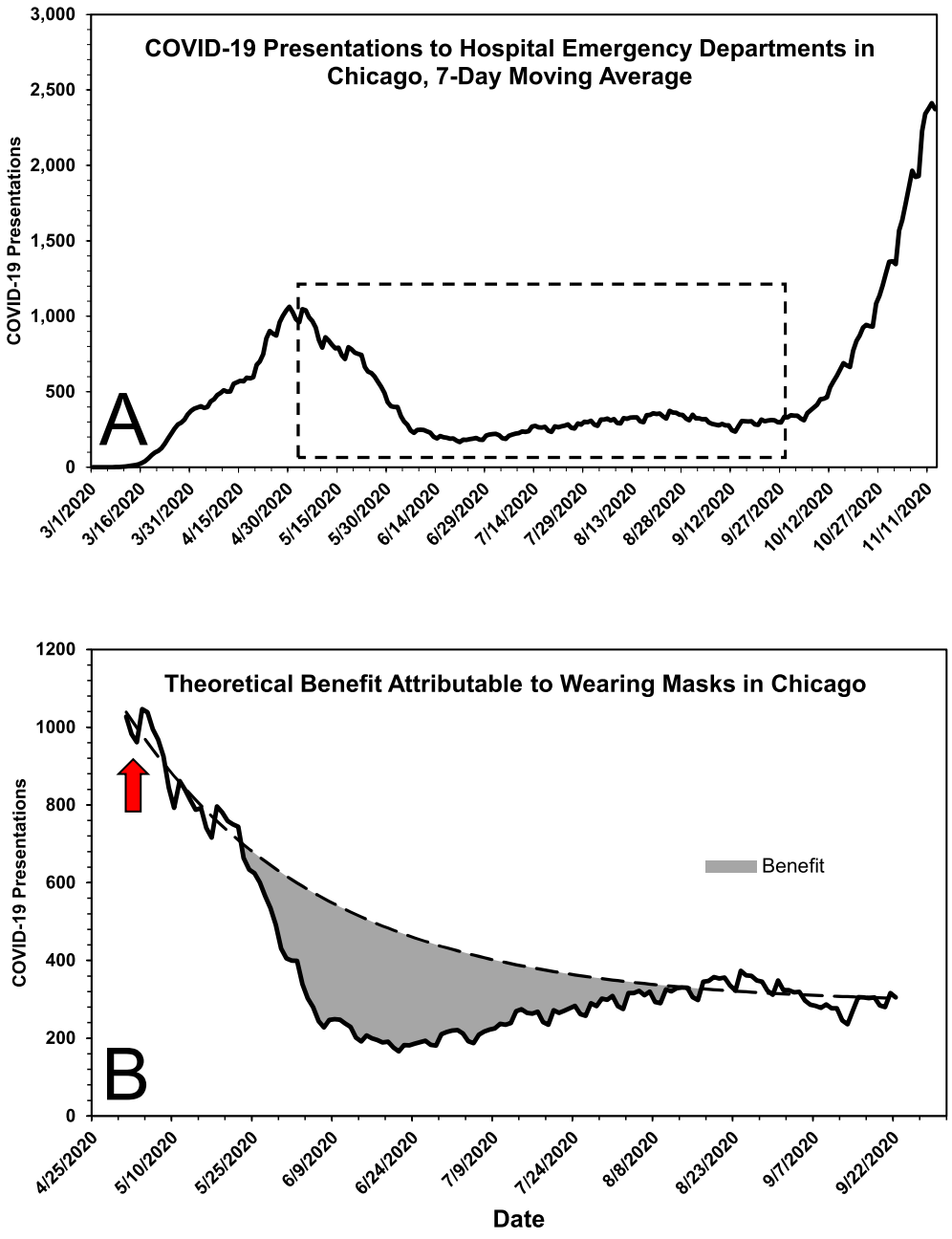






**Fig. 1. Panel A**, 7-day moving average of COVID-19 presentations to emergency departments of all Chicago hospitals, March 1, 2020, through November 13, 2020. The dashed line encloses the time-course shown in **Panel B**. In **B**, the dashed line represents the first-order fit of the ILI data for the period May 1, 2020 (arrow) through September 23, 2020 ($R^2 = 0.993$). Excluded from the fit were data corresponding to the period May 23, 2020, through August 16, 2020, the interval across which the benefit attributable to the wearing of face masks is purported to have occurred. See text for details.

## References

[1] Matuschek C, Moll F, Fangerau H, Fischer JC, Zänker K, van Griensven M, et al. Face masks: benefits and risks during the COVID-19 crisis. Eur. J. Med. Res. 2020;25(1). https://doi.org/10.1186/s40001-020-00430-5.

[2] Shah, R.B., Shah, R.D., Retzinger, D.G., Retzinger, A.C., Retzinger, D.A., Retzinger, G.S. Competing bioaerosols may influence the seasonality of influenza-like illnesses including COVID-19. The Chicago experience. Pathogens 2021; in press.

Damien G. Retzinger[a], Andrew C. Retzinger[b], Gregory S. Retzinger[c,*]
[a] *Graycore, Cincinnati, OH 45140, United States*
[b] *Department of Emergency Medicine, West Virginia University, Camden Clark Medical Center, Parkersburg, WV 26101, United States*
[c] *Department of Pathology, Feinberg School of Medicine, Northwestern University, Chicago, IL 60611, United States*

[*] Corresponding author.
*E-mail addresses:* damien@graycore.io (D.G. Retzinger), gretzing@nm.org (G.S. Retzinger).