



COVID-19 and Public Interest in Face Mask Use

Maintaining good general hygiene is an important aspect to prevent coronavirus disease (COVID-19), but there has been much controversy regarding face mask use in the community setting (1). The World Health Organization (WHO) does not recommend that healthy people wear a mask routinely (2), whereas the CDC has recently shifted to recommend wearing cloth face coverings in public (3) because of the evolving pandemic and new study findings on asymptomatic and presymptomatic virus transmission (4, 5). In many Asian countries such as China and Japan, the use of face masks in this pandemic is ubiquitous and is considered hygiene etiquette, whereas in many Western countries, its use in the public is less common. The discrepant behaviors between cultures have induced stigmatization and have even caused a rash of racism on several occasions.

To explore the relationship between public interest in face masks and the COVID-19 epidemic, we retrieved the global incidence data and Google Trends relative search volume (RSV) data on the topic “surgical mask” until May 20, 2020. We observed a divergent pattern of RSV values along the timeline of COVID-19, with some geographical regions having peak RSV values early in the epidemic (Figure 1 and Table E1 in the online supplement). This led us to ask whether early awareness on face mask use could help contain the outbreak. We further retrieved the RSV data over the early epidemic period from January 21, 2020 (when WHO published the first Situation Report) to March 11, 2020 (when WHO officially declared a pandemic), and correlated with the epidemics in different regions indicated by the average daily number of COVID-19 cases (6). We observed a significant inverse correlation, with a Kendall rank correlation coefficient (τ) of -0.47 ($P = 2.4 \times 10^{-5}$) among 42 geographical regions from six continents. Notably, lower numbers of daily cases were seen in several Asian regions that correlated with high search volumes (Figure 2). Partial correlation analysis showed that this correlation remained independently significant after adjusting for RSV of related terms of hand washing and social distancing as well as government policy responses represented by the Oxford COVID-19 Government Response Tracker stringency index over the same period (7) (Table E2).

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These results suggest that early public interest with face mask may be an independently important factor in controlling the COVID-19 epidemic on a population scale. One illustrative region is Hong Kong, where the public interest in a face masks is among the highest. Paralleling the high RSV index, a recent survey showed that a face mask was used in 98.8% of the respondents to prevent COVID-19, a proportion higher than other measures of hand washing or crowd avoidance (8). Being one of the first cities inflicted by the severe acute respiratory syndrome (SARS) virus, residents in Hong Kong saw COVID-19 with an uncanny resemblance and quickly equipped themselves with protective wear early in the epidemics. Despite the close proximity and heavy passenger traffic with mainland China, the rise in case numbers in the city was relatively modest. At 16 days after having the first patient with COVID-19, there were only 12 confirmed local cases before the city imposed mandatory quarantine for individuals arriving at the border. During that period, the RSV value has reached its peak (Figure E1) as the city received 294,883 arrivals from mainland China (9). Although the RSV values do not necessarily equate mask purchase or its actual use, we observed significant correlations with global e-commerce sales volumes and public opinion surveys (Table E3 and Figure E2). These suggest that the RSV index may serve as a good surrogate to reflect public interest even without absolute search volume data and population size adjustment (10).

It is reasonable to suggest that face masks can mitigate the current pandemic, as it may reduce coronavirus in aerosols and respiratory droplets (11). Multiple studies have demonstrated their protective role in preventing respiratory viral illnesses in health care (12) and household settings (13), acknowledging user adherence as an important factor. Furthermore, studies based on fluid dynamics unrelated to virus suggested that a cough turbulent gas cloud could propel to 7–8 m (14), and the SARS coronavirus 2 (SARS-CoV-2) may survive in environmental aerosols for 3 hours after deliberate jet nebulization (15), challenging the WHO and CDC recommendations on a social distance of 1–2 m. Advocacy to broaden the use of face masks in the community, both for source control and individual protection, should be considered, especially given the high viral load in asymptomatic or minimally symptomatic patients with COVID-19 (16).

The COVID-19 pandemic continues to inflict losses in different countries, yet we do not seem to have a highly effective method to control this disease. The healthcare systems worldwide are heavily burdened by the increase in case numbers, and the mortality rate can climb even higher when the systems become overloaded. We believe broader mask use is key to control the pandemic of COVID-19, apart from hand hygiene, social distancing, and other public policy measures. Although universal masking may seem tedious and is criticized by the lack of high-quality supporting evidence, we think it is reasonable to reconsider such a measure in all but sparse areas in the public. As the saying goes, “better safe than sorry,” and is it not better to adopt a possibly imperfect protective measure than to wait for more evidence at the expense of human lives? ■

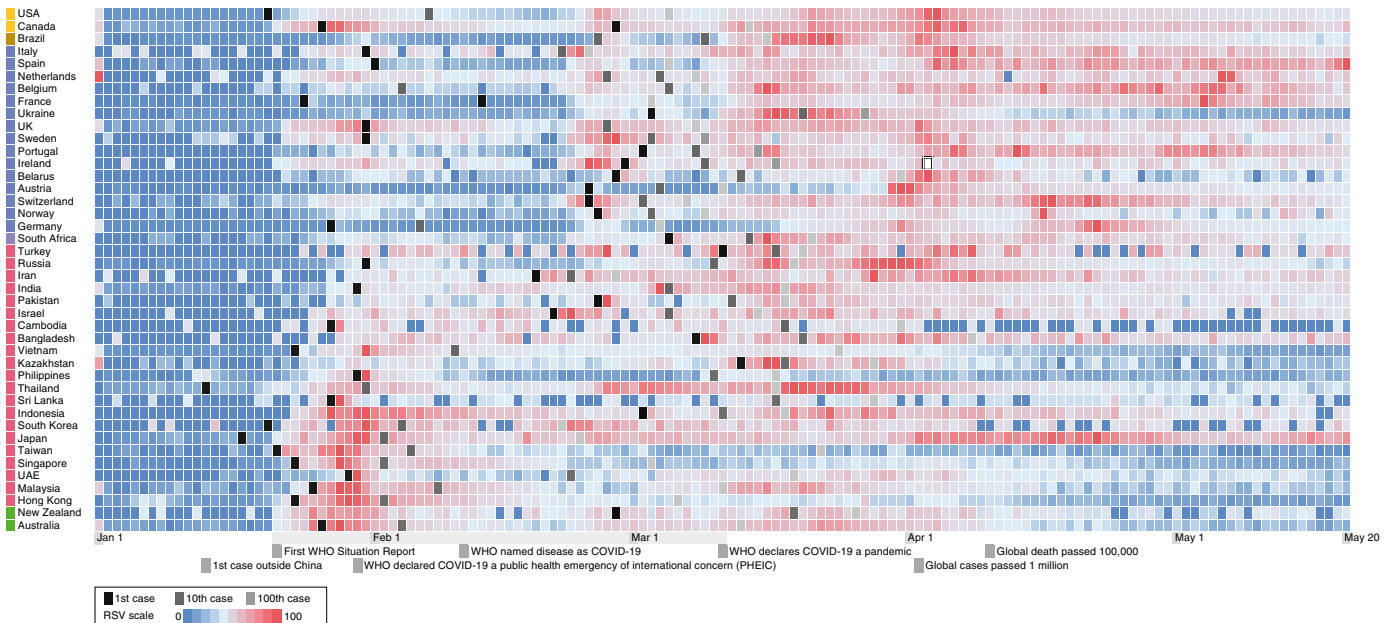


Figure 1. Heat-map showing RSV of surgical mask over the epidemic period until May 20, 2020. The color gradients indicate the RSV values, and the striped/cross-hatched boxes indicate the dates of the 1st, 10th, and 100th coronavirus disease (COVID-19) cases in the respective region. RSV = relative search volume; WHO = World Health Organization.

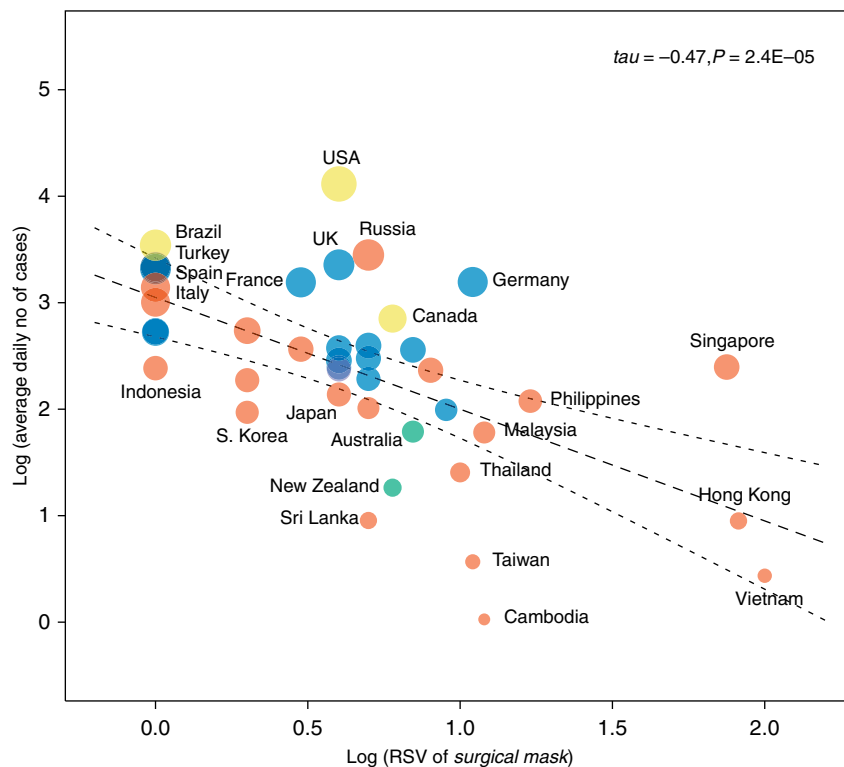


Figure 2. Diagram showing the relationship between RSV of surgical mask in the early epidemic period and the average daily number of cases. A significant correlation was observed ($\tau = -0.47$; $P = 2.4 \times 10^{-5}$), and it remained robust after removal of outliers ($P = 9.1 \times 10^{-5}$) in sensitivity analysis. The dot colors indicate continents of the respective regions, and the dot sizes correspond to the total cumulative number of coronavirus disease (COVID-19) cases as of May 20, 2020. RSV = relative search volume.

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References

- Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med* 2020;8: 434–436.
- World Health Organization. Coronavirus disease (COVID-19) advice for the public: When and how to use masks. 2020 [accessed 2020 May 27]. Available from: www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks.
- Centers for Disease Control and Prevention (CDC). How to protect yourself & others. 2020 [accessed 2020 May 27]. Available from: www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html.
- Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L, et al. Presumed asymptomatic carrier transmission of COVID-19. *JAMA* 2020;323: 1406–1407.
- Kimball A, Hatfield KM, Arons M, James A, Taylor J, Spicer K, et al.; Public Health – Seattle & King County; CDC COVID-19 Investigation Team. Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility - King County, Washington, March 2020. *MMWR Morb Mortal Wkly Rep* 2020;69: 377–381.
- Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis* 2020;20:533–534.
- Hale T, Webster S, Petherick A, Phillips T, Kira B; Blavatnik School of Government. Oxford COVID-19 government response tracker. 2020 [accessed 2020 May 27]. Available from: www.bsg.ox.ac.uk/covidtracker.
- Cowling BJ, Ali ST, Ng TWY, Tsang TK, Li JCM, Fong MW, et al. Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study. *Lancet Public Health* 2020;5:e279–e288.
- The Hong Kong Special Administrative Region Government Immigration Department. Statistics on passenger traffic. 2020 [accessed 2020 May 27]. Available from: www.immd.gov.hk/eng/message_from_us/stat_menu.html.
- Schootman M, Toor A, Cavazos-Rehg P, Jeffe DB, McQueen A, Eberth J, et al. The utility of Google Trends data to examine interest in cancer screening. *BMJ Open* 2015;5:e006678.
- Leung NHL, Chu DKW, Shiu EYC, Chan KH, McDevitt JJ, Hau BJP, et al. Respiratory virus shedding in exhaled breath and efficacy of face masks. *Nat Med* 2020;26:676–680.
- Radonovich LJ Jr, Simberkoff MS, Bessesen MT, Brown AC, Cummings DAT, Gaydos CA, et al.; ResPECT Investigators. N95 respirators vs medical masks for preventing influenza among health care personnel: a randomized clinical trial. *JAMA* 2019;322:824–833.
- Cowling BJ, Chan KH, Fang VJ, Cheng CK, Fung RO, Wai W, et al. Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Ann Intern Med* 2009;151: 437–446.
- Bourouiba L. Turbulent gas clouds and respiratory pathogen emissions: potential implications for reducing transmission of COVID-19. *JAMA* [online ahead of print] 26 Mar 2020; DOI: 10.1001/jama.2020.4756.
- van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 2020;382: 1564–1567.
- Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 2020;382:1177–1179.

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Thromboprophylaxis in COVID-19: Anti-FXa—the Missing Factor?



To the Editor:

Coronavirus disease (COVID-19) infection was declared a public health emergency of international concern in January 2020. The medical literature has since seen a succession of reports questioning a link between the disease in its severe form, a dynamic spectrum of coagulopathy, and a concerning incidence of thrombotic complications. As we accumulate observational data from around the globe and await well-designed prospective studies to inform best practice, clinical guidance on the management of thrombotic risk remains pragmatic.

We have read with interest initial reports from Wuhan, China, describing significant differences in D-dimer levels between survivors and nonsurvivors of COVID-19 and the overt presence of disseminated intravascular coagulation in over 70% of deaths (1). In light of the histological features of thrombotic occlusion of the pulmonary vasculature at autopsy (2), the Shanghai Clinical Treatment Group advised the early application of anticoagulation therapy in severe COVID-19. This led to a retrospective comparison of patients who had not received any heparin before the guidance with those who had, and, unsurprisingly, heparin treatment was associated with a reduced mortality. A prophylactic dose of low-molecular-weight heparin (LMWH) was mostly used; however, the authors proposed that a higher dose may be more beneficial for non-Asian patients (3).

With growing awareness of a distinct coagulopathy accompanying COVID-19 infection, the medical community has been keen to address the significant thrombotic risk for this patient group. Institutions have anecdotally reported what were perceived to be higher than expected rates of pulmonary embolus (PE), deep vein thrombosis, and occlusion of citrated circuits.

Klok and colleagues reported a 31% cumulative incidence of venous and arterial thrombosis, increasing to 49% after adjustment

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