



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.

found that 54.5% reported anosmia in the first week. In this subset, anosmia appeared on day 2 (IQR 0–5) and had a median duration of 6 (3–11) days, but in 10% of cases, anosmia could persist for 3 weeks or more. In contrast, fever lasted a median of 3 days (1–7), although 10% reported it lasting more than 11 days and only 3.6% for more than 21 days.⁵

These data suggest that those people with new-onset anosmia should self-isolate and seek testing. However, as anosmia or dysosmia can often be present long after the first 10 days when transmission is less likely,⁶ when used as a screening tool, it is crucial to consider the onset of symptoms so as not to discriminate against older people or those with long-term symptoms.

We thank all users of the COVID Symptoms Study app. ZOE Global provided in kind support for all aspects of building, running, and supporting the app and service to all users worldwide. The UK Department of Health funds the core data collection and surveys. CM is funded by the Chronic Disease Research Foundation and the Medical Research Council's AimHy project grant. CHS is supported by the Alzheimer's Society. SO is funded by the Wellcome Trust, the EPSRC Centre for Medical Engineering, and Innovate UK (UK Research and Innovation). TDS is consultant for ZOE Global. CJS declares no competing interests.

*Cristina Menni, Carole H Sudre, Claire J Steves, Sebastien Ourselin, *Tim D Spector*

tim.spector@kcl.ac.uk

Department of Twin Research and Genetic Epidemiology (CM, CJS, TDS) and School of Biomedical Engineering and Imaging Sciences (CHS, SO), King's College London, London SE1 7EH, UK; and MRC Unit for Lifelong Health and Ageing, University College London, London, UK (CHS)

- Menni C, Valdes AM, Freidin MB, et al. Real-time tracking of self-reported symptoms to predict potential COVID-19. *Nat Med* 2020; **26**: 1037–40.
- Department of Health and Social Care. Statement from the UK Chief Medical Officers on an update to coronavirus symptoms. May 18, 2020. <https://www.gov.uk/government/news/statement-from-the-uk-chief-medical-officers-on-an-update-to-coronavirus-symptoms-18-may-2020> (accessed Nov 2, 2020).
- Menni C, Sudre CH, Steves CJ, Ourselin S, Spector TD. Quantifying additional COVID-19 symptoms will save lives. *Lancet* 2020; **395**: e107–08.
- Brämerson A, Johansson L, Ek L, Nordin S, Bende M. Prevalence of olfactory dysfunction: the Skövde population-based study. *Laryngoscope* 2004; **114**: 733–37.

- Sudre C, Murray B, Varsavsky T, et al. Attributes and predictors of long-COVID: analysis of COVID cases and their symptoms collected by the Covid Symptoms Study app. *medRxiv* 2020; published online Oct 21. <https://doi.org/10.1101/2020.10.19.20214494> (preprint).
- Centers for Disease Control and Prevention. Duration of isolation and precautions for adults with COVID-19. Sept 10, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html> (accessed Sept 10, 2020).

Institutional versus home isolation to curb the COVID-19 outbreak

Borame Dickens and colleagues' Correspondence¹ is an interesting read. They have modelled and contrasted the epidemic curves of China with those of the USA and Europe to arrive at the conclusion that institutional isolation is better than home isolation.¹ They, however, do not explicitly discuss the caveats—both theoretical and real-life.

Theoretically, Dickens and colleagues¹ have made favourable oversimplistic assumptions, such as lower rates of infectivity (basic reproduction number of 2.0, unlike 1.4–6.5 reported elsewhere²) and a lower prevalence of asymptomatic individuals (up to 50%, unlike reports of up to 80% elsewhere³). There are further underlying assumptions—eg, early stage of importation, homogeneity of risk-exposure, and virulence of severe acute respiratory syndrome coronavirus 2 within and between populations. Differences in systems' capacity have been overlooked, such as strength of implementation of universal physical distancing, workplace or school closures, surveillance, testing and contact tracing interventions, surge capacity, and sustainability.

From a real-life perspective, Dickens and colleagues¹ could have discussed why Israel (an example cited for failed home-based isolation) has been able to implement other containment measures stringently and could still mitigate the spread of the virus. In fact, Germany could achieve success

despite home-based isolation and management of cases with mild symptoms, which could have also been discussed. Dickens and colleagues¹ mention, but do not elaborate on, the so-called legal enforcement dimension for facility-based isolation in Wuhan, China. Could legal enforcement of mandatory facility-based isolation confound and accentuate the effect of such isolation on containment, vis-à-vis that of voluntary home-based isolation? Would stringent enforcement violate individuals' right to freedom of choice? Quarantine and isolation have mental health consequences. Why remove individuals from familiar home environments?⁴

The pandemic is now also ravaging the low-income and middle-income countries (LMICs). WHO data show that these countries are under-resourced (eg, 25.9 doctors per 10 000 population in the USA [2016] vs 17.9 in China [2015] vs 7.8 in India [2017]) and overpopulated. Institutional isolation in LMICs has challenges related to capacity and quality of care. There is risk of undue exposure and further depletion of scarce health-care resources.⁵ The WHO-China Joint Mission on COVID-19⁶ suggested that infection among health-care workers could be high if supplies such as personal protective equipment are lower—a situation more likely in LMIC settings. Health systems in LMICs are not as resilient as in high-income countries. High rates of infection in their health-care workers could lead to a health services crisis.

We acknowledge that, at times, home-based isolation might have its disadvantages—eg, risk of transmission to others. Yet can we be as sure that institutional, and not home-based isolation, could contain the outbreak? Should these be stand-alone strategies? In figure A of the Correspondence,¹ it seems that the curves touch the x-axis almost simultaneously. Thus, the interventions will not reduce the duration of the outbreak but the peak. Since most



Palavra Baglioli/Getty Images

Published Online
November 6, 2020
[https://doi.org/10.1016/S0140-6736\(20\)32161-9](https://doi.org/10.1016/S0140-6736(20)32161-9)

For WHO data on doctors see http://www.who.int/gho/health_workforce/physicians_density/en/

countries have opted for both home-based and institutional isolation and lockdown, how do the 95% CIs of the curves overlap? A discussion of these issues would be insightful.

We declare no competing interests.

*Ajeet Singh Bhadoria,
Kanchan Gawande, Rachit Sharma,
Archisman Mohapatra, Ravi Kant
ajeetsinghbhadoria@gmail.com

All India Institute of Medical Sciences, Rishikesh,
249 203, India (ASB, KG, RK) and Executive Office,
GRID Council, Delhi, India (RS, AM)

- 1 Dickens BL, Koo JR, Wilder-Smith A, Cook AR. Institutional, not home-based, isolation could contain the COVID-19 outbreak. *Lancet* 2020; **395**: 1541–42.
- 2 Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. *J Travel Med* 2020; **27**: taaa021.
- 3 Day M. Covid-19: four fifths of cases are asymptomatic, China figures indicate. *BMJ* 2020; **369**: m1375.
- 4 Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 2020; **395**: 912–20.
- 5 WHO. Risk assessment and management of exposure of health care workers in the context of COVID-19. Interim guidance. March 19, 2020. https://apps.who.int/iris/bitstream/handle/10665/331496/WHO-2019-nCov-HCW_risk_assessment-2020.2-eng.pdf (accessed May 11, 2020).
- 6 WHO-China Joint Mission on Coronavirus Disease 2019. Report of the WHO-China Joint Mission on coronavirus disease 2019 (COVID-19). Feb 16, 2020. <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf> (accessed Nov 2, 2020).



Authors' reply

We thank Ajeet Singh Bhadoria and colleagues for their insightful comments in response to our Correspondence.¹ Although we focus on teasing out the impact of institutional isolation beyond the other non-pharmaceutical measures, we agree that isolation of all cases cannot be a stand-alone strategy. The pandemic response to COVID-19 must be a multipronged approach that includes liberal testing, tracing and quarantine of contacts, physical distancing, and widespread use of face masks—such a multipronged approach is particularly crucial for a disease with a high asymptomatic rate.² However, we disagree with Bhadoria and colleagues on several other points.

The authors offer two examples of countries with successful mitigation without case isolation, but recent data from the evolving epidemic show that neither Israel nor Germany have truly mitigated the outbreak. As of Sept 18, 2020, Israel became the first country to announce a second country-wide lockdown. Germany has been a role model in Europe based on extensive testing, tracing, and quarantine of contacts, but it did not contain the outbreak to the extent that various Asian countries did. We invite Bhadoria and colleagues to look further east, to China, Taiwan, South Korea, and Vietnam, for templates for success in preventing or mitigating widespread community spread. These countries employed isolation of all cases, even mild ones, often using isolation shelters, hospitals, or other institutions such as hotels.^{3,4}

Careful study of the sequential mounting of public health responses in Wuhan, China, to combat their explosive outbreak in January and February, 2020, showed five distinct phases. Only in the fourth and fifth phases, when isolation shelters for all cases (even mild cases) were instituted, did the epidemic curve not only flatten but show a rapid decline in daily new cases, down to zero within a matter of weeks.⁵ Of note, these shelters for isolation of mild cases were facilities built as make-shift hospitals in addition to existing health-care facilities.⁶

Why is institutional isolation such an impactful additional tool in the public health armamentarium to combat a respiratory pathogen associated with droplet, contact, and possibly even aerosol transmission? Because voluntary self-isolation of mild cases at home will always lead to some degree of non-compliance, thus further propagating transmission within households and into the community. As viral loads are high even in mild cases, mild cases can efficiently transmit the virus.⁷ There are ample reports that secondary attack rates in household settings are higher

than in most other settings. In fact, 46–66% of transmission is household-based (using the standard formula for attributable fraction).⁸ We need to zoom in our efforts on those settings where transmission is high.

The advantages of isolation of infected individuals in designated facilities are manifold. First, moving infected people out of their households and communities will interrupt chains of onward transmission. Second, even make-shift isolation shelters can provide medical monitoring to identify those patients who might clinically deteriorate, which usually happens around day 7–12 of illness. About 11% of mild cases deteriorate, often rapidly, with hypoxaemic pneumonia;⁶ hence mechanisms for rapid referrals from low-care isolation shelters to hospitals with higher levels of medical care will enhance clinical prognosis. Third, many self-isolating patients report loneliness and lack of access to daily necessities such as food. Isolation shelters can provide food, social activities, and company.⁴ Finally, isolation of all cases, even mild ones, will benefit the society at large as containing outbreaks early will prevent damaging lockdowns. It will also allow for speedier recovery of the economy as now seen in China.

Despite these advantages, we agree with Bhadoria and colleagues that there are several challenges with facility-based isolation of mild COVID-19. Make-shift hospitals or shelters where hundreds of infected people are cohorted might not be culturally acceptable in many societies—though such facilities have a long history—and cannot be legally enforceable in some jurisdictions. There are, however, other potentially more palatable options to isolate COVID-19 patients. Hotels or dormitories could be re-purposed, for example. Given the high global incidence of mild COVID-19 cases, we might not be able to rapidly scale up such facilities for all of those with mild disease. Those who live in multi-generational families, those staying at home with individuals at risk of severe COVID-19 outcomes, and