
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.

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## Widespread smell testing for COVID-19 has limited application

Having campaigned to achieve recognition that anosmia (loss of smell) is a highly prevalent symptom of COVID-19,[1,2] we were delighted that Public Health England changed the case definition on May 18, 2020.[3] We agree with Cristina Menni and colleagues,[4] that the added sensitivity attributed to adding anosmia to the case definition (less than 2%) is very likely to be a gross underestimate. Indeed, even the additional 15·9% of cases who are identified when including anosmia[5] might still fail to capture the full benefit because access to testing in the UK has been so restricted for patients with mild disease. Data from elsewhere suggest that anosmia will have most value as a marker in mild cases that, until recently, were excluded from testing.

However, we urge caution about a call to introduce smell tests as a screening tool in some settings, such as airports and shopping centres, with the intention of denying access to those identified as having lost their sense of smell.[4] Although new-onset and sudden-onset anosmia has a high likelihood of predicting a positive test for COVID-19 when the prevalence of disease is high, population estimates suggest that 19·1% of adults suffer from pre-existing diminished sense of smell, a figure that rises to 80% in patients older than 75·5 years. These data closely reflect the 21·7% of patients who tested negative for COVID-19 in the COVID Symptom Study who reported a loss of sense of smell.[5] Furthermore, in patients who have developed anosmia as a result of COVID-19, chemosensory loss persists for 8 weeks in approximately 10% of cases (unpublished), but this does not reflect how infectious these individuals are to others and when they have viral clearance. The self-reported median recovery rate of 5 days, as reported by Menni and colleagues,[4] will not be matched by the results of psychophysical smell tests. To deny access to airports or retail parks to approximately one fifth of the population on this basis risks introducing a form of discrimination and would be an intervention that goes beyond the public health benefits of reducing transmission.

We strongly advise all people who experience new-onset loss of sense of smell to self-isolate and seek confirmatory testing. However, we must not impose punitive measures on those patients who have lived without a sense of smell for many years. We encourage extreme caution in how this new finding is incorporated into policy and would suggest that clinicians and researchers working in this field be called upon to ensure that such policies are rigorously and appropriately defined.

We declare no competing interests.

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1 Hopkins C, Kumar N. Loss of sense of smell as marker of COVID-19 infection. March 19, 2020. https://www.entuk.org/loss-sense-smell-marker-covid-19-infection (accessed June 4, 2020).
2 Hopkins C, Kumar N, Smith BC. ENT UK statement on the failure to recognise lost sense of smell or taste as symptoms of COVID-19 infection. May 13, 2020. https://www.entuk.org/sites/default/files/ENT%20UK%20and%20BRS%20joint%20statement%20on%20anosmia.pdf (accessed June 4, 2020).
3 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).
4 Menni C, Sudre CH, Steves CJ, Ourselin S, Spector TD. Quantifying additional COVID-19 symptoms will save lives. *Lancet* 2020; **395:** e107–08.
5 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.
6 Brämerson A, Johansson L, Ek L, Nordin S, Bende M. Prevalence of olfactory dysfunction: the Skövde population-based study. *Laryngoscope* 2004; **114:** 733–37.

## Authors' reply

Since the beginning of the COVID-19 pandemic, there has been much debate worldwide about which of the COVID-19 symptoms should be used for contact tracing to contain the viral spread. In April, 2020, we showed that loss of smell was the strongest single predictor of COVID-19,[1] and anosmia was finally added to Public Health England's COVID-19 case definition on May 18, 2020.[2]

In our previous Correspondence,[3] we also suggested that low-cost so-called smell the difference screening tests could be implemented in some settings to capture a larger number of positives than temperature sensors do. We highlighted the greater potential importance of anosmia, as fever was present only in 42·7% of individuals testing positive, versus anosmia being present in 64·6% (34·7% of those not suffering from fever).[2]

However, we agree with Claire Hopkins and Barry Smith that recommendations for screening should be more cautious as a high percentage of the population, especially older people, have a pre-existing diminished sense of smell[4] and should not be discriminated against. There is also the problem of long duration symptoms, increasingly known as long COVID.

Using the COVID Symptoms Study app, which now has more than 4 million users,[5] we confirm that anosmia is still the single most predictive symptom of a positive swab test across different age groups, with odds ratios ranging from 13·67 (95% CI 11·65–16·02) for the older group to 20·86 (18·62–23·4) for the younger one (appendix).

We have also been able to collect data on symptoms duration. Of the 4182 adult app users who (1) were healthy at the time of sign-up, (2) tested positive for severe acute respiratory syndrome coronavirus 2 after registration on the app, with onset of symptoms occurring between 14 days before and 7 days after PCR test, and (3) logged regularly (ie, no gap in reporting of more than 7 days), we

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For **Public Health England's COVID-19 case definition** see https://www.gov.uk/government/publications/wuhan-novel-coronavirus-initial-investigation-of-possible-cases/investigation-and-initial-clinical-management-of-possible-cases-of-wuhan-novel-coronavirus-wn-cov-infection

For the **Covid Symptoms Study app** see https://covid.joinzoe.com/

See Online for appendix

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.

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1 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.

2 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).

3 Menni C, Sudre CH, Steves CJ, Ourselin S, Spector TD. Quantifying additional COVID-19 symptoms will save lives. *Lancet* 2020; **395:** e107–08.

4 Brämerson A, Johansson L, Ek L, Nordin S, Bende M. Prevalence of olfactory dysfunction: the Skövde population-based study. *Laryngoscope* 2004; **114:** 733–37.

5 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).

6 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' Correspondence[1] 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 colleagues[1] have made favourable over-simplistic assumptions, such as lower rates of infectivity (basic reproduction number of 2·0, unlike 1·4–6·5 reported elsewhere[2]) and a lower prevalence of asymptomatic individuals (up to 50%, unlike reports of up to 80% elsewhere[3]). 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 colleagues[1] 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 colleagues[1] 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-19[6] 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

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