

# UCSF

## UC San Francisco Previously Published Works

### Title

Asymptomatic Transmission, the Achilles' Heel of Current Strategies to Control Covid-19

### Permalink

<https://escholarship.org/uc/item/14x4t8t3>

### Journal

New England Journal of Medicine, 382(22)

### ISSN

0028-4793

### Authors

Gandhi, Monica  
Yokoe, Deborah S  
Havlir, Diane V

### Publication Date

2020-05-28

### DOI

10.1056/nejme2009758

Peer reviewed

## EDITORIAL



## Asymptomatic Transmission, the Achilles' Heel of Current Strategies to Control Covid-19

Monica Gandhi, M.D., M.P.H., Deborah S. Yokoe, M.D., M.P.H., and Diane V. Havlir, M.D.

Traditional infection-control and public health strategies rely heavily on early detection of disease to contain spread. When Covid-19 burst onto the global scene, public health officials initially deployed interventions that were used to control severe acute respiratory syndrome (SARS) in 2003, including symptom-based case detection and subsequent testing to guide isolation and quarantine. This initial approach was justified by the many similarities between SARS-CoV-1 and SARS-CoV-2, including high genetic relatedness, transmission primarily through respiratory droplets, and the frequency of lower respiratory symptoms (fever, cough, and shortness of breath) with both infections developing a median of 5 days after exposure. However, despite the deployment of similar control interventions, the trajectories of the two epidemics have veered in dramatically different directions. Within 8 months, SARS was controlled after SARS-CoV-1 had infected approximately 8100 persons in limited geographic areas. Within 5 months, SARS-CoV-2 has infected more than 2.6 million people and continues to spread rapidly around the world.

What explains these differences in transmission and spread? A key factor in the transmissibility of Covid-19 is the high level of SARS-CoV-2 shedding in the upper respiratory tract,<sup>1</sup> even among presymptomatic patients, which distinguishes it from SARS-CoV-1, where replication occurs mainly in the lower respiratory tract.<sup>2</sup> Viral loads with SARS-CoV-1, which are associated with symptom onset, peak a median of 5 days later than viral loads with SARS-CoV-2, which makes symptom-based detection of infection more effective in the case of SARS CoV-1.<sup>3</sup> With influ-

enza, persons with asymptomatic disease generally have lower quantitative viral loads in secretions from the upper respiratory tract than from the lower respiratory tract and a shorter duration of viral shedding than persons with symptoms,<sup>4</sup> which decreases the risk of transmission from paucisymptomatic persons (i.e., those with few symptoms).

Arons et al. now report in the *Journal* an outbreak of Covid-19 in a skilled nursing facility in Washington State where a health care provider who was working while symptomatic tested positive for infection with SARS-CoV-2 on March 1, 2020.<sup>5</sup> Residents of the facility were then offered two facility-wide point-prevalence screenings for SARS-CoV-2 by real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) of nasopharyngeal swabs on March 13 and March 19–20, along with collection of information on symptoms the residents recalled having had over the preceding 14 days. Symptoms were classified into typical (fever, cough, and shortness of breath), atypical, and none. Among 76 residents in the point-prevalence surveys, 48 (63%) had positive rRT-PCR results, with 27 (56%) essentially asymptomatic, although symptoms subsequently developed in 24 of these residents (within a median of 4 days) and they were reclassified as presymptomatic. Quantitative SARS-CoV-2 viral loads were similarly high in the four symptom groups (residents with typical symptoms, those with atypical symptoms, those who were presymptomatic, and those who remained asymptomatic). It is notable that 17 of 24 specimens (71%) from presymptomatic persons had viable virus by culture 1 to 6 days before the development of symptoms. Finally, the

mortality from Covid-19 in this facility was high; of 57 residents who tested positive, 15 (26%) died.

An important finding of this report is that more than half the residents of this skilled nursing facility (27 of 48) who had positive tests were asymptomatic at testing. Moreover, live coronavirus clearly sheds at high concentrations from the nasal cavity even before symptom development. Although the investigators were not able to retrospectively elucidate specific person-to-person transmission events and although symptom ascertainment may be unreliable in a group in which more than half the residents had cognitive impairment, these results indicate that asymptomatic persons are playing a major role in the transmission of SARS-CoV-2. Symptom-based screening alone failed to detect a high proportion of infectious cases and was not enough to control transmission in this setting. The high mortality (>25%) argues that we need to change our current approach for skilled nursing facilities in order to protect vulnerable, enclosed populations until other preventive measures, such as a vaccine or chemoprophylaxis, are available.

A new approach that expands Covid-19 testing to include asymptomatic persons residing or working in skilled nursing facilities needs to be implemented now. Despite “lockdowns” in these facilities, coronavirus outbreaks continue to spread, with 1 in 10 nursing homes in the United States (>1300 skilled nursing facilities) now reporting cases, with the likelihood of thousands of deaths.<sup>6</sup> Mass testing of the residents in skilled nursing facilities will allow appropriate isolation of infected residents so that they can be cared for and quarantine of exposed residents to minimize the risk of spread. Mass testing in these facilities could also allow cohorting<sup>7</sup> and some resumption of group activities in a nonoutbreak setting. Routine rRT-PCR testing in addition to symptomatic screening of new residents before entry, conservative guidelines for discontinuation of isolation,<sup>7</sup> and periodic retesting of long-term residents, as well as both periodic rRT-PCR screening and surgical masking of all staff, are important concomitant measures.

There are approximately 1.3 million Americans currently residing in nursing homes.<sup>8</sup> Although this recommendation for mass testing in skilled nursing facilities could be initially rolled out in geographic areas with high rates of community Covid-19 transmission, an argument can be made

to extend this recommendation to all U.S.-based skilled nursing facilities now because case ascertainment is uneven and incomplete and because of the devastating consequences of outbreaks. Immediately enforceable alternatives to mass testing in skilled nursing facilities are few. The public health director of Los Angeles has recommended that families remove their loved ones from nursing homes,<sup>9</sup> a measure that is not feasible for many families.

Asymptomatic transmission of SARS-CoV-2 is the Achilles’ heel of Covid-19 pandemic control through the public health strategies we have currently deployed. Symptom-based screening has utility, but epidemiologic evaluations of Covid-19 outbreaks within skilled nursing facilities such as the one described by Arons et al. strongly demonstrate that our current approaches are inadequate. This recommendation for SARS-CoV-2 testing of asymptomatic persons in skilled nursing facilities should most likely be expanded to other congregate living situations, such as prisons and jails (where outbreaks in the United States, whose incarceration rate is much higher than rates in other countries, are increasing), enclosed mental health facilities, and homeless shelters, and to hospitalized inpatients. Current U.S. testing capability must increase immediately for this strategy to be implemented.

Ultimately, the rapid spread of Covid-19 across the United States and the globe, the clear evidence of SARS-CoV-2 transmission from asymptomatic persons,<sup>5</sup> and the eventual need to relax current social distancing practices argue for broadened SARS-CoV-2 testing to include asymptomatic persons in prioritized settings. These factors also support the case for the general public to use face masks<sup>10</sup> when in crowded outdoor or indoor spaces. This unprecedented pandemic calls for unprecedented measures to achieve its ultimate defeat.

Disclosure forms provided by the authors are available with the full text of this editorial at NEJM.org.

From the Department of Medicine, University of California, San Francisco.

This editorial was published on April 24, 2020, at NEJM.org.

1. Wölfel R, Corman VM, Guggemos W, et al. Virological assessment of hospitalized patients with COVID-2019. *Nature* 2020 April 1 (Epub ahead of print).
2. Cheng PK, Wong DA, Tong LK, et al. Viral shedding patterns of coronavirus in patients with probable severe acute respiratory syndrome. *Lancet* 2004;363:1699-700.

3. To KK-W, Tsang OT-Y, Leung W-S, et al. Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. *Lancet Infect Dis* 2020 March 23 (Epub ahead of print).
4. Ip DKM, Lau LLH, Leung NHL, et al. Viral shedding and transmission potential of asymptomatic and paucisymptomatic influenza virus infections in the community. *Clin Infect Dis* 2017;64:736-42.
5. Arons MM, Hatfield KM, Reddy SC, et al. Presymptomatic SARS-CoV-2 infections and transmission in a skilled nursing facility. *N Engl J Med*. DOI: 10.1056/NEJMoa2008457.
6. Cenziper D, Jacobs J, Mulcahy S. Nearly 1 in 10 nursing homes nationwide report coronavirus cases. *Washington Post*. April 20, 2020 (<https://www.washingtonpost.com/business/2020/04/20/nearly-one-10-nursing-homes-nationwide-report-coronavirus-outbreaks/>).
7. Centers for Disease Control and Prevention. Key strategies to prepare for COVID-19 in long-term care facilities (LTCFs): updated interim guidance. April 15, 2020 (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/long-term-care.html>).
8. Centers for Disease Control and Prevention. Nursing home care. March 11, 2016 (<https://www.cdc.gov/nchs/fastats/nursing-home-care.htm>).
9. Dolan J, Hamilton M. Consider pulling residents from nursing homes over coronavirus, says county health director. *Los Angeles Times*. April 7, 2020 (<https://www.latimes.com/california/story/2020-04-07/coronavirus-nursing-homes-residents-remove-la-county>).
10. Centers for Disease Control and Prevention. Use of cloth face coverings to help slow the spread of COVID-19. April 3, 2020 (<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html>).

DOI: 10.1056/NEJMe2009758

Copyright © 2020 Massachusetts Medical Society.