for positive samples (-360 vs. -77 per week; p<0.05) also differed between 2020 and 2019 (Figure 1, panel B). Both the number of influenza strains isolated from clinical specimens in commissioned laboratories and the positivity rate dropped drastically in 2020; the trends were different from 2019 (p<0.05 for both) (Figure 1, panel C). The number of cases of confirmed influenza with severe complications decreased from 99 to 1 in 2020, compared with a decrease from 44 to 22 in 2019 (p<0.05) (Figure 1, panel D). In contrast, the number of outpatient department visits for varicella and the number of varicella diagnoses per 1,000 visits remained similar in 2020 and 2019 (p = 0.660 for outpatient department visits and p = 0.157 for varicella diagnosis) (Figure 1, panel E).

The functional healthcare and surveillance systems in Taiwan, the government's efforts to identify causes of ILI during the COVID-19 pandemic, and sufficient laboratory capacity ensure appropriate influenza testing and reporting of results. Healthcare avoidance during COVID-19 pandemic may be an important confounder for the results we reported. However, because of awareness of the similarities in symptoms between COVID-19 and influenza and the low number of COVID-19 patients in Taiwan (<200 cases as of March 21, 2020), patients with ILI would not avoid seeking medical help for a diagnosis. Healthcare avoidance also did not explain the lower number of severe influenza cases observed in 2020 (Figure 1, panel D). Therefore, we believe that the decreasing influenza activity in Taiwan in 2020 is the result of strict control measures that were established in response to COVID-19.

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Asymptomatic SARS-CoV-2 Infection in Household Contacts of a Healthcare Provider, Wuhan, China

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We found that all 5 asymptomatic household contacts of a Wuhan, China, physician with coronavirus disease had severe acute respiratory syndrome coronavirus 2 detected by PCR. The index patient and 2 contacts also had abnormal chest computed tomography scans. Asymptomatic infected household contacts of healthcare workers with coronavirus disease might be underrecognized.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the cause of the coronavirus disease (COVID-19) pandemic, is highly contagious and can put families of healthcare professionals at risk for both symptomatic COVID-19 and asymptomatic

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Table. Summary of laboratory results of a SARS-CoV-2–positive patient and 5 asymptomatic household contacts, Wuhan, China*

Laboratory test	Reference range	Patient 1	Contact 1	Contact 2†	Contact 3‡	Contact 4	Contact 5
C-reactive protein, mg/L	0–10	18.8	2.0	0.4	0.4	1.5	2.7
Leukocyte count, × 10⁹ cells/L	3.5–9.5	6.68	6.89	4.79	6.86	3.54	5.84
Lymphocyte ratio, %	20–50	17.70	18.50	45.50	67.90	34.60	33.10
CD19⁺ absolute count/μL	240–1317	140	147	626	767	271	299
ALT, U/L	7–45	45	11	520	16	15	7
AST, U/L	13–35	21	14	439	24	18	14
D-dimer, ng/mL	0–500	161	89	101	>3500	150	97

*ALT, alanine aminotransferase; AST, aspartate aminotransferase; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.
†Contact 2 had 4 serial negative throat swabs for SARS-CoV-2, and negative influenza A, influenza B, respiratory syncytial virus, parainfluenza virus, adenoviridae, Epistein-Barr virus, cucumber mosaic virus, mycoplasma, and chlamydia results. He had elevated AST and ALT and was negative for hepatitis A, B, C, and E; he had no jaundice or gastrointestinal symptoms. His AST and ALT returned to normal after 9 days of treatment with glycyrrhizinate 50 mg 3 times daily and vitamin C (0.2 g 3×/d).
‡Contact 3 had an elevated D-dimer level without anemia, bleeding, or evidence of a coagulopathy. She received vitamin C (0.2 g 3 ×/d). After the SARS-CoV-2 nucleic acid (throat swab) test was negative, her D-dimer level returned to normal (111 ng/mL).

SARS-CoV-2 infection with potential to infect others (1–4). Data regarding asymptomatic SARS-CoV-2 infection (5) among families of healthcare professionals can help inform healthcare management and the public health response during the COVID-19 pandemic. We describe the case of a physician in Wuhan, China, who had mildly symptomatic COVID-19 and the subsequent asymptomatic SARS-CoV-2 infection in all 5 of his household contacts.

The index patient (patient 1) was a 39-year-old nephrologist at Central Hospital of Wuhan who had onset of a dry cough on January 31, 2020, was admitted with fever on February 7, and was diagnosed with symptomatic SARS-CoV-2 infection on February 10. During January 31–February 6, patient 1 lived with 5 other immediate family members, all of whom were hospitalized on February 11 at Zhongnan Hospital of Wuhan University for ethics committee–approved (approval no. 2019125) medical studies, for which informed consent was obtained. The household contacts were his 37-year-old wife, a laboratory physician without patient contact at Zhongnan Hospital (contact 1); 7-year-old fraternal twins, who were in contact only with family because of school closure and social distancing (contacts 2 and 3); a retired 62-year-old grandfather, who was a current smoker in good health (contact 4); and a retired 64-year-old grandmother in good health (contact 5).

All household contacts underwent chest computed tomography scans and throat swabs for quantitative real-time reverse transcription PCR (qRT-PCR) tests for SARS-CoV-2 nucleic acid, in addition to other routine laboratory examinations (Table). qRT-PCR tests on stool specimens of contacts 1, 2, and 3 were positive for SARS-CoV-2. Contact 1 also was positive for SARS-CoV-2 on qRT-PCR tests of multiple serial throat swab specimens but negative for SARS-CoV-2 on IgM and IgG tests.

All 5 household contacts of patient 1 had laboratory evidence of SARS-CoV-2 infection but remained asymptomatic throughout the period of observation (February 11–March 1) (Figure, panel A). All household contacts who had throat swab specimens tested for SARS-CoV-2 were positive by PCR except for contact 2, who tested negative on 4 consecutive throat swab specimen tests for SARS-CoV-2 but whose stool specimen was positive for SARS-CoV-2; contact 2 also had elevated liver enzymes but no jaundice. Contact 3 had an elevated D-dimer level. These abnormal laboratory values resolved during observation (Table) and were not associated with clinical illness in either patient. Patient 1 and contacts 2 and 4 also had abnormal chest computed tomography scans consistent with SARS-CoV-2 infection (Figure, panel B).

Contact 1 underwent 11 serial throat swabs for SARS-CoV-2. Her case demonstrates the challenges of clinical interpretation qRT-PCR results for SARS-CoV-2. On 2 separate occasions, she had 2 consecutive negative results on throat swab specimens for SARS-CoV-2, only to revert back to having a throat swab specimen positive for SARS-CoV-2 (Figure, panel A). Contact 1 was the only family member who underwent serologic tests, which demonstrated low B lymphocyte counts but no detectable SARS-CoV-2–specific IgM or IgG. We cannot determine the cause or clinical significance of the lack of a detectable antibody response in contact 1 in our study, which differs from findings reported in other studies (6). The immunologic response after asymptomatic SARS-CoV-2 infection requires further study.

A likely source of infection for the 5 asymptomatic contacts was patient 1. Contact 1 had no patient contact and no known contact with COVID-19–positive co-workers, and contacts 2, 3, 4, and 5 were at their home in Wuhan and had no other substantial human contact during the period when they likely were infected. We identified no other likely source of infection. Our study could not determine the method of transmission between family contacts, but we did note the potential for respiratory transmission (e.g., through droplets), fecal–oral transmission, or both.
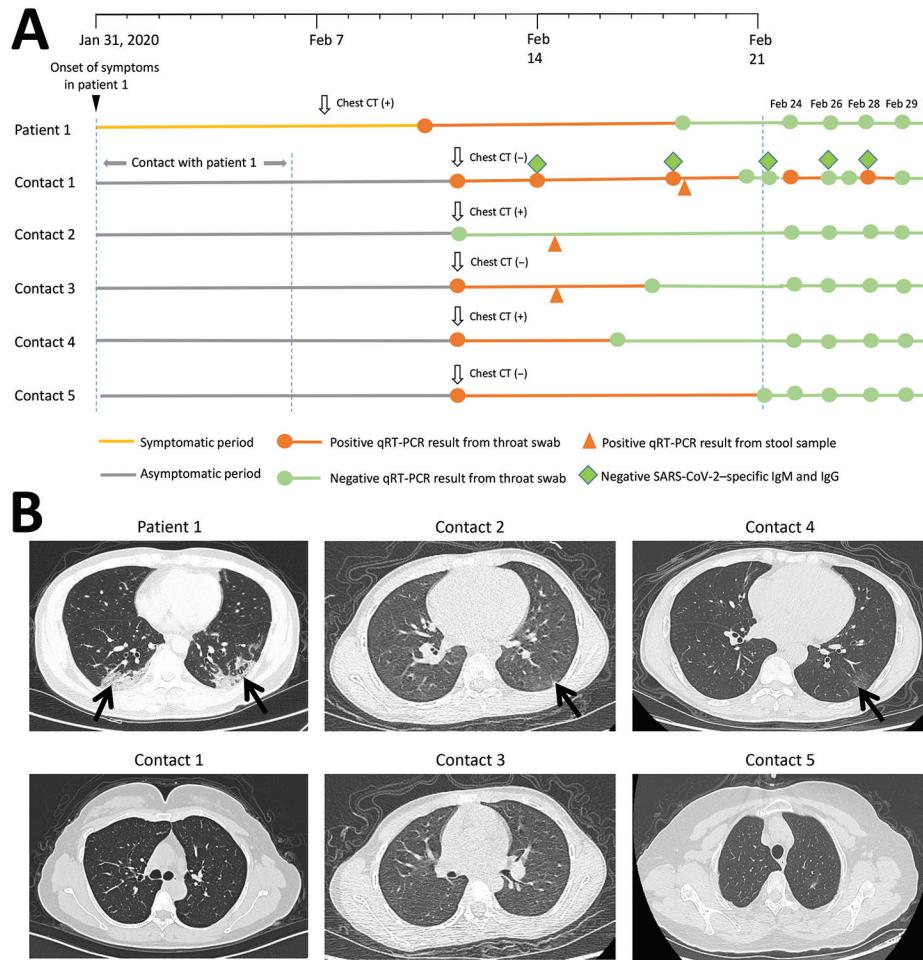
Figure. Timeline and CT images associated with a cluster of SARS-CoV-2 infections in a single household, Wuhan China. A) Timeline of key events, including laboratory tests, associated with SARS-CoV-2 infections in the index patient and 5 asymptomatic household contacts. B) Abnormal chest CT scans showing features consistent with SARS-CoV-2 infection (arrows) observed in the index patient and 2 household contacts (top row), compared with normal CT scans among the 3 other household contacts (bottom row). CT, computed tomography; qRT-PCR, quantitative real-time reverse transcription PCR; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

An early report from China on 72,314 COVID-19 cases found that only 1% of SARS-CoV-2 infections were asymptomatic; however, asymptomatic close contacts were not routinely tested in that study (*7*). In our study, all 5 household contacts of a physician diagnosed with COVID-19 had laboratory evidence of infection but remained asymptomatic. This finding is consistent with emerging evidence that suggests that a substantial proportion of SARS-CoV-2 infections are asymptomatic (*1*,*8*,*9*).

In summary, this single-household study found a high attack rate for asymptomatic SARS-CoV-2 infection among the immediate family members of a symptomatic COVID-19 case-patient. The extent to which asymptomatic SARS-CoV-2 infections contribute to overall disease transmission is still unknown and warrants further study. We believe the potential for fecal–oral transmission also warrants investigation (*10*). Moreover, our experience indicates that screening symptomatic contacts with a single throat swab test for SARS-CoV-2 might

lead to an underestimate of the rate of infection and that asymptomatic persons can repeatedly revert between positive and negative PCR results on throat specimens.

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Decreased Influenza Incidence under COVID-19 Control Measures, Singapore

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We compared indicators of influenza activity in 2020 before and after public health measures were taken to reduce coronavirus disease (COVID-19) with the corresponding indicators from 3 preceding years. Influenza activity declined substantially, suggesting that the measures taken for COVID-19 were effective in reducing spread of other viral respiratory diseases.

Public health measures, including public education and physical distancing, were implemented in Singapore to reduce transmission of coronavirus disease (COVID-19). However, instead of a lockdown, Singapore kept schools and workplaces open and did not advise the routine use of masks for persons who were well during the initial phase of the outbreak in January–February 2020. We examined the effect of these COVID-19 measures on influenza incidence as a proxy to determine the overall potential reduction in respiratory virus transmission.

We obtained routine sentinel surveillance data on influenza-like illnesses (ILI) from a national network of primary care clinics and the National Public Health Laboratory. ILI was defined as fever ($\geq$38°C) and cough. Data included number of visits to government primary care clinics for ILI per day, ILI samples tested per week, and percentage influenza positivity. We estimated number of influenza cases per day by multiplying ILI visits per day by the proportion of ILI patients who tested positive for influenza, which better reflects influenza infection rates than either indicator alone (1).

We compared influenza activity between epidemiologic weeks 1–4 and weeks 5–9 of 2020. Most community-based COVID-19 measures were instituted after the first few cases were reported in epidemiologic week 4, and public awareness was increased (2). These measures included cancellation of large-scale events and precautions at schools (e.g., fewer assemblies, no interclass mixing, and staggered meal times) and workplaces (e.g., segregated teams and teleworking