

55%–77% lower than the mean estimated R_0 of 2.2 (4). This finding is consistent with the observed 76% reduction in influenza transmission.

Our study has several limitations. First, a decrease in influenza transmission is expected in February–March, given the yearly bimodal pattern of influenza incidence in Singapore (5). However, the decrease in 2020 is marked compared to previous years. Second, there could be fewer ILI visits to government clinics because of altered health-seeking behavior, or cases may be referred to hospitals and therefore not captured as ILI cases in clinics. However, these missed ILI cases would not affect the proportion positive for influenza. Third, we can infer similar effects on COVID-19 only if the transmission dynamics are similar to influenza.

In conclusion, we found a marked decline in ILI in Singapore after the implementation of public health measures for COVID-19. Our findings suggest that such measures are effective in reducing spread of viral respiratory diseases and could mitigate the impact of the COVID-19 pandemic.

About the Author

Dr. Soo is a preventive medicine resident in the National University Health System in Singapore. He obtained his medical degree from the National University of Singapore and is currently pursuing a Master of Public Health degree.

References

1. Lee VJ, Chen MI, Yap J, Ong J, Lim W-Y, Lin RTP, et al. Comparability of different methods for estimating influenza infection rates over a single epidemic wave. *Am J Epidemiol*. 2011;174:468–78. <https://doi.org/10.1093/aje/kwr113>
2. Singapore Government. Coronavirus disease 2019: cases in Singapore. A timeline of the confirmed cases in Singapore. 2020 [cited 2020 April 15]. <https://www.gov.sg/article/covid-19-cases-in-singapore>
3. World Health Organization. Q&A: Similarities and differences—COVID-19 and influenza. Geneva: The Organization; 2020 [cited 2020 April 15]. <https://www.who.int/news-room/q-a-detail/q-a-similarities-and-differences-covid-19-and-influenza>
4. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*. 2020;382:1199–207. <https://doi.org/10.1056/NEJMoa2001316>
5. Chow A, Ma S, Ling AE, Chew SK. Influenza-associated deaths in tropical Singapore. *Emerg Infect Dis*. 2006;12:114–21. <https://doi.org/10.3201/eid1201.050826>

Address for correspondence: Vernon J. Lee, Communicable Diseases Division, Ministry of Health, Singapore, 12 College Rd, 169852, Singapore; email: Vernon_Lee@moh.gov.sg

SARS-CoV-2 Transmission from Presymptomatic Meeting Attendee, Germany

DirkJan Hijnen, Angelo Valerio Marzano, Kilian Eyerich, Corine GeurtsvanKessel, Ana Maria Giménez-Arnau, Pascal Joly, Christian Vestergaard, Michael Sticherling, Enno Schmidt

Author affiliations: Erasmus MC University Medical Center Rotterdam, Rotterdam, the Netherlands (D. Hijnen, C. GeurtsvanKessel); Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy (A.V. Marzano); Università degli Studi di Milano, Milan (A.V. Marzano); Karolinska Institutet, Solna, Sweden (K. Eyerich); Universitat Autònoma de Barcelona, Barcelona, Spain (A.M. Giménez-Arnau); INSERM U—Rouen University Hospital, Rouen, France (P. Joly); Aarhus University Hospital, Aarhus, Denmark (C. Vestergaard); University Hospitals Erlangen, Erlangen, Germany (M. Sticherling); Lübeck Institute of Experimental Dermatology, Lübeck, Germany (E. Schmidt); University of Lübeck, Lübeck (E. Schmidt)

DOI: <https://doi.org/10.3201/eid2608.201235>

During a meeting in Munich, Germany, a presymptomatic attendee with severe acute respiratory syndrome coronavirus 2 infected at least 11 of 13 other participants. Although 5 participants had no or mild symptoms, 6 had typical coronavirus disease, without dyspnea. Our findings suggest hand shaking and face-to-face contact as possible modes of transmission.

We describe efficient spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) resulting from contact with a presymptomatic infected person during a scientific advisory board meeting held February 20–21, 2020, in Munich, Germany; the country had <20 diagnosed coronavirus disease (COVID-19) cases at the time. Eight dermatologists from 7 countries and 6 scientists from the same company attended the meeting at a hotel in central Munich. The meeting was held in a room (≈ 70 m²) with conventional radiators; a U-shaped setup of tables were separated by a central aisle >1 m wide. During the meeting, refreshments were served buffet style in the same room 4 times. In addition to 9.5 hours of discussions, the participants had dinner on February 20 in a nearby restaurant. Additional direct contacts between participants were handshakes during welcome and farewell with few short hugs without kisses. None of the participants, including the index patient (participant [Pt] 1), showed any signs of infection (e.g., coughing, sneezing, respiratory symptoms,

shivering, fever) before or during the meeting. No one wore a mask during the meeting. After the meeting, the index patient (Pt 1) shared a taxi with Pt 2, 4, and 9 for ≈ 45 min.

After returning home the evening of February 21, Pt 1 sought care for fever. Reverse transcription PCR was performed on throat and nasal swab specimens, and SARS-CoV-2 RNA was detected by established methods (1). The patient was admitted to the hospital for supportive care, although he had only moderate symptoms (Table, <https://wwwnc.cdc.gov/EID/article/26/8/20-1235-T1.htm>).

National authorities contacted most meeting participants on February 26 (Pt 7, 11–13) and 27 (Pt 2–6, 8–12); Pt 14 was contacted by a coworker. Twelve participants, including Pt 1, were tested for SARS-CoV-2 by PCR; 2 were not, Pt 9 because he showed no signs of infection and Pt 6 because testing was not available at his location (New York, NY, USA) at the time. Pt 6 later underwent ELISA testing, which showed IgA and IgG against the recombinant S1 domain of structural protein of SARS-CoV-2 (Euroimmun, <https://www.euroimmun.com>) (2). Excluding the index patient, in 10/11 tested participants, SARS-CoV-2 RNA was detected. In 1 participant, Pt 11, the PCR result for SARS-CoV-2 RNA was negative (Table). Thus, the index patient infected ≥ 11 (85%) of the 13 other participants.

All participants were isolated either in a hospital or at home with or without their families, regardless of the outcome of the first PCR test. These measures resulted in the subsequent infection of 14 additional persons (Table). Of the 12 infected participants, 2 (17%) had no symptoms, 3 (25%) experienced mild influenza-like symptoms, and 7 (58%) experienced a considerable reduction of their health, without dyspnea, classified as moderate COVID-19 (Table). None of the participants had a relevant medical history.

The index patient (Pt 1) was most likely infected by an outpatient he had examined in Milan, Italy, on February 18. The index patient reported that he had experienced no symptoms when attending the meeting. Probable transmission of SARS-CoV-2 from presymptomatic persons has been reported (3,4), with viral load levels in the nose similar to those of symptomatic patients (5). In contrast to severe acute respiratory syndrome coronavirus and influenza virus, the infectiousness of SARS-CoV-2 peaks on or before symptom onset (6).

The exact mode of transmission during the meeting remains elusive. At least 4 routes have been suggested: droplets during face-to-face contacts, aerosolized droplets ($< 5 \mu\text{m}$) via air flow, fomites, and hand shaking (4,7–9). We identified face-to-face contacts lasting > 5 min with the index patient and the 11 infected

participants during 2 lunches (30 min each), 2 coffee breaks (15 min each), and the social dinner (sitting close to Pt 2, 4, 5, and 11). We also tracked Pt 1 sitting next to Pt 3 and Pt 6 during the meeting, and a 45-min taxi ride after the meeting (with Pt 2, 4, and 9) (Table). The index patient sat ≈ 2.60 m away from the closest participant opposite to him and had an average talk time during the meeting. Virus aerosolization in the relatively small room that was heated by conventional radiators appears to be possible in light of the duration of the meeting. Transmission via fomites appears to be less likely because few objects (bottles, coffee pots, forks) were shared by all participants during the breaks. Telephone communication with hotel management on April 20 revealed that none of the involved hotel staff were tested for SARS-CoV-2 and no staff member reported symptoms consistent with COVID-19.

Our findings indicate that hand shaking, aerosolization, and face-to-face contact may be relevant modes of transmission in this COVID-19 outbreak. Limitations include the lack of environmental samples and data about room ventilation and airflow patterns, as well as missing information about the infection status of Pt 9 and the inability to determine the actual impact of SARS-CoV-2 transmission from handshakes, droplets, and aerosolization.

Acknowledgments

We thank the company and the participating scientists for their contributions and support.

About the Author

Dr. Hijnen is a dermatologist, instructor, and researcher at Erasmus MC University Medical Center Rotterdam. His primary research interests are T-cell immunology and precision medicine in atopic dermatitis.

References

1. World Health Organization. Country & technical guidance – coronavirus disease (COVID-19) [cited 2020 May 7]. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance>
2. Okba NMA, Müller MA, Li W, Wang C, GeurtsvanKessel CH, Corman VM, et al. Severe acute respiratory syndrome coronavirus 2-specific antibody responses in coronavirus disease 2019 patients. *Emerg Infect Dis*. 2020 Apr 30 [Epub ahead of print].
3. Li P, Fu JB, Li KF, Chen Y, Wang HL, Liu LJ, et al. Transmission of COVID-19 in the terminal stage of incubation period: a familial cluster. *Int J Infect Dis*. 2020 Mar 6 [Epub ahead of print]. <https://doi.org/10.1016/j.ijid.2020.03.027>
4. Tong ZD, Tang A, Li KF, Li P, Wang HL, Yi JP, et al. Potential presymptomatic transmission of SARS-CoV-2, Zhejiang Province, China, 2020. *Emerg Infect Dis*. 2020;26:1052–4. <https://doi.org/10.3201/eid2605.200198>

5. 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;382:1177-9. <https://doi.org/10.1056/NEJMc2001737>
6. He X, Lau EHY, Wu P, Deng X, Wang J, Hao X, et al. Temporal dynamics in viral shedding and transmissibility of COVID-19. *Nat Med*. 2020. <https://doi.org/10.1038/s41591-020-0869-5>
7. Cai J, Sun W, Huang J, Gamber M, Wu J, He G. Indirect virus transmission in cluster of COVID-19 cases, Wenzhou, China, 2020. *Emerg Infect Dis*. 2020 Mar 12 [Epub ahead of print]. <https://doi.org/10.3201/eid2606.200412>
8. Lu J, Gu J, Li K, Xu C, Su W, Lai Z, et al. COVID-19 outbreak associated with air conditioning in restaurant, Guangzhou, China, 2020. *Emerg Infect Dis*. 2020 Apr 2 [Epub ahead of print]. <https://doi.org/10.3201/eid2607.200764>
9. 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;382:1564-7. <https://doi.org/10.1056/NEJMc2004973>

Address for correspondence: DirkJan Hijnen, Erasmus MC University Medical Center Rotterdam, Department of Dermatology, Rotterdam, The Netherlands; email: d.hijnen@erasmusmc.nl

COVID-19 and Acute Pulmonary Embolism in Postpartum Patient

Zohre Khodamoradi, Shahrokh Sadeghi Boogar, Farnaz Kamali Haghighi Shirazi, Pariya Kouhi

Author affiliation: Shiraz University of Medical Sciences, Shiraz, Iran

DOI: <https://doi.org/10.3201/eid2608.201383>

We report a 36-year-old woman in Iran who sought care for left shoulder pain and cough 5 days after a scheduled cesarean section. Acute pulmonary embolism and coronavirus disease were diagnosed. Physicians should be aware of the potential for these concurrent conditions in postpartum women.

An outbreak of viral pneumonia that emerged in late 2019 and spread rapidly worldwide was named coronavirus disease (COVID-19) (1). COVID-19 is caused by severe acute respiratory syndrome

coronavirus 2 (SARS-CoV-2). Two other viruses of this family, severe acute respiratory syndrome coronavirus and Middle East respiratory syndrome coronavirus, also have caused outbreaks globally (1).

Venous embolism has been associated with severe infection. Acute pulmonary embolism has been associated with severe acute respiratory syndrome coronavirus infections, but no cases have been reported with Middle East respiratory syndrome (2,3). A study reported a 75-year-old hospitalized woman with COVID-19 and pulmonary embolism (4). In addition, in 2 COVID-19-positive patients, 57 and 70 years of age, from Wuhan, China, computed tomography angiography (CTA) confirmed pulmonary embolism (5). Three cases of deep vein thrombosis with COVID-19 also have been reported (6).

Pregnancy increases the risk for venous embolism (7). Although approximately half of venous embolism occurs during pregnancy and half occurs during the postpartum period, the risk per day is greatest in the weeks immediately after delivery (8). We report a patient in Iran who sought care for cough and shoulder pain 5 days after an uncomplicated cesarean delivery in whom an acute pulmonary embolism and COVID-19 infection were subsequently diagnosed. The ethics committee of Shiraz University of Medical Sciences (Shiraz, Iran) approved the study.

A healthy 36-year-old nonsmoking woman (gravid 2, 1 term infant delivered, 1 abortion/miscarriage) underwent an elective scheduled cesarean section at 37 weeks 2 days of gestation after an uncomplicated pregnancy. The uncomplicated surgery resulted in the birth of a healthy infant. Mechanical prophylaxis to prevent deep vein thrombosis was used at delivery until ambulation. The woman was discharged on postpartum day 2 in a good condition. On postpartum day 5, she sought care for sudden onset left-side shoulder pain and dry cough. She stated that she did not have fever, myalgia, or diarrhea. On postpartum day 5, she experienced mild shortness of breath. During her pregnancy, she had no known history of contact with persons who had confirmed or suspected COVID-19.

At admission, physical examination revealed a blood pressure of 110/70 mm Hg, body temperature of 36.8°C, pulse rate of 92 beats/min, respiratory rate of 20 breaths/min, and oxygen saturation of 94% on ambient air. Her body mass index was 24.8 kg/cm². Her physical examination was otherwise unremarkable.

Laboratory test results showed a complete blood count and leukocyte differentials within reference ranges but elevated liver function tests, C-reactive