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sisters (patients 1 and 2) and her mother (patient 3) at their family home. She had a family dinner with her mother, two sisters, and her brother (patient 4) on Jan 21. The index patient had another family dinner with eight relatives on Jan 23. She had been well without any symptoms of infection but started to have a fever and cough on Jan 28. She went to Zhejiang on Jan 24, where she tested positive for SARS-CoV-2 infection on Jan 29. No one in the family cluster had travelled to Wuhan in the previous 2 weeks except for the index patient. Three patients (patients 1–3) who lived together with the index patient and three relatives (patients 4, 6, and 7) who attended the dinner with the index patient on Jan 23 were positive for SARS-CoV-2 infection thereafter. Furthermore, patient 5 who lived with patient 4 and had no direct contact with the index patient was diagnosed with SARS-CoV-2 infection on Jan 30. On Jan 24, two patients (patients 6 and 7) who had been well without any symptoms attended another family dinner with 13 relatives. Three of the relatives (patients 8–10) were diagnosed with SARS-CoV-2 infection within 2 weeks.

Human-to-human transmission can occur among close contacts of SARS-CoV-2.³ However, the family cluster of patients we describe provides evidence that asymptomatic people can be potential sources of SARS-CoV-2 infection.

We obtained written informed consent from the patients and the case study was approved by the institutional ethics board of our hospital (Nanjing Drum Tower Hospital, The Affiliated Hospital of Nanjing University Medical School). We declare no competing interests.

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- 2 Gorbalenya AE, Baker SC, Baric RS, et al. Severe acute respiratory syndrome-related coronavirus: the species and its viruses—a statement of the Coronavirus Study Group. *bioRxiv* 2020; published online Feb 11. DOI:10.1101/2020.02.07.937862.
- 3 Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020; published online Jan 29. DOI:10.1056/NEJMoa2001316.

Outbreak investigation for COVID-19 in northern Vietnam

Two Vietnamese adults returned to their home province of Vinh Phuc in northern Vietnam on Jan 17, 2020, from Wuhan, China, where they had been living since Nov 15, 2019, for a business trip. They presented with mild respiratory symptoms to their local health facilities at 4 days and 8 days, respectively, after arrival in Vinh Phuc. Both individuals were initially placed into respiratory isolation in hospital. Case 1 tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative organism of coronavirus disease 2019 (COVID-19), on Jan 30, 2020, and remained in isolation until recovery. Case 2 was discharged from isolation in hospital after having one negative test result on Jan 28 (11 days after returning from Wuhan). Following discharge, the patient attended a family social function. 2 days later, she was readmitted after a second nasal swab for SARS-CoV-2 taken during her time in hospital was reported as positive.

Screening of 79 individuals who had been in contact with these two patients (namely, family members in the same household and anyone who had been within 2 m of them) was initiated on Jan 31. Six individuals from the same work team, who had also travelled from Wuhan on Jan 17, were isolated, and four of them tested positive

for SARS-CoV-2 (cases 3, 4, and 8 in Vinh Phuc, and one case from another province). Five secondary cases were diagnosed within the social network of case 2. These included three household members (cases 6, 7, and 11) and two people who had attended the social function (cases 5 and 9; appendix p 1). Four of these individuals reported mild respiratory symptoms; the remaining patient was asymptomatic (case 7) at the time of diagnosis.

On Feb 8, 2020, increased contact investigation was commenced among an additional 343 contacts of the people returning from China and the secondary cases diagnosed in Vinh Phuc, with screening of contacts of any suspected cases, and health workers providing direct medical care. This ongoing investigation includes monitoring of body temperature and suspected symptoms daily. Those with symptoms have been quarantined at health facilities and tested for SARS-CoV-2. This additional cascade screening identified one further case, a boy aged 3 months (case 10) who had brief exposure to case 5 (his grandmother, aged 42 years) on Jan 28. He developed respiratory symptoms 9 days later (cough and rhinorrhoea) and tested positive for SARS-CoV-2 on Feb 11 (appendix pp 2). On Feb 13, when case 11, the father of case 2 and living in the same household, was identified, the resident commune (Son Loi) of case 2 was locked down. Residents were advised to stay in the commune, and body temperature and suspected symptoms in all residents were monitored daily by commune-based health workers reinforced by an external team. As of March 2, 18 days after case 11 was detected, no new cases have been identified.

In summary, this outbreak investigation identified six cases of COVID-19 resulting from transmission in Vietnam. One case occurred after secondary spread from a person

See Online for appendix



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who had not visited China. This case illustrates the importance of isolating patients and suspected cases for at least 14 days after exposure and of community-wide screening to enhance diagnosis of COVID-19.

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Covert COVID-19 and false-positive dengue serology in Singapore

Dengue and coronavirus disease 2019 (COVID-19) are difficult to distinguish because they have shared clinical and laboratory features.^{1,2} We describe two patients in Singapore with false-positive results from rapid serological testing for dengue, who were later confirmed to have severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, the causative virus of COVID-19.

The first case is a 57-year-old man with no relevant past medical, travel, or contact history, who presented to a regional hospital on Feb 9, 2020, with 3 days of fever and cough. He had thrombocytopenia (platelet count $140 \times 10^9/\text{mL}$) and a normal chest radiograph. He was discharged after a negative rapid test for dengue NS1, IgM, and IgG (SD Bioline Dengue Duo Kit; Abbott, South Korea). He returned to a public primary health-care clinic with persistent fever, worsening thrombocytopenia ($89 \times 10^9/\text{mL}$), and new onset

lymphopenia ($0.43 \times 10^9/\text{mL}$). A repeat dengue rapid test was positive for dengue IgM and IgG (Dengue Combo; Wells Bio, South Korea). He was referred to hospital for dengue with worsening cough and dyspnoea. A chest radiograph led to testing for SARS-CoV-2 by RT-PCR (in-house laboratory-developed test detecting the *N* and *ORF1ab* genes) from a nasopharyngeal swab, which returned positive. The original seropositive sample and additional urine and blood samples tested negative for dengue, chikungunya, and Zika viruses by RT-PCR,³⁻⁵ and a repeat dengue rapid test (SD Bioline) was also negative. Thus, the initial dengue seroconversion result was deemed a false positive.

The second case is a 57-year-old woman with no relevant past medical, travel, or contact history, who presented to a regional hospital on Feb 13, 2020, with fever, myalgia, a mild cough of 4 days, and 2 days of diarrhoea. She had thrombocytopenia ($92 \times 10^9/\text{mL}$) and tested positive for dengue IgM (SD Bioline). She was discharged with outpatient follow up for dengue fever. She returned 2 days later with a persistent fever, worsening thrombocytopenia ($65 \times 10^9/\text{mL}$), and new onset lymphopenia ($0.94 \times 10^9/\text{mL}$). Liver function tests were abnormal (aspartate aminotransferase 69 U/L [reference range 10–30 U/L], alanine aminotransferase 67 U/L [reference range <55 U/L], total bilirubin 35.8 $\mu\text{mol/L}$ [reference range 4.7–23.2 $\mu\text{mol/L}$]). Chest radiography was normal and she was admitted for dengue fever. She remained febrile despite normalisation of her blood counts and developed dyspnoea 3 days after admission. She was found to be positive for SARS-CoV-2 by RT-PCR from a nasopharyngeal swab. A repeat dengue test (SD Bioline) was negative and an earlier blood sample also tested negative for dengue by RT-PCR.⁶ The initial dengue IgM result was deemed to be a false positive.

Failing to consider COVID-19 because of a positive dengue rapid test result has serious implications not only for the patient but also for public health. Our cases highlight the importance of recognising false-positive dengue serology results (with different commercially available assays) in patients with COVID-19. We emphasise the urgent need for rapid, sensitive, and accessible diagnostic tests for SARS-CoV-2, which need to be highly accurate to protect public health.

We declare no competing interests.

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