About the Authors

Dr. Le is deputy director at the National Institute of Hygiene and Epidemiology, Hanoi, Vietnam. Her research interest is the epidemiology of tropical and emerging infectious diseases. Dr. Takemura is assistant professor at the Institute of Tropical Medicine, Nagasaki University, Japan. His research interests include molecular epidemiologic studies on viral and bacterial diseases.

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Address for correspondence: Futoshi Hasebe, WHO Collaborating Center for Reference and Research on Tropical and Emerging Virus Diseases, Institute of Tropical Medicine, Nagasaki University, 1-12-4 Sakamoto, Nagasaki 852-8523, Japan; email: rainbow@nagasaki-u.ac.jp; Duc Anh Dang, National Institute of Hygiene and Epidemiology, 1 Yersin St, Hanoi 10000, Vietnam; email: dda@nihe.org.vn

Asymptomatic and Human-to-Human Transmission of SARS-CoV-2 in a 2-Family Cluster, Xuzhou, China

Chunyang Li,[1] Fang Ji,[1] Liang Wang,[1] Liping Wang, Jungui Hao, Mingjia Dai, Yan Liu, Xiucheng Pan, Juanjuan Fu, Li Li, Guangde Yang, Jianye Yang, Xuebing Yan, Bing Gu

Author affiliations: Department of Infectious Disease, Affiliated Hospital of Xuzhou Medical University, Xuzhou, China (C. Li, F. Ji, L. Wang, J. Hao, M. Dai, Y. Liu, X. Pan, J. Fu, L. Li, G. Yang, X Yan); Department of Bioinformatics, School of Medical Informatics, Xuzhou Medical University, Xuzhou (L. Wang); Jiangsu Key Laboratory of New Drug Research and Clinical Pharmacy, School of Pharmacy, Xuzhou Medical University, Xuzhou (L. Wang); Medical Technology School of Xuzhou Medical University, Xuzhou Key Laboratory of Laboratory Diagnostics, Xuzhou (B. Gu); Department of Laboratory Medicine, Affiliated Hospital of Xuzhou Medical University, Xuzhou (B. Gu)

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We report epidemiologic, laboratory, and clinical findings for 7 patients with 2019 novel coronavirus disease in a 2-family cluster. Our study confirms asymptomatic and human-to-human transmission through close contacts in familial and hospital settings. These findings might also serve as a practical reference for clinical diagnosis and medical treatment.

The ongoing outbreak of 2019 novel coronavirus disease (COVID-19) originating from Wuhan, China, has spread rapidly across the world (*1*). Both human-to-human and asymptomatic transmission have been reported (*2*,*3*). Phylogenetic study reveals that severe acute respiratory syndrome (SARS) coronavirus 2 (SARS-CoV-2), the causative agent of COVID-19, is closely related to 2 SARS-CoV–like bat coronaviruses, bat-SL-CoVZC45 and bat-SL-CoVZXC2 (*4*). Although case-fatality rate for COVID-19 is not finalized yet (*5*), it is largely accepted that the infection is less fatal than that for SARS-CoV infection, which had an ≈10% case-fatality rate (*6*).

Typical symptoms of COVID-19 include fever, cough, and fatigue, whereas sputum, headache, hemoptysis, and diarrhea are less common (*7*). No vaccine to prevent the infection exists. In this study, we describe a cluster of 7 COVID-19 case-patients among whom interfamilial and intrafamilial transmission

[1]These authors contribute equally to the study.

occurred. Our findings are consistent with previous confirmation of asymptomatic and human-to-human transmission of SARS-CoV-2 in family and hospital settings and also provide practical reference for clinical diagnosis and treatment of COVID-19.

On January 14, 2020, a 56-year-old man (index patient) departed from Guangzhou, China, transferred at Hankou Station in Wuhan, China, for 6 hours, and arrived at Xuzhou, China, showing no symptoms on the same day in the evening. During January 14–22, he had close contact with his 2 daughters, a 32-year-old pregnant teacher (patient 1) and a 21-year-old undergraduate student (patient 2). On January 15, he began caring for his 42-year-old son-in-law (patient 3, husband of patient 1), who had been hospitalized at the Affiliated Hospital of Xuzhou Medical University in Xuzhou until January 23. Meanwhile, a 62-year-old man (patient 4) stayed in the hospital during January 2–19 because of pancreatic surgery; he shared the same ward with patient 3 and was cared for by his 34-year-old son (patient 5). During January 15–January 18, patients 4 and 5 had close contact with the index patient, who was asymptomatic during that time. On January 19, patient 4 was discharged to home and had close contact with his 56-year-old wife (patient 6). We compiled a comprehensive illustration of the contact history of the clustered cases (Figure).

On January 25, the index patient was confirmed to have COVID-19 and was admitted to the Affiliated Hospital of Xuzhou Medical University with symptoms of fever, cough, and sore throat. His illness rapidly became severe; he had a high respiratory rate (38 breaths/min) and low oximetry saturation (≤93%). Subsequently, during January 26–31, another 6 members of the 2 families all tested positive for SARS-CoV-2 by real-time fluorescent reverse transcription PCR of their throat swab samples. The clinical features of these patients varied (Appendix Table 1, https://wwwnc.cdc.gov/EID/article/26/7/20-0718-App1.pdf).

We used imaging features of pneumonia (detected using chest computed tomography) as clinical confirmation for all patients except patient 1. We performed laboratory diagnostic tests, including routine blood tests, comprehensive metabolic panels, coagulation tests, and screening for infection for all patients (Appendix Tables 2–4). We provided all patients with medical therapy (Appendix Table 5, Figure 1) except patient 1, who was pregnant. Because the index patient was in severe condition during his hospitalization, we have included a more detailed description of his medical treatment.

During January 26–February 3, we administered to the index patient the antiviral drugs lopinavir/ritonavir (400 mg/100 mg 2×/d by mouth), umifenovir (200 mg 3×/d by mouth), and interferon α-2b (5 MIU 2×/d by aerosolized inhalation). We administered the antibacterial drug moxifloxacin hydrochloride (400 mg 1×/d by intravenous drip)

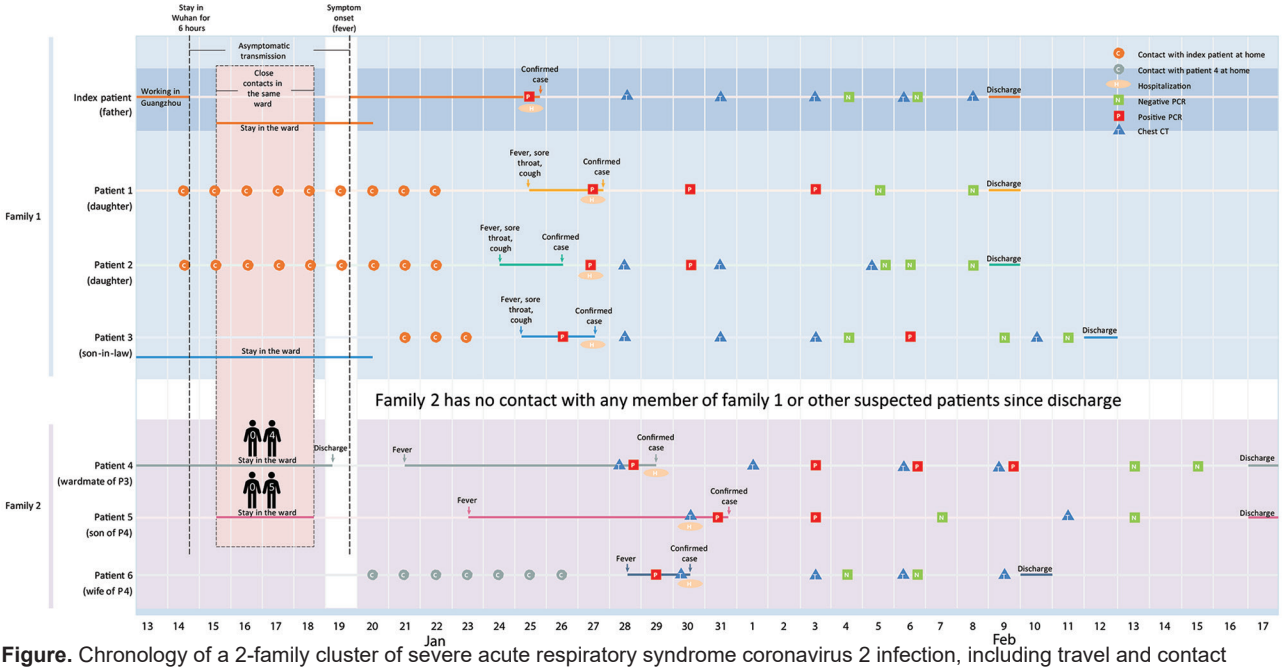

Figure. Chronology of a 2-family cluster of severe acute respiratory syndrome coronavirus 2 infection, including travel and contact history, in familial and hospital settings, Xuzhou, China, January 13–February 17, 2020. Dates of case confirmation, hospitalization, and discharge are labeled. Real-time fluorescent reverse transcription PCR for severe acute respiratory syndrome coronavirus 2 infection and corresponding results are indicated, together with the dates of chest CT. CT, computed tomography.

during January 28–February 6, 2020, and intravenous immunoglobulin therapy (20 g/d) during January 28–February 1. In addition, we administered glucocorticoid therapy with methylprednisolon (20–60 mg 2×/d by intravenous drip) during January 29–February 1. The patient's fever abated on January 29. He tested negative for SARS-CoV-2 on February 4 and again on February 6. During the progression of his recovery, we observed gradual reduction of the white patches in the lung caused by SARS-CoV-2 infection (Appendix Figure 2). On January 28 and January 31, we observed multiple ground-glass–like high-density shadows on both lungs with blurred edges and interstitial changes. On February 3, high-density shadows were slightly absorbed in the upper lobe of the bilateral lungs. On February 6, some lesions in the lower lobe of both lungs were slightly absorbed, and we observed the same situation on February 8. The index patient was discharged to home on February 9.

In summary, our epidemiologic study demonstrates asymptomatic and human-to-human transmission of SARS-CoV-2 infection through close contacts in both familial and hospital settings. In addition, the laboratory test results, together with course of medical therapies described, can provide a practical reference for COVID-19 diagnosis and treatment.

About the Author

Dr. Li specializes in infectious diseases and works as a clinical doctor at the Department of Infectious Disease at the Affiliated Hospital of Xuzhou Medical University, Xuzhou, Jiangsu Province, China. His primary research interests included clinical microbiologic detection and emerging infectious diseases.

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Addresses for correspondence: Dr. Bing Gu, Department of Laboratory Medicine, Affiliated Hospital of Xuzhou Medical University, No. 99 West Huai'hai Rd, Xuzhou, Jiangsu, 221006, China; email: binggu2015@xzhmu.edu.cn; or Dr. Xuebing Yan, Department of Infectious Disease, Affiliated Hospital of Xuzhou Medical University, No. 99 West Huai'hai Rd, Xuzhou, Jiangsu, 221006, China; email: yxbxuzhou@126.com

COVID-19 Outbreak Associated with Air Conditioning in Restaurant, Guangzhou, China, 2020

Jianyun Lu,[1] Jieni Gu,[1] Kuibiao Li,[1] Conghui Xu,[1] Wenzhe Su, Zhisheng Lai, Deqian Zhou, Chao Yu, Bin Xu, Zhicong Yang

Author affiliations: Guangzhou Center for Disease Control and Prevention, Guangzhou, China (J. Lu, K. Li, C. Xu, W. Su, C. Yu, Z. Yang); Guangzhou Yuexiu District Center for Disease Control and Prevention, Guangzhou, China (J. Gu, Z. Lai, D. Zhou, B. Xu)

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During January 26–February 10, 2020, an outbreak of 2019 novel coronavirus disease in an air-conditioned restaurant in Guangzhou, China, involved 3 family clusters. The airflow direction was consistent with droplet transmission. To prevent the spread of the virus in restaurants, we recommend increasing the distance between tables and improving ventilation.

From January 26 through February 10, 2020, an outbreak of 2019 novel coronavirus disease (COVD-19) affected 10 persons from 3 families (families A–C)

[1]These authors contributed equally to this article.

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Appendix

Asymptomatic and Human-to-Human Transmission of SARS-CoV-2 in a 2-Family Cluster, Xuzhou, China

Appendix Table 1. Summary of clinical features of all cases in the two-family cluster infected with SARS-CoV-2019 before hospitalization.

Relationship		Index Patient Father of P1 and P2	Patient 1 Daughter of Index Patient	Patient 2 Daughter of Index Patient	Patient 3 Son-in-law of Index Patient	Patient 4 Wardmate of P3	Patient 5 Son of P4	Patient 6 Wife of P4
Age (years)		56	32	21	42	62	34	56
Sex		Male	Female	Female	Male	Male	Male	Female
Occupation		Farmer	Teacher	Undergraduate student	Scientific Researcher	Farmer	Worker	Farmer
Date of symptom onset		19/1/2020	25/1/2020	24/1/2020	25/1/2020	21/1/2020	23/1/2020	28/1/2020
Date of hospital admission		25/1/2020	27/1/2020	27/1/2020	27/1/2020	28/1/2020	30/1/2020	30/1/2020
Date of case confirmation		25/1/2020	27/1/2020	26/1/2020	27/1/2020	29/1/2020	31/1/2020	30/1/2020
Interval between symptom onset and case confirmation		7	3	3	3	9	9	3
History of smoking		None	None	None	None	None	None	None
History of alcohol drinking		None	None	None	None	None	None	None
Chronic medical illness		None	Pregnancy	None	None	Hypertension	None	Diabetes, Breast Cancer, Cervical cancer
Presenting symptoms and signs before admitted to hospital	Fever	+	–	+	+	+	+	+
	Peak body temperature (°C)	39.5	37.3	37.5	38	39.2	37.5	37.3
	Cough	–	–	+	–	–	+	–
	Sputum	–	–	+	–	–	+	+
	Shortness of breath	–	–	–	–	+	–	+
	Breath difficulty	–	–	–	–	–	–	+
	Sore throat	+	–	–	–	–	–	–
	Headache	–	–	–	–	–	–	–
	Vomit	+	–	–	–	–	–	+
	Diarrhea	–	–	–	–	–	–	+
	Muscular Soreness	–	–	–	–	–	–	–
	Fatigue	+	–	–	–	–	–	+
	Oximetry saturation (%)	92	99	95	95	99	95	100
	Respiratory rate (breaths/min)	23	15	16	22	20	18	32
	Blood pressure (mmHg)	130/70	115/72	120/80	120/80	147/87	123/76	98/70
	Heart rate (bpm)	76	72	72	75	123	85	60

Appendix Table 2. Summary of medical laboratory tests for index patient in the two-family cluster.

Laboratory Diagnosis		Index Patient				
Routine Blood Test	Normal Range		29/1/20	31/1/20	3/2/20	8/2/20
Leukocytes (10^9/L)	4.0–10.0		4.9	10.3	5.6	7.1
Neutrophil Ratio (%)	50.0–70.0		86	89.5	77.9	77.1
Lymphocyte Ratio (%)	20.0–40.0		10.8	6.4	13.9	13
Monocyte Ratio (%)	3.0–8.0		3.1	4	8.2	9
Neutrophil Count (10^9/L)	2.00–7.00		4.23	9.23	4.39	5.47
Lymphocyte Count (10^9/L)	0.80–4.00		0.5	0.7	0.8	0.9
Monocyte Count (10^9/L)	0.12–1.20		0.15	0.41	0.46	0.64
Red blood cell Count (10^12/L)	3.5–5.0		4.68	4.34	4.62	4.49
Hemoglobin (g/L)	110–150		154	140	148	146
Hematocrit (%)	37.0–43.0		44	40.9	41.7	43.4
Platelet Count (10^9/L)	100–300		178	262	282	248
Red blood cell Distribution Width (%)	11.6–14.0		12.1	12.4	12	12.1
Mean Platelet volume (fL)	9.4–12.5		11.1	11.8	12	10.1
Platelet Distribution Width (fL)	39.0–46.0		16.6	13.7	14.5	16.3
Platelet Hematocrit (%)	0.108–0.282		0.2	0.31	0.34	0.25
Comprehensive Metabolic Panel	Normal Range	26/1/20	28/1/20	31/1/20	3/2/20	8/2/20
Alanine Aminotransferase (U/L)	0–45	23	29	55	27	33
Aspartate Aminotransferase (U/L)	0–40	30	36	30	15	19
Alkaline Phosphatase (U/L)	42–128	80	83	68	61	77
Glutamyltransferase (U/L)	11–50	95	101	89	73	87
Lactate Dehydrogenase (U/L)	0–252	334	403	295	229	195
Total Bilirubin (umol/L)	0–20	9.8	14.5	11	21.6	9.9
Albumin (g/L)	34–48	41.4	41.8	33.5	34	35.6
Glucose (mmol/L)	3.8–6.1	/	/	/	5.83	6.22
Urea (mmol/L)	1.7–8.3	6.1	6.4	7.2	7.1	4.5
Creatinine (umol/L)	44–97	122	112	72	79	76
Uric Acid (umol/L)	208–428	373	439	273	264	259
Triglyceride (mmol/L)	0–1.70	2.25	/	1.66	4.22	4.93
Total Cholesterol (mmol/L)	2.80–5.20	4.19	/	4.06	4.34	4.71
Calcium (mmol/L)	2.1–2.7	2.28	2.24	2.19	2.12	2.17
Phosphorus (mmol/L)	.097–1.61	0.98	1.49	0.84	0.75	/
Potassium (mmol/l)	3.5–5.3	4.61	4.27	4.63	3.89	4.24
Sodium (mmol/l)	135–146	141	135	137.2	134.2	145
Chlorine (mmol/l)	96–108	101.4	100.2	107.1	97.3	104.4
eGFR (ml/min/1.73m^2)	100–120	/	62.53	104.12	93.55	/
Infection Test	Normal Range	23/1/20	28/1/20	31/1/20	3/2/20	8/2/20
Erythrocyte Sedimentation Rate (mm/1h)	M 0–15/F 0–20	/	/	/	/	/
Ferritin (μg/L)	M 0–322/F 0–219	/	1253	929.65	881.9	/
Procalcitonin (ng/ml)	0–0.1	/	0.08	0.04	0.04	0.06
C-reactive Protein (mg/L)	0.8–8	101.4	/	7.9	1.6	6.4
Coagulation	Normal Range	26/1/20	28/1/20	31/1/20		8/2/20
International Normalized Ratio	0.8–1.2	1.08	1.15	1.04		1
Prothrombin Time (s)	10–14	11.7	12.4	11.2		10.8
Activated Partial Prothrombin Time (s)	21–40	36.6	36.1	30.8		28.9
Thrombin Time (s)	14.0–21	12.6	12.8	14.7		14.9
D-dimer (μg/ml)	0–0.5	0.14	0.13	0.37		0.59

Appendix Table 3. Summary of medical laboratory tests for patients 1–3 in the two-family cluster.

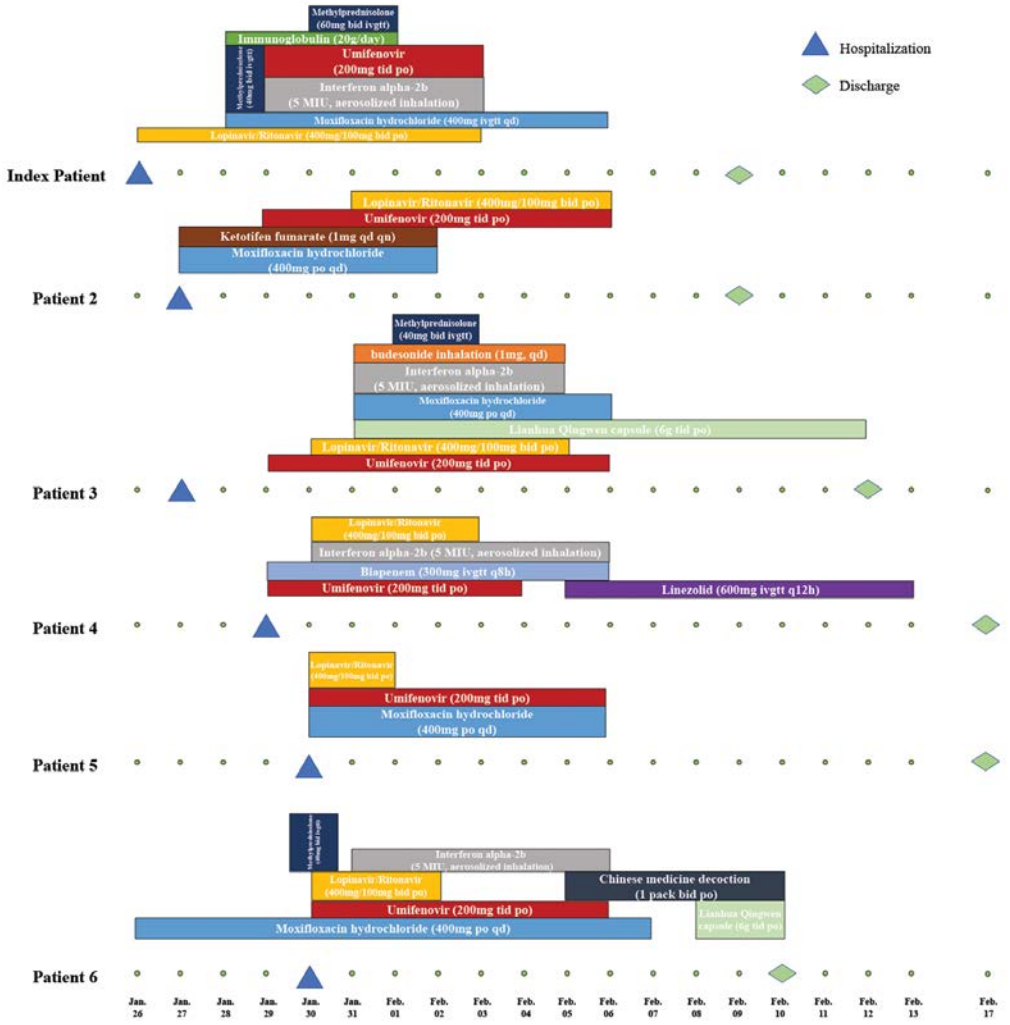
Laboratory Diagnosis		Patient 1			Patient 2		Patient 3	
Routine Blood Test	Normal Range	27/1/20	3/2/20		3/2/20	27/1/20	1/2/20	6/2/20
Leukocytes (10^9/L)	4.0–10.0	3.7	3.9		12.6	5.9	2.4	6.9
Neutrophil Ratio (%)	50.0–70.0	72.6	66.1		68.4	63.6	69.3	48.5
Lymphocyte Ratio (%)	20.0–40.0	16.5	24.2		26.1	21.6	28.2	38.7
Monocyte Ratio (%)	3.0–8.0	10.6	8.2		4.8	12.4	2.2	11.5
Neutrophil Count (10^9/L)	2.00–7.00	2.68	2.57		8.59	3.75	1.66	3.36
Lymphocyte Count (10^9/L)	0.80–4.00	0.6	0.9		3.3	1.3	0.7	2.7
Monocyte Count (10^9/L)	0.12–1.20	0.39	0.32		0.6	0.73	0.05	0.79
Red blood cell Count (10^12/L)	3.5–5.0	3.23	3.02		5.06	4.3	4.48	4.13
Hemoglobin (g/L)	110–150	106	98		141	116	123	112
Hematocrit (%)	37.0–43.0	30.2	28		42.2	36.1	37	35.1
Platelet Count (10^9/L)	100–300	142	174		346	647	499	447
Red blood cell Distribution Width (%)	11.6–14.0	11.9	11.6		11.7	13	12.4	12.6
Mean Platelet volume (fL)	9.4–12.5	10.2	10.2		9.3	10	9.2	9.2
Platelet Distribution Width (fL)	39.0–46.0	10.8	10.8		10.1	10.4	15.7	15.7
Platelet Hematocrit (%)	0.108–0.282	0.15	0.16		0.32	0.71	0.46	0.41
Comprehensive Metabolic Panel	Normal Range	27/1/20	3/2/20	27/1/20	3/2/20	27/1/20	1/2/20	6/2/20
Alanine Aminotransferase (U/L)	0–45	14	8	25	11	47	36	28
Aspartate Aminotransferase (U/L)	0–40	18	13	33	12	30	27	15
Alkaline Phosphatase (U/L)	42–128	71	78	70	63	65	76	46
Glutamyltransferase (U/L)	11–50	9	8	40	23	41	39	29
Lactate Dehydrogenase (U/L)	0–252	111	113	220	162	197	228	/
Total Bilirubin (umol/L)	0–20	5.9	3.3	8.8	9.5	6	8.5	7.7
Albumin (g/L)	34–48	35.7	30.9	49.1	43.7	40.1	43.7	30.4
Glucose (mmol/L)	3.8–6.1	/	4.44	/	4.06	/	/	/
Urea (mmol/L)	1.7–8.3	2.8	2.9	3.6	2.4	3.5	3.1	5.1
Creatinine (umol/L)	44–97	42	40	60	56	63	63	56
Uric Acid (umol/L)	208–428	300	252	487	413	271	253	233
Triglyceride (mmol/L)	0–1.70	1.82	2.87	1.17	3.44	0.87	1.08	2.92
Total Cholesterol (mmol/L)	2.80–5.20	5.14	4.61	3.41	3.66	3.63	4.96	4.2
Calcium (mmol/L)	2.1–2.7	2.09	1.97	2.34	2.19	2.22	2.32	2.02
Phosphorus (mmol/L)	.097–1.61	1.32	1.12	1.46	1.05	1.32	1.31	1.24
Potassium (mmol/l)	3.5–5.3	3.58	3.41	3.75	3.76	4.81	4.99	4.44
Sodium (mmol/l)	135–146	136.5	138	139.7	138.8	134.8	133.4	138
Chlorine (mmol/l)	96–108	103.6	105.4	103.9	102.9	98.9	96.7	102.6
eGFR (ml/min/1.73m^2)	100–120	/	>120	/	>120	/	>120	>120
Infection Test	Normal Range	27/1/20	3/2/20	27/1/20	3/2/20	27/1/20	1/2/20	6/2/20
Erythrocyte Sedimentation Rate (mm/1h)	M 0–15/F 0–20	/	47	/	28	/	50	14
Ferritin (μg/L)	M 0–322/F 0–219	/	14.16	/	128.2	/	/	/
Procalcitonin (ng/ml)	0–0.1	0.04	0.06	0.05	0.03	0.06	0.04	/
C-reactive Protein (mg/L)	0.8–8	16.3	/	/	/	4.4	7.1	0.8
Coagulation	Normal Range	27/1/20	3/2/20	27/1/20	3/2/20	27/1/20	1/2/20	6/2/20
International Normalized Ratio	0.8–1.2	0.99	0.94	1.08	1.01	1.23	1.12	1.1
Prothrombin Time (s)	10–14	10.7	10.1	11.7	10.9	13.3	12.1	11.9
Activated Partial Prothrombin Time (s)	21–40	26.7	28.9	27.9	31.7	30.7	30.6	31.6
Thrombin Time (s)	14.0–21	13.1	15.4	13.2	15.1	15.1	14.6	15.3
D-dimer (μg/ml)	0–0.5	0.21	0.28	0.07	0.06	0.51	0.48	0.69

Appendix Table 4. Summary of medical laboratory tests for patients 4–6 in the two-family cluster

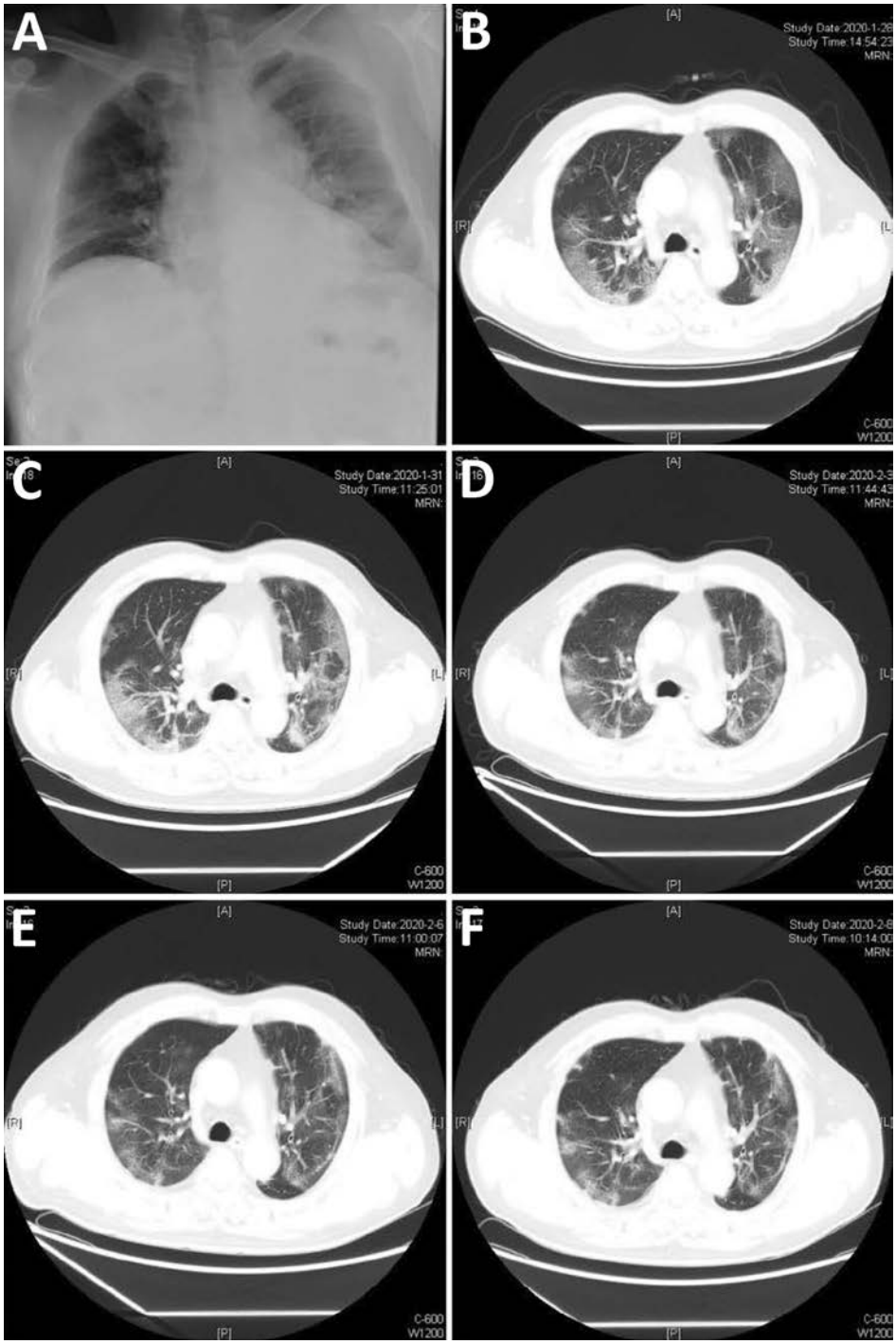
Laboratory Diagnosis		Patient 4					Patient 5		Patient 6		
Routine Blood Test	Normal Range	28/1/20	2/2/20	4/2/20	6/2/20	10/2/20	30/1/20	3/2/20	30/1/20	3/2/20	8/2/20
Leukocytes (10^9/L)	4.0–10.0	8.2	15.9	17.7	14.3	5.9	4.5	4.2	2.4	4.2	3.7
Neutrophil Ratio (%)	50.0–70.0	80.5	78.6	87.9	83.6	71.1	54.1	49.9	71.4	59.8	53.5
Lymphocyte Ratio (%)	20.0–40.0	7.9	14.1	7.4	10.8	22.1	36.1	40.8	26.6	32.6	35.5
Monocyte Ratio (%)	3.0–8.0	11.3	6.6	4	4.7	5.2	8.6	7.2	1.7	7.4	7.8
Neutrophil Count (10^9/L)	2.00–7.00	6.57	12.47	15.56	11.96	4.19	2.43	2.09	1.69	2.51	1.98
Lymphocyte Count (10^9/L)	0.80–4.00	0.7	2.2	1.3	1.5	1.3	1.6	1.7	0.6	1.4	0.29
Monocyte Count (10^9/L)	0.12–1.20	0.92	1.05	0.71	0.67	0.31	0.38	0.3	0.04	0.31	0.12
Red blood cell Count (10^12/L)	3.5–5.0	2.26	2.61	3.39	3	2.68	4.64	265	3.97	4.45	4.01
Hemoglobin (g/L)	110–150	75	86	113	102	90	146	150	124	134	125
Hematocrit (%)	37.0–43.0	21.5	25.6	33.2	29.3	25.8	40.9	43	35.6	38.8	36.3
Platelet Count (10^9/L)	100–300	240	365	407	378	313	213	265	136	164	194
Red blood cell Distribution Width (%)	11.6–14.0	11.4	11.9	11.9	12.3	12.7	11.2	11.2	11.9	11.9	11.1
Mean Platelet volume (fL)	9.4–12.5	8.6	8.1	7.8	8.1	7.9	7.9	7.7	8.6	9.9	8.2
Platelet Distribution Width (fL)	39.0–46.0	15.7	15.5	15.5	15.7	15.5	15.7	15.7	16.2	10.9	16
Platelet Hematocrit (%)	0.108–0.282	0.21	0.3	0.32	0.31	0.25	0.17	0.2	0.12	0.16	0.16
Comprehensive Metabolic Panel	Normal Range	28/1/20	2/2/20	4/2/20	6/2/20	10/2/20	30/1/20	3/2/20	30/1/20	3/2/20	8/2/20
Alanine Aminotransferase (U/L)	0–45	28	24	/	27	22	45	33	22	24	24
Aspartate Aminotransferase (U/L)	0–40	22	14	/	19	19	30	27	25	27	22
Alkaline Phosphatase (U/L)	42–128	175	99	/	64	68	56	48	121	111	113
Glutamyltransferase (U/L)	11–50	123	66	/	43	38	23	18	33	28	28
Lactate Dehydrogenase (U/L)	0–252	129	133	/	187	144	126	128	163	166	175
Total Bilirubin (umol/L)	0–20	10.3	8.7	/	10.7	8.3	27.6	14	11.9	11	3.7
Albumin (g/L)	34–48	24.6	31.8	/	41.5	45.2	46.7	44	43.3	45.1	36.1
Glucose (mmol/L)	3.8–6.1	6.73	/	/	/	2.87	6.88	5.01	10.67	5.18	5.87
Urea (mmol/L)	1.7–8.3	4.1	4.5	/	8	7.2	3.7	4.6	4.6	6.3	4.2
Creatinine (umol/L)	44–97	59	55	/	39	53	60	65	51	54	37
Uric Acid (umol/L)	208–428	175	145	/	156	211	309	246	278	321	102
Triglyceride (mmol/L)	0–1.70	0.89	1.43	/	2.87	0.87	/	2.17	/	3.51	6.52
Total Cholesterol (mmol/L)	2.80–5.20	2.25	2.65	/	2.46	2.22	/	3.72	/	5.45	4.47
Calcium (mmol/L)	2.1–2.7	1.86	2.22	2.11	2.24	2.32	2.26	2.19	2.19	2.12	2.18
Phosphorus (mmol/L)	.097–1.61	/	/	1	0.9	1.15	1.06	1.1	1	1.22	/
Potassium (mmol/l)	3.5–5.3	3.35	4.93	5.27	4.56	4.28	4.05	4.47	4.21	3.12	3.54
Sodium (mmol/l)	135–146	131	138	135	132.4	138.9	138.4	139.5	140.2	141.9	148
Chlorine (mmol/l)	96–108	90	99.2	96	97.1	98.1	102.9	104	107	101.2	106.9
eGFR (ml/min/1.73m^2)	100–120	/	/	/	>120	>120	>120	>120	115.02	107.68	/
Infection Test	Normal Range	28/1/20	31/1/20	4/2/20	6/2/20	10/2/20	30/1/20	3/2/20	30/1/20	3/2/20	8/2/20
Erythrocyte Sedimentation Rate (mm/1h)	M 0–15/F 0–20	/	/	/	/	11	8	/	14	/	/
Ferritin (μg/L)	M 0–322/F 0–219	/	564	773.6	892.7	/	248.5	237	339.4	490.6	/
Procalcitonin (ng/ml)	0–0.1	0.6	/	/	0.08	0.1	0.03	0.02	0.04	0.02	0.06
C-reactive Protein (mg/L)	0.8–8	174.6	/	17.6	7.4	4.2	0	0	1.8	17	3.5
Coagulation	Normal Range	28/1/20	2/2/20		6/2/20	10/2/20	30/1/20	3/2/20	30/1/20		8/2/20
International Normalized Ratio	0.8–1.2	1.51	1.16		1.28	1.38	1.21	1.12	1.17		1.03
Prothrombin Time (s)	10–14	16.3	12.5		13.8	14.9	13.1	12.1	12.6		11.1
Activated Partial Prothrombin Time (s)	21–40	26	24.6		26.3	29	30.2	31.7	28		28.3
Thrombin Time (s)	14.0–21	15.8	16.5		15.2	16.4	17.2	19	17		16.8
D-dimer (μg/ml)	0–0.5	0.76	0.84		1.07	0.58	0.01	0.06	0.05		0.09

Appendix Table 5. Summary of drug therapy during COVID-19 treatment of the clustered cases. Due to pregnancy, patient 1 did not receive any medication. For an illustration of the drug therapy scheme, please see the visualized timeline below.

Index Patient	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	26/1/20	3/2/20
Umifenovir	200mg tid po	29/1/20	3/2/20
Interferon α-2b	5MIU bid aerosolized inhalation	29/1/20	3/2/20
Moxifloxacin hydrochloride	0.4g qd ivgtt	28/1/20	6/2/20
Immunoglobulin	20 g/d	28/1/20	1/2/20
Methylprednisolon	40mg bid ivgtt	28/1/20	29/1/20
Methylprednisolon	60mg qd ivgtt	30/1/20	31/1/20
Methylprednisolon	40mg qd ivgtt	31/1/20	1/2/20
Methylprednisolon	20mg qd ivgtt	31/1/20	1/2/20
Patient 2	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	31/1/20	6/2/20
Umifenovir	200mg tid po	29/1/20	6/2/20
Moxifloxacin hydrochloride	0.4g qd po	27/1/20	2/2/20
Ketotifen fumarate	1mg qd qn	27/1/20	2/2/20
Patient 3	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	30/1/20	5/2/20
Umifenovir	200mg tid po	29/1/20	6/2/20
Interferon α-2b	5MIU bid aerosolized inhalation	31/1/20	5/2/20
Moxifloxacin hydrochloride	0.4g qd po	31/1/20	6/2/20
Methylprednisolon	40mg bid ivgtt	1/2/20	3/2/20
Lianhua Qingwen capsule	6g tid	31/1/20	12/2/20
Budesonide	1mg qd aerosolized inhalation	31/1/20	5/2/20
Patient 4	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	30/1/20	3/2/20
Umifenovir	200mg tid po	29/1/20	4/2/20
Interferon α-2b	5MIU bid aerosolized inhalation	30/1/20	6/2/20
Biapenem	0.3g q8h ivgtt	29/1/20	6/2/20
Linezolid	0.6g q12h ivgtt	5/2/20	13/2/20
Patient 5	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	30/1/20	1/2/20
Umifenovir	200mg tid po	30/1/20	6/2/20
Moxifloxacin hydrochloride	0.4g qd po	30/1/20	6/2/20
Patient 6	Dosage and Administration	Start Date	End Date
Lopinavir/Ritonavir	400mg/100mg bid po	30/1/20	2/2/20
Umifenovir	200mg tid po	30/1/20	6/2/20
Interferon α-2b	5MIU bid aerosolized inhalation	31/1/20	6/2/20
Moxifloxacin hydrochloride	400mg qd po	26/1/20	7/2/20
Methylprednisolon	40mg bid ivgtt	30/1/20	30/1/20
Chinese medicine decoction	1Package bid po	5/2/20	10/2/20
Lianhua Qingwen capsule	6000mg tid po	8/2/20	10/2/20



Appendix Figure 1. Illustration of the drug therapy scheme for all the patients with SARS-CoV-2 infection in the 2-family cluster.



Appendix Figure 2. Typical evolution of chest CT findings in the 56-year-old male index patient confirmed positive for SARS-CoV-2 infection. A) Chest radiograph. Bilateral lungs show flocculent high-density shadows while the left lung is more prominent. B–F) Chest CT scanning. B) Multiple ground-glass-like high-density shadows on both lungs with blurred edges and interstitial changes on January 28. C) No significant difference from previous observation on January 31. D) Slightly absorbed shadow in the upper lobe on February 3. E) Some lesions in the lower lobe of both lungs were slightly absorbed on February 6. F) No significant difference from previous observation on February 8. Ground glass white patches are shown in each subgraph due to SARS-CoV-2 infection. With the progression of recovery, gradual reduction of white patches is observed.