Successful Confinement of a Familial Cluster of COVID-19 in Qingdao, China in the Early Phase of Pandemic

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From Jan 26, 2020 to Feb 3, 2020, a total of 7 confirmed cases and 2 asymptomatic infected persons were reported in Qingdao, China. These cases had no history of sojourning in Hubei Province, contacting with animals, visiting to markets, and eating game meat.

On Jan 19, 2020, patient 1, the initial case, returned to Qingdao from Kunming by air, on which flight there were two persons from Wuhan City with fever. She had developed fever, cough, and weakness since Jan 21, 2020. Then she attended to an outpatient clinic near her community and was treated with intravenous cefazolin from Jan 23 to 24. Due to persistent symptoms, she was admitted to hospital on Jan 25, 2020 and diagnosed as a suspected case. The throat swab was tested positive for 2019-nCoV by RT-PCR on Jan 26, 2020.

Patient 2 lived together with her mother (patient 1) and the older daughter of patient 1 (patient 4) lived in the same community. Patient 1 had gone to the house of patient 4 for many times since she returned to Qingdao. On Jan 20, patient 1 had lunch in her father’ house which was in another community with her father, sister, niece (asymptomatic infected person, patient 9) and granddaughter (patient 5). In the evening, the two daughters (patient 4 and 2), son-in-law (patient 3, husband of patient 4), grandson, granddaughter (patient 5) had supper with patient 1 in the house of patient 4. Patient 3 and 4 took their children back to their parents’ home for the Spring Festival on Jan 23. The family visited their aunt (patient 6) and uncle-in-law (asymptomatic infected person, patient 8) on the evening of Jan 23. None wore surgical masks during the whole visit. Patient 7, who also did not wear a surgical mask, met patient 1 in the same clinic when patient 1 attended to the outpatient clinic (Fig 1 and Fig 2). Due to PCR was delayed under such situation, positive nucleic acid test for patient 9 might occur earlier than February 6, fortunately we quarantined her in advance and did not resulted in further spread.

Through the field investigation, 115 persons were exposed during this cluster and the total attack rate was 6.09% (7/115). The attack rate of only this family was 41.18% (7/17). All the cases had been treated in isolation at designated hospitals and these exposers had been subjected to intensive isolation and medical observation since patient 1 was confirmed. After a maximum incubation period, no more cases related to this cluster were reported, and the transmission of this cluster was terminated on Feb 3, 2020.

As the COVID-19 outbreak occurred, Shandong province launched the first-level response to this public health emergency, in accordance with the management as A class infectious disease, belonged to B class infectious disease. Meanwhile, Qingdao immediately entered the state of “War”. Since the first confirmed case of COVID-19 was reported, the number of cases had been increasing in Qingdao City. So far, 171
cases had been reported in Qingdao City, which included 118 confirmed cases and 53 asymptomatic infected persons. This cluster, as the first cluster in Qingdao, was of great significance for prevention and control of the epidemic. On one hand, it further confirmed the importance of “four early” (early detection, early identification, early isolation and early treatment). The timely detection and isolation of cases and the close contacts could effectively prevent the further spread of the epidemic, which was the key points of this cluster successful controlled. On the other hand, this cluster had raised the awareness of people to prevent and control the epidemic, which should not take it lightly, especially wear mask consciously and avoid dinner together. Over above, Qingdao had successfully controlled several cluster of outbreak and no community transmission had occurred. As shown in our study, it was crucial to detect and isolate case, trace and quarantine close contacts as early as possible, which was particularly important when PCR was delayed.

Our study had limitations. First, we only tested the samples from patients. The samples from environment were not obtained. Second, the isolated virus was not sequenced and the homology analysis was not performed.
Fig1 The relation diagram of cases in the cluster (the textbox filled in orange are confirmed cases, blue are asymptomatic infected persons; the date in the textbox was the onset)
Fig 2 The sequence chart of onset of the cluster and their contacts in Jan, 2020 (Dates filled in red are confirmed times, in yellow are onset time, in blue are exposure time to patient 1 and green are exposure time to patient 3)
Reference:

