

A Panorama of SARS-CoV-2 Transmission for a World-Famous Tourist City in China

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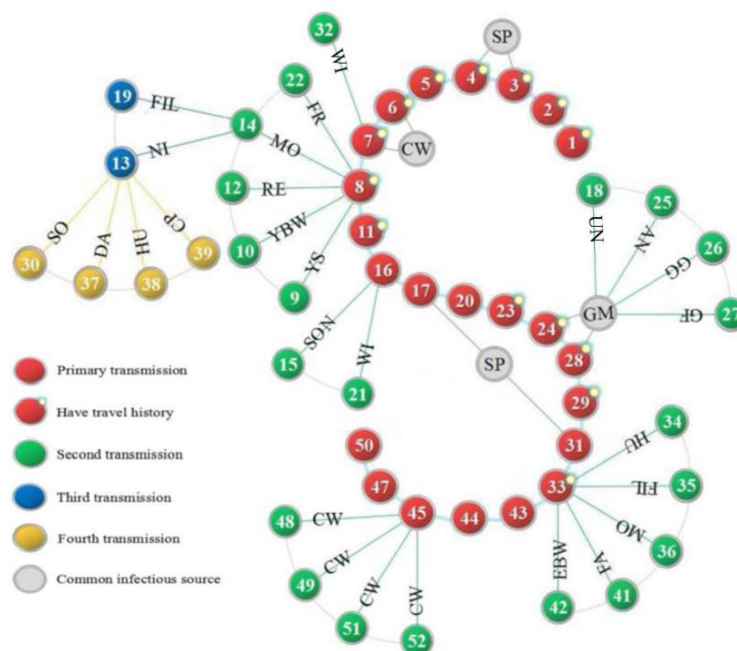
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Dear Editor,

Not like Beijing, Shanghai or some provincial capitals is known by people all over the world, Jining City, a local level city of China, seems unknown. However, if another small city is mentioned, I think lots of people are very familiar – Qufu City, the hometown of Confucius. Confucius is the one of the greatest ideologist, educationist and politician in China, and is very known by people in the world. While as a county, Qufu City just belongs to Jining City.



Most of the transmissions caused by the primary infected persons are terminated after the first transmission. There is one case who came back from Beijing transmit the pathogen for three generations. The relationship between the infected person and the contact one is described from the angle of the later, e.g. case 32 is the wife of case 7. As to the common infectious source or the two persons cannot be identified who actual transmitted the pathogen, the relationship is described with the little sequence of the case and infected persons. For example, case 18 is aunt of case 24, while case 28 is grandmother of case 24. UN: uncle; AU: aunt; CCP: common contact person; CW: co-worker; DA: daughter; EBW: elder brother's wife; FA: father; FIL: father-in-law; FR: friend; GF: grandfather; GG: great-grandmother; GM: grandmother; HU: husband; YS: younger sister; MO: mother; NI: niece; RE: relative; SIL: sister-in-law; SON: son; SP: spouse; YBW: younger brother's wife; YS: younger sister.

Figure 1: The panorama of SARS-Cov-2 transmission of 52 cases in Jining City, China

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In the panorama, there are 23 index persons who are taken as the initial transmission source and responsible for the local epidemic of SARS-CoV-2 to some extent. Under the condition of contact with them, 21 persons are infected. Subsequently, the third and fourth generation of communicated persons emerged, and the number is 4 and 2 persons, respectively.

Among the index cases, 14 persons have clear travel histories to the cities of other provinces including Wuhan (case 1, 2, 3, 4, 28), Hankou (case 11), Beijing (case 8), Chongqing (case 6), etc. As a potential source of primary transmission, how the remainders of no travel history infected the coronavirus remains unknown. Besides, in 23 index cases, there are four pairs of persons who are all have the same travel experiences of out-provinces with each other in 14 days. Between each of four pairs, the relationship is co-workers, spouse or grandmother and grandchild. In the analysis progress of identifying the infection sources, it is difficult to confirm the actual person who transfers the virus to others, and hence, these eight persons are generally taken as the parallel or common infectious source for the next generation of infected people.

Of the index cases, there are seven persons (including a pair of parallel infectors) transmitted SARS-CoV-2 to others. Case 8 who came back from Beijing transmitted the pathogen through three generations; the transmission of the other primary infected persons terminated at the second generation. In the panorama, the relationships between the infectious and infected persons are described from the angle of the later, e.g. case 32 is the wife of case 7, case 19 is the father-in-law of case 14. As to the persons belong to the common infectious source, the relationship is described between the infected person with low case number and the next generation case who contacted him. For example, case 18 is the aunt of case 24, while case 28 is the grandmother of case 24.

There are several characters for the panorama of the SARS-CoV-2 epidemic of Jining City: First, about half of the original infected persons have the travel histories to other province, especially came back from epidemic area such as Wuhan; while how the remainder half of index persons infected remain unknown. Second, only near one-third of the index cases with SARS-CoV-2 infection transmitted the virus to others, while many of them did not. Third, only a few persons achieved infection of SARS-CoV-2 through the third and fourth generation of transmission.

To date, all of 52 patients with SARS-CoV-2 infection or even someone developed novel coronavirus disease (COVID-19)

have already recovered. Compared to the madly epidemic in many areas of the world [3], some people can't help to ask: Why SARS-CoV-2 does not widely spread in Jining City? Why most of the infected persons do not become the infectious resource to spread the virus? How the spread of virus is terminated at the stage of second generation? These questions just reflect what the values of the panorama are. The answers can be generalized into four points which are taken as the four magic weapons defeat against such an evil plague: strict isolation measure which including home isolation and collective centralization quarantine; extensive insistence of social distance; wearing face mask in any public sites; timely and effective therapy.

Maybe the transmission of SARS-CoV-2 in every city all over the world could be drawn a picture like this. Through the picture, the panorama of epidemic and control of SARS-CoV-2 in a city could be seen. However, as a famous tourist city of North China, Jining city wins the war fighting against SARS-CoV-2; so other cities of China do. Perhaps, such an experience is worth to learn for all the policy-makers and people all over the world [4].

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