

Countries of origin of imported COVID-19 cases into China and measures to prevent onward transmission

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Highlight

From 11 March to 6 July 2020, a total of 268 imported cases of COVID-19 from abroad were confirmed in Guangzhou. 74% of the imported cases were detected during customs inspection and 19% under centralized quarantine. We advocate for legally enforced quarantine and monitoring of quarantined persons.

Main text

Coronavirus disease 2019 (COVID-19) is spreading rapidly throughout the world. Compared with severe acute respiratory syndrome coronavirus (SARS-CoV), severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) appears to have a higher reproductive number than SARS, further compounded by silent spread through asymptotically infected persons.¹ In addition, increased global connectiveness facilitated the rapid spread of COVID-19 around the world.² The prevalence of SARS-CoV-2 positivity in air passengers during the height of the pandemic in Europe in March-April 2020 was as high as 3-6%.^{3,4} Residents in transportation hubs are at elevated risk of COVID-19 if cases imported from abroad are not managed appropriately. Timely assessment of the current policies and rapid adaption of control measures for people entering from abroad is important including understanding the epidemiological characteristics of imported cases.

Guangzhou is a transportation hub and an economic center located in the south of China.

In view of the rapid lockdown within China⁵ and stringent measures taken,⁶ the number

of locally cases of COVID-19 in Guangzhou have been reduced at low levels since early March 2020.⁷ However, the resurgence risk of COVID-19 is of great concern, with the increasing number of imported cases from abroad. Here we aimed to (1) describe the policies and control measures for people who entered Guangzhou from abroad; (2) elucidate the epidemiological characteristics of imported cases of COVID-19; (3) and explore the indirect contact transmission of SARS-CoV-2 in Guangzhou, China.

We obtained approval from the Research Ethics Committee of Guangzhou Center for Disease Control and Prevention (CDC). Guangzhou CDC provided individual data of all imported cases of COVID-19 from abroad in Guangzhou, confirmed between 11 March and 6 July 2020. Data on sex, age, nationality, source of infection, whether the case transferred before arriving in Guangzhou and the dates of arrival, illness onset and confirmed infection were extracted. The date of illness onset was defined as the date of symptom onset for the cases of SARS-CoV-2-related pneumonia and as the date of sample collection for the asymptomatic cases testing positive for SARS-CoV-2. To explore the indirect contact transmission of SARS-CoV-2, samples were collected from the objects in the residential places of 12 imported cases of COVID-19 from abroad and then tested using real-time reverse transcription polymerase chain reaction (rRT-PCR).

On 11 March 2020, a 25-year-old asymptomatic man from Thailand was tested positive for SARS-CoV-2, while a 50-year-old man from Philippines was confirmed to be the first imported case of symptomatic COVID-19 in Guangzhou on 15 March 2020. The first second-generation case as a result from transmission from an imported case was reported on 21 March 2020. In response to the rapid escalation of COVID-19 spread, already by 19 March 2020 the local government formulated and updated a series of policies and control measures to contain onward transmission of SARS-CoV-2 from imported cases. The local government required that the rRT-PCR test should be used in all travelers or returning residents who entered Guangzhou through immigration check points followed by quarantine in a centralized center, similarly to what Shanghai and Singapore did.^{8,9} Such travelers or returning residents will be released from quarantine if they do not present with symptoms and are tested negative for SARS-CoV-2 after 14 days of quarantine. Between 2 April and 1 May 2020, a large-scale community screening was performed to people from COVID-19 hotspots overseas and their close contacts (Figure S1).

From 11 March to 6 July 2020, a total of 268 imported cases of COVID-19 from abroad (of which 183 cases were symptomatic and 85 asymptomatic) were confirmed in Guangzhou: 158 cases (59.0%) were males, with a median age of 32 years (range: 3-70 years) (Table 1). Most of the imported cases were students (34.9%) and businessmen engaged in commercial services (32.6%). Chinese accounted for 89.2% of imported cases and the majority of cases came from Asia (41.4%) and Europe (26.5%).

The cases from the United Kingdom, Bangladesh and the United States represented 52.2% of the imported cases from overseas. Symptoms were present in 77 (28.7%) cases before they arrived in Guangzhou. Among the 257 imported cases with information of travel history, 143 cases (55.6%) transferred in other places before arriving in Guangzhou. Some cases even transferred more than once (Table 1). The transfer of COVID-19 cases could represent a serious challenge to the prevention and control of COVID-19. Global cooperation, particularly sharing the travel information of COVID-19 cases, is highly recommended.

73.5% of the imported cases were detected during customs inspection and 19.0% under centralized quarantine while the minority were confirmed during self-quarantine period when being monitored as close contacts of confirmed cases (3.4%), or during a consultation with health-care professional (1.5%) (Table S1). We identified 65 clusters of 85 imported cases and the related local cases, with a median size of 2 (range: 2-12). 6,963 close contacts of the imported cases were traced and 6,494 (93.3%) of them were those who had been in the same vehicle with confirmed cases. Other close contacts were those who had a connection with confirmed cases in family (0.7%), social (2.5%), doctor-patient (0.1%) and other relationships (3.4%) (Table S2).

A total of 182 samples were collected from the objects in the living places of 12 imported cases, among which 24 samples (13.2%) were testing positive for SARS-CoV-2 and the majority of positive samples were collected from door handle,

sink, floor drain, remote control and cup. Our finding further highlighted the possibility of indirect contact transmission of SARS-CoV-2 between human and human. Further studies which evaluate the live SARS-CoV-2 on innate surface and the duration that SARS-CoV-2 can survive on innate surface could provide stronger evidence for indirect contact transmission of SARS-CoV-2.

Policies and control measures implemented in Guangzhou can shed light on how to reduce the resurgence risk of COVID-19 due to imported cases for other affected locations, particularly transportation hubs with high population mobility. Customs inspection and quarantine are crucial for identifying imported cases and containing the spread of COVID-19. We advocate for legally enforced quarantine and monitoring of quarantined persons.

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Conflict of interest

The authors have declared no conflicts of interest.

Author contributions

Conceived study: ZBZ, L LUO, CQO. Collected data: PZQ, KL, YH. Analyzed data:

L LI. Interpreted results: ZBZ, PZQ, L LUO, CQO. Wrote the first draft: L LI.

Critically revised the draft and approved the final version: all authors.

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Table 1. Demographic characteristics and travel information of the imported cases of coronavirus disease 2019 from abroad in Guangzhou, China, confirmed between 11 March and 6 July 2020.

Characteristics	Cases (n=268)
Male sex – no. (%)	158/268 (59.0)
Median age (range) – years	32 (3-70)
Occupation – no. (%)	
Students	91/261 (34.9)
Businessmen engaged in commercial services	85/261 (32.6)
Others*	85/261 (32.6)
Nationality – no. (%)	
Chinese	239/268 (89.2)
Others [#]	29/268 (10.8)
Source of infection (by continent) – no. (%)	
Asia	111/268 (41.4)
Europe	71/268 (26.5)
North America	47/268 (17.5)
Africa	34/268 (12.7)
South America	4/268 (1.5)
Oceania	1/268 (0.4)
Source of infection (by country) – no. (%)	
The United Kingdom	54/268 (20.1)

Bangladesh	45/268 (16.8)
The United States	41/268 (15.3)
Philippines	23/268 (8.6)
Nigeria	17/268 (6.3)
France	11/268 (4.1)
The United Arab Emirates	11/268 (4.1)
Others [§]	66/268 (24.6)
Resident in Guangzhou – no. (%)	24/267 (9.0)
Transfer before arriving in Guangzhou – no. (%)	
No	114/257 (44.4)
Once	124/257 (48.2)
Twice	14/257 (5.4)
Three times	5/257 (1.9)

Reduced denominators suggested missing data.

* Other occupations included judge, teachers, blue-collar workers, white-collar workers, businessmen engaged in catering industry, athletes, the unemployed, retired people and children.

Other nationality included Angola, Australian, Brazilian, British, Burkina Faso, Congolese, Egyptian, Ethiopian, French, Malagasy, Nigerian, Niger, Russian and Syrian.

§ Other sources of infection included Angola, Australia, Burkina Faso, Cambodia, Canada, Chile, Egypt, Ethiopia, India, Indonesia, Ireland, Madagascar, Malaysia,

Morocco, Pakistan, Peru, Russia, Tanzania, the Democratic Republic of the Congo,
Singapore, Spain, Togo, Thailand, the United Arab Emirates, Turkey.

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