

Current situation and improvement suggestions of COVID-19 close contacts tracking investigation official letter management

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Abstract

Background: This study analyzes the current status of tracking investigation official letter management for 9036 COVID-19 close contacts in Guangzhou, and explains the necessity of establishing a COVID-19 close contacts tracking investigation sharing system.

Method: Based on the information obtained from COVID-19's close contacts' tracking investigation official letters from January 21 to March 31 in Guangzhou, the epidemic situation map and flow chart of receiving and sending official letters were drawn, and the observation rate, sampling rate and Turn positive rate of close contacts were calculated.

Results: The tracking investigation official letter involved in 31 provinces (municipalities directly under the central government, autonomous regions) and 172 cities, investigation close contacts with 9036: 309 investigation letters were received from the nonlocal case, investigation close contacts with 2790, involved in 30 provinces and 95 cities, medical observation at a rate of 100%, sampling rate 99.56%, turn positive rate was 3.76%; The city of Guangzhou issued 204 official letters of investigation, with 6,246 close contacts, covering 27 provinces and 114 cities. The medical observation rate was 100%, the sampling rate 99.63%, and turn the positive rate of 2.26%. The reply time of the investigation results is within 1-12 hours, and the other 1-3 days. As of March 31, 440 cases of covid-19 were confirmed in Guangzhou (including 92 imported cases), and the tracking coefficient of close contacts was 14.2 (6246 / 440).

Conclusion: Guangzhou close contacts tracking investigation official letter management is tight, the prompt detection of the source of infection to control the epidemic situation is significant. However, due to the multiple sources and complicated process of official letters, it is suggested to establish a COVID-19 close contacts tracking and investigation sharing system.

Background

Since December 29, 2019, COVID-19 has appeared in Wuhan, China, and the epidemic has spread throughout the country. High risk of transmission At the beginning of the outbreak in Wuhan, many people, including some medical staff, did not protect against infection control measures. Patients who were exposed to COVID-19 were infected and then transmitted the infection to others. In March 2003, more than 300 people were infected with SARS in Hong Kong Amoy Gardens (AG) estates (Kwun Tong District) after close contact with other residents, family members and friends [1]. From January 21, 2020, the National Health and Health Commission began to report on the "National Pneumonia Epidemic Situation of New Coronavirus Infections", and reported 77 cases of COVID-19 on January 20 [2]; 149 cases on January 21 [3], 571 cases on January 22 [4], 830 cases on January 24 [5], 1975 cases on January 25 [6], 2744 cases on January 26 [7], the rate of transmission of infectious diseases depends on a key The size of the basic reproductive number (R_0) of epidemiological parameters, COVID-19 virus has strong human-to-human transmission ability (the basic reproductive number $R_0 = 2 \sim 6$), and the

transmission speed is fast (intergenerational interval $T_g = 6.2 \sim 7.5$ d) [8] R_0 The estimated value is far greater than 1, indicating that close contacts have spread from person to person, and close contacts are one of the most dangerous groups. Therefore, close contacts tracing and investigation is an effective method to find the source of infection. The three to five editions of the "Novel coronavirus pneumonia Prevention and Control Plan" issued by the National Health Commission[9-11], Annex 3 "Novel coronavirus pneumonia Infection Pneumonia Cases Close Contacts Management Plan", clarifies the determination of close contacts Standards and management requirements, but there is no investigation guide for the method of tracking investigation of close vaccinators, information transmission. At present, close contacts are all over the country, and tracking of them requires multiple departments to forward the tracking investigation official letter, which makes the tracking investigation very complicated and delays the discovery patient time; lack of communication between departments, opaque information leads to different departments track at the same time. Therefore, it is necessary to establish a fast and effective shared system for tracking investigation of COVID - 19 close contacts, multi-sectoral sharing of personal information and action trajectories of close contacts, timely blocking the spread of infectious agents, and better control the development of the epidemic.

Methods

COVID-19 close contacts definition

The National Health Commission issued the "New Coronavirus Pneumonia Prevention and Control Plan" [9-11], Annex 3 "New Coronavirus Infection Pneumonia Cases Close Contact Management Plan", close contacts in the third version of the prevention and control plan refer to those who are positive for asymptomatic infection but fail to take effective protection after the onset of suspected cases, confirmed cases and mild cases; the fifth version of the prevention and control plan updates the close contacts refer to those who start 2 days before the symptoms of suspected cases and confirmed cases, or 2 days before the sampling of asymptomatic infection samples At the beginning of the day, no effective protection has been taken for personnel in close contact (within 1 meter).

COVID-19 close contacts tracking investigation official letter management and classification of COVID-19 close contacts in Guangzhou

Guangzhou has a population of 15.3059 million people [12]. The official letters of COVID-19 close contacts tracking investigation received and sent out by the Guangdong Center For Disease Control And Prevention (Guangdong CDC) and the Guangzhou Municipal Health Commission. Guangzhou Center For Disease Control And Prevention [Guangzhou CDC] is responsible for the management of tracking investigation official letter, and which are distributed to 11 District Center For Disease Control And Prevention [District CDC].

Guangzhou divides the close contacts tracking investigation official letter into two modes: local case and nonlocal case management. The official letter of investigation on close contacts of local cases refers to the close contacts who have been confirmed as COVID-19 cases in Guangzhou. The close contacts who live in Guangzhou are transferred from the city CDC to the District CDC, and the tracking investigation is carried out by the group of three people in the district. The close contacts who live in nonlocal are sent the official letter of a tracking investigation by the Guangzhou CDC to the CDC in other places, and they are requested to feedback the investigation results. The official letter of investigation on close contacts of non-local cases refers to the official letter of investigation received by Guangzhou City, where the close contacts confirmed as COVID-19 cases live in Guangzhou. After the investigation, Guangzhou will reply to the results of the source unit.

The municipal and district health committees and relevant departments organize and implement medical observation of close contacts. The medical observation place adopts two methods of home isolation and centralized isolation. Priority is given to the implementation of centralized isolation medical observation for close contacts, and home medical observation can be adopted in areas that do not have the conditions. The medical observation period is 14 days after the last contact with cases and asymptomatic patients without effective protection. During the period of medical observation, medical and health personnel measured their body temperature every morning and evening and asked about the progress of the disease. Once any respiratory symptoms or other symptoms appeared, they immediately reported and consulted the doctor for treatment. When the medical observation period expires, if there is no abnormal situation, the medical observation shall be released in time.

Data collection and analysis

The epidemic situation map and flow chart of the letter was drawn, and the observation rate of close contacts receiving medical observation = (number of people receiving medical observation/number of people who should receive medical observation) * 100%, sampling rate = (number of people sampling/number of people who should sampling) * 100%, conversion rate = (number of people with close contacts being nucleic acid positive / number of people with close contacts being nucleic acid tested) * 100%, close contacts tracking coefficient = cumulative number of close contacts / cumulative number of confirmed cases.

Results

Map of the epidemic situation sent and received by tracking investigation official letter in Guangzhou

As of March 31, close contacts tracking investigation official letter involved in 31 provinces (municipalities directly under the central government, autonomous regions) and 172 cities(Table 1), investigation close contacts with 9036. Among them, 309 investigation letters were received from the nonlocal case, investigation close contacts with 2790, involved in 30 provinces and 95 cities(Fig.1A).The

city of Guangzhou issued 204 official letters of investigation, with 6,246 close contacts, covering 27 provinces and 114 cities(Fig.1B).All 21 cities in Guangzhou and Guangdong Province there are tracking investigation official letters (Fig.1C). The top three cities with the largest number of the nonlocal confirmed COVID-19 close contacts are: 780 in Wuhan, 130 in Wenzhou and 58 in Jinan. The top three cities with the largest number of the local confirmed COVID-19 close contacts were Jian (14), Jingzhou (13), and Wuhan (12); The top three cities with the largest number of close contacts in Guangdong province surveyed by Guangzhou were 109 in Shenzhen, 50 in Zhongshan and 32 in Meizhou. The top three cities with the highest number of close contacts surveyed in Guangzhou in Guangdong province were 72 in Shenzhen, 42 in Foshan and 39 in Dongguan.

Guangzhou 's close contacts tracking investigation official letter sending and receiving process, the number of participants and the time for reply

The official letters of tracking investigation received by the Guangzhou CDC mainly came from five channels: the Guangdong CDC, the other cities CDC in Guangdong province, the health commission in Guangzhou, the other provinces CDC and the other cities CDC in other provinces. Guangzhou CDC is assigned to each district according to its residential address, and a team of 3 persons from the district shall conduct on-site concentration, home isolation, sampling and medical tracking investigation of close contacts. District CDC shall directly reply to Guangdong CDC (Guangdong CDC shall be responsible for replying to the CDC in other provinces and other cities in other provinces and other cities in Guangdong province for the results of the tracking investigation), and shall also copy to the Guangzhou CDC; Also, district CDC will be from the Guangzhou municipal commission of health tracking investigation official letter results back to the Guangzhou CDC, by the Guangzhou CDC to the Guangzhou municipal commission of health to reply to the results(Fig. 2).Response time of all tracking investigation official letters: reply within 1-12 hours for urgent and 1-3 days for routine results.

Investigation results and tracking coefficient by close contacts tracking investigation official letter of in Guangzhou

As of March 31, close contacts tracking investigation official letter involved in 31 provinces (municipalities directly under the central government, autonomous regions) and 172 cities, investigation close contacts with 9036. Among them, 309 investigation letters were received from the nonlocal case, investigation close contacts with 2790, involved in 30 provinces and 95 cities, medical observation at a rate of 100%, sampling rate 99.56% (2775/2790), turn positive rate was 3.76% (105/2790); The city of Guangzhou issued 204 official letters of investigation, with 6,246 close contacts, covering 27 provinces and 114 cities. The medical observation rate was 100%, the sampling rate 99.63% (6233/6246), and turn the positive rate of 2.26% (141/6246).

The number of close contacts in the tracking investigation official letters from CDC in Guangdong Province is up to 1226, Guangzhou Municipal Health Committee 1004, other cities CDC in Guangdong Province 411, other provinces CDC 91 and other cities CDC in other provinces 51 (Table 2).

As of March 31, 440 local cases were diagnosed in Guangzhou (92 of which were Input cases), and the tracking coefficient of close contacts of local cases in Guangzhou was 14.2 (6246/440) (Fig. 3). We received 528 nonlocal cases with a tracking coefficient of 5.3 (2790/528). We only have a part of the close contacts of nonlocal cases, so the tracking coefficient only represents the number of people received in our city.

Discussion

"Early detection, early reporting, early isolation, early diagnosis, early treatment" close contacts is the first line of defence for infectious disease prevention and control, and effective prevention and control of accurate tracking investigation, home visits, health monitoring, home isolation, centralized isolation, etc, measures will effectively contain the spread and spread of the epidemic. According to statistics, there are more than 2,000 "three-person groups" in Guangzhou, with more than 5,000 police officers. They are also equipped with corresponding cadres and doctors of the neighbourhood committees, it has achieved full coverage of all communities, making important contributions to the accurate isolation of close contacts, the control of the source of infection and the cutting off of transmission routes in Guangzhou [13]. As of March 31, the turn positive rate of close contacts (local cases + nonlocal cases) was 2.72% (246/9036) in Guangzhou. The Beijing Health Commission announced that the rate of turn positive of close contacts in Beijing is about 5.8% [14]. Guangzhou is almost half less than Beijing. One of the reasons is to find close contacts in time; the national close contact tracking coefficient is 8.68 (707913/81554) [15], Hubei province is 4.1 (278179/67802) [16], the epidemic epicentre Wuhan has not announced the number of close contacts. The tracking coefficient of local case close contacts in Guangzhou has risen linearly since February 4. The higher the tracking coefficient, the greater the tracking strength. As of March 31, the tracking coefficient reached the highest 14.2, which is higher than the national average, indicating our tracking strength It is constantly strengthening, and the close contact investigation in Guangzhou is more effective.

However, the close contacts involved in the COVID-19 epidemic came from all over the country. There are many close contacts, and there are many tracking investigation official letters requested. All the tracking investigation official letters are sent and received in the form of official letters from government departments and administrative institutions (CDC). The process is cumbersome and involves much staff, and the opaque information also affects the tracking time of close contacts. For example, Guangzhou sent and received an official letter of inquiry through at least four departments and 15 people. The opaque information also caused different cities to send letters repeatedly, wasting a lot of manpower and time. Close contact has complained that he received more than 10 calls from different departments and cities asking him about his status at the same time. At present, with the spread of the epidemic in the world, many overseas Chinese, Chinese, and international students choose to return to the country to

avoid an epidemic. the number of imported cases of foreign flights increased, and more and more people from all over the country asked for assistance to check the close contacts of flights, but the communication often lacked information, such as close contacts of the Paris-Guangzhou flight CZ348 were requested to provide only the passport number. For example, a positive patient in Shenzhen took a taxi to leave Guangzhou Baiyun Airport. When Shenzhen CDC sent a tracking investigation official letter to the Guangzhou CDC asking to track down the taxi driver and provide only the taxi license plate. Due to the lack of sharing mechanism between the public security department, health department and transportation department in the same city, the information cannot be transferred and shared. Each time the Guangzhou CDC encounters an inquiry letter with unknown information, it needs to send a tracking investigation official letter to these departments. It usually takes a few days to get the relevant results. After receiving the information, the Guangzhou CDC is forwarded to the district CDC according to the territory, which greatly reduces the working efficiency of close contacts tracking investigation. At present, there is no shared system for close contacts tracking and investigation in the country. The close contacts tracking investigation lacks a unified standard, and the tracking investigation depends to a large extent on local understanding and practice; big data platforms in different cities and different departments are often self-built and strictly Restricting the authority of the platform, the lack of information sharing; the lack of communication and cooperation between cities makes it difficult for close contacts to share information.

China is a country with a large population and strong population mobility. It is unrealistic to rely on the health department to tracking and investigate close contacts alone when encountering major epidemics involving all parts of the country, many levels and many personnel. Now is the Internet era. Networks, computing, software, and data are everywhere. Big data, or huge amounts of data, is the ability to quickly obtain valuable information from various types of data.[17]. In this COVID-19 epidemic, some cities use big data to track the life trajectory of close contacts, population exposure history, lock down the source of infection and close contact with the population, to provide valuable information for epidemic prevention and control. For example, the big data administration of Zhengzhou uses technologies such as big data and artificial intelligence to open up the sharing channel of epidemic data among all departments of the city, and accumulatively collects 16 million pieces of data of 42 categories such as confirmed personnel information, suspected personnel information, close contacts information and traffic information of the city. The Haidian District Government of Beijing has assembled personalized data analysis. For key personnel, high-risk suspected personnel, and close contacts, according to the requirements of the Beijing Municipal Health Commission's classification and prevention and control requirements, a daily collection of key physical signs indicators, and tracking and processing of recorded information [18]. Big data brings new methods and technologies so that the original large-volume, time-consuming and labour-intensive work can be sorted out by big data technology, and the working method becomes faster and more efficient. It is suggested that the government take the lead to clarify the information classification of close contacts and the responsibilities of each department, determine the population information Shared with relevant departments in the form of system, and improve the information-sharing system of close contacts to achieve information interconnection and sharing (Fig. 4).

Conclusions

Guangzhou close contacts tracking investigation official letter management is tight, the prompt detection of the source of infection to control the epidemic situation is significant. However, due to the multiple sources and complicated process of official letters, it is suggested to establish a COVID-19 close contacts tracking and investigation sharing system.

Abbreviations

Novel coronavirus pneumonia:COVID-19;the basic reproductive number: R_0 ;Guangdong Center for Disease Control and Prevention: Guangdong CDC; Guangzhou Center for Disease Control and Prevention:Guangzhou CDC; District Center for Disease Control and Prevention: District CDC;the other cities Center for Disease Control and Prevention in Guangdong province: the other cities CDC in Guangdong province; the other provinces Center for Disease Control and Prevention: the other provinces CDC; the other cities Center for Disease Control and Prevention in other provinces: the other cities CDC in other provinces.

Declarations

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Authors' contributions

ZQL made substantial contributions to the conception and design of the study,LL,QLJ,JXX,ZYZ contributed to the acquisition of data and JC,RDH,JJL made a substantial contribution to the analysis of data. All authors were involved in the writing, reviewing and editing of the manuscript. All authors gave final approval and agreed to be accountable for all aspects of the work.

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Availability of data and materials

The data that support the findings of this study are available from the Guangzhou Center for Disease Control and Prevention but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Guangzhou Center for Disease Control and Prevention.

Ethics approval and consent to participate

No patient involved. In this study, all data was obtained from COVID-19's close contacts' tracking investigation official letters data sets of the Guangzhou CDC, etc. which removed the patient identifiers. There was no direct patient and public involvement.

Consent for publication

This study was a retrospective study, it did not contain any individual person's data.

Competing interests

No conflict of interest exists in the submission of this manuscript, and the manuscript is approved by all authors for publication.

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Tables

Please see the supplementary files section to view the tables.

Figures



Figure 1

As of March 31, the epidemic situation map of the official letter of close contacts sent and received COVID-19 in Guangzhou (Fig. 1A-C). Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

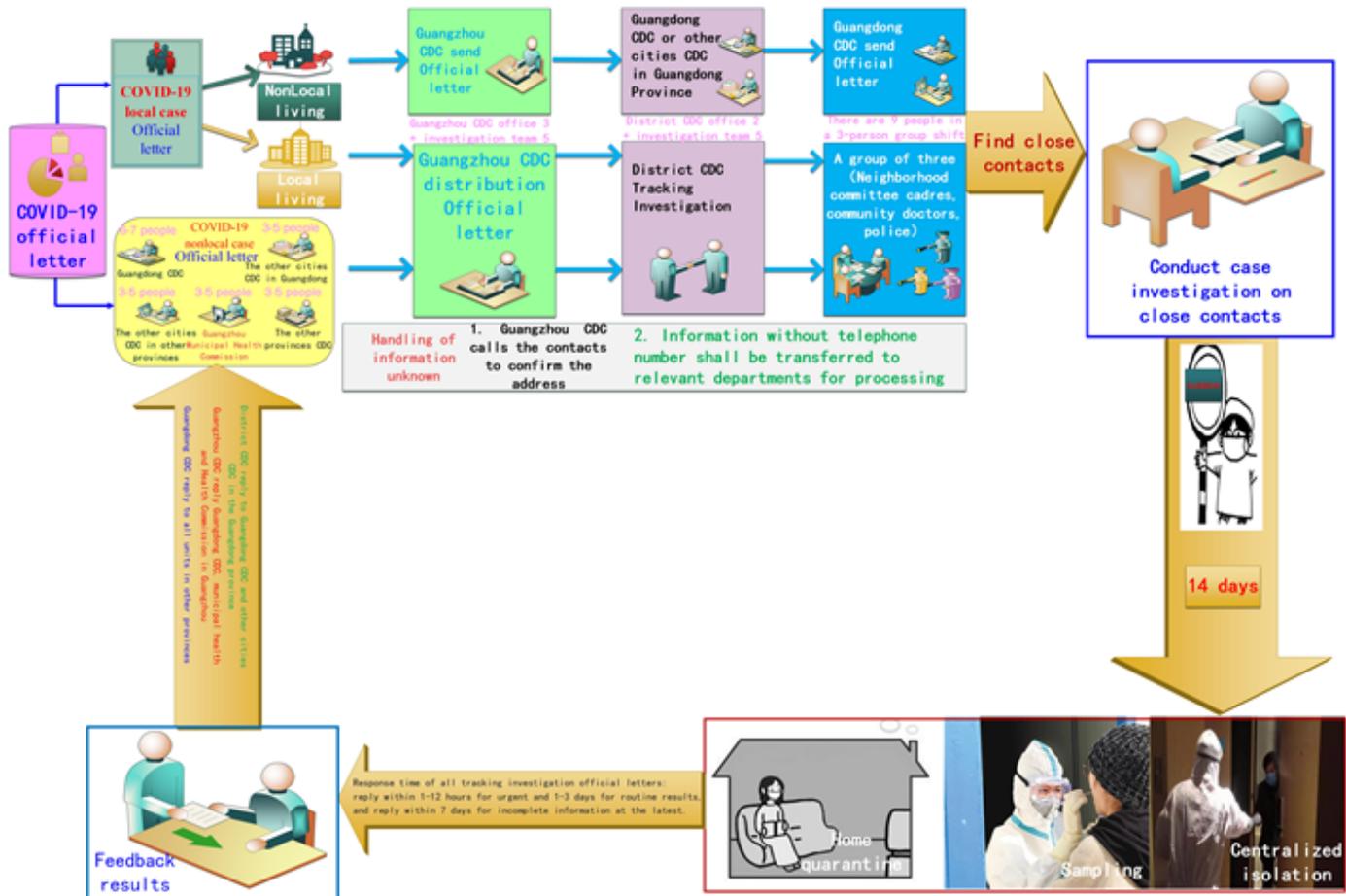


Fig. 2 Flow chart of sending and receiving COVID-19 close contacts tracking investigation official letters in Guangzhou

Figure 2

[See figure.]

Fig. 3 Tracking coefficient of close contacts in Guangzhou

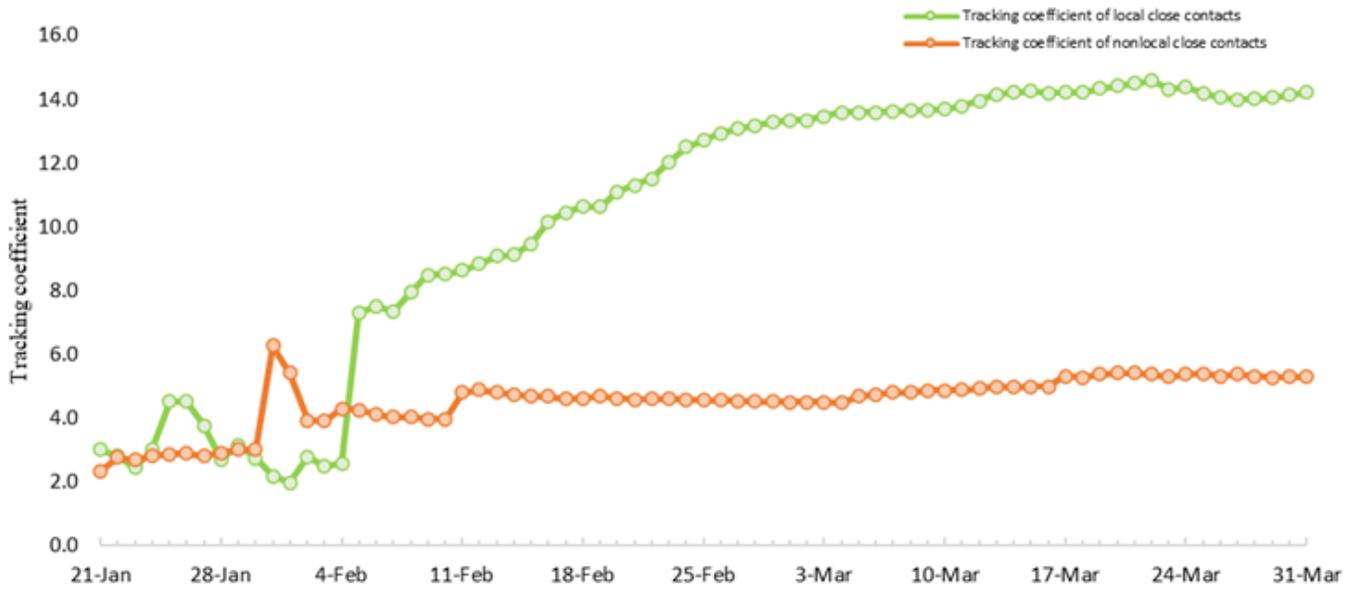


Figure 3

[See figure.]

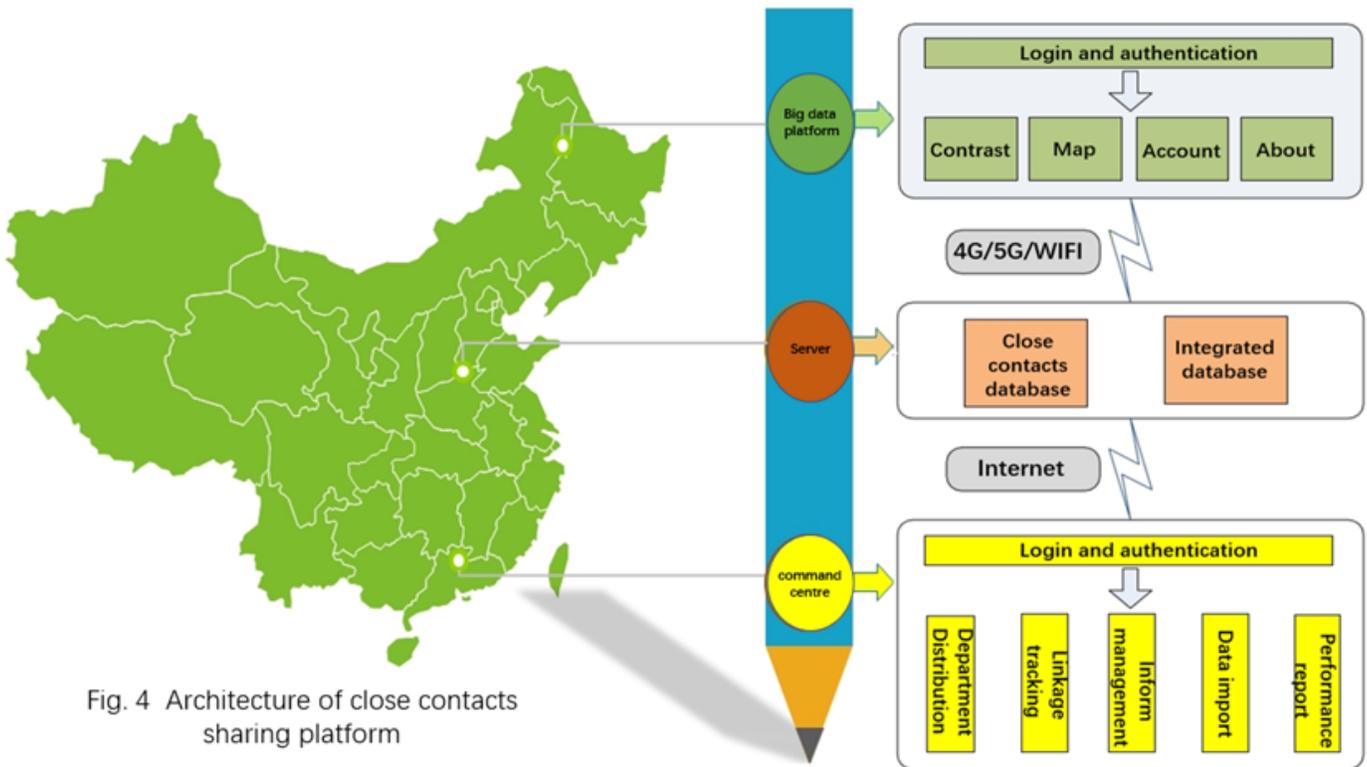


Fig. 4 Architecture of close contacts sharing platform

Figure 4

[See figure.] Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

Supplementary Files

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- [Table12.xlsx](#)