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A Cluster of Coronavirus Disease (COVID-19) Cases Linked to a Restaurant during Early Local SARS-CoV-2 Transmission in Thailand

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Abstract

Coronavirus disease (COVID-19) has become a global pandemic. After notification of a new COVID-19 case working in a restaurant on 10 Mar 2020, the Department of Disease Control, Ministry of Public Health of Thailand initiated an investigation of the index case and all contacts. The aim was to identify COVID-19 cases associated with the index case, identify potential sources of disease, describe the epidemiological characteristics, and control the outbreak. We conducted a cross-sectional descriptive study of the identified cases from active case finding. A total of three laboratory-confirmed COVID-19 cases were identified, two of which were asymptomatic. The cases included the owner of the restaurant A (index), and two employees in the restaurant. In-dept interviews with the cases found that restaurant staffs and customers did not comply with important preventive methods such as social distancing and use of personal protective equipment. However, all cases were diligent about self-isolation when they were identified as having the infection by laboratory tests or when they developed symptoms. Following the investigation, the Thai government strengthened messaging about COVID-19 risks and prevention practices directed to restaurants.

Keywords: Coronavirus Disease, COVID-19, restaurant, Thailand

Introduction

Coronavirus disease (COVID-19) is a new emerging disease caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The common clinical symptoms of the disease are fever, cough and shortness of breath.[1] The exact mode of transmission is unknown; however, it is believed that the disease can spread through respiratory droplets.[2] The mortality rate varies depending on age, gender and co-morbidities, and is estimated to be approximately 0.001 to 0.068 deaths per 10 person-days.[3] The incubation period has been reported to be 4 to 6 days on average, and the reproductive number is 2.2.[4-6]

The World Health Organization (WHO) declared COVID-19 a global pandemic. As of 11 Mar 2020, there were over 100,000 confirmed COVID-19 cases and 7,000 deaths, reported from a large number of countries, including Thailand.[7,8] In Thailand, during this period, more than 200 confirmed COVID-19 cases and one death were identified.[9] To prevent and control the disease with a timely and coordinated response, the Ministry of Public Health (MOPH) activated the Emergency Operation Center (EOC) which included a Situation Awareness Team (SAT) and an Operation Team. The Operation Team was responsible for field investigation of all cases when the Thai MOPH was notified from local public health staffs.

On 10 Mar 2020, the Operation Team received notification from the SAT that there was a probable COVID-19 case visiting Bamrasnaradura Infectious Diseases Institute (BIDI). The Operation Team conducted a joint investigation with BIDI with the following objectives: (i) to identify COVID-19 cases associated with the index case, (ii) to identify the potential source of disease, (iii) to describe epidemiological characteristics, and (iv) to provide recommendations to control the outbreak.

Methods

The index case was interviewed regarding symptoms, travel history, behavioral characteristics and all high-

Table 1. Definitions of COVID-19 cases and contacts

Type	Definition
COVID-19 cases	
Patient under investigation (PUI)	A person who developed fever (or body temperature ≥37.5°C) and at least one of the following respiratory symptoms, cough, rhinorrhea, sore throat, dyspnea, shortness of breath.
Probable case	A PUI who had SARS-CoV-2 detected by a single reference laboratory*.
Confirmed case	A PUI who had SARS-CoV-2 detected by at least two reference laboratories*.
Asymptomatic infection	A person who had no abnormal signs and symptoms but a positive test for SARS-CoV-2 from at least two reference laboratories.
Contacts	A person who shared activities with case
High-risk contact	A person who lived with, or had a history of close contact with, a confirmed COVID-19 case by either one of the following means: (i) talking with a case for more than 5 minutes without wearing proper personal protective equipment, (ii) being exposed to the body secretions from a case without wearing proper personal protective equipment, and (iii) staying together with a case within 1 meter-distance in a closed space, e.g. same vehicle or same air-conditioned room, for more than 15 minutes without wearing proper personal protective equipment.
Low-risk contact	A contact who did not meet the criteria for a high-risk contact.

*Note: *Reference laboratory means a laboratory that was approved for Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) test by the Department of Medical Sciences.*

risk and low-risk contacts focusing on 14 days before the onset of symptoms of the index case to the isolated period. Medical records were reviewed to record the medical history and prescribed medications of the index case. To identify the cases and risk assessment of contacts, the investigator teams used the established case definitions from the standard national guideline for COVID-19 investigation in Thailand as outlined by the Thai Department of Disease Control as of 3 Mar 2020.[10] The definitions for COVID-19 cases and contacts are shown in Table 1.

An in-depth interview was conducted with all high-risk and low-risk contacts of the COVID-19 cases to obtain information on symptoms, travel history, mechanism of contacts, and their preventive measures.

Laboratory testing of the index case was performed using a nasopharyngeal and throat swab tested for SARS-CoV-2 by real time reverse transcription polymerase chain reaction (RT-PCR) at BIDI. Symptomatic contacts of the index case were tested immediately using the same methods. All specimens obtained from the remaining high-risk contacts were tested on day 5 or later after contact with the index case. If the contacts with undetected SARS-CoV-2 laboratory result met the PUI criteria later, he/she will be tested for COVID-19 one more time.

Results

History of Index Case

The index case was a Singaporean male, aged 36 years old, and living in Bangkok, Thailand. He was the owner of a restaurant in Bangkok (Restaurant A). He developed chills, fatigue, and muscle aches on 8 Mar 2020; he visited Hospital A on the following day presenting with the above-mentioned symptoms plus fever and cough. At the hospital, physical examination revealed a body temperature of 38.6 degrees Celsius, a pulse rate of 99 beats per minute, and a respiratory rate of 20 breaths per minute. Further laboratory tests included complete blood count (hematocrit 47.8%, hemoglobin 16.1 g/dL, white blood cells 5,000 cell/ml [Neutrophil 75%, Lymphocyte 19%, Monocyte 6%] and platelet count 251,000 cell/ml); RT-PCR for SARS-CoV-2 was collected on 9 Mar 2020 and reported as detected on 10 Mar 2020 by two reference laboratories, Ramathibodi Hospital and the National Institute of Health, Department of Medical Sciences.

The index case had recently visited Singapore and returned to Thailand on 2 Feb 2020. He lived alone and had no household contacts. His routine schedule included working at his own restaurant, a football workout with his friends every Monday, teaching students every Wednesday and Saturday, and dinner with his girlfriend at least once per week. In addition

to this routine, he had a meeting with a Singaporean friend at a bar on Thonglor street, Bangkok, on 7 Mar 2020. Figure 1 shows a timeline of his movements during the 14-day period leading up to his hospital admission.

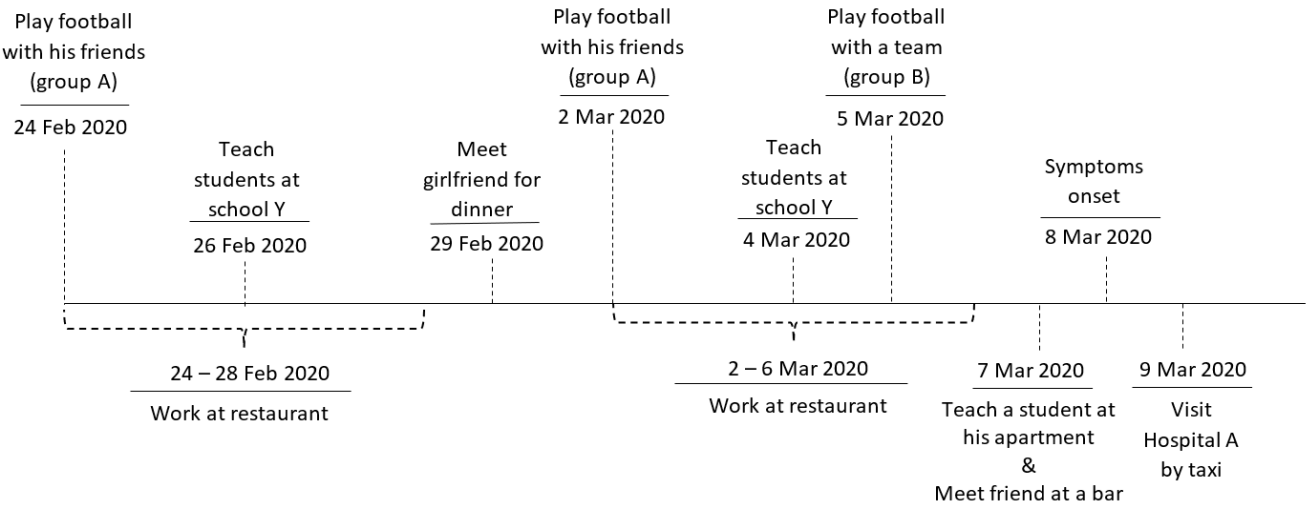

Figure 1. Detailed history of index case during the fourteen-day period before visiting a hospital

Contact Tracing

A total of 46 contacts were identified. His contacts could be categorized into five groups: (i) 13 school contacts, (ii) 15 hospital contacts, (iii) 10 football-playing friends (group A), (iv) five restaurant employees, including four full-time employees and one part-time employee, and (v) three others (his girlfriend, a Singaporean friend, and a taxi driver). Restaurant customers and other football players (group B) could not be traced due to a lack of information. Of the 46 contacts, 33 (71.7%) were classified as high-risk contacts. Among the high-risk contacts, four reported experienced abnormal clinical symptoms; two of whom met the definition of PUI. A summary of the contacts is shown in Table 2.

All thirty-three nasopharyngeal and throat swab specimens from the high-risk contacts were collected and tested for SARS-CoV-2. Of all collected specimens, two were positive for SARS-CoV-2. These two were employees (employee A and employee B) at the index case' restaurant despite exhibiting no symptoms. Table 3 presents the results of the laboratory testing among the 33 high-risk contacts.

History of Laboratory Confirmed Cases that were Contacts with the Index Case

Both employees, A (female, 33 years old) and B (female, 27 years old), who were asymptomatic SARS-CoV-2 infections, worked with the index case during weekdays. Fourteen days prior to the index case's symptoms onset, all full-time employees, including A and B, had a meeting with the index case with a gap of at least 1 meter between each person. Nobody wore a face mask or other personal protective equipment. After the meeting, the index case worked in his office at the restaurant or greeted the customers. The last contact that the two employees had with the index case was at the restaurant on 6 Mar 2020. During work, employee A and B did not talk to each other; however, they had lunch together with other colleagues without the use of serving spoons to serve the food from the shared dishes.

The restaurant employees' responsibilities included cooking, serving food, and cleaning. The employees had no fixed duty; their role varied depending on the restaurant's needs. They wore no face mask or gloves when they were working; but they did wear a mask when going outside the restaurant. Both had no respiratory symptoms and quarantined themselves on 10 Mar 2020 after being notified of the laboratory result by their employer.

Contacts of employee A included a boyfriend who was living in the same apartment, two sisters, a brother-in-law, who shared a meal together once a week, and the four other restaurant employees. All were considered high-risk contacts. Employee B had six contacts, namely, two household members and the four other restaurant employees. No low-risk contacts were identified. The total number of contacts of employees A and B comprised nine high-risk contacts. Their nasopharyngeal and throat swabs were collected and tested for SARS-CoV-2 and the results of all tests were not detected.

Preventive and Control Measures of COVID-19 at the Restaurant

The restaurant, located in a community building, was an air-conditioned restaurant with an on-site dining and indoor seating area. In terms of preventive and

Table 2. Description of contacts and clinical presentation (n=46)

Location of contacts	Total n (%)[b]	Clinical presentation[a]	
		Symptomatic n (%)	Asymptomatic n (%)
School (n=13)			
High-risk	11 (84.6)	2 (18.2)[c]	9 (81.8)
Low-risk	2 (15.38)	0	2 (100.0)
Hospital (n=15)			
High-risk	5 (33.3)	0	5 (100.0)
Low-risk	10 (66.7)	0	10 (100.0)
Football[d] (n=10)			
High-risk	10 (100.0)	1 (10.0)[c]	9 (90.0)
Low-risk	0	0	0
Restaurant[e] (n=5)			
High-risk	4 (80.0)	0	4 (100.0)
Low-risk	1 (20.0)	0	1 (100.0)
Others (n=3)			
High-risk	3 (100.0)	1 (33.3)	2 (66.7)
Low-risk	0	0	0
Total (n=46)			
High-risk	33 (71.7)	4 (12.1)	29 (87.9)
Low-risk	13 (28.3)	0	13 (100.0)

Note: [a] Row percentage, [b] Column percentage, [C] One met PUI definition, [d] Only football players group A, [e] Only restaurant employees

control measures of COVID-19 at the restaurant before detecting the index case, screening for respiratory symptoms including fever and social distancing was not being practiced and improper protective equipment were being used. Seating space was less than 1 meter with no barriers. Face masks and gloves were not used.

Preventive and Control Measures of COVID-19 Cases and their Contacts

After the outbreak was recognized, the owner of restaurant and all employees were aware of the risk of SARS-CoV-2 infection and transmission. The owner closed the restaurant for at least 14 days, cleaned and disinfected all areas. In addition, the owner also notified customers of the restaurant to be tested for SARS-CoV-2 via his social media. He also informed the school where he taught about this incident.

None of the identified contacts wore facial masks before the outbreak detection. However, after the outbreak was detected and notified, they all complied with preventive and control measures as instructed by the Department of Disease Control. They quarantined themselves and reported their symptoms each day for the next 14 days after their last contact with the index case.

Table 3. SARS-CoV-2 laboratory results of identified high-risk contacts of the index case classified by types and clinical presentations (n=33)

Type of Contact*	Specimen collected [a]			Positive for SARS-CoV-2	
	Total	Symptomatic	Asymptomatic	Symptomatic	Asymptomatic
School	11	2 (18.2%)[b]	9 (81.8%)	0	0
Hospital	5	0	5 (100.0%)	0	0
Football	10	1 (10.0%)[b]	9 (90.0%)	0	0
Restaurant	4	0	4 (100.0%)	0	2 (50.0%)
Others	3	1 (33.3%)	2 (66.7%)	0	0
Total	33	4 (12.1%)	29 (87.9%)	0	2 (6.9%)

*Note: [a] Row percentage, [b] One met PUI definition, * All identified high-risk contacts were tested for SARS-CoV-2.*

Discussion

This report describes a local outbreak of SARS-CoV-2 in Thailand with a confirmed COVID-19 index case and two asymptomatic SARS-CoV-2 infections. As the index case developed symptoms approximately 35 days after arrival in Thailand from Singapore, which was longer than the documented incubation time, it was unlikely that he acquired the infection abroad. In addition, the two asymptomatic SARS-CoV-2 infections had no history of traveling abroad. This information indicates a local SARS-CoV-2 transmission in Thailand. The potential sources of the SARS-CoV-2 infection in this outbreak cluster was someone from the unidentified contacts – a customer of the restaurant or a football player in group B – as all identified contacts of the index case tested negative for SARS-CoV-2.

Regarding the transmission path among the index case, employee A, and employee B, the most likely scenario is that the index case was infected by a customer (since part of his duty was to greet all customers entering his restaurant), while employees A and B may have also been infected by the same unknown customer, or one was infected by the unknown customer and then she infected the other employee. As the index case had only one meeting with his employees and kept a distance of more than 1 meter during the asymptomatic period, transmission between the index case and the two employees with positive SARS-CoV-2 was less likely. For employees A and B, transmission might be explained by two possible paths. First, sharing dishes during lunchtime without the use of a serving spoon, and second, direct contact with an infected customer as previously mentioned. Transmission of a virus through the consumption of shared food without the use of a serving spoon has also been documented in a cluster in Singapore.[11,12] It is possible that both employees became infected after direct contact with a source case who was a customer at the restaurant, or were exposed to some fomite such as a used napkin and cutlery because preventive measures such as face shields and protective masks were not worn by the employees.

In terms of prevention and control measures, personal protective equipment was not worn before the index case was detected as SARS-CoV-2 positive. However, after the index case became symptomatic, he isolated himself immediately. Additionally, all contacts quarantined themselves, thus complying with COVID-19 prevention and control protocols announced by the Ministry of Public Health.

Restaurants are known to be a source of several COVID-19 outbreaks.[13–16] This particular restaurant was considered to be the highest risk setting according to guiding principles devised by the US Centers for Disease Control and Prevention.[17] As the restaurant had air-conditioning, indoor-dining, and less than 6 feet between adjacent seats, the potential for SARS-CoV-2 transmission was relatively high.[15–17] In addition, as the employees did not wear protective face-shields or masks, the chances of contact with respiratory droplets from customers to employees and vice versa was increased.

This study emphasized the importance of prevention and control measures for restaurants and supports the national policy for COVID-19 prevention and control in a restaurant. As restaurants are a potential source of a large outbreak, the Thai Emergency Operations Center launched restaurant policies and regulations which is composed of five major requirements: (i) screening system using body temperature; (ii) track and trace systems using a technology-based application called “Thaichana”; (iii) social distancing (table space ≥2 meters or barrier ≥1.5 meters) and proper protective equipment; (iv) air ventilation (v) cleaning and disinfection procedures.

Actions Taken

In terms of preventive and control measures, all contacts were recommended to self-quarantine themselves, wash their hands frequently, and wear a face mask whenever they ventured outdoors or received visitors to their homes. Although some contacts tested negative for SARS-CoV-2, several studies have reported that the incubation period varies widely across individuals and asymptomatic infections can also transmit the virus.[4,5,14] In addition, all contacts reported their daily health status to the Department of Disease Control for the 14-day period after their last contact with a SARS-CoV-2 infected case.

Limitations

As some of the contacts (restaurant customers and members of the football team B) could not be followed, the definite source of infection is yet to be identified and the magnitude of SARS-CoV-2 infections from this cluster is indeterminate. This study only followed the contacts for 14 days, although the reported longest incubation period is 27 days.[15] Therefore, contacts who developed symptoms after the follow-up time ended were not detected. However, this error would be relatively small as one study reports that the 95th percentile for the incubation period is 12.5

days.[6] Moreover, information bias might occur as 14-day timing for contact tracing is not recent. Finally, this study was conducted using a routine outbreak investigation. Therefore, time was limited for conducting intensive interviews.

Public Health Recommendations

The Department of Disease Control should enhance the effectiveness of the track-and-trace system to indicate the telephone number and location of the investigated person within a specific time frame. This will help increase the timeliness and completeness of contact tracing. In addition, the Department of Disease Control should work in concert with the Department of Health to disseminate the guideline for prevention and control of COVID-19 at restaurants. After that, the guideline should be distributed to the wider public, especially restaurants and canteens, with regular assessment after its launch.

Conclusion

A confirmed SARS-CoV-2 cluster was detected with one confirmed COVID-19 case and two asymptomatic infections. The likely source of infection was a customer(s) of the restaurant or football players who the index case had played with 3 days prior to symptoms onset. The definite source of infection and magnitude of the outbreak are unknown due to a lack of information from all contacts of the index case. Therefore, a tool for tracing people attending community places should be strengthen and implemented effectively. In addition, a guideline for COVID-19 prevention in restaurants should be publicized and adapted. The index case and identified contacts complied with the Ministry of Public Health's COVID-19 prevention and control protocols after developing symptoms or being notified of the index case's status. These practices likely led to effective control and ultimately resulted in a small number of subsequent cases/contacts.

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