



Investigation of a COVID-19 Cluster in a State Quarantine Facility in Thailand and Prevention Measures for Incoming Travelers

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Abstract

Coronavirus disease (COVID-19) became a global pandemic in 2020. Thailand introduced a mandatory 14-day quarantine at government facilities for all arrivals. On 15 May 2020, the Department of Disease Control received notification concerning ten confirmed COVID-19 cases at a state quarantine center. A joint investigation led by the Department of Disease Control confirmed the diagnoses, identified the source of infection, and assessed the state quarantine's environment and procedures. The confirmed cases were all on a flight from Pakistan. The attack rate among the passengers was 9%. All had a risk history of COVID-19 infection in Pakistan, such as attending crowded areas and living in an area with a COVID-19 outbreak. On the flight, three possible clusters could be classified using the two-row rule; however, all cases wore a face mask throughout the journey. Transmission was unlikely to have occurred at the quarantine center due to a lack of contact history and appropriate preventive measures in place. This investigation provides insight into the state quarantine practices and shows gaps for improvement, such as using genomic data for cluster identification and developing a COVID-19 questionnaire for use at the quarantine center.

Keywords: coronavirus disease, COVID-19, severe acute respiratory syndrome coronavirus 2, SARS-CoV-2, State Quarantine, Thailand

Background

Coronavirus disease 2019 (COVID-19), an emerging infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first recognized in Wuhan, China at the end of 2019.¹ Subsequently, the disease spread to the rest of the country and to the whole world.² Due to the oppressive situation of COVID-19 outbreaks worldwide, on 15 Apr 2020, the Civil Aviation Authority of Thailand announced a ban on all incoming international flights. Thai nationals who remained in affected countries were evacuated by a charter flight followed by a 14-day mandatory state quarantine.^{3,4}

The quarantine period started when the flight landed in Thailand. Detainees could be discharged on day 15. According to the regulation, the first of two nasopharyngeal specimens is collected during days 3-5, and the second is collected following recommendations

of the investigation team.⁵ The specimens are tested for SARS-CoV-2 using reverse transcriptase-polymerase chain reaction (RT-PCR) at a certified laboratory. People with positive SARS-CoV-2 tests are referred to a designated hospital for isolation.⁵

On 26 Feb 2020, the Pakistan government reported the first two cases of COVID-19, a student at the University of Karachi and one in Islamabad.^{6,7} The number of cases increased dramatically and spread to several districts of Pakistan, including Islamabad, Karachi, and Lahore.⁸

On 15 May 2020, the Division of Epidemiology, Department of Disease Control (DDC), Ministry of Public Health received notification from the Office of Disease Prevention and Control 6 Chonburi that ten confirmed COVID-19 cases had returned from Pakistan. The joint investigation team investigated the event between 16 and 17 May in order to confirm the

diagnosis, identify the source of infection, and assess the state quarantine's environment and management procedures.

Methods

A descriptive cross-sectional study was conducted on 16 May 2020. The investigation team interviewed the reported COVID-19 cases via phone regarding their travel history, symptoms, and contacts in the previous 14 days before arrival. Medical records and laboratory results of cases were reviewed. Case definition was any person who had a history of traveling from a foreign country from all flights and tested positive for SARS-CoV-2. The specimen was collected by nasopharyngeal swab and sent to the Regional Medical Science Center 6 Chonburi. Inconclusive cases were tested again two days later.

Contacts were classified into two categories: (i) high-risk, defined as any person who had contact or conversation with an index case longer than 5 minutes within 1-meter distance, stayed in a closed space with an index case within 1-meter distance, or a medical staff who had contact with an index case and did not wear adequate personal protective equipment (PPE), and (ii) low-risk, defined as any person who had a history of contact with a confirmed case but did not meet the high-risk contact criteria.⁹

We defined three sources of COVID-19 infection: (i) Pakistan, (ii) the airplane, and (iii) Thailand. Infection in Pakistan was assessed by interviewing cases about their daily schedule and PPE use 14 days before arrival in Thailand. History of contact with confirmed cases or those with respiratory symptoms were also examined. The risk of infection in the airplane was assessed by interviewing the cases about their PPE use on the flight and mapping their seats. The risk of infection in Thailand was evaluated by interviewing the cases and state quarantine staff. An environmental survey was conducted at the designated state quarantine facility focusing on infection prevention and control measures.

Statistical Analysis

Continuous data were presented using median with interquartile range (IQR), while categorical data were presented using frequency with percentage.

Ethics

Ethical clearance was waived as this study was performed as part of a Thai-DDC routine outbreak investigation.

Results

On the affected flight, 113 Thai nationals departed from Lahore, Pakistan on 6 May 2020 and arrived at Don

Muang Airport, Bangkok, Thailand on 7 May. Most passengers (89%) were male and the median (IQR) age was 27 years (Q1=24, Q3=31). Most had visited Lahore (48.7%) and Karachi (38.9%).

Characteristics of Laboratory-Confirmed COVID-19 Cases

Of the 113 passengers, ten were confirmed to have COVID-19 (attack rate=8.9%) of which two were symptomatic on 8 May 2020. The asymptomatic cases were tested on 12 May (day 5) and seven tested positive. Two inconclusive cases were tested again on 15 May, of which one tested positive. The median (IQR) age of the cases was 26.5 years (Q1=23.5, Q3=27.0) and the male-to-female ratio was 9:1. Most cases (90%) were students at Karachi, Lahore, and Islamabad (Table 1).

Possible Source of COVID-19 Infection

History of daily life in Pakistan

All cases reported that they quarantined themselves at an authorized place before departure from Pakistan. However, six reported traveling outside the quarantine building, five visited a mosque, and five had contact with a confirmed case during the 14 days before departing Pakistan. There were no temperature screening devices at the mosque and social distancing measures were absent. At that time, none of the cases wore a face mask.

History of SARS-CoV-2 testing was self-reported with no documents for confirmation. All ten cases reported that they were tested for SARS-CoV-2 in Pakistan; nine cases tested negative. The positive case was tested twice; the first result was inconclusive and the second test was not reported. Seven cases were tested during 2 to 5 May (within four days before departure), while two were tested approximately one month before departure (Table 1).

History of traveling from the accommodation to the airport in Pakistan

- *Lahore (4 cases)*

The Thai consulate sent buses to transfer people from their accommodation to the hotel on 5 May. On arrival, nasal swabs were taken. Sleeping arrangements were two per room. The next day, on 6 May, they were transferred to the airport via bus. All passengers had their forehead temperature measured before boarding the buses and all wore masks en route.

- *Karachi (4 cases)*

The Thai consulate sent two buses to transfer people from their accommodation to a hotel on 5 May. Everyone wore masks during the journey. Nasal swabs were collected before the journey to the hotel. However,

five passengers diagnosed with COVID-19 traveled by bus with other infected SARS-CoV-2 passengers. They arrived at Lahore airport on 6 May.

- *Islamabad (2 cases)*

One case traveled from his accommodation in Islamabad directly to Lahore airport via private car (a 5-hour drive), which was driven by a friend on 6 May.

Both wore protective face masks for most of the journey. The other case traveled from a local quarantine facility by car to a university on 6 May and traveled to the airport by bus with other passengers bound for Thailand. Before boarding the bus, the staff checked the temperature of all passengers using a forehead thermometer. Face masks were a requirement for all passengers.

Table 1. Demographic data of confirmed COVID-19 cases who were returning from Pakistan (n=10)

Case No.	Gender	Age	Occupation	City	Symptoms	Date of onset	Test in Pakistan ^T	Risk factor in Pakistan	Date of confirmation
1	Male	27	Student	Karachi	Fever, rhinorrhea, diarrhea, anorexia, and myalgia	8 May 2020	NPS, neg, 4 May 2020	Contacting with COVID-19 case, going out from SQ in Pakistan	8 May 2020
2	Male	26	Student	Islamabad	Fever, cough, and sputum	28 Apr 2020	NPS, neg, 4 May 2020	Praying at mosque, going out from SQ in Pakistan	8 May 2020
3	Male	24	Student	Lahore	Asymptomatic	-	NPS, neg, 5 May 2020	Contacting with COVID-19 case	12 May 2020
4	Female	27	Housewife	Karachi	Asymptomatic	-	NPS, neg, 2 May 2020	Contacting with COVID-19 case, going out from SQ in Pakistan	12 May 2020
5	Male	27	Student	Lahore	Asymptomatic	-	NPS, neg, 5 May 2020	-	12 May 2020
6	Male	31	Student	Lahore	Asymptomatic	-	NPS, did not know the result, 5 May 2020	-	12 May 2020
7	Male	28	Student	Karachi	Asymptomatic	-	NPS, neg, 28 Apr 2020	Praying at mosque, contacting with COVID-19 case, going out from SQ in Pakistan	12 May 2020
8	Male	18	Student	Islamabad	Asymptomatic	-	NPS, neg, 4 May 2020	Praying at mosque, going out from SQ in Pakistan	12 May 2020
9	Male	23	Student	Lahore	Asymptomatic	-	NPS, neg, 5 May 2020	Praying at mosque, contacting with COVID-19 case	15 May 2020
10	Male	17	Student	Karachi	Asymptomatic	-	NPS, neg, end of April	Praying at mosque, contacting with COVID-19 case, going out from SQ in Pakistan	12 May 2020

Note: NPS=nasopharyngeal swab, neg=negative, SQ=State Quarantine

^TSwab collection methods, results, date of test

History of traveling on the flight from Pakistan to Thailand

All 10 cases were seated in three zones; seats 9-12, 17-18, and 23-25. Two seats could not be identified due to wrong telephone numbers in the list of seat and temperature screening (Figure 1). All flight attendants wore personal protective equipment (masks, face shields, gloves, and protective suits). A face mask was given to all passengers

and the flight attendants gave alcohol gel and alcohol wipes to the passengers to clean their belongings before boarding the airplane. Meals were not served on board. All passengers always wore their face masks and sat at their designated seats throughout the flight. There was no report about coughing on board among the cases. The duration of the flight from Lahore to Bangkok was 4 hours and 30 minutes.

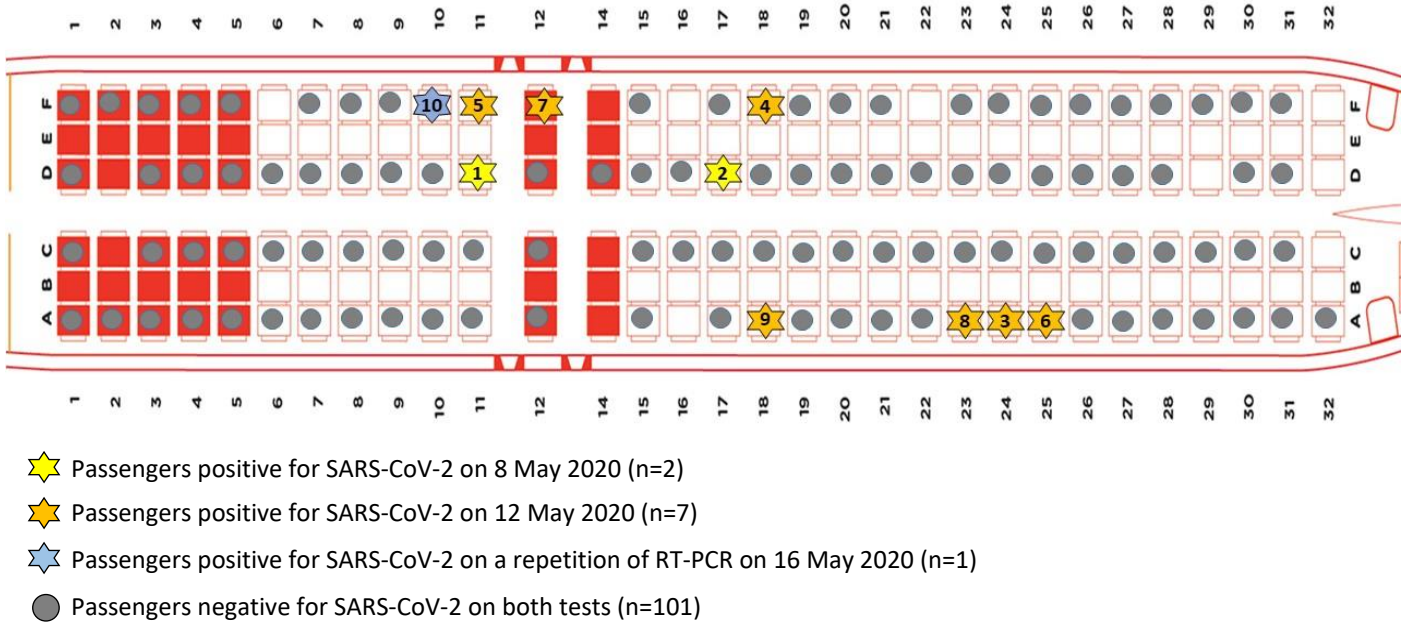


Figure 1. Map of passenger seats on a flight from Lahore Airport, Pakistan to Don Muang Airport, Thailand

History of traveling from the airport to the quarantine facility in Thailand

On arrival at the airport in Thailand, the airport staff arranged passengers to be sent directly to one of seven government-provided buses on a first-come-first-serve basis. Temperature screening was done before boarding the buses. Passengers sat with one space free in the middle position. All passengers wore face masks and all staff members wore standard protective equipment.

History of staying at the quarantine facility in Thailand

On arrival at the quarantine facility, staff brought all passengers' luggage at the front of the quarantine facility and sprayed them with disinfectant chemicals. Staff then asked passengers to alight from the buses and collect their belongings while keeping a one-meter distance between them. Passengers then proceeded to the registration center where their personal information including symptoms and fasting history were collected. Social distancing and wearing a face mask were implemented during the registration period.

After registration, returnees went directly to their room using the lift one at a time. Most were single rooms; however, two rooms were shared by more than one person. The returnees were not allowed to leave their rooms during the 14-day quarantine period. Three meal boxes were provided each day at 7.30 AM, midday, and 6 PM and the garbage was collected twice a day at 8 AM and 8 PM. Separate routes were used to deliver meals and remove garbage.

The quarantine facility was cleaned with the proper disinfectant every day. A closed-circuit television monitor was in use continuously and if anyone left their room, a warning alarm would sound.

Contact Tracing

Contact tracing identified at least 523 people as high-risk contacts of these 10 confirmed cases. Twenty had stayed with the 10 cases. At least 400 contacts were exposed in Pakistan during religious activities with three cases who visited a mosque and 103 passengers who traveled on the same flight. The remaining passengers were under 14-day quarantine with no report of new SARS-CoV-2 infection. At least 38 people were identified as low-risk contacts: six flight

attendants who wore proper personal protective equipment, an unidentified number of airport screening staff and staff who escorted passengers to the buses, at least ten people who worked at the state quarantine facility, 12 laboratory staff who collected patients' specimens, and 10 medical staff who treated cases at the hospital.

Discussion

This outbreak investigation described a group of COVID-19 cases returning from Pakistan and quarantined at the Thai government's designated quarantine facility. The Thai government implemented a 14-day quarantine measure for all travelers entering Thailand from abroad.¹⁰ Similar quarantine measures were implemented in many other countries; however, in Thailand, State Quarantine is fully supported by the government and receives cooperation from the hotels and private hospitals.¹¹ From our investigation, among 113 returnees from Pakistan in May 2020 who tested positive for SARS-CoV-2, 10 (8.9%) were symptomatic. This rate is slightly higher than that among the first group of 134 returnees from Wuhan in February 2020.^{12,13}

Most of the confirmed cases in this cluster passed the local screening procedure, including temperature screening and lung examination for obtaining the fit-to-fly document, a required document, and a nasal swab test before traveling, which is not required. Therefore, measuring the forehead temperature and examining the lungs via x-ray might not be able to detect asymptomatic infections, which constituted the majority of confirmed cases.

Most confirmed cases had a history of visiting a mosque prior to leaving Pakistan. This corresponds to a previous study where social distancing was lacking, particularly at places of worship, which increases the risk of infection with respiratory diseases.^{14,15} To prevent transmission among this high-risk group, prayer room screening measures should strictly follow the public health measures against COVID-19, such as wearing masks and screening temperature.

Returnees from Karachi reported that some of them traveled with people infected with SARS-CoV-2 on the bus from their accommodation to the consulate. We cannot confirm that this was the source of transmission, but we advise travelers to take maximum precautions, for example, wearing face mask, separating bus between suspected patients and other people, against SARS-CoV-2 infection if their trip is unavoidable.

Limitations

A limitation of this study is that the specimens were inadequate for sequencing tests. Another limitation was that contact tracing among contacts in Pakistan was not possible. However, we sent information about this investigation to the International Health Regulation unit, which then contacted the respective authorities in Pakistan for further investigation.

Public Health Recommendations

At the state quarantine facilities, we recommend that a list of all staff, including food deliverers, garbage collectors, maintenance personnel, cleaners, and all healthcare workers who may have been exposed to potential cases, be maintained for possible source investigation in case any infections among them occurs. The bus drivers and the number of passengers transported should also be recorded. For the Department of Disease Control, quarantine should be mandatory among all people traveling abroad. We recommended creating a channel for submission of electronic documents of SARS-CoV-2 laboratory results from the origin country among people returning from other countries if the origin country uses it with a fit-to-fly certificate. A guideline for sequencing tests and a state quarantine investigation form should also be developed.

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Suggested Citation

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