



## An Investigation of Coronavirus Disease (COVID-19) in a Chinese Tourist, January-February 2020: Surgical Mask Wearing in Pre-Physical Distancing Strategy

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### Abstract

On 29 Jan 2020, the Operation team was notified by the Emergency Operation Center that there was a Chinese man infected with SARS-CoV-2 admitted in a private hospital in Bangkok. Division of Epidemiology, Office of Disease Prevention and Control 1, 11, and Institute for Urban Disease Control and Prevention jointly deployed to conduct an investigation. Descriptive study was conducted by interviewing the index case about his symptoms, travel history, and reviewing medical records. Contact tracing was done. Close contacts of the index case were classified to high-risk and low-risk contacts. Laboratory testing for SARS-CoV-2 was done among high-risk contacts and symptomatic low-risk contacts. The index case was a 30-year-old Chinese. He had worked in Guangxi province, China. He spent 2 days in Wuhan city and 2 days in Guangzhou city before traveling to Thailand. He developed fever, cough, and sore throat after being in Thailand for 3 days. According to the median incubation period of COVID-19, he could be infected from China. Since he started traveling from China, he wore a surgical mask all the time. From contact tracing, the high-risk contacts that could be followed, none of them had laboratory test positive. Therefore, this strategy of wearing a face mask should be encouraged nationwide especially in case that physical distancing could not be done.

**Keywords:** Coronavirus Disease, COVID-19, imported case, case investigation, surgical mask, Thailand

### Introduction

On 31 Dec 2019, a cluster of pneumonia of unknown etiology was reported in Wuhan City, Hubei Province of China. Chinese authorities reported in the media that the cause of this viral pneumonia was initially identified as a new type of coronavirus, which is different from any other human coronaviruses discovered so far.<sup>1</sup> On 7 Jan 2020, the World Health Organization (WHO) named it as the 2019 novel coronavirus (2019-nCoV). On 11 Feb 2020, WHO named the illness associated with 2019-nCoV as the 2019 Coronavirus Disease (COVID-19) and

International Committee on Taxonomy of Viruses (ICTV) announced “Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)” as the name of the new virus.<sup>2-5</sup>

On 10 Jan 2020, the first death and 41 clinically confirmed infections caused by the coronavirus were reported in China.<sup>6</sup> By 22 Jan 2020, COVID-19 had spread to major cities and provinces in China, with 571 confirmed cases and 17 deaths reported. Confirmed cases were also reported in other regions and countries, including Hong Kong, Macau, Taiwan, Thailand, Japan, South Korea, and the United

**Table 1. Case definition of COVID-19 (version 28 January 2020)**

Type	Definition
Patients under investigation (PUI)	<p>Anyone who had body temperature <math>\geq 37.5</math> °C or had history of fever with one of these following signs &amp; symptoms: cough, runny nose, sore throat, dyspnea or difficult breathing</p> <p>With one of these following situations:</p> <ul style="list-style-type: none"> <li>• Traveled from or lived in China (Exclude Hongkong, Macau, and Taiwan) within 14 days before onset of symptoms</li> <li>• Close contacted with confirmed case</li> </ul>
Probable case	PUI with detected SARS-CoV-2 by rRT-PCR from 1 designated laboratory
Confirmed case	PUI with detected SARS-CoV-2 by rRT-PCR from 2 designated laboratories

States.<sup>7</sup> On 23 Jan 2020, the central government of China imposed a lockdown in Wuhan and other cities in Hubei to quarantine the center of an outbreak of COVID-19; this action is commonly referred to as the "Wuhan lockdown" as a last resort to contain the epidemic.<sup>6,8</sup> To contain the spread in Wuhan, authorities imposed unprecedented restrictions on travel and ordered the closure of most businesses in the bustling metropolis, which is home to 11 million people. Chinese authorities have credited these measures with a downturn in infection rates, and the vast majority of cases are now being reported outside of China.<sup>9</sup>

On 29 Jan 2020, the Operation team was notified by Situation Awareness Team (SAT) of Emergency Operation Center (EOC) that there was a Chinese man infected with SARS-CoV-2 admitted in a private hospital in Bangkok, Thailand, since 27 Jan 2020. Division of Epidemiology, Office of Disease Prevention and Control 1, 11, and Institute for Urban Disease Control and Prevention from the Department of Disease Control (DDC) jointly deployed to conduct an investigation.

## Methods

### Descriptive Study

A descriptive study was conducted. We followed the guidelines of the DDC, Ministry of Public Health (MOPH), for case definition of COVID-19 (version 28 Jan 2020) as show in Table 1.

We performed data collection by interviewing the index case about his symptoms, travel history, and reviewing medical records. We did an active case finding of those who had come in close contact with

the index case from 30 Jan – 10 Feb 2020 by watching closed-circuit television (CCTV) in the private hospital, coordinating with Health Control at the airport, airlines, hotels, taxi cooperatives, and bus company for a list of close contacts.

Close contacts were people who contacted with the index case since he developed signs or symptoms. We classified close contacts into high-risk and low-risk contacts according to the guideline by DDC, as show in Table 2.

Information of close contacts who were foreigners was sent to the Thai International Health Regulations (IHR) focal point to alert its IHR network of their country of origin. Therefore contact tracing can be done to prevent spreading of the disease. For close contacts who were Thai, we coordinated with relevant organizations to follow up their symptoms for 14 days after the last exposure with the index case.

### Laboratory Investigation

According to the DDC guideline, throat swab (TS) for SARS-CoV-2 by real time reverse transcription polymerase chain reaction (rRT-PCR) was done in all asymptomatic high-risk contacts. For symptomatic cases, both low-risk and high-risk contacts that met Patient Under Investigation (PUI) criteria as in Table 1, nasopharyngeal swab (NPS) and TS was done. Samples were sent to two designated laboratories including the National Institute of Health (NIH), Department of Medical Sciences, MOPH, and the Thai Red Cross Emerging Infectious Diseases (TRC-EID) Health Science Centre, Chulalongkorn University (Table 3). Samples with detected SARS-CoV-2 by rRT-PCR from these 2 designated laboratories were classified as confirmed (Table 1).

**Table 2. Contacts classification (version 30 Jan 2020)**

Type	High-risk contacts	Low-risk contacts
Household contacts	<ul style="list-style-type: none"> <li>- People who took care of the index case</li> <li>- People who lived in the same house with the index case</li> </ul>	
Hospital contacts	<ul style="list-style-type: none"> <li>- Healthcare workers or visitors who contacted with the index case in hospital without standard PPE</li> <li>- Other patients or visitors who lived in the same ward with the index case</li> <li>- Laboratory staff who dealt with the index case's specimens without standard PPE</li> </ul>	Healthcare workers or laboratory staff or visitors who contacted with the index case in hospital with standard PPE
Vehicles	<p>Airplane:</p> <ul style="list-style-type: none"> <li>- Passengers who had seat in the same row, 2 front rows and 2 back rows of the index case</li> <li>- Crews who responsible in zone of the index case seated</li> </ul> <p>Bus:</p> <ul style="list-style-type: none"> <li>- Passengers who had seat in the same row, 2 front rows and 2 back rows of the index case</li> <li>- Staff who contacted to the index case's belongings</li> </ul> <p>Taxi:</p> <ul style="list-style-type: none"> <li>- Taxi driver who took index case to any places</li> </ul>	All passengers and crews in the same vehicle with the index case who did not meet high-risk contact criteria
Hotels	<ul style="list-style-type: none"> <li>- The hotel staff who took risk of contact with the index case's secretion such as receptionist, maids who made the index case's room, hotel drivers who took the index case to any places</li> </ul>	

## Results

### Index Case

#### *Travel history*

The index case was a Chinese man, aged 30 years old. He had no past medical illness, no history of smoking, or regular drinking. His hometown was in Wuhan city, Hubei province, China. He worked as an environmental engineer in Guangxi province which located in South China. He mostly lived in Guangxi for working and going back to his hometown occasionally. On 17 Jan 2020, he traveled from Guangxi to Wuhan by high-speed train, arrived Wuhan on 18 January. On 18 to 20 January, he worked in the Wuhan branch company and had a party with his friends every evening. No one wore any protective equipment.

On 20 January, he traveled from Wuhan to Guangzhou city, Guangdong province by high-speed train and stayed in Guangzhou until 22 Jan. When he was in Wuhan and Guangzhou, no one around him had any abnormal symptoms. On 22 Jan, he traveled from Guangzhou to Don Mueang International Airport, Bangkok, Thailand and arrived at 7.30 a.m. The flight time was approximately 3 hours. At Don Mueang International Airport, there was no screening for people traveling from cities other than Wuhan. All passengers from Wuhan were screened by using thermoscan. People with the temperature of 38.0 °C or more were separated for further investigation by airport officials to prove whether they had met the PUI criteria or not. Passengers who met PUI definition were transferred for laboratory testing and quarantined at the hospital. Screening for flights from Guangzhou began on the 25 Jan 2020.

Therefore, on 22 January, he did not receive any screening.

On 22 January, he stopped shortly at Hotel A where was located near the airport and met his girlfriend. On the same day, he and his girlfriend traveled to

Chiang Mai Province by plane and arrived at 10.00 p.m., then stayed in Hotel B for one night. On 23 January in the morning, they went to a temple in Chiang Mai Province. Then in the afternoon, they went to Pai District, Mae Hong Son Province by a bus and stayed in Hotel C during 23 to 25 January.

**Table 3. Laboratory test (version 30 Jan 2020)**

	Site of specimen collection	Designated Laboratory	Laboratory testing
PUI	Both of - Nasopharyngeal swab - Throat swab in 1 UTM*	Both of - NIH - TRC-EID	} rRT-PCR for SARS-CoV-2
High-risk contacts	Throat swab in 1 VTM**	Both of - NIH - TRC-EID	

\*Universal transport media, \*\* Viral transport media

They traveled around Pai District by riding a rental motorcycle. In the morning of 25 Jan, the index case started having a sore throat, cough, and low-grade fever. He did self-checked body temperature was 37.2 °C. He did not take any medicine. He and his girlfriend went back to Chiang Mai Province in the afternoon of 25 January by the bus. After that, they took a 2-hour-direct-flight from Chiang Mai Province to Phuket Province, and arrived there at midnight. They took a van of Hotel D to the hotel and stayed in Hotel D, Mueang District, Phuket Province, on 25 to 27 January. During their stay in Phuket Province,

they spent their time relaxing on the beach, in front of the hotel and walking around the nearby shops. On 27 January, he still had a fever, his body temperature was 38.0 °C by self-checking and had muscle pain. In the evening, they took a van of the hotel to Phuket Airport. Then they took a 1.5-hour-flight from Phuket Province to Suvarnabhumi International Airport, Bangkok. There was no temperature screening of the domestic flight at that time. As his symptoms got worse, they decided to take a taxi from the airport to a private hospital. Timeline of the index case shows in Figure 1.



**Figure 1. Timeline of the index case during 1 to 28 Jan 2020**

### *Clinical history*

At the private hospital, he was diagnosed as PUI for COVID-19 with the following criteria: temperature more than 37.5 °C, cough, and sore throat with history of living in China. Then, he was placed in a negative pressure room. The physical examination showed body temperature 38.0 °C, slightly tachycardia, no dyspnea, no tachypnea and normal

oxygen saturation. Laboratory investigation showed SARS-CoV-2 detection from both designated laboratories. Chest radiography revealed minimal peri-bronchial interstitial infiltration at both lungs, suggested of bilateral bronchitis. He was treated by symptomatic and supportive treatment. Neither antiviral nor antibiotic was given. On 31 January, the fever disappeared but cough and sore throat

remained. On 3 February, his clinical symptoms were improved, but because of economic problem, he was transferred to a government hospital. The followed-up chest radiography was normal, and he was fully recovery by 10 February. However, NPS and TS samples were positive for SARS-CoV-2 until 19 February. At that time, criteria for discharging COVID-19 patients from the hospital was undetected

of SARS-CoV-2 by rRT-PCR for two consecutive times from two designated laboratories. He was discharged on 27 Feb 2020. The final diagnosis of this case was COVID-19 bronchitis. For this case, it took 16 days from the onset to fully recovery and took 32 days from the onset to two negative rRT-PCR result. Timeline after the onset of symptoms of the index case shows in Figure 2.

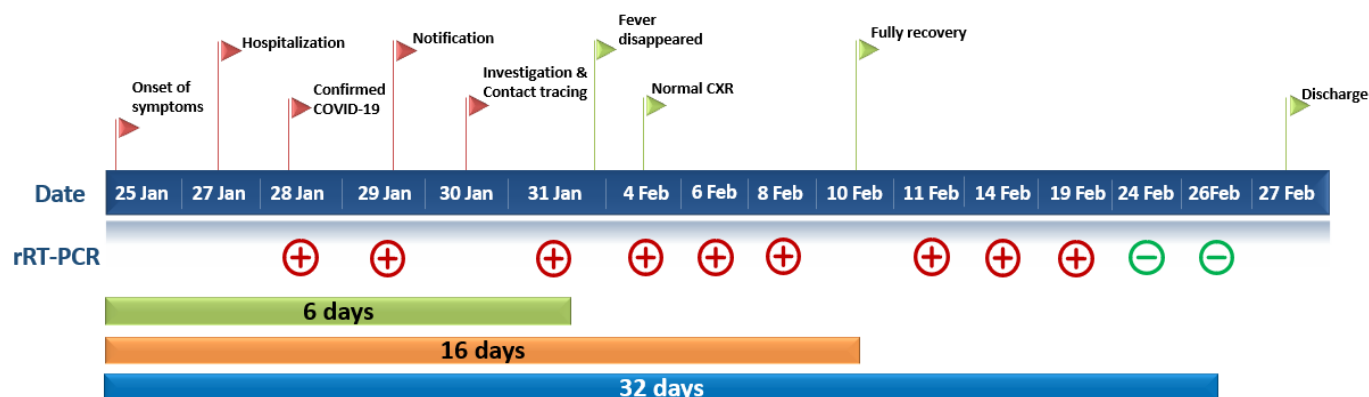


Figure 2. Timeline of the index case, from onset of symptoms to date of discharge from the hospital

### Health behavior, hygiene, and risk factors

When he was in China, he had never gone to fresh market or exposed to poultry. He sometimes wore a mask while being on a bus or train. But while he was with his friends or colleagues, he did not wear a mask at all.

During traveling in Thailand, the news of outbreak of COVID-19 had been increasing in China. He was quite concerned about it, therefore after leaving the room or traveling in public, he and his girlfriend wore surgical masks and kept hand hygiene by using alcohol gel all the time. His mask-wearing information was obtained from the interview with him, his flight attendants, the hotel staff, and CCTV, which had the same information. After he got sick, he and his girlfriend wore surgical masks and kept distancing even in their personal time.

### Contact Tracing

Contact tracing was done in collaboration with relevant partners including Office of Disease Prevention and Control 1 (for Chiang Mai Province), 11 (for Phuket Province), and Institute for Urban Disease Control and Prevention (for Bangkok). There were totally 591 close contacts in which 114 were classified as high-risk contacts and 405 were classified as low-risk contacts. Among 114 high-risk contacts, there were one household contact (girlfriend), 13 healthcare workers, 80 passengers and crews on the airplanes, one taxi driver, six passengers on the bus, and 13 people at the hotels.

His girlfriend got tested on 30 Jan 2020 and the result was not detected. However, on 2 February she

developed fever and cough. Therefore, she was hospitalized and was tested again on 3, 6, and 8 February (number of laboratory testing depended on the clinician). The laboratory results were not detected for SARS-CoV-2 by rRT-PCR from two designated laboratories and her chest radiography was within normal limit. She was diagnosed with acute bronchitis from other causes and was discharged on 9 Feb 2020.

Thirteen healthcare workers were classified as high-risk contacts, including two registration officers, six nurses, one laboratory personnel, three security guards, and one maid. All of them did not wear appropriate masks and contacted with the index case's belongings without appropriate hand hygiene. One nurse met PUI criteria. However, all of them were tested for SARS-CoV-2 and the results were not detected.

For airplane setting, the onset of the index case was on 25 Jan 2020, therefore, two domestic airlines were involved (Table 4). There were 63 passengers classified as high-risk contacts. Fifty of 63 were foreigners (79.4%), and 13 (20.6%) were Thai. Among 50 foreign passengers, 42 (84%) had contact information available. Thus, information of those 42 people was sent to IHR focal point to coordinate with IHR of their homeland countries. For 13 Thai passengers, only two people had contact information available and could be reach. The rest of them had wrong telephone number and contact information. We monitored symptoms of two contacts by phone everyday as they were not comfortable to go to the hospital for specimen collection. None of them had

any abnormal symptoms 14 days after being exposure. Seventeen aircrews were classified as high-risk contacts. They wore surgical masks and gloves all the time while working on the airplanes to follow the flight rules during the COVID-19 outbreak. All of them were tested and the results were not detected. The taxi driver who took the index case to the private hospital was also classified as a high-risk contact. He met the PUI criteria and the test for SAR-CoV-2 was not detected. The six bus passengers on the Pai-Chiang Mai route were the high-risk contacts. Two people were tested for SARS-CoV-2 and the results were not detected but another four people had no contact information.

In the hotel setting, from the onset of the index case, only two hotels were involved (Table 4). There were 13 hotel staff classified as the high-risk contacts: receptionists, drivers, and maids. All of them were not detected for SARS-CoV-2.

Among 405 low-risk contacts, we were able to follow up 25 people (6.2%) who were healthcare workers. The team monitored their symptoms by phone. No one had any abnormal symptoms 14 days after exposure. The rest of the low-risk contacts were passengers on the planes (91.3%) who had left Thailand at the time of the investigation and the passengers on the bus (2.5%) whose contact information was not available. More details of close contacts show in Table 4.

## Discussion

The index case was a Chinese man, traveling to Thailand before Wuhan lockdown. He was among the early imported COVID-19 cases in Thailand (No. 18 of Thailand). At the time of his travels, as of 21 Jan 2020, WHO reported 270 cases in Wuhan city and 17 cases in Guangdong Province, the two most reported cities in China but no COVID-19 case was reported in Guangxi at that time.<sup>11</sup>

**Table 4. Number of close contacts and laboratory testing classified by risk group**

Type	High-risk contacts			Low-risk contacts		
	Total	rRT-PCR	Result	Total	rRT-PCR	Result
Household contact	1	1	Not detected (PUI)	-	-	-
Hospital contact						
- The private hospital	13	13	Not detected: 13 (PUI:1)	15	-	-
- The government hospital	0	0	-	10	-	-
Vehicles						
# Airplane						
- Passengers (N=63)						
- Flight <sup>฿</sup> CNX- <sup>¥</sup> HKT	21	0	IHR: 12	149	-	-
- Flight HKT- <sup>฿</sup> BKK	42	0	IHR: 30	221	-	-
			Monitored by phone: 2 (Thai)			
- Crews (N=17)						
- Flight CNX-HKT	4	4	Not detected: 4	-	-	-
- Flight HKT-BKK	13	13	Not detected: 13 (PUI:1)	-	-	-
# Taxi	1	1	Not detected (PUI)	-	-	-
# Bus	6	2	Not detected: 2	10	-	-
Hotels						
- Hotel C	6	6	Not detected: 6	-	-	-
- Hotel D	7	7	Not detected: 7	-	-	-
<b>Total</b>	<b>114</b>	<b>47</b>	<b>Not detected: 47</b>	<b>405</b>	<b>-</b>	<b>-</b>

Note: <sup>฿</sup>CNX; Chiang Mai Province, <sup>¥</sup>HKT; Phuket Province, <sup>฿</sup>BKK; Bangkok

According to the report from WHO, the median incubation period of SARS-CoV-2 was 5.1 days (range 2.1-11.1 days), he could be infected from either Wuhan city in Hubei or Guangzhou city in Guangdong than anywhere else.<sup>12,13</sup> Since two cities were the most epidemic at that time and he had activities outside without protective equipment. It

was less likely to be infected in Thailand because during 22 to 24 Jan 2020, before the onset, there were only five COVID-19 cases in Thailand, and all of them were imported from Wuhan.<sup>14</sup> Moreover, while he was traveling in Thailand, he wore surgical mask all the time.

At point of entry, only flight from Wuhan would be screening at the airport since 3 Jan 2020. The screening for flight from Guangzhou began on 25 Jan 2020. The airport screening strategy would miss people who were from Wuhan but traveled to other cities for boarding to Thailand. From this investigation, we could see the gap in the detection PUI case at the airport. There were the checkpoints on only the international flights but not on the domestic flights. He might be detected in Chiang Mai, Phuket, or Suvarnabhumi International Airport if there were the thermoscan screenings for domestic flights. If he had been detected as PUI since those airports, he would be confined earlier. We would be able to reduce the number of people who were at risk of infection on the airplanes and the taxi. In early period of COVID-19 outbreak, the airport screening was the responsibility of Health Control, DDC, in which the personnel were not sufficient for the number of flights that need to be screened day by day. Therefore, there was a collaboration with the Ministry of Transport to screen travelers in both domestic and international flights extending to the whole country by the end of March.<sup>15,16</sup>

The index case was aware of the droplet precaution and hygiene as he and his girlfriend wore surgical mask all the time in public, even in the personal time with his girlfriend after he knew that he might be infected. Although, we were unable to follow all close contacts, but none of the close contact that were tested had positive result, even in the really close contact like his girlfriend. According to current evidence, respiratory droplet is one of transmission mode of SARS-CoV-2. Droplet transmission occurs when a person is in close contact (within 1 meter) with someone who has respiratory symptoms.<sup>17</sup> Therefore, wearing surgical mask is useful in reducing the spread of infection. In this case, especially during that time, there had been no physical distancing strategy. This investigation result corresponded with a study demonstrating the efficacy of surgical masks to reduce coronavirus detection and viral copies in large respiratory droplets and aerosols.<sup>18</sup> In accordance with another study, using surgical masks at the infection source could reduce environmental contamination. Surgical mask could capture particles both tidal volume breathing and cough.<sup>19</sup> This is important implications for control of COVID-19, suggesting that surgical masks can be used by ill people to reduce onward transmission especially in case where physical distancing was difficult or cannot be done.

## Limitations

There were many obstacles in this investigation, especially for the contact tracing. Hence, we were not able to follow all contacts. At that time, WHO had not yet announced COVID-19 as Public Health Emergency of International Concern (announced on 30 January 2020) and Thailand had not yet announced COVID-19 as Dangerous Communicable Disease under the Communicable Disease Act 2015 (announced on 29 Feb 2020).<sup>20,21</sup> As the result, some organizations did not cooperate, especially in matters related to personal information since there was no law to be enforced under the Act. Nevertheless, in this event, the secondary attack rate among close contacts was zero, even his girlfriend who traveled along with him all the time was negative. So, it was likely that those missing contacts had low probability of infection as well.

Information on travel from the index case might be incomplete due to retrospective memory. Moreover, the national guideline on investigation of COVID-19 in Thailand, including definitions of PUI and close contacts, has been frequently updated following the revolving situation. As a result, operation definitions and criteria in our study were revised accordingly as well.

## Recommendations

Wearing surgical mask by an infected person is likely to reduce the COVID-19 transmission. Thus, this strategy should be encouraged nationwide, especially when physical distancing is not feasible. Close contacts should maintain good personal hygiene and observe clinical symptoms for 14 days after exposure. The innovative technology for contact tracing would be helpful in obtaining complete information for epidemiological investigations.

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## Suggested Citation

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