



Outbreak Investigation and Control of Coronavirus Disease 2019 in Entertainment Venues along Bangla Road, Phuket Province, Thailand, March–April 2020

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Abstract

On 22 Mar 2020, the investigation team was notified by the Phuket Provincial Health Office that there was an outbreak of coronavirus disease 2019 linked to entertainment venues on Bangla Road, Phuket Province. An outbreak investigation was conducted to verify, describe, and control the outbreak. A descriptive study was conducted by gathering epidemiological and clinical data from cases and an environmental study was conducted at the entertainment venues on Bangla Road. There were 63 confirmed cases linked to the entertainment venues. Most of the cases were Thai female employees. The median age was 32 years, and waitress and security staff were the most common occupations. The majority of cases were symptomatic with mild level of severity. The clinical manifestations were sore throat, cough and fever. Factors associated with being a case were occupational risk of infection, that is, having contact with a large number of tourists. The entertainment venues where cases were found were mostly air-conditioned closed indoor settings. This event might have originated from imported cases followed by local transmission. Therefore, employees and customers should be screened before working at or entering entertainment venues.

Keywords: outbreak, coronavirus disease 2019, entertainment venue

Introduction

Unknown cases of pneumonia were detected on 8 Dec 2019 from a group of people with respiratory symptoms in Wuhan City, People's Republic of China. The majority of patients worked and lived near the Huanan Seafood Wholesale Market.¹ On 7 Jan 2020, the causative agent, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was isolated from a patient's throat swab by the Chinese Center for Disease Control and Prevention.² On 30 Jan 2020, the World Health Organization (WHO) announced that this unknown pneumonia outbreak was a Public Health Emergency of International Concern, and was called coronavirus disease 2019 (COVID-19) on 11 Feb 2020.^{3,4} The incubation period was reported to be 2 to 14 days with an average of 5 days.⁵

As of 13 Mar 2020, there were over 132,000 confirmed cases and 4,955 deaths of COVID-19 globally, most of which were found in WHO's Western Pacific region.⁶ While in Thailand at that time, there were 75 cases and only one death.⁷ On 22 Mar 2020, the investigation team was notified by the Phuket Provincial Health Office that they had detected a cluster of patients with COVID-19 epidemiologically linked to entertainment venues on Bangla Road, Patong Sub-district, Kathu District, Phuket Province, an attractive tourist destination which has a high volume of travelers per square mile.⁸ The investigation was conducted by the Office of Disease Prevention and Control Region 11 Nakhon Si Thammarat and the Phuket Provincial Health Office. The objectives of this investigation were to: confirm the diagnosis and outbreak, describe the

epidemiological characteristics and identify factors related to the outbreak, and control and prevent the spread of disease.

Methods

A descriptive study was conducted in Phuket Province from March to April 2020. The data was gathered from 63 confirmed cases who had a confirmed infection of SARS-CoV-2 by reverse transcription polymerase chain reaction (RT-PCR). We gathered epidemiological data via interviews from confirmed cases regarding general information, risk

of infection, and travel history. Information from inpatient medical records was reviewed such as medical history, laboratory tests, diagnoses, symptoms, and clinical classification, and these were distinguished by Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia.⁹ Patients in the community were identified by close contact tracing, and the surveillance of patient under investigation (PUI) in acute respiratory infection (ARI) clinics of both public and private hospitals in Phuket Province. The definitions for COVID-19 cases and close contacts are shown in Table 1.

Table 1. The definitions of COVID-19 cases and close contacts

Type	Definition
Patient under investigation (PUI)	Business owners, staff or tourists in the entertainment venues on Bangla Road, Kathu District, Phuket Province or contacts of a confirmed case who satisfied one of the following criteria between March and April 2020: (i) body temperature $\geq 37.5^{\circ}\text{C}$ or history of fever, (ii) cough, (iii) runny nose, (iv) sore throat, (v) dyspnea, (vi) shortness of breath, (vii) pneumonia, or (viii) death with unknown cause
Confirmed case	
a. Symptomatic case	PUI with detected SARS-CoV-2 by RT-PCR from a reference laboratory between March and April 2020.
b. Asymptomatic case	Business owners, staff or tourists who frequented the entertainment venues on Bangla Road, Kathu District, Phuket Province or contacts of confirmed case who had no symptom according to the PUI criteria, with detected SARS-CoV-2 by RT-PCR from a reference laboratory between March and April 2020
Close contact	A person who had a close contact with a confirmed case
a. High-risk close contact	A person who satisfied at least one of the following criteria: (i) talked with a confirmed case within a distance of 1 meter for more than 5 minutes, (ii) exposed to bodily secretions of a confirmed case without wearing proper personal protective equipment (PPE), or (iii) stayed together with a confirmed case in a closed space for more than 15 minutes without wearing proper PPE.
b. Low-risk close contact	Spoke with a confirmed case within a distance of 1 meter for less than 5 minutes

Laboratory testing of PUI was performed in accordance with the guideline of the Thailand's Department of Disease Control as of 23 Mar 2020 by collecting nasopharyngeal and throat swab samples tested for SARS-CoV-2 by RT-PCR.¹⁰ Symptomatic contacts, both low-risk and high-risk, were tested as soon as possible using the same methods, and the other high-risk close contacts were tested on day 5 after contacting confirmed cases.

Environmental surveys of the entertainment venues on Bangla Road were conducted by observing and interviewing staff or the owners of each entertainment place. The data collected consisted of the location, general environment, building characteristics and ventilation system, and the ability to accommodate customers.

Data were analyzed by descriptive statistics including mean and standard deviation (SD), frequency, and proportion.

Results

There were 197 PUIs in ARI clinics, of which 25 confirmed cases (12.7%) were found. From 1,070 people found through contact tracing, 38 confirmed cases (3.6%) were identified, including 30 symptomatic cases and eight asymptomatic cases. Overall, 63 people (5.0%; 63/1,267) were positive for SARS-CoV-2, including 55 symptomatic cases with one death and eight asymptomatic related to entertainment venues on Bangla Road from March to April 2020.

The dead case was a 25-year-old Hungarian male, with a history of traveling to the entertainment venue every day. He had an immunocompromised disease. His symptoms presented on 30 Mar 2020 with fever, sore

throat, runny nose, and cough. He walked into a hospital on 8 Apr 2020 with chief complaints being dyspnea and exhaustion. Physical examination showed that blood pressure was 80/60 millimeter of mercury, pulse rate was 90 beats per minute, respiratory rate was 26 times per minute, oxygen saturation was 88% and chest radiography showed infiltration in both lungs. SARS-CoV-2 was detected the following day with progression of symptoms. Serial chest radiography was worse with ground-glass opacity being found. He died on 26 Apr 2020, 18 days after admission.

Most of the infected cases were females with ages ranging from 21–40 years. The median age of all cases was 32 years, and the age range was 21–63 years. The majority of cases were Thai nationality, followed by Russian and Italian, respectively. Most of the infected cases were staff of the entertainment venues, including waitresses and security officers, followed by household contacts of the staff, and tourists. Common underlying diseases of the cases were hypertension, chronic obstructive pulmonary disease, and diabetes (Table 2).

Table 2. Demographic characteristics of cases infected with SARS-CoV-2 (n=63)

Characteristic	Total	Percentage (%)
Gender		
Female	40	63.5
Male	23	36.5
Age (years)		
21-30	27	42.9
31-40	29	46.0
41-50	4	6.3
51-60	1	1.6
61+	2	3.2
Nationality		
Thai	44	69.8
Russian	5	7.9
Italian	4	6.3
French	3	4.8
Kazakhstan	2	3.2
Others	5	7.9
Occupation		
Waitress	14	22.2
Security personnel	8	12.7
Commercial sex worker	7	11.1
Unknown (tourist)	6	9.5
Freelance	4	6.3
Others	24	38.1
Relation to entertainment venue		
Staff	40	63.5
Household contact	9	14.3
Tourist	9	14.3
Business owner	4	6.3
Underlying disease		
Hypertension	16	29.1
Chronic obstructive pulmonary disease	7	12.7
Diabetes mellitus	6	10.9
Cardio vascular disease	4	7.3
Human immunodeficiency virus	4	7.3
Chronic kidney disease	3	5.5
Carcinoma	1	1.8

Among the 55 symptomatic cases, the most common clinical manifestations were sore throat (81.8%) followed by cough (72.7%), fever (67.3%), runny nose (43.6%), and difficult breathing (21.8). Anosmia and loss of taste were presented in 10.9% and 9.1% of the cases. The median clinical recovery time for people with mild

symptoms was 12 days (range 6–18 days), for those with moderate symptoms was 18 days (range of 16–21 days), and among those with severe symptoms was 22 days (range of 20–26 days). One case with critical symptoms died 28 days after symptoms onset. Abnormal chest radiography was found in 18.2% of cases (Table 2).

Table 3. Clinical features of patients with COVID-19 (n=55)

Characteristic	Total	Percentage (%)
Clinical manifestations		
Sore throat	45	81.8
Cough	40	72.7
Fever	37	67.3
Runny nose	24	43.6
Difficulty breathing	12	21.8
Sputum production	10	18.2
Myalgia	9	16.4
Diarrhea	7	12.7
Headache	6	10.9
Anosmia	6	10.9
Loss of taste	5	9.1
Clinical classification		
Mild	40	72.7
Moderate	10	18.2
Severe	4	7.3
Critical	1	1.8
Chest radiography (CXR)		
Normal	45	81.8
Abnormal	10	18.2
- Infiltration	9	90.0
- Ground-glass opacity	5	50.0
- Consolidation	1	10.0
- Patchiness	1	10.0
- Reticular opacities	1	10.0

The initial laboratory results revealed eosinophilia (90.9%) and metabolic acidosis (61.8%) (Table 4). The majority of laboratory parameters were normal. Factors related to the outbreak were occupational risk,

that is, contact with a large number of people, particularly tourists (81.1%), exposure to confirmed cases (50.8%), and traveling from the affected area (9.5%).

Table 4. Initial laboratory testing of COVID-19 cases (n=55)

Laboratory test result	Total	Percentage (%)
Complete blood count		
Platelet count		239,000 (58,643)*
low (<12 x 10 ⁴ cells/mm ³)	2	3.6
normal (12-38 x 10 ⁴ cells/mm ³)	51	92.7
high (>38 x 10 ⁴ cells/mm ³)	2	3.6
Hematocrit		46.39 (8.1)*
low (<36%)	5	9.1
normal (36-56%)	42	76.4
high (>56%)	8	14.6
White blood cell count		6,717.74 (1,926.4)*
low (<4 x 10 ³ cells/cu.mm)	5	9.1
normal (4-9 x 10 ³ cells/cu.mm)	48	87.3
high (>9 x 10 ³ cells/cu.mm)	2	3.6
Neutrophil		50.73 (13.9)*
low (<42%)	11	20.0
normal (42-85%)	39	70.9
high (>85%)	5	9.1

* Mean (standard deviation)

Table 4. Initial laboratory testing of COVID-19 cases (n=55) (cont.)

Laboratory test result	Total	Percentage (%)
Complete blood count (cont.)		
Lymphocytes		37.71 (11.9)*
low (<11%)	4	7.3
normal (11-49%)	39	70.9
high (>49%)	12	21.8
Monocytes		8.70 (2.6)*
normal (0-9%)	35	63.6
high (>9%)	20	36.4
Eosinophils		2.22 (2.6)*
normal (0-6%)	5	9.1
high (>6%)	50	90.9
Renal function tests		
Blood urea nitrogen		13.24 (5.6)
low (<7 mg/dL)	3	5.5
normal (7-20 mg/dL)	45	81.8
high (>20 mg/dL)	7	12.7
Creatinine		0.88 (0.3)
low (<0.6 mg/dL)	4	7.3
normal (0.6-1.3 mg/dL)	49	89.1
high (>1.3 mg/dL)	2	3.6
Glomerular filtration rate		124.74 (30.7)
low (≤ 90 ml/min/1.73 mm ²)	3	5.5
normal (>90 ml/min/1.73 mm ²)	52	94.6
Liver function test		
Total protein		7.61 (0.9)
normal (6-7.8 g/dL)	34	61.8
high (>7.8 g/dL)	21	38.2
Albumin		4.45 (0.9)
normal (3.5-5.2 g/dL)	52	94.6
high (>5.2 g/dL)	3	5.5
Total bilirubin		0.69 (0.2)
normal (0.2-1.2 mg/dL)	51	92.7
high (> 1.2 mg/dL)	4	7.3
Globulin		3.20 (0.5)*
Direct bilirubin		0.25 (0.2)*
normal (0-0.5 mg/dL)	53	96.4
high (>0.5 mg/dL)	2	3.6
Aspartate transaminase		31.11 (16.3)*
normal (5-34 U/L)	35	63.6
high (>34 U/L)	20	36.4
Alanine transaminase		57.68 (20.6)*
normal (0-55 U/L)	47	85.5
high (>55 U/L)	8	14.6
Alkaline phosphatase		76.96 (27.5)*
low (<40 U/L)	5	9.1
normal (40-150 U/L)	50	90.9

* Mean (standard deviation)

Table 4. Initial laboratory testing of COVID-19 cases (n=55) (cont.)

Laboratory test result	Total	Percentage (%)
Electrolytes		
Sodium		137.93 (5.4)*
low (<136 mmol/L)	9	16.4
normal (136-145 mmol/L)	45	81.8
Potassium		4.15 (0.5)*
low (<3.5 mmol/L)	1	1.8
normal (3.5-5.1 mmol/L)	52	94.6
high (>5.1 mmol/L)	2	3.6
Chloride		105.52 (16.4)*
low (<98 mmol/L)	3	5.5
normal (98-107 mmol/L)	43	78.2
high (>107 mmol/L)	9	16.4
Bicarbonate		21.92 (2.0)*
low (<22 mmol/L)	34	61.8
normal (22-29 mmol/L)	18	32.7
high (>29 mmol/L)	2	3.6

* Mean (standard deviation)

The primary case developed symptoms on 14 Mar 2020. The case was a 46-year-old Canadian who had a family living in Phuket Province. He was a business owner of an entertainment venue. The case did not have a travel history outside of the area in the 14 days

prior to becoming ill, but gave a history of contacts with business partners traveling from China, Italy, and France, which were countries with ongoing epidemics at that time. Since then, more patients were detected as shown in Figure 1.

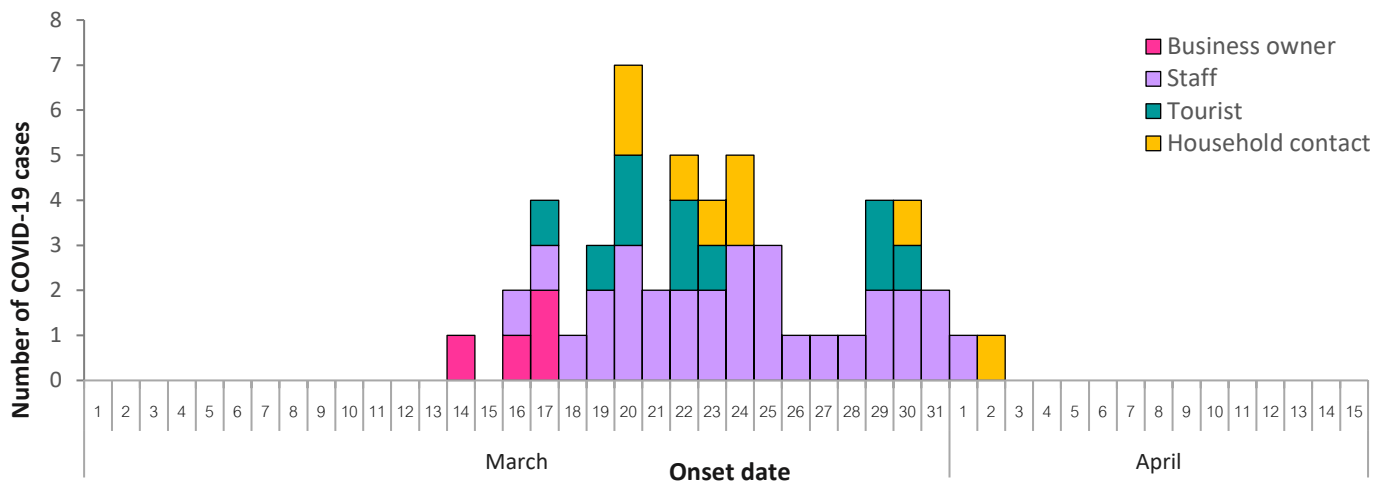


Figure 1. Epidemic curve of COVID-19 cases during the outbreak in entertainment venues, Bangla Road, Kathu District, Phuket Province, March–April 2020 (n=52)

From interviews with persons who had contact with confirmed cases, the outbreak spread to five generations of the COVID-19 epidemic, meaning a person who contracted disease from one source has infected a person, who infected another person, who then infected another person, who then infected another one, in entertainment venue that was divided by history of confirmed cases contact. The initial phase found cases among business owners who had contact with foreigners, customers or business partners who came from COVID-19 affected countries. After that, the next phase of cases consisted of staff and household

contacts of staff members (Figure 2). Among 30 symptomatic close contacts, they presented with symptoms within 2–8 days (median of 5 days) after their first exposure (Figure 2).

There were 11 entertainment places where the patients worked or traveled to, most of which were closed settings and had integrated cooling systems. From the investigation, the first patient worked at entertainment venue number 38 (Figure 3). After identification of the first case, more cases were found widely distributed among staff working at venues along the Bangla Road.

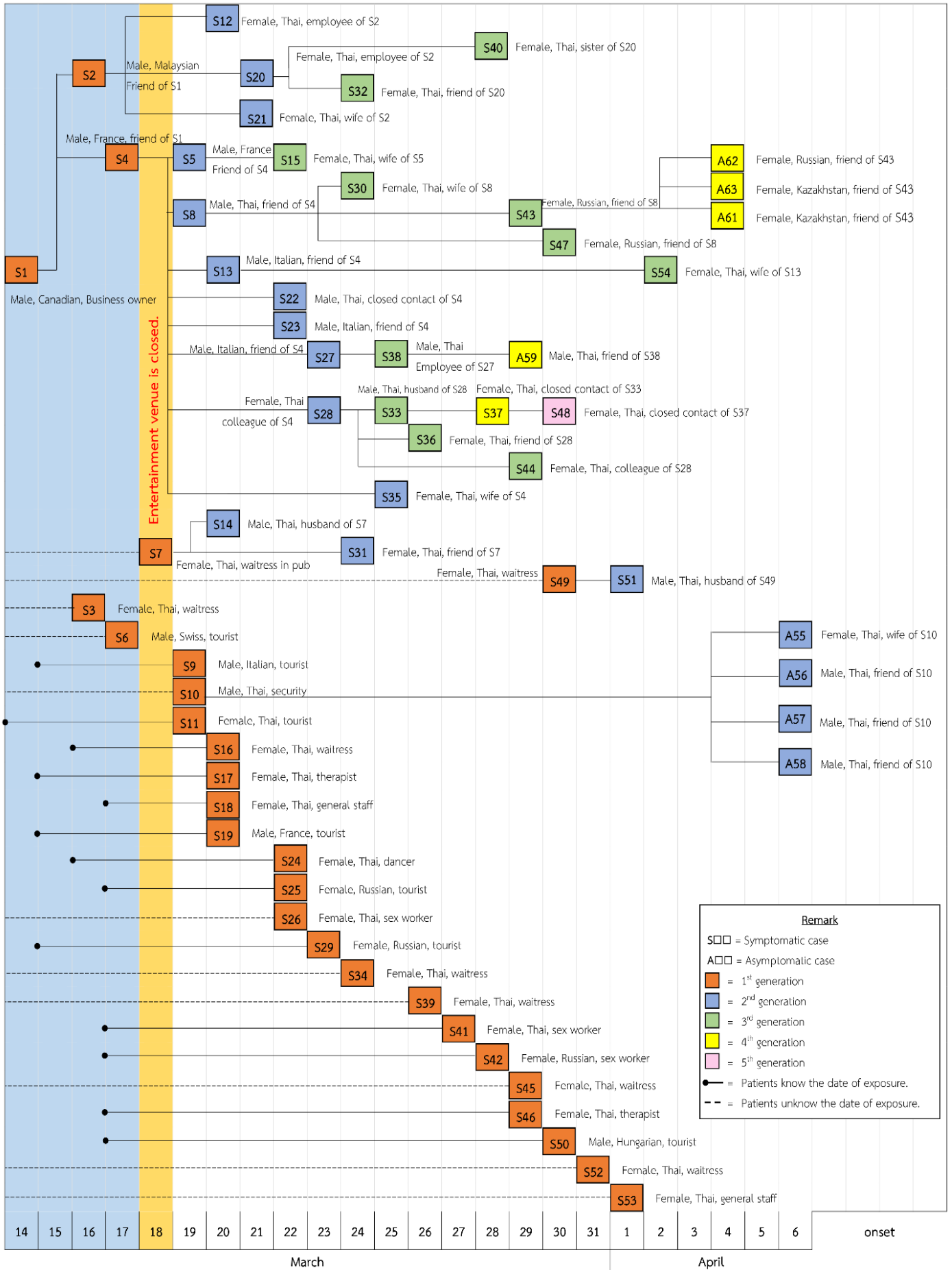


Figure 2. Linkage of symptomatic and asymptomatic cases during the COVID-19 outbreak in entertainment venues, Bangla Road, Kathu District, Phuket Province, March–April 2020 (n=62)

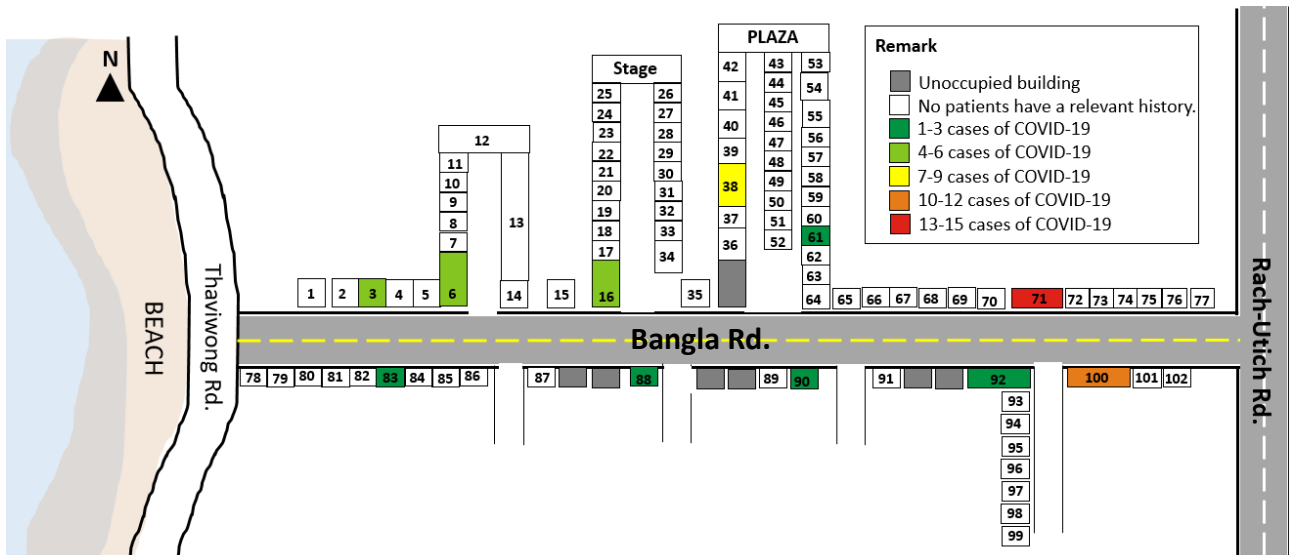


Figure 3. Map of Bangla Road and entertainment places where COVID-19 cases were found, Kathu District, Phuket Province, March-April 2020 (n=102 entertainment places)

Public Health Actions

The Provincial Communicable Disease Committee announced, on 18 Mar 2020, that the entertainment venues must be closed and prohibited citizens from entering and leaving Patong Sub-district on 4 Apr 2020, including ordering the entertainment venue owners or operators to disinfect their facilities.

Information was publicized to business owners, staff, tourists, and contacts of the confirmed cases to avoid visiting crowded places and to seek medical treatment as soon as possible if they developed fever or respiratory symptoms. If this was not possible, they were advised to wear a face mask appropriately and perform sanitary hand washing with 70% alcohol gel or soap.

An active case finding was launched on any pharmacies in the area using Google Form to report PUI. Responsible hospitals were advised to contact these individuals to get the test in an ARI clinic at the nearest hospital. This active case finding was able to detect 109 PUI and found one confirmed case. All PUI were isolated and nasopharyngeal and throat swabs were collected to detect SARS-CoV-2, until the tests produced two negative results 24 hours apart. All close contacts were traced, especially among high-risk ones, and they were followed up and quarantined at a designated hotel. Samples were collected using the same method of collection for PUIs and the contacts were quarantined for 14 days. All 63 confirmed cases with severe chest radiographic findings and those with signs of pneumonia were treated with Favipiravir.

Discussion

We identified a cluster of COVID-19 cases in entertainment venues along a popular road for tourists, which might have started with an imported case and

followed by local transmission. The primary cases had no history of traveling outside the area or traveling to other countries, similar to outbreaks found elsewhere such as Taiwan.¹¹ The initial phase of the outbreak consisted of an infection among staff and tourists; subsequently, cases among household contact were found. The outbreak reached five generations spreads of the COVID-19 epidemic that distinguished from contact history to confirmed case, as it did in the outbreak of religious evangelists at the Sri Petaling Mosque in Kuala Lumpur, Malaysia.¹²

The proportion of asymptomatic cases was lower than a study by Oran, and most clinical classifications were mild, similar to another study.^{13,14} Therefore, there might be asymptomatic cases or cases with mild symptoms in the community who were not in isolation or the quarantine system and could have spread the virus in the area.

The most common clinical manifestations in this outbreak were sore throat and cough, unlike another study, which found that the majority of cases had fever, while some cases presented with anosmia and loss of taste, which suggests that national guidelines should include those symptoms in the PUI surveillance protocol.¹⁵

In this outbreak, the majority of infected cases were female, which was different from an outbreak among travelers in Germany.¹⁶ This might be due to fact that the majority of cases were waitresses. Most of the cases in this outbreak worked in entertainment facilities where poor ventilation is usual condition. The majority of entertainment places were closed indoor settings that had air-conditioning systems. A study by the World Health Organization found that this type of setting has a high risk of infection.¹⁷ Environmental

factors such as high humidity, and poor ventilation has been shown to be significant risk factors of transmission of SARS-CoV-2.¹⁸

Recommendations

For the early detection of COVID-19 cases, Thailand should include anosmia and loss of taste in the national surveillance protocol and increase resources for screening at the points of entry such as setting up an RT-PCR laboratory testing unit to test SARS-CoV-2 infection on all international travelers or be strict about permitting people traveling from affected areas into the country. Patients should be advised to separate themselves from family immediately after feeling sick. At the workplace, staff should be screened each day and those with symptoms should be allowed to leave work and be tested.

The provincial health office needs to strengthen the surveillance system to detect outbreaks in the early stage by focusing on any clusters of people experiencing respiratory symptoms or fever. We recommend both measurement and verbal screening be used in staff and customers of entertainment venues. Notification of suspicious cases should be issued from the entertainment venue directly to the provincial health office and each venue must designate a responsible person for this matter. The situation awareness and the investigation teams should analyze the risk factors of each patient to find epidemiological connections.

Conclusion

We reported a COVID-19 cluster in entertainment venues of Bangla Road, Phuket from March to April 2020. There was a total of 63 infected persons including 55 symptomatic cases and 8 asymptomatic cases. Staff, comprising waitresses and security personnel, were considered at-risk during the outbreak. The outbreak investigation found five generations of human-to-human transmission. The outbreak was characterized by occupational risk and transmission to tourists and customers of entertainment venues. The median incubation period was 5 days. Among the symptomatic cases, most symptoms were mild, and we found that around 10% of cases had anosmia and loss of taste. Most of the entertainment places on Bangla Road that had confirmed cases were closed-door settings.

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