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Short Communication

Quarantine measures for coronavirus disease 2019 on a cruise ship, Taiwan, February 2020

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ABSTRACT

To early detect coronavirus disease 2019 on an international cruise ship and prevent its spread, Taiwan's Central Epidemic Command Center implemented on-board quarantine measures on a cruise ship docked at the Port of Keelung, Taiwan, on February 8, 2020. Quarantine officers, medical professionals, and administrative staff from competent authorities conducted fever screening and investigated the present illness and travel history of 1738 passengers and 776 crew members on the ship. Throat swabs were collected from 128 (5.1%) passengers and crew members with fever or respiratory symptoms during the past 14 days or travel history to China, Hong Kong, or Macao within 30 days. All swabs tested negative for severe acute respiratory syndrome coronavirus 2 at the national reference laboratory. The whole process, from on-board preparation to the completion of testing, took 9 h. All passengers and crew were permitted to disembark and were required to take 14-day self-health management measures. No cases were reported by the end of the self-health management period.

Introduction

Considering the crowded and closed environment on cruise ships, which facilitates the spread of infectious diseases (Moriarty et al., 2020), and taking account of the recent coronavirus disease 2019 (COVID-19) outbreak on an international cruise ship (Kakimoto et al., 2020), Taiwan's Central Epidemic Command Center (CECC) announced that international cruise ships were banned from calling at the ports of Taiwan from February 6, 2020 (Wang et al., 2020). A cruise ship (Cruise A), carrying 1738 passengers (98% from Taiwan; 1.6% from Southeast Asia) and 776 crew members (48% from Southeast Asia; 31% from China), departed the Port of Keelung, Taiwan, on February 4, called at Naha, Japan on February 5 and 6, and then requested a berthing permit at Keelung on February 7. The CECC issued a special permit on condition that all passengers and crew should undertake entry screening. Persons who met specific criteria were to be tested for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

On-board quarantine measures

A total of 49 staff conducted the on-board quarantine, including 10 quarantine officers, 16 medical professionals, and 23 administrative staff. Personal protective equipment used by the medical professionals included N95 respirators, face shields, gloves, coveralls, and gowns. Other staff not in close contact with passengers and crew wore face masks and gloves.

Cruise A arrived at Keelung on February 8. All passengers completed health declaration forms in their cabins, reporting whether they had fever or respiratory symptoms (cough, rhinorrhea, or shortness of breath) or had been to China, Hong Kong, or Macao recently (US CDC, 2020). Quarantine officers screened the body temperature of all passengers and crew, first with infrared thermometers and then with ear thermometers for confirmation. Fever was defined as ear temperature >38 °C.

After fever screening, the quarantine officers reviewed the health declaration forms. In addition, recent 30-day travel histories of passengers and crew were checked by the National Immigration Agency.

A throat swab was obtained from any person who had fever or respiratory symptoms during the past 14 days, travel history to China, Hong Kong, or Macao within 30 days, or unclear travel

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history. All throat swabs were collected by medical professionals on deck in an open environment (the jogging track), and they were tested for SARS-CoV-2 with real-time reverse transcription PCR assays by the national reference laboratory (Cheng et al., 2020). Those who did not meet the criteria for testing were requested to return to their cabins or workplaces (Figure 1).

A total of 26 passengers and 17 crew members, including 1 member who had boarded an airplane in Wuhan, China, on January 20, had been to China, Hong Kong, or Macao within 30 days. In addition, the recent travel histories of 28 non-Taiwanese passengers could not be identified by the National Immigration Agency and were categorized as having unclear travel history (Table 1).

No passengers or crew were found to have fever during screening. Five passengers reported having had fever, and 51 had respiratory symptoms, including cough or rhinorrhea, during the previous 14 days. One crew member had fever on February 3 and was diagnosed with tonsillitis by the doctor on board (Table 1).

In all, 128 (5.1% overall) throat swabs were collected, and all tested negative for SARS-CoV-2. The whole process, including preparation, specimen collection, specimen transportation, and testing, took 9 h (180 person-hours in total). All passengers and crew were permitted to disembark on the same day and were required to take self-health management measures for the following 14 days, including wearing surgical masks, paying attention to respiratory hygiene and cough etiquette, checking their temperature twice a day, and seeking medical attention if any respiratory symptoms developed (Taiwan CDC, 2020). No suspect COVID-19 cases were reported at the end of the 14-day period.

Table 1
Number of specimens collected among passengers and crew on Cruise A, February 2020.

	Passengers (n = 1738)	Crew (n = 776)
Travel history within 30 days[a]		
Officially confirmed	24	16
Self-reported	2[b]	1[c]
Unclear	28	
Symptoms within 14 days		
Fever	5	1
Cough	44	
Fever and cough	2	
Rhinorrhea	2	
Unspecified	3	
Subtotal	110	18

[a] Travel history to China, Hong Kong, or Macao.
[b] Fujian province, China, January 18–26.
[c] Wuhan City, Hubei province, China, on January 20.

Discussion

As of February 8, 2020, 18 laboratory-confirmed COVID-19 cases had been identified in Taiwan, including 16 imported cases and 2 import-linked cases related to household transmission. Because no community-acquired or unknown-source cases were found in Taiwan, and >99% of confirmed cases worldwide were from China at that time (WHO, 2020), we assumed that most COVID-19 cases on board, if they existed, would have contracted the disease while visiting China, Hong Kong, or Macao before boarding. Therefore, we tested all of those who had been to China, Hong Kong, or Macao within 30 days and all who had unclear travel histories, regardless of their health condition. To detect cases with possible contraction of COVID-19 elsewhere or even on board, we also tested all passengers and crew who reported fever or respiratory symptoms during the past 14 days, regardless of their travel history. Our quarantine strategy might overlook COVID-19 cases among asymptomatic individuals without relevant travel history. However, the estimated asymptomatic proportion among infected cases on a cruise ship was reported to be 17.9% in a published analysis (Mizumoto et al., 2020). It would have been unlikely for all COVID-19 cases on Cruise A to be asymptomatic.

If any passenger or crew member had tested positive for SARS-CoV-2, confirmed cases would have been transferred to a designated hospital for isolation, and all in close contact would have been quarantined in designated facilities. All other passengers and crew would also be quarantined in their cabins for 14 days. Because no COVID-19 case was detected, no further isolation and quarantine measures were implemented.

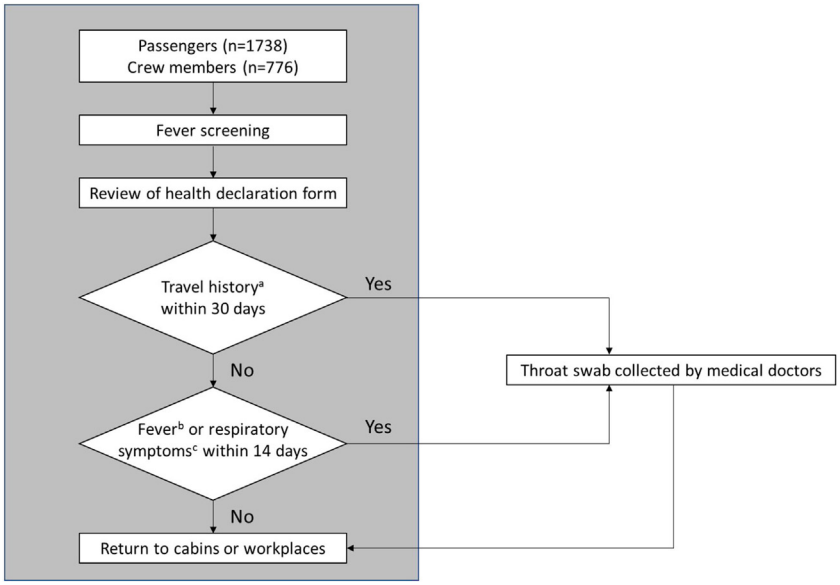

Figure 1. Flow chart of on-board quarantine measures on Cruise A: gray areas indicate indoor regions.
[a]Travel to China, Hong Kong, or Macao.
[b]Ear temperature >38 °C.
[c]Cough, rhinorrhea, or shortness of breath.

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Ethical approval

Not required.

Conflict of interest

All authors have no conflict of interest to declare.

Declaration of Competing Interest

The authors report no declarations of interest.

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