Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short Communication

Implications for border containment strategies when COVID-19 presents atypically

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ABSTRACT

Objectives: For a large part of the coronavirus disease 2019 (COVID-19) pandemic, Singapore had managed to keep local cases in the single digits daily, with decisive measures. Yet, we saw this critical time point when the imported cases surged through our borders. The gaps which we can and have efficiently closed, using a public health approach and global border containment strategies, are aptly illustrated through this case. This critical point of imported case surge has resulted in a large spike of daily local cases sustained through community transmission, up to 120/day within a very short time frame. We were able to rapidly bring this under control.
Study design: This is a case study of a patient who passed through our borders, with COVID-19 masquerading as a resolved sore throat.
Methods: The events were prospectively documented.
Results: We present a case of a 21-year-old student returning from Nottingham. He presented with sore throat as the only symptom the few days prior his return, and on arrival at our border (day 7 from initial symptoms), his sore throat had already resolved. The events leading up to his COVID-19 diagnosis highlight the gaps of the international screening processes at the global border entry and the potential consequences of community chain transmission through imported COVID-19 cases.
Conclusions: An important global border control measure to implement quickly will be to expand the symptom list to isolated sore throat and/or a prior history of recent symptoms (resolved). This may capture a larger proportion of imported cases at border entry point for more effective containment. This piece will be equally relevant to the general physicians, emergency care physicians, otolaryngologists and anaesthetists, who are at higher risk of encountering a throat visualization during intubation and routine examination. This information can be useful to countries with low resources or insufficient COVID-19 testing kits.

Introduction

In the early months of the coronavirus disease 2019 (COVID-19)[1] pandemic, Singapore had managed to keep the number of local cases down to single figures daily through decisive measures. We identified a critical time point when the number of imported cases surged through our borders that resulted in a large spike of daily local cases, up to 120/day within a very short time frame, that was further sustained through community transmission. Using a public health approach and global border containment strategies, we were able to rapidly bring this under control. This short communication highlights how an atypical presentation of COVID-19 (sore throat) could breach border containment. We present some effective strategies for COVID-19 screening at border entry.

Case study

A 21-year-old student returning from Nottingham presented with sore throat as the only symptom a few days prior his return. On arrival at our border (day 7 from initial symptoms), his sore throat had already resolved. Self-taken photographs by the patient

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during the initial symptomatic phase (day 5) with the sensation of sore throat and on day 7 and 12, when the sensation of sore throat had resolved, revealed persistent pharyngitis. The patient had no fever during his symptomatic phase and had performed temperature checks twice a day with a thermometer. He had experienced some nasal congestion initially which was attributed to his underlying allergic rhinitis.

At border entry, this patient had declared his symptom of sore throat, which had resolved. The patient directly moved from the airport to his stay home notice (SHN) hotel to stay in isolation. Following the instructions on the information sheet from Singapore Global Network (a division in the Singapore Economic Development Board which broadens and deepens the overseas network of Singapore citizens) available online,[2] the patient and his family contacted the People's Association (a government-supported statutory board to promote racial harmony and social cohesion in Singapore) to clarify the symptom of a resolved sore throat and highlighted the patient's contact history with an Italy-returning medical student during a fencing sparring. Italy, at that point, had the most COVID-19 cases globally. Staff at the People's Association rapidly facilitated the patient to be picked up in a dedicated ambulance to National Center of Infection Disease, Singapore, where a chest x-ray performed was normal, and the swab test was positive for COVID-19 (day 8 of initial symptoms).

This patient's parents transported him from the airport to his SHN hotel. All three individuals (patient and patient's parents) were wearing surgical masks in the enclosed air-conditioned car space (windows were not wound down). The duration of transport was around 1 h or less. The patient had changed to a new surgical mask, wiped down his suitcase and personal belongings with disinfecting wipes and washed his hands before meeting his parents and getting into the car. About 36 h later, the father started experiencing dry throat, dry cough and runny nose. The patient's mother experienced dry throat. The patient's brother (who did not have any direct contact with the patient was picked up in the same car but separately from the patient about 1.5 h after) developed fever of 37.7 C, bodyache, nasal congestion and throat discomfort ~48 h later from the car ride. It is unclear if a chain transmission occurred through parents at home to the patient's brother who did not come into contact with the patient or through the consecutive use of a common transport vehicle. Swab test results were however negative for the rest of the family.[f] In retrospect, the patient recalled unusual/impaired sense of smell for the first 4 days during initial symptoms.

The events leading up to his COVID-19 diagnosis highlight the gaps of the international screening processes at the global border entry and the potential consequences of community chain transmission through imported COVID-19 cases. Here, we emphasize some effective strategies for COVID-19 screening at the global border entry.

Providing detailed breakdown of COVID-19 symptoms through education posters at global border entry points

Fever and/or other respiratory symptoms are frequently highlighted at the global border entry as indications for swab tests. However, sore throat alone may be an unclear symptom for individuals to declare. This is a case of COVID-19 with isolated sore throat, which has recovered. We will suggest a detailed breakdown of the symptoms/education posters placed at global border entry points to facilitate declarations and diagnosis.

Importance and efficiency of a national online COVID-19 network resource for overseas returning persons, facilitation through government agency and a closed loop transportation

This patient had declared his symptom of sore throat, which had resolved. Overseas returning persons to Singapore have been placed on a mandatory 14-day SHN since 20 March 2359 h. The availability of the instructions on the information sheet online from Singapore Global Network[2] and the provision of a hotline assistance from the People's Association (government-supported) were the key factors and contact point which allowed the patient to be identified and rapidly facilitated to be picked up while isolated in his SHN hotel, in a dedicated ambulance to National Center of Infection Disease, Singapore. We highlight the importance and efficiency of a national online COVID-19 network resource for overseas returning persons, facilitation through government agency and a closed loop transportation in the containment of COVID-19 spread.

Eliminating the risk of COVID-19 exposure to the family members

This patient's parents who transported him from the airport to his SHN hotel and the patient's brother (who did not have direct contact with the patient but was picked up in a common transport vehicle afterwards) developed symptoms despite negative swab test results.[f] A study on environmental contamination by patients with symptomatic COVID-19 in airborne infection isolation rooms demonstrated that air samples were negative despite the extent of environmental contamination.[3] However, swabs taken from the air exhaust outlets tested positive, suggesting that small virus-laden droplets may be displaced by airflows and deposited on vents.[3] To prevent potential spread of infection from UK and US returning individuals to their family members, the Ministry of Health, Singapore, has activated the separate transportation from the airport to SHN hotels (not home) as of 24 March 2020.

The patient's swab test was persistently positive from day 8 to day 14 of symptom onset. This case demonstrated the possibility of infection transmission beyond 7 days of symptom onset, which displaced the prior assumption that transmission beyond 7 days of symptom onset is unlikely due to the presence of neutralizing antibodies in convalescent patients. This observation, together with the patient's contact history with an Italy-returning medical student (Italy at that point had the most COVID-19 cases globally), both strengthen the argument for quarantining returning travellers from high infection incidence countries. More recently, research has shown that viable virus was not found in patients with COVID-19 after day 14 despite the persistence of polymerase chain reaction detection of viral fragments, indicating that patients are not likely to be infectious after day 14 of illness and are not infectious by day 21. These data, in conjunction with the clinical course observed for this case study (day 14 negative swab corresponded with a normal throat appearance), support a minimum quarantine or passive monitoring duration of 14 days. This information can be useful to countries with low resources or insufficient COVID-19 testing kits.

Recognizing new emerging symptoms of COVID-19

In retrospect, the patient recalled unusual/impaired sense of smell for the first 4 days during initial symptoms. Some new reports suggest loss of smell or taste as COVID-19 symptoms.[4–6] Loss of smell (68–85.6%) and loss of taste (71–88%) were frequent among patients in two European cohorts, reported very recently.[5-6] But this knowledge was not available at the earlier phase of the COVID-19 pandemic when the patient was symptomatic, and these symptoms may not be readily offered by a non-suspecting patient.

[f] A follow-up COVID-19 serology may be helpful to determine if there was an exposure to COVID-19.

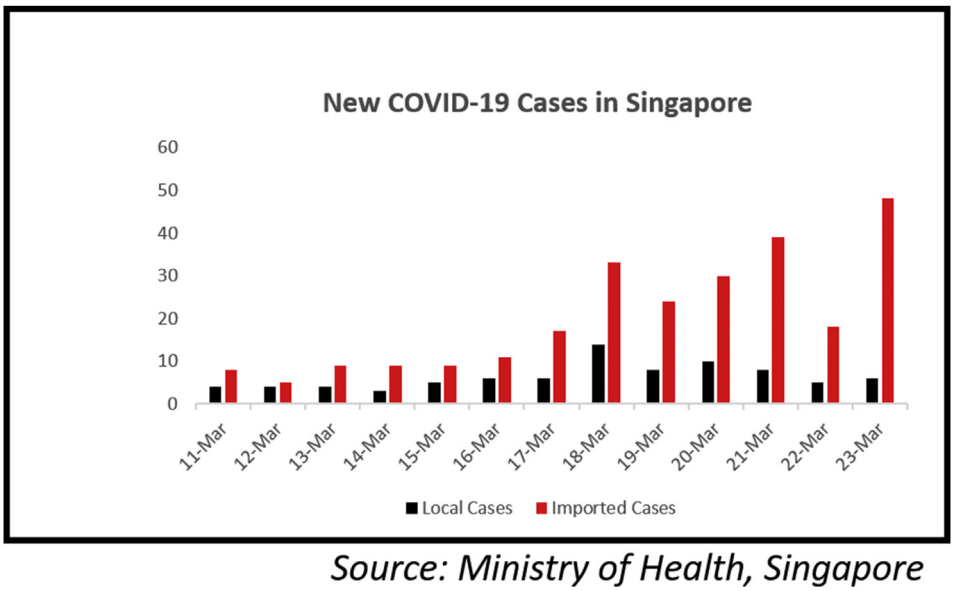

Fig. 1. Bar graphs showing the rapid and sustained increase of imported COVID-19 cases in Singapore between 18 and 23 March 2020. Data from the Ministry of Health, Singapore.

Physicians need to actively probe for this history. Our frontline physicians worldwide also need a high index of suspicion encountering at least three geographic variants of COVID-19 that have been reported so far. While loss of smell and taste were well-represented symptoms in two large European cohorts,[5,6] a report[7] published mid-April 2020 on 393 patients in New York City indicated gastrointestinal symptoms of diarrhoea (23.7%), nausea and vomiting (19.1%) appeared to be more common than those in China (where these symptoms occurred in 4–5% of patients). Coupled with the knowledge that COVID-19 can spread asymptomatically, these a typical symptoms may be the initial manifestation of the illness.

Discussion

We hope that global collaborative efforts at border screening can contain and slow down the rapid spread of COVID-19 internationally. Availability of a government-supported go-to online resource can unite efforts between returning persons and national directions in containing this pandemic. Another strategy to ease the border point screening and declaration logistics can be to set up an online pre-arrival declaration by government agency, where returning persons/students can self-report any symptoms or resolution of symptoms and contact history, which can be reviewed prior arrival. Returning individuals can then be pre-issued an electronic QR code/tagged queue number through email, which allows the suspected cases to be channelled to a separate queue or screening area with physical distancing precautions. This will allow suspected cases to be effectively prioritized during declaration screening. As of 17 March 2020, our Ministry of Foreign Affairs in Singapore has issued a statement to encourage Singaporean students studying overseas to consider returning home soon.[8] We will expect an increase in the number of imported cases from this group. A high index of suspicion for COVID-19 when identifying an isolated sore throat on clinical examination will be equally relevant to the general physicians, emergency care physicians, otolaryngologists and anaesthetists,[9] who are at higher risk of encountering a throat visualization during intubation and routine examination (Fig. 1). This information can be useful to countries with low resources or insufficient COVID-19 testing kits.

Our Ministry of Health released the figures – 90% of Singapore's imported cases over 3 days (18–21 March) did not show any symptoms at border entry.[10] An important global border control measure to implement quickly will be to expand the symptom list to isolated sore throat and/or a prior history of recent symptoms (resolved). This may capture a larger proportion of imported cases at border entry point for more effective containment. The majority 70.8% (34/48) imported cases (cohort from 23 March, Fig. 1) were returning from the United Kingdom.[8] This is an important message to deliver to the larger global community in our efforts to control the rapidly escalating pandemic.

Author statements

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Ethical approval

Ethical approval was not required by our institutional review board as this is a case report. Informed patient consent was obtained in accordance to our institutional guidelines.

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Competing interest

None declared.

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