IJTMGH
International Journal of Travel Medicine and Global Health

Int J Travel Med Glob Health. 2022 Feb;10(1):10-15
http://ijtmgh.com

doi 10.34172/ijtmgh.2022.03

Original Article

Open Access

Epidemiological Investigation of a COVID-19 Community Cluster in Kedah, Malaysia

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Received October 22, 2021; **Accepted** January 28, 2022; **Online Published** February 20, 2022

Abstract

Introduction: A cluster of novel coronavirus disease 2019 (COVID-19) linked to an international traveller was reported in Kedah, Malaysia in July 2020. This study aimed to report data of a local community cluster of COVID-19 with a view to document the lessons learnt and to identify key points for future containment strategy in response of the ongoing pandemic.

Methods: Epidemiological and clinical data from individuals with confirmed cases of COVID-19 within this cluster were collected via interviews and in-patient medical records. All data were analysed, and socio-demographic and clinical characteristics of all cases were presented.

Results: Total of 31 cases of COVID-19 were confirmed and linked epidemiologically in Kedah state. The index case was identified and reported to breach quarantine order for international traveller given by health authority. The virus transmission widely spread among family members, restaurant customers and later in the community.

Conclusion: Non-adherence to the preventive measures is the driving factor for the widespread of this cluster infection. Active contact tracing, aggressive containment measures, and effective risk communication are important to control the virus transmission in this locality.

Keywords: COVID-19 Virus Infection, Disease Outbreaks, Health Communication, Infectious Disease Transmission, Quarantines

Citation: Azit NA, Mohd Suan MA, Omar N, Dali N, Romli M, Md Yusof MA, et al. Epidemiological investigation of a covid-19 community cluster in kedah, malaysia. Int J Travel Med Glob Health. 2022;10(1):10-15. doi:10.34172/ijtmgh.2022.03.

Introduction

Approximately two months after Malaysia reported its first case of novel coronavirus disease SARS-CoV-2 2019 (COVID-19) on 25 January 2020, the deadly virus has then infected in excess of 2500 individuals with 43 reported deaths.[1] The major surge in the number of locally transmitted cases of COVID-19 came in March 2020 after hundreds of participants in religious gathering were found positive.[2] This increasing number of cases has prompted nationwide lockdown known as Movement Control Order (MCO) which took effect on 18 March 2020.[3] During this period, the Ministry of Health (MOH) Malaysia has encouraged the public to adopt health preventive measures such as wearing a face mask, maintaining social distancing, and observing good personal hygiene.[4] Additionally, a mobile phone application, *MySejahtera*, was introduced to help the public to identify their risk of COVID-19 infection as well as assisting the MOH to perform contact tracing on individuals detected positive for COVID-19.[5]

The government also implemented several rules for travellers to prevent imported infection from outside the country. Since 3 April 2020, all Malaysians and visitors returning from overseas were subjected to the compulsory 14-day quarantine at designated centres across the country. As the COVID-19 outbreak was gradually kept under control, the government partially eased the lockdown starting from 10 June 2020.[6] Beginning on the same date, travellers who tested negative upon arrival in the country were allowed to undergo their mandatory quarantine at home.[7] Despite the initial success of lowering the number of positive cases, the MOH reiterated calls urging the public to continue complying with preventive health measures.

On 26 July 2020, a cluster of COVID-19 was identified in Kubang Pasu district of Kedah state involving six people staying

in the shophouse.[8] The index case had history of travelling to India but failed to comply with home quarantine order. This non-compliance has led to a widespread transmission of the virus among his housemate, customers, and surrounding community. This study aims to report data of a local cluster of COVID-19 with a view to document the lessons learnt from this cluster and to identify key points that may increase the success rate for future containment in response of the ongoing pandemic.

Methods

Setting of Study

The index case for this cluster was the owner of Restaurant S located in Kubang Pasu district. Kubang Pasu is one of the twelve administrative districts, situated at northern Kedah state. The district covers an area of 950 km^2 and as of 2019, there are approximately 254 000 people inhabit this district of various ethnicity. It is bordered by the state of Perlis to the west, while its northern boundary forms part of the Malaysia-Thailand border. Another three Kedah's district formed its border from east to south.

Characteristics of Patients

All individual who tested positive for COVID-19 infection via reverse transcription-polymerase chain reaction (RT-PCR) test and either had epidemiological link with the index case, had visited the restaurant on 27 July 2020 and 14 days prior to the date, or a close contact to the positive case, were included in this study. The nasopharyngeal and oropharyngeal swab samples of those who fulfilled the above criteria were taken for RT-PCR test and sent to the nearby government hospital's laboratory on the same day. Individuals were classified as having confirmed COVID-19 if SARS-CoV-2 was detected by real-time RT-PCR testing of a nasopharyngeal and oropharyngeal specimen.[9] This study used the date of PCR result as the date of confirmed COVID-19 positive. Due to difficulty in accessing data from other states, positive COVID-19 individuals not from Kedah state were excluded from the data analysis.

Data Collection

This retrospective, cohort study was performed from 26 July 2020 when the first notification received from a private hospital on positive RT-antigen of COVID-19 involving four non-Malaysian workers until the cluster was declared over on 7 September 2020. The data was obtained from district health office (DHO) through epidemiology investigation and patient's medical record. The data included socio-demographic characteristics, clinical symptoms, activity patterns, clinical information on concomitant medical illnesses, laboratory, and radiological results, as well as clinical progression and outcome.

Data Analysis

The median and interquartile range (IQR) of incubation period were reported, where they are defined as the duration between earliest date of contact with suspected or confirmed case and date of symptom onset. Distribution of the onset of symptoms, demographic and clinical characteristics of all cases were examined. All data were analysed using Microsoft Excel.

Results

Description of Confirmed COVID-19 Patients

Total of 45 individuals was found positive for COVID-19 in this cluster comprising 31 cases from Kedah state, 11 and 3 cases from neighbouring state of Perlis and Penang, respectively. Of 31 confirmed cases from Kedah state, majority was male (61.3%) with a mean age of 35.5 years. Sore throat and runny nose were the two most common symptoms, as reported in 7 (22.6%) and 4 (12.9%) individuals, respectively (Table 1). The median incubation period was six days (IQR 6–9). Patchy shadowing was the only abnormality reported on chest radiography at admission in five (16.1%) individuals. Two individuals received Favipiravir, two treated with remdesivir,

Table 1. Demographic, Clinical, and Radiological Characteristics of Patients With Confirmed COVID-19 Infection in SV Cluster, Kedah, Malaysia

Variables	Individuals (n = 31)
Age (years), mean (SD)	35.5 (18.63)
Gender, n (%)	
Male	19 (61.3)
Female	12 (38.7)
Nationality, n (%)	
Malaysian	27 (87.1)
Non-Malaysian	4 (12.9)
Chronic illness, n (%)	
Hypertension	8 (25.8)
Diabetes mellitus	3 (9.7)
Heart disease	2 (6.5)
Asthma	1 (3.2)
None	22 (71.0)
Symptoms, n (%)	
Sore throat	7 (22.6)
Runny nose	4 (12.9)
Fever	3 (9.7)
Cough	3 (9.7)
Anosmia	2 (6.5)
Diarrhoea	1 (3.2)
Lethargy	1 (3.2)
No symptom	21 (67.8)
Major abnormality on lung image on admission, n (%)	
Patchy shadowing	5 (16.1)
No major abnormality	21 (67.8)
Not imaged	5 (16.1)
Treatment given, n (%)	
Favipiravir	2 (6.5)
Remdesivir	2 (6.5)
Standard hospital care	27 (87.0)
Duration of hospitalization (days), mean (SD)	18.0 (6.0)

SD, standard deviation

while more than three-quarter of positive cases received standard hospital care. None of them required supplemental oxygen, intubation, or intensive care. Mean duration of hospitalisation was 18 days. No deaths were recorded from this cluster as of 26 August 2020.

Description of SV Cluster

The DHO was alerted to four individuals with locally acquired COVID-19 on 26 July 2020. All of them were non-Malaysians, worked in the same Restaurant S, and staying together in the house located above the restaurant. The investigation findings later linked them epidemiologically to an index case, who was the owner of the restaurant where the four individuals had worked.

The index case (SV1.1) has a travel history to Tamil Nadu state in India. He returned to Malaysia on 13 July 2020 and the first swab sample for RTK-antigen test was taken at the international airport, which came back negative. He was put under compulsory home quarantine for 14 days and later developed cough on 19 July 2020. He was reported to have violated the home quarantine order by visiting his restaurant and went to the banks during quarantine period. Following this policy violation, he was compounded by police and instructed to continue quarantine at home. Second swab sample for RTK-antibody test was taken on 26 July 2020 and reported to be negative. However, because his workers were found positive for COVID-19, he was rescreened on 27 July 2020 and PCR result confirmed that he was infected with COVID-19.

The index case stayed together with his son, SV1.2, a local university student and four restaurant employees (SV1.3, SV1.4, SV1.5, and SV1.6). All of them shared household amenities with the index case during his home quarantine period. The son was reported to have developed symptoms on 25 July 2020 and tested positive for COVID-19 on 28 July 2020. The four workers were asymptomatic and confirmed positive for COVID-19 on 27 July 2020. Following this situation, this cluster, named as SV Cluster, was declared by the Kedah State Health Department and press statement given by Director General Ministry of Health Malaysia on 28 July 2020. The Restaurant S was ordered to close.

Active case detection and contact tracing was done among restaurants clients. The investigating team found that the premise did not comply with the Standard Operating Procedure (SOP) on scanning body temperature at restaurant's entry and placing table/seat 1 meter apart. Additionally, no record of customer was found either using the *MySejahtera* application or manual form. Hence, the team was forced to enquire around from nearby shops on any individuals with the possibility of visiting the restaurant.

Subsequently, through active screening (swab) of contacts, four customers (SV2.1, SV 3.1, SV 4.1 and SV5.1) were confirmed positive for COVID-19. These customers later had spread the virus to their family members, friends, and neighbours. Further investigation revealed that among those with confirmed COVID-19 infection, several of them had history of attending school, social gathering, and business meetings few days before being tested positive. One of the infected patients from Perlis state was reported to have spread the virus to ten of his family members. However, the details of positive cases in Perlis were not analysed in this article.

There was also an increase in movement activities towards and from the affected town for the celebration of Eid al-Adha, which fell on 31 July 2020. As the number of confirmed cases surged and possibility of large-scale virus transmission escalated in the community following family gathering during the festive season, the local government and Ministry of Health Malaysia decided to implement more aggressive containment measures, Targeted Enhanced Movement Control Order (TEMCO), from 3 to 30 August 2020. TEMCO was imposed on four localities within the district, namely area within one kilometre radius from Restaurant S, Pida 1, Bendang Dalam and Kampung Ulu. All residents in the TEMCO area underwent compulsory screening and testing for COVID-19, and mandatory home quarantine during TEMCO period. Over 4000 residents from TEMCO area had undergone COVID-19 mass screening which took approximately five days to complete.

Among those who had been screened, nine more individuals (SV6.1, SV6.2, SV7.1, SV8.1, SV9.1, SV10.1, SV11.1, SV12.1, and SV12.2) were found positive for COVID-19 infection, including three cases from Penang state with a travel history to TEMCO area (SV6.2, SV12.1, and SV12.2). All positive cases from Penang were not included in this study. No additional cases linked to this cluster were identified as of 26 August 2020. The TEMCO was lifted earlier on 26 August 2020 and the SV Cluster was declared over on 7 September 2020. Figure 1 shows a summary of timeline of events and cases of confirmed COVID-19 cases in this cluster.

Discussion

This community cluster was one of the fast-spreading local transmission of COVID-19 occurred in Malaysia. In the expand of 14 days from the first case notification, this virus has infected 45 individuals from Kedah state (31 cases) and neighbouring state of Perlis (11 cases) and Penang (3 cases). The transmission begins from an index case who violated home quarantine order for overseas travellers and subsequently spread between household contacts and community. The town where the index case stayed in India has reported over 800 confirmed COVID-19 cases as of July 12, 2020.[10] Issue of non-compliance to home quarantine among international travellers has been a great concern during the COVID-19 pandemic. Botswana and South Korea have reported similar breach in quarantine regulations which led to local transmission of COVID-19 infection.[11,12] In response to strengthen the surveillance activity among travellers from abroad, the Malaysian government revoked the mandatory quarantine at home for travellers and replaced with quarantine at hotels or designated quarantine centres, where monitoring and enforcement is in place beginning from July 24, 2020.[13,14]

Effective risk communication is one of the utmost important public health measures during current COVID-19 pandemic. Particularly for this cluster, social media was used

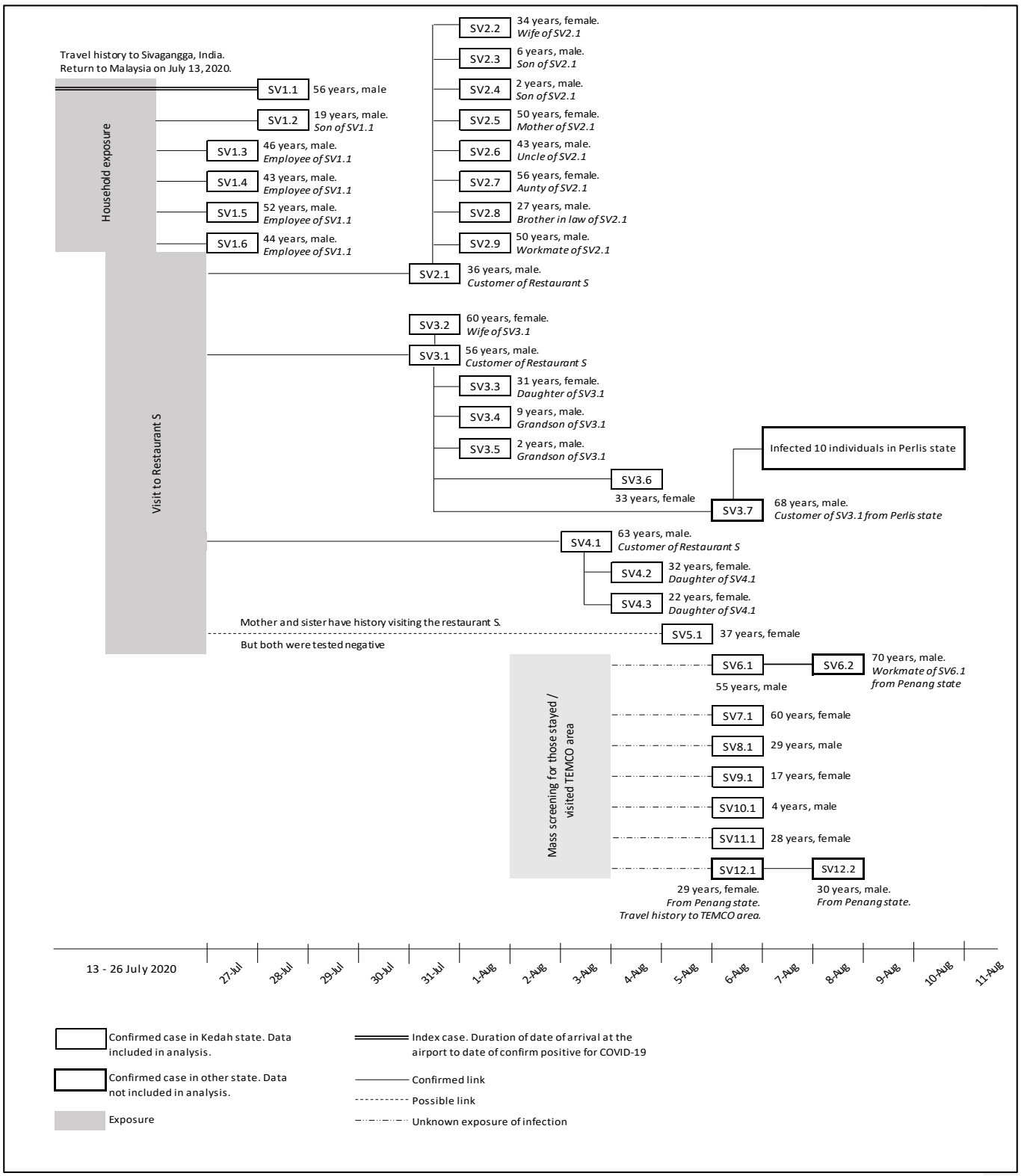

Figure 1. Timeline of Events and Cases in SV Cluster. Note: Age and sex are shown for each case with other pertinent information (e.g., relationship).

not only for updating the public on day-to-day situation, but also for tracing close contact to the positive case. This is following the failure of Restaurant S, the epicentre of this cluster, to document its customer contact details. Identifying close contact of positive case without a name list would be challenging in real-world settings. Social and mass media were utilized to urge public who have visited the restaurant to come forward and get screened for COVID-19 from nearest public health clinic. Using the same platform, those who have travel history during festive season to four localities under TEMCO, were asked to get screen. Other countries that reported using coronavirus tracking apps to aid contact tracing were Australia, Bahrain, Colombia and Ghana.[15]

Many confirmed cases of COVID-19 experience mild

symptoms for which medical attention was not sought early. Ignorance on symptoms albeit the advice given through mass media has caused delay in cases of detection and containment. Symptomatic individuals were also found attending social gathering without wearing a mask and maintaining safe social distance, all of which might contribute to the virus transmission in the community as the highest viral shedding occurs during the early phase of symptom onset.[16] This finding highlights the importance of public seeking early medical care following symptom onset while adhering to personal hygiene and avoiding gatherings when symptomatic. This study also concurs with the recommendation by Cevik et al to enhance public awareness on the risk which later may help symptomatic individuals and their close contacts to isolate or self-quarantine to prevent ongoing transmission.[17]

This study illustrates the need to inculcate the new norm for festive celebrations during this pandemic time. The onset of this cluster began five days before the Islamic holiday, Eid al-Adha. Increased public movement during the festive season makes case detection and containment difficult. Family gatherings continued despite health authority's advice to have a homely, closed-door celebration.[18] The fear that this situation may enhance virus transmission in the community is justified when seven more positive cases were detected through a mass screening of residents after TEMCO was declared. This study also demonstrates the role of TEMCO in controlling public movement to avoid the spreading of virus. Health authority should continue emphasising the new norm of celebrating festive seasons (i.e., avoid interstate and interdistrict movement, encourage close-door celebration), of which the public should adhere to.

It is important to note several limitations in this study. Information on date of symptom onset were collected retrospectively from cases. Nevertheless, its accuracy may be influenced by recall bias. Patients might have problem recalling the exact date of symptom onset, especially if the symptoms were mild. The date of contact with the transmission source in this report was unable to be estimated for patient SV1.1 (index case) because he had stayed in Tamil Nadu state, India for several months. This study also did not address on asymptomatic transmission of COVID-19 in this cluster. Hence, further study is needed to establish a deeper understanding of disease transmissibility of asymptomatic cases.

Conclusion

Non-adherence to public health measures for reducing the risk of COVID-19 transmission is deemed the driving factor for the widespread of this cluster infection. Effort should be focused to continue educating and emphasising the public on the safe social distancing, good personal hygiene, and avoiding crowded places. Additionally, public is encouraged to adapt to the new norm when celebrating any festival during the pandemic period. This cluster infection also showed that active contact tracing, aggressive containment measures, and effective risk communication are the key points to keeping the virus transmission under control.

Authors' Contributions

NAA, MAMS, NO and ND contributed to conception, design, analysis, and writing of the manuscript. MR, MAMY and MA contributed to the data collection, analysis and writing of the manuscript. SAR and MZI contributed to the critically reviewed the manuscript before the final submission.

Conflict of Interest Disclosures

None of the authors had any financial conflicts of interest.

Ethics Approval

The conduct of this study has received approval from the Medical Research and Ethics Committee, Ministry of Health Malaysia (NMRR-20-3160-57299).

Funding/Support

The conduct of this study did not receive any funding.

Acknowledgements

The authors would like to thank the Director General of Health Malaysia for permission to publish this manuscript. We also would like to extend our gratitude to all the health personnel from Kubang Pasu District Health Office and Hospital Sultanah Bahiyah for their kind help in this study.

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