

Original Article

Coronavirus Disease (COVID-19) Outbreak among Islamic Missionaries in Terengganu state of Malaysia in 2020.

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Abstract

Background: Malaysia experienced an outbreak of COVID-19 after Islamic missionaries returned from religious gathering in Sri Petaling Mosque, Kuala Lumpur. The outbreak extended to the state of Terengganu which also resulted in an outbreak in a private Islamic institution known as BKMQ (an anonymized name) in Kuala Terengganu District. **Materials and Methods:** A descriptive cross-sectional study was conducted to describe the characteristics of COVID-19 cases and the experience of COVID-19 outbreak containment in BKMQ. **Results:** There were six individuals diagnosed with COVID-19 in BKMQ. Majority of them were male (83.3%), in the age group of 20 to <40 years old (50.0%) and had fever as their symptom (50.0%). The time of last exposure to diagnosis among majority of cases were 12 days, and majority of cases (66.6%) stayed in hospital between 20 days to less than 40 days. **Conclusion:** The transmission of virus was postulated to be through household exposure and vehicle sharing. Prompt action, immediate lockdown and inter-agencies collaboration were the key factors in successfully controlling the spread of COVID-19 in the institution and community.

Keywords: COVID-19, outbreak, mass gathering, Islamic missionaries, Terengganu.

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Introduction

Coronavirus Disease (COVID-19) is a newly emerging disease, which is caused by severe acute respiratory syndrome coronavirus (SARS-CoV-2) and spreads rapidly from person to person. The virus is transmitted by asymptomatic infected individuals, as well as symptomatic individuals via oral fluid droplets, mainly airborne via coughing or sneezing¹. Since the COVID-19 outbreak

on 31 December 2019, it has hit more than 200 countries or territories with 51,848,261 cases and 1,280,868 deaths as of 13th November 2020². The World Health Organization (WHO) had declared COVID-19 as a pandemic on 11 March 2020². In Malaysia, the first case of COVID-19 was detected on 25th January 2020 among three tourists who had close contact with an infected person in Singapore.¹ One year later, the disease had spread

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nationwide and there were more than 408,713 cases reported as of end of April 2021 with more than 1,506 deaths related to COVID-19. Malaysia had identified 1,655 COVID-19 clusters as of 30th April 2021 which affected all states and federal territories of Malaysia³.

Malaysia experienced an outbreak of COVID-19 after Islamic missionaries returned from a mass religious gathering known as “International Qudamak and Ulamak Malaysia 2020” which was held from 28th February 2020 until 2nd March 2020 in Sri Petaling Mosque, Kuala Lumpur⁴. About 30% of COVID-19 cases in Malaysia during the first wave of COVID-19 pandemic were originated from this gathering which involved about 19,000 local and international attendees. As a result, COVID-19 cases had spread to many generations via 17 sub-clusters or outbreaks when the participants of this mass gathering returned to their place of origin, as Sri Petaling Mosque served as a headquarter for *Jamaah Tabligh* in Malaysia and coordinates all the related activities⁵. *Jamaah Tabligh* is a group of movement to revive pure Islamic teaching without any affiliation in political and conflicting jurisprudence sect, aiming to propagate good Islamic practices among all Muslims. *Tabligh* simply means preacher of Islamic teachings⁶. The Sri Petaling Mosque Cluster was declared on 11th March 2020 and ended on 8th July 2020⁵. Movement Control Order (MCO) had been imposed in Malaysia under the Prevention and Control of Infectious Disease Act 1988 and the Police Act 1967 under eight different phases as a mitigation strategy starting from 18th March until 31st December 2020. Further continuation of MCO will be dependent on the current COVID-19 situation in Malaysia⁵.

One of the states in Malaysia which was affected by the COVID-19 outbreak related to Islamic missionaries is Terengganu State. The first COVID-19 case was detected on 13th March 2020 in Terengganu State, which was related to the religious mass gathering in Sri Petaling Mosque following voluntary screening. The disease had then spread to the next generation when the infected persons went back to a private Islamic institution known as BKMQ (anonymized name) to continue their Islamic missionaries. BKMQ is situated in the district of Kuala Terengganu with approximately 400 occupants, which consisted of 346 students, 36 teachers and staff, as well as their family members. It stretches over seven acres of land area with a mosque, two classrooms buildings, a four stories

staff quarters and ten houses. There are 20 students in average per classroom. Only boys are eligible to pursue their study in BKMQ. There were also non-Malaysian students for example those originated from Thailand, Philippines, China, Indonesia, Singapore, Brunei, Vietnam, Cambodia, Yemen, France, and Morocco. Besides functioning as an Islamic religion learning centre, BKMQ also acts as the centre for Non-Governmental Organization of Islamic missionary movement, which is known as *Tabligh Jamaat Markaz* (Centre for *Tabligh* Movement) for Terengganu State. Malaysian *Jamaah Tabligh* and also those from all over the world will gather and transit in BKMQ for one to two days before they were assigned to go out for *dakwah* (preaching activities) in local *surau* (smaller version of Islamic religion gathering or activities centre situated in communities) or mosque for three days, 40 days or four months. BKMQ also served as a weekly assembly point to all the *jamaah tabligh* from all over Terengganu, which falls on every Thursday⁷.

An infectious disease outbreak which happened in an institution like BKMQ posed risk of fast spreading to the occupants of the institution, depending on the practice of infectious control, ratio of occupants to space available, age group and immunity status of occupants, as well as the activities held in the institution.⁸ The routine function and the mobility nature of people in BKMQ had also created great challenges to outbreak containment. Apart from that, an outbreak linked to an institution will affect the reputation of an institution. Therefore, infectious disease outbreak management related to an institution requires prompt decision and action; and to halt the spread of the disease in the shortest possible duration to reduce casualties and complications. In view of COVID-19 as a newly emerging disease, sharing of knowledge and successful experience in outbreak management especially in an institution is particularly important to give implications and reference to other stakeholders in future management of similar condition. This paper aimed to describe the characteristics of COVID-19 cases and to outline the experience of COVID-19 outbreak containment in a private Islamic institution in Kuala Terengganu district, Terengganu state of Malaysia.

Materials and Methods

From 1st March 2020 until 30th June 2020, a descriptive cross-sectional study was conducted in Kuala Terengganu District Health Office based

on retrospective record review for COVID-19 cases notified to Kuala Terengganu District Health Office, Terengganu from the cluster period of 13th March 2020 until 5th April 2020. The reference populations and the study samples were all COVID-19 cases in BKMQ who fulfilled study inclusion and exclusion criteria. The inclusion criteria were individuals with laboratory confirmed positive test for COVID-19⁹, and they must be the occupant of BKMQ at the time of diagnosis. Samples with incomplete record of 30% variables will be excluded from the study.

Data were collected from Kuala Terengganu District Health Office via e-COVID19 online registry (an online database for COVID-19 under the governance of Ministry of Health Malaysia)⁹. Data were then being recorded in a pre-design study proforma. The retrieved information included socio-demographic features, travel history, signs and symptoms, epidemiological risk assessment, movement history 14 days prior to onset of symptoms, numbers of close contacts, laboratory investigation, control and prevention done by the Kuala Terengganu District Health Office.

Specific operational definitions were employed in this study. A confirmed case of COVID-19 is defined as individual with positive results of reverse transcription polymerase chain reaction (RT-PCR) for COVID-19⁹. Meanwhile, an outbreak is defined as two or more cases of similar infectious disease happened in close proximity or had epidemiological link to each other and happened within the same incubation period⁹. Fever is defined as measured fever of $\geq 38^{\circ}\text{C}$ ⁹. Time of last exposure to diagnosis is defined as time (in days) from the date of last unprotected exposure of individual to the index case/infection source until the day of being diagnosed with COVID-19 by mean of RT-PCR positive result. Time of first exposure to onset of symptoms (or diagnosis) is defined as time (in days) from the date of first unprotected exposure of individual to the index case/infection source until the day of onset of symptoms (or being diagnosed with COVID-19 by mean of RT-PCR positive result).

Statistical analysis

Data entry and analysis were done by using SPSS Statistics (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). Descriptive statistics with frequency and percentages were calculated.

Results

Socio-demographic and clinical characteristics

Table 1: Socio-demographic and clinical characteristics of COVID-19 cases in a private Islamic institution in Kuala Terengganu District (n=6)

Characteristics	Frequency, n (%)
Gender	
Male	5 (83.3)
Female	1 (16.7)
Age group (years)	
< 20	1 (16.7)
20 to < 40	3 (50.0)
≥ 40	2 (33.3)
Time of last exposure to diagnosis (first generation of cases, n=4)	
10 days	1 (25.0)
12 days	2 (50.0)
19 days	1 (25.0)
Time of first exposure to onset of symptoms (second generation of cases, n=2)	
11 days	1 (50.0)
12 days	1 (50.0)
Time of first exposure to diagnosis (second generation of cases, n=2)	
12 days	1 (50.0)
16 days	1 (50.0)
Length of hospital stay	
< 10 days	1 (16.7)
10 days to < 20 days	0 (0.0)
20 days to < 40 days	4 (66.6)
≥ 40 days	1 (16.7)

of among COVID-19 cases

The COVID-19 outbreak related to BKMQ, a private Islamic institution in Kuala Terengganu district started on 13th March 2020 and ended on 5th April 2020. A total of six COVID-19 cases were detected in this outbreak, among 400 tested occupants (positivity rate: 1.5%). Socio-demographically, majority of them were male and in the age group of 20 to <40 years old. Clinically, fever was the most common symptom among cases followed by cough, headache and coryza. The time of last exposure to diagnosis among majority of cases were 12 days, and majority of cases stayed in hospital between 20 days to less than 40 days. Details are shown in Table 1 and Figure 1.

Epidemiological link between COVID-19 cases

Initially four cases (Case 1, 2, 4, 6) had attended the "International Qudamak and Ulamak Malaysia 2020" mass gathering which was held from 28th February 2020 until 2nd March 2020 in Sri Petaling Mosque. They stayed together in the mosque and mingled with other participants. On 3rd March 2020, all of them went back to BKMQ. Case 1

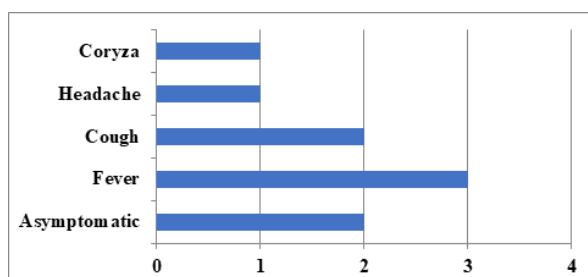


Figure 1: Distribution of symptoms among COVID-19 cases in a private Islamic institution in Kuala Terengganu District (n=6).

and Case 4 travelled back together in the same car and stayed together in a room in BKMQ. They came to BKMQ for the purpose of transit before being assigned for the next Islamic mission. Both of them were not originated from Terengganu state. Meanwhile, Case 2 and Case 6 travelled together in another car. Both of them stayed with their family members in different houses in BKMQ, as they also worked as religious teachers in BKMQ. On the 15th March 2020, Case 1 and Case 2 were detected positive for COVID-19 at different time of the same day, following voluntary screening program. The promotion of voluntary screening program was done by Kuala Terengganu District Health Office after a positive COVID-19 case was detected from a Bruneian citizen who had attended the mass gathering in Sri Petaling Mosque. This was done with the cooperation from the BKMQ managerial team and Terengganu State Health Department. Those attended the same mass gathering in Sri Petaling Mosque were contacted by phone calls over three days, starting on 11th March 2020. The promotion of voluntary screening program cannot be done openly via mass media or social media at that time to prevent unnecessary public anxiety and stigma towards *jamaah tabligh*. After Case 1 was detected positive for COVID-19, an immediate communication was done with the highest authority of BKMQ to conduct lockdown of the institution voluntarily to prevent the movement of BKMQ occupants into the community. At the same time, an ambulance with a medical team was arranged to transfer Case 1 from BKMQ to a tertiary hospital for further treatment. An emergency meeting was held in Kuala Terengganu District Health Office with main stakeholders to discuss for further intervention until late midnight. At the same time, Case 2 was reported to be positive. Similarly, another medical team and transport was deployed to transfer Case 2 to a tertiary hospital.

However, as expected, voluntary lockdown of the institution did not prevent the BKMQ occupants from going out. Case 4 (at that time not yet detected as positive COVID-19) and 2 other non-Malaysian BKMQ occupants who stayed together in the same room with Case 1, had travelled on a bus to Kuala Lumpur with the help of local people on the next morning, after Case 1 and Case 2 were sent to hospital. Therefore, Kuala Terengganu District Health Office worked together with the Royal Malaysian Police, Malaysia Civil Defense Force and RELA (The People's Volunteer Corps) to implement a strict mandatory lockdown under the Prevention and Control of Infectious Disease Act 1988 on 16th March 2020. It was one of the earliest lockdown or movement control order taken in Malaysia, prior to the national announcement of Movement Control Order (MCO) on 18th March 2020 (MCO is a *cordon sanitaire* implemented as a preventive measure by the federal government of Malaysia in response to the COVID-19 pandemic in the country starting on 18 March 2020, which is extended and adjusted to different phases according to COVID-19 cases burden). These agencies had arranged for several teams to guard at the main entrance and two side entrances of BKMQ, as well as patrolling the whole surrounding of BKMQ, to prevent anyone from going in and out of BKMQ. These officers worked in shift for 24 hours a day and seven days a week. At the same time, with the cooperation of Terengganu State Health Department, Kemaman District Health Office and Royal Police Malaysia, Case 4 and two other non-Malaysian occupants of BKMQ were able to be detained in Kemaman district of Terengganu State, and were sent to a district hospital for quarantine and sampling. At the same time, social gatherings within BKMQ such as classes, mass prayers in BKMQ mosque were cancelled after communication with the highest authorities of BKMQ.

Meanwhile, Kuala Terengganu District Health Office had also arranged several medical and health teams to go into BKMQ with full personal protective equipment on daily basis. The medical teams conducted medical screening and COVID-19 sampling for approximately 400 occupants every day, starting from 16th March 2020. Those having symptoms suggestive of COVID-19 were being sampled, retrieved and sent to hospital for further treatment. While the health teams did disinfection of every premise and common places in BKMQ, with the help of the Fire and Rescue Department.

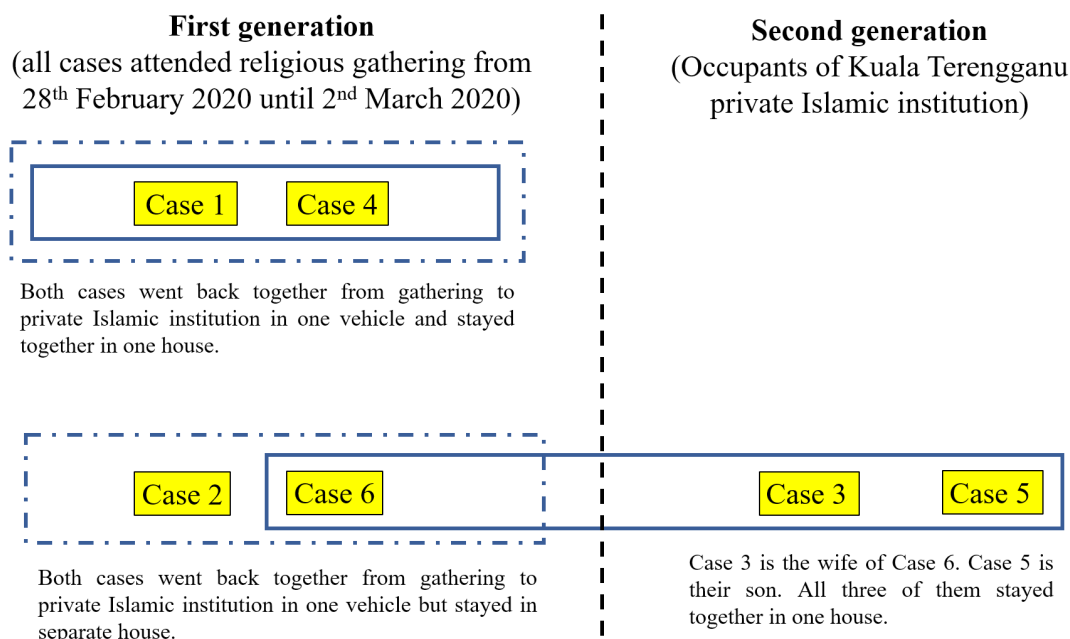


Figure 2: Illustration of epidemiological link between cases in COVID-19 outbreak in BKMQ, a private Islamic institution in Kuala Terengganu District. First generation cases were all individuals who attended religious gathering in Sri Petaling Mosque from 28th February 2020 until 2nd March 2020, while second generation of cases were occupants of BKMQ.

The Kuala Terengganu District Health Office's Crisis, Preparedness and Response Center (CPRC) was opened 18 hours daily since 15th March 2020, to coordinate the arrangement of teams, agencies, logistic, disinfections, investigations of positive cases, contact tracing, data collections and so on. The Kuala Terengganu District Office also became the main player in coordinating the whole process later on. The Welfare Department of Malaysia had taken the responsibility of ensuring and sending supply of foods, drinks and basic needs to the BKMQ occupants, as well as officers of all agencies during this difficult period of time. The Kuala Terengganu Municipal Council also facilitated in the maintenance of cleanliness and sanitation of the surrounding of BKMQ.

On 19th March 2020, Case 3 and Case 4 were detected positive for COVID-19 following COVID-19 sampling and contact screening. Case 3 is a lady and the wife of Case 6 (not yet detected positive at that time), who had never been to the Sri Petaling Mosque mass gathering. This indicated that the COVID-19 outbreak had further spread to another generation. On 21st March 2020, Case 5 was detected positive for COVID-19. Case 5 is the son of Case 3 and Case 6, who had not been to the Sri Petaling Mosque mass gathering. He is also one of the students in BKMQ. There seem

to be missing epidemiological link between these cases until Case 6 was detected positive later on 21st March 2020 on his third COVID-19 sample. In short, all cases had been detected as positive COVID-19 on their first sample except for Case 6. The illustration of epidemiological link between cases is shown in Figure 2.

Discussion

Five out of the six positive COVID-19 cases detected in BKMQ were male. Our finding is in line with finding from Thailand's COVID-19 outbreak related to the same Islamic mass gathering which found male group was more affected than female group⁴. This may be due to a male predominance in Islamic religious gathering, be it in Sri Petaling Mosque or BKMQ. Observational data from Wuhan, China also reported male group as the more pathologically susceptible group to be infected with COVID-19¹⁰. Previous study had shown that female group was less susceptible to contract COVID-19 as they have higher macrophage and neutrophil activity and hence, better immune response¹¹.

As for age group, young adults (20 years old until less than 40 years old) were the predominant group among all COVID-19 cases in this COVID-19 outbreak. Similar findings were observed in Thailand and Beijing where majority of cases

ranged between the age of 15 years old to 40 years old^{4,12}. These findings may be attributed to the lifestyle of young adults who tend to have many social activities with their peers, which in this case, attending religious mass gathering in group with their peers¹³.

The duration of last exposure until the detection of positive COVID-19 or presence of symptoms took 10 days or more among the BKMQ cases. Studies found that COVID-19 incubation period differs widely across the world. It can be as short as three days or up to twelve days^{14,15}. For example, in a Chinese study, majority of COVID-19 cases showed that the days from exposure to symptom onset took only three to four days¹³. Meanwhile, the duration between day of exposure to onset of symptoms among Islamic missionaries in Thailand was around five days⁴.

Majority of our cases had lengthy hospital stay which was around 20 days to more than 40 days. Similar findings were being reported in a systematic review on COVID-19 length of hospital stay globally that it varied from less than a week to nearly 2 months. This was due to the differences in admission and discharge criteria, as well as different timing and frequencies of cases between countries, and the capacity of which the hospitals could cope with during the pandemic^{16,17}. As for current practice in Malaysia, a few criteria were set as the hospital discharge criteria for symptomatic COVID-19 cases. Firstly, at least 10 days have passed since symptom onset. Secondly, at least 24 hours have passed since resolution of fever without the use of antipyretic medications; and thirdly improving clinically in general. As for asymptomatic COVID-19 patients, they can be discharged from hospital 10 days after the date of their first positive RT-PCR test for SARS-CoV-2⁹. An additional criterion for hospital discharge during the BKMQ outbreak period was at least two RT-PCR sample for COVID-19 was tested negative prior to discharge, as the COVID-19 infectivity period was still under research at that period¹⁶. Hence, the purpose of hospital stay was to provide supportive treatment to those diagnosed as positive COVID-19 until their RT-PCR results turned negative at that time, as an objective measurement that they are not infective anymore. As for symptoms, most of our cases had fever followed by cough, headache and coryza. But 33% of our cases were asymptomatic. Studies in other settings also pointed out similar findings with fever and cough were the predominant symptoms

of COVID-19^{4,12}. Meanwhile in Italy, a large proportion of COVID-19 patients presented with common symptoms such as cough, fever, dyspnea, musculoskeletal symptoms (myalgia, joint pain, fatigue), gastrointestinal symptoms, and anosmia/dysgeusia¹⁸. However, recent communal cluster in Terengganu state showed more asymptomatic cases (64.7%) than symptomatic cases being detected, as in the biggest communal cluster known as Makekar Cluster in Dungun district, Terengganu¹⁹.

Regarding the transmission of virus among cases, one possible scenario is that the infected cases transmitted the virus to their friends during their journey in private transportation. It took at least five hours journey by car from Sri Petaling Mosque to BKMQ. Case 1 might have infected Case 4, and Case 2 might have infected Case 6 during their journey back from the mass gathering using private cars. Previous study had reported on strong correlation between spatial transmission of COVID-19 with the use of private or public transportation²⁰, especially if the windows of the vehicle were closed throughout the journey. COVID-19 has a high risk of transmission among passengers in confined spaces such as private cars and public transportations. It was reported in previous study that passengers adjacent to the index COVID-19 patient had the highest attack rate, especially passengers who sat on the same row as the index patient in the same vehicle²¹.

Besides spatial transmission of virus within transport vehicles, our report also highlighted the transmission of COVID-19 through household exposure. The most likely scenario is that the infected Case 6 had transmitted the virus to his wife (Case 3) and son (Case 5) after they spent substantial amount of time together within the same house, although Case 6 was asymptomatic and being the last one to be detected positive. A systematic review and meta-analysis reported that infection risk of household contacts is 10 times higher than other contacts, and SARS-CoV-2 is more transmissible than SARS-CoV and MERS-CoV in households²². Studies suggested that infected individuals can transmit the virus efficiently within household via droplets, fomites, aerosol and faecal contamination^{23,24}. Moreover, household transmission of SARS-CoV-2 is very efficient because the virus can survive up to 9 hours on human skin and can remain viable for up to 72 hours on plastic surface and stainless steel within the household confined space²⁵⁻²⁷.

Conducting immediate contact tracing and control

measures were important to contain this outbreak in Kuala Terengganu district. The implementation of immediate lockdown of BKMQ when first case was diagnosed in which no one can go in or out of the institution had prevent further transmission of the virus in the community. Cancellation of social gathering and daily disinfection within BKMQ had also successfully prevent further cases within BKMQ. All confirmed COVID-19 cases from the institution were immediately isolated and admitted to hospital for treatment, including symptomatic occupants who were not detected as positive yet. Inter-agencies collaboration is utmost important in the implementation of lockdown of BKMQ and deterring SARS-CoV-2 transmission in community²⁸. Kuala Terengganu District Health Office had obtained continuous assistance and cooperation from various governmental and non-governmental agencies during the lockdown period of BKMQ.

Numerous challenges were faced during the COVID-19 outbreak in BKMQ. Firstly, there was some degree of difficulty in isolating the residents to their own place as most of them were sharing living spaces in the institution, while no one patrol inside the institution constantly. Next, most of the occupants were teenagers with no local social support as they originated from all over Malaysia and abroad. Language barrier is another challenge faced when dealing with non-Malaysian occupants. As a newly emerging disease, COVID-19 outbreak in BKMQ had also led to fear of being infected, tremendous stress and anxiety to the ground level officers and front-liners who were deployed to take care of BKMQ occupants on daily basis. While there were about 400 occupants that needed to be locked down in the institution for 7 weeks, Kuala Terengganu District Health Office also need to manage other COVID-19 cases detected outside of the institution. This high burden of workload and mental stress led to exhaustion of manpower and the morale of work, as well as depletion of resources such as personal protective equipment and transports. However, constant

communications, coordination and assistance from other agencies had provided great relief to medical and health personnel in containment of COVID-19 within BKMQ and from further transmission in community. This had successfully contained the COVID-19 outbreak to only six positive cases in BKMQ among 400 occupants.

Conclusions

In conclusion, outbreak management in an institution requires prompt decision and action to contain the outbreak from getting worse. Immediate lockdown of BKMQ managed to contain the spread of COVID-19 from six cases to the rest of 400 occupants. Inter-agencies collaboration during the outbreak had successfully curbed the transmission of virus more effectively and relief the burden on healthcare personnel.

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Ethical approval issue: This study was approved by the Medical Review and Ethical Committee from National Institute of Health, Ministry of Health Malaysia (NMRR-20-2584-56487).

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Conception: G.S.N., H.A., M.H.A., K.E, N.A.Y,

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Data collection and/or processing: H.A., G.S.N., A.F.O., F.M., M.H.A.,

Analysis and/or Interpretation-H.A., G.S.N., K.E, N.A.Y,

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