

COVID-19 OUTBREAK IN AN ORPHANAGE IN THE PHILIPPINES

Shirlyn May G. Abling, MD^a, Arlene S. Dy-Co, MD, FPPS, FPIDSP^{abc}

^aWorld Citi Medical Center, Quezon City Philippines

^bNational Children's Hospital, Quezon City Philippines

^cSt. Luke's Medical Center, Quezon City, Philippines

ABSTRACT

Objectives: Identifying factors that can lead to an outbreak in an orphanage is important. This study describes a COVID-19 outbreak in an orphanage in the Philippines. The clinicodemographic profile of the children and employees, safety protocols implemented and outbreak response are reported.

Methodology: This is a descriptive study of the COVID-19 outbreak which occurred at a local orphanage in Metro Manila. The clinicodemographic profile of children and employees were obtained from the orphanage's health records. Interview of employees and administrators and focused group discussions (FDG) were done. A questionnaire on how the orphanage dealt with the COVID-19 pandemic was administered.

Results:

A total of 128 children and 34 staff were in the orphanage during the COVID-19 outbreak. Majority (96%) of children were symptomatic and 15% of them have co-morbidities. While 82% of the employees were asymptomatic, majority had a positive rapid antigen test or RT-PCR for SARS-CoV2. All the children and employees had mild illness and recovered with no complications.

The orphanage implemented strict infection control measures when the COVID-19 pandemic was declared. There was a halt in the adoption processes and in the movement of persons in the orphanage.

With the decline of COVID-19 cases in Metro Manila, the orphanage resumed accepting new admissions and processing adoption papers. A few weeks later, a child became symptomatic but was not immediately considered as a case of COVID-19. This was followed by the majority of the children and the employees becoming symptomatic, thus the COVID-19 outbreak was called. Foremost in the response was to attend to the medical needs of the children. Strict lockdown was enforced by the City Health Office until all cases were deemed not contagious.

Conclusion: Factors that can lead to an outbreak in an orphanage include missed opportunities for early diagnosis, contact tracing and intervention. Despite strict infection control measures, a single breach undermined all the efforts done to prevent an outbreak in a closed community.

KEYWORDS: *COVID-19, outbreak, orphanage*

Correspondence:

Dr. Shirlyn May G. Abling

Email: shirlyn_abling@yahoo.com

The author declares that the data presented are original material and has not been previously published, accepted or considered for publication elsewhere; that the manuscript has been approved by the author, and that the author has met the requirements for authorship.

INTRODUCTION

COVID-19, an infectious disease caused by the SARS-CoV-2 virus was first reported in China in December 2019.¹ Globally, as of December 31, 2021, there have been 288 million confirmed cases², whereas locally, 2.8 million cases of confirmed COVID-19³ were documented. In the pediatric age group, as of November 7, 2021, more than 340,000 confirmed COVID-19 cases have been reported with pediatric mortalities accounting for 1.9% of total mortalities.⁴ SARS-CoV-2 is a highly transmissible virus that spreads mainly between people who are in close contact with one another, especially in poorly ventilated and/or crowded indoor settings.⁵

The World Health Organization (WHO) has identified children in orphanages to be one of the vulnerable populations as they are more susceptible to the rapid spread of infection once introduced from outside.⁵ There are published reports of outbreaks in orphanages due to acute flaccid poliomyelitis in India, measles in Thailand, cholera in Haiti, and dermatological disorders like tinea capitis in Tanzania and Myanmar. Common to the occurrence of these were the inefficient surveillance systems, late recognition of the index case, poor infection control measures, and delayed outbreak response. Recommendations from these outbreaks highlighted the importance of increased health protection measures.⁶⁻¹¹

To date, there is paucity of published studies on COVID-19 outbreaks in orphanages worldwide. In April 2020, global media reported COVID-19 cases among 13 children and 12 staff in an orphanage in Ireland.^{12,13} Locally, Hospicio de San Jose, an orphanage in Manila, reported having two COVID-19 outbreaks.¹⁴⁻¹⁶ Outbreak control in an orphanage is challenging and identifying factors that can lead to an outbreak is paramount. This study describes a COVID-19 outbreak that occurred last September 2021 in an orphanage in Quezon City, Philippines.¹⁷ The clinicodemographic profile of children and employees in the orphanage, the safety protocols

implemented and how the orphanage dealt with the COVID-19 outbreak is reported.

MATERIALS AND METHODS

This is a descriptive study of the COVID-19 outbreak declared last September 2021 in a local orphanage in Quezon City, Philippines. Conduct of the study was from October 2021 to December 2021.

All 128 children and 34 employees of the orphanage at the time when the outbreak was called were included. The clinicodemographic profile, signs and symptoms of COVID-19 and outcome of children and employees were obtained from the orphanage's health records. After chart review, interview of employees and administrators and focused group discussions (FGDs) were done. The investigators utilized a standard questionnaire during the interview and FDG. Responses to the questions gave a description of the orphanage and its daily set-up pre and during the pandemic and provided information on its daily processes and conduct of activities such as mealtimes, education, hygiene and sleeping arrangements, sanitation and ventilation, medical and adoption needs. Likewise, adjustments in set-up during and after the outbreak was called, measures implemented when the nationwide lockdown was declared, exceptions allowed to the set safety measures, problems encountered during the lockdown, and the overall outbreak response were recorded. A questionnaire on the safety protocols implemented and how the orphanage dealt with the COVID-19 outbreak was also provided to the administrators and 5 key employees representing security, food, education, medical and the head caregiver.

Data collected were entered in an excel sheet. Responses to the questionnaire and output from the FGD were summarized. A line list was created to analyze the cases and identify the possible source of the outbreak. Data collected were anonymized. Only the investigators had access to the data which were stored in a password protected computer.

The study commenced upon the approval of the World Citi Medical Center (WCMC) Research and Ethics committee. Informed consent from the director of the orphanage was also obtained prior to the conduct of the study. The study followed the principles of good clinical practice in the conduct of this research.

The investigators declare no conflicts of interest in the conduct of this study. The WCMC department of pediatrics paid for the statistician's fee and no other funding was received for this study.

RESULTS

Clinicodemographic profile of children in the orphanage

A total of 128 children were in the orphanage when the COVID-19 outbreak was declared and reasons for admission are presented in table 1 with the top reasons being surrender of parental rights by biological parents and abandonment.

Table 1. Reasons for admission in the orphanage

	Subject	
	N = 128	
	n	(%)
Surrendered	47	36.7%
Abandoned	40	31.3%
Foundling	23	18.0%
Neglected	17	13.3%
Orphan	1	0.8%
TOTAL	128	100.0%

There is an almost equal gender distribution among study participants. Mean age of children was 8.7 years with the youngest at 5 months old. About 15% of children have at least one co-morbidity as seen in Table 2.

Table 3 shows that majority of children were symptomatic, and only 5 remained asymptomatic during the outbreak. Fifteen percent of symptomatic children had different co-morbidities (Table 2) with only 1 patient with developmental delay remaining asymptomatic. Fever duration ranged from 1-3 days,

Table 2. Demographic profile of children in the orphanage

Demographic Characteristics	Subject	
	N=128	
	n	%
Gender		
Male	65	50.8%
Female	63	49.2%
TOTAL	128	100.0%
Age		
Mean ± SD	8.7 years ± 4.04	
Range	5 mos – 18 yrs	
Comorbidities		
None	109	85.2%
Neurological	8	6.3%
Respiratory	3	2.3%
Cardiac	3	2.3%
Others	5	3.9%
TOTAL	128	100.0%

with temperatures ranging from 38-38.5 °C. The average duration of cough and colds was 9 days (range of 3-17 days). Other symptoms noted were decreased appetite and playfulness. There was no report of anosmia or ageusia. It was noted that children who remained symptomatic beyond 7 days had either neurological, ophthalmologic, cardiac or renal comorbidities while those with a respiratory comorbidity - asthma or pulmonary tuberculosis mostly had symptoms of less than 7 days. All children had mild COVID-19 and not a single case progressed to severe disease. Based on the children's health records, all children were symptom free when this study was conducted more than 2 months after the outbreak was called. There were no reports of illness recurrence or appearance of other symptoms within the 2- month period after recovery.

Table 3. Clinical manifestations of children in the orphanage during the COVID-19 outbreak

Signs and Symptoms	Subject	
	Child, N=128	
	n	%
Duration		
Mean ± SD	9.3 ± 4.98	
Signs and Symptoms		
None	5	3.9%
Fever	123	96.1%
Cough and colds	123	96.1%
TOTAL	128	100.0%

With the symptomatic index child having a positive result for reverse transcriptase-polymerase chain reaction (RT-PCR) for SARS-CoV2, the first two children who developed respiratory symptoms 2 days after, were likewise tested and turned positive. Table 4 shows the COVID-19 status of the remaining 125 children who were tested by the City Health Office (CHO) using rapid antigen test (RAT), 4 days after the index case had a positive result. Thirteen children were negative in the rapid antigen test while the rest were positive. The 13 children with negative rapid antigen test were further tested using RT-PCR and quarantined in separate rooms. There were 8 whose PCR turned positive while 5 were negative. After another 5 days, the 5 remaining children with negative RT-PCR were re-tested and 4 came out positive while 1 remained negative. All 5 asymptomatic children had either a positive rapid antigen or RT-PCR test while the only child with a negative antigen and 2 negative RT-PCR tests was symptomatic and had cough for 11 days. This child did not have any comorbidity.

Table 4. COVID-19 test results of children in the orphanage

Diagnostic Test	Subject N=128	
	n	%
RT-PCR (09/03/2021)		
Positive	1	-
RT-PCR (09/05/2021)		
Positive	2	-
Antigen (09/07/2021)		
Negative	13	10.4%
Positive	112	89.6%
TOTAL	125	100.0%
RT-PCR (09/07/2021)		
Negative	5	38.5%
Positive	8	61.5%
TOTAL	13	100.0%
RT-PCR (09/13/2021)		
Negative	1	20%
Positive	4	80%
TOTAL	5	100.0%

There were 34 in-house employees when the outbreak was called, with 4 having co-morbidities as follows: 1 with goiter, controlled; 1 with type 2 diabetes, obese with poor compliance to medications; 1 with hypertension, controlled and 1 with poorly controlled hypertension (Table 5).

Table 5. Demographic profile of employees in the orphanage

Demographic Characteristics	Subject Adult, N=34	
	n	%
Gender		
Male	10	29.4%
Female	24	70.6%
TOTAL	34	100.0%
Age		
Mean ± SD	33.5 ± 4.04	
Comorbidities		
None	30	88.2%
Neurological	0	0.0%
Respiratory	0	0.0%
Hypertension	2	5.9%
Diabetes, obesity	1	2.9%
Goiter	1	2.9%
TOTAL	34	100.0%

Majority of adults had fever, colds, and cough. Other associated symptoms were anosmia and ageusia. The staff with diabetes mellitus and obesity had prolonged cough of more than 14 days which was relieved by bronchodilator therapy and did not require supplemental oxygen. The employee with controlled hypertension was asymptomatic and with 4 other asymptomatic employees. About 18% of adults were asymptomatic while only 4% of children were asymptomatic.

Out of 34 employees, 32 had COVID-19 (27 were symptomatic and 5 were asymptomatic). There were 2 who did not present with any symptoms and remained RAT and RT-PCR test negative (Table 6). All who had COVID-19 recovered without any complications and none warranted hospital admission. At the time of the outbreak in September of 2021, all employees were not yet fully vaccinated against COVID-19.

Table 6. COVID-19 test results of the employees/adults

Diagnostics	Subject	
	Adult, N=34	
	n	%
Antigen (09/07/2021)		
Negative	12	35.3%
Positive	22	64.7%
TOTAL	34	100.0%
RT-PCR (09/07/2021)		
Not done	22	64.7%
Negative	6	17.6%
Positive	6	17.6%
TOTAL	34	100.0%
RT-PCR (09/13/2021)		
Not done	28	82.4%
Negative	3	8.8%
Positive	3	8.8%
TOTAL	34	100.0%

Safety measures implemented in the orphanage when the lockdown was declared in the National Capital Region (NCR) in March 2020

At the start of the pandemic in March 2020, the local orphanage implemented strict infection prevention and control measures. There was a halt in the movement of persons in and out of the orphanage and all employees were requested to live in the orphanage premises. This led to a decrease in the number of staff from 51 to 34.

There was also a halt in all adoption processes from March 2020 to August 2021. Face to face classes in the orphanage were suspended. All essential goods were bought online and donations were accepted by the guard stationed outside the premises. The only time children went out of the orphanage was for urgent medical needs. A month into the pandemic, a child was hospitalized for severe pneumonia and presumptive tuberculosis. The symptomatic child and asymptomatic watcher were negative for SARS-CoV-2 but were isolated and quarantined respectively for 14 days after discharge. There were no other symptomatic children after this pneumonia case was diagnosed.

Infection control measures particularly handwashing was emphasized in the orphanage. The director, teachers and psychologists took the responsibility of educating the children and

maintaining their mental well-being. The orphanage employed a kitchen staff to prepare all meals and an identified personnel attended to and kept all areas of the orphanage clean and sanitized. Utilization of disinfecting agents within the facility increased by twice as much than the usual. The staff maintained their social circle with no contact from the outside environment.

Figure 1 displays the timeline of significant events such as movement of employees, visitors and children, onset and duration of symptoms, and timing of COVID-19 testing.

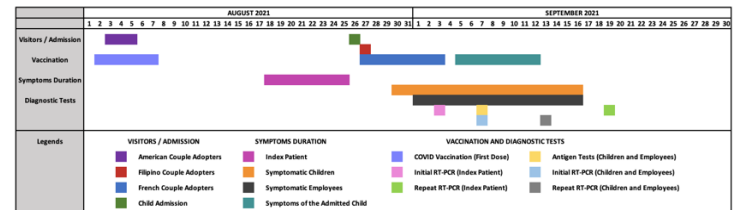


Figure 1. Timeline of significant events in the orphanage during the COVID-19 outbreak

With the decline in COVID-19 cases in Metro Manila, the orphanage decided to resume the processing of adoption papers after 17 months of complete lockdown. Requirements for all visitors included (1) absence of COVID-19-related symptoms 2) a negative COVID-19 RT-PCR test result for all even if without symptoms and (3) absence of exposure to a COVID-19 case in the last 2 weeks. The transition and resumption to pre-pandemic activities coincided with the availability of the COVID-19 vaccines for adults.

As movement in and out of the orphanage continued, none of the new admissions had an RT-PCR test done after thorough screening given that these admissions came from centers that maintained strict isolation protocols. Prior to the outbreak, the last admission was in August 26, 2021 where a four year old asymptomatic, malnourished child was accepted. She tested negative for RAT, thus she was not quarantined. Her admission is one possible source for the COVID-19 virus to gain entry into the orphanage. Figure 1 shows that the onset of symptoms of children started on the 4th day from

exposure to this newly admitted asymptomatic child. It is also a possibility that she did not have COVID-19 upon entry but rather was exposed to a positive case and became symptomatic 7 days after entering the orphanage.

Another reasonable source for the introduction of SARS-CoV-2 into the orphanage was the resumption of legal processes for adoption, consequently requiring selected people to come in and out of the orphanage. These activities are inevitable as an orphanage only serves as a temporary shelter for children with the aim of finding a permanent home for them. In the timeline shown above, there were three couple adopters who visited the orphanage from August to September, 2021, 1-3 weeks from when the outbreak was called.

Another possible contributor was the movement of employees for their scheduled COVID-19 vaccination in different facilities. There was a 10 day interval in the possible exposure of the first symptomatic child to an asymptomatic employee who went out for vaccination.

The index child's onset of symptoms on August 18, 2021, could still be due to other common respiratory viruses. This child was brought to a clinic as a requirement for routine visa processing. He was tagged as a COVID-19 suspect but the director opted to observe the child and brought him back to the orphanage without testing. The timing of the COVID-19 RT-PCR test would have been crucial in defining the source of COVID-19 infection. If the RT-PCR test was done at the clinic on the same day of the onset of symptom, the sensitivity of the test would be at 62%. If the RT-PCR was done on the 3rd day of symptoms it would have the highest yield at 80%⁴ and the source of the outbreak would have been easier to trace or the outbreak would have been averted. While the patient did not have an RT-PCR test done immediately, he was isolated in a single room. Molecular evidence eventually confirmed the presence of COVID-19 infection more than one week after symptom resolution. He was eventually tested because of the appearance of respiratory symptoms in 2 other kids. The caregiver of this child was not

isolated nor tested at this time but was only assigned to this index child and had no encounter with the other children.

The other 123 children, in a span of 3-5 days became symptomatic fourteen days after the onset of symptoms of the index patient. This happened about four days after the new admission wherein most of the children became symptomatic with RAT tests being positive. Most of the employees started having symptoms three days after the onset of symptoms in majority of the children.

Table 7 is the line list of cases involved in the outbreak in the orphanage. The guard supposedly did not have any contact with anyone inside the orphanage but upon testing, he was positive for COVID-19 but was asymptomatic. The source of his COVID-19 may either be from someone in the orphanage or from an outside source. This may suggest that there was a lapse in adherence to policies within the orphanage and this suggests a possible break in infection prevention and control procedures in the unit.

Table 7. Line List of the COVID-19 outbreak in the orphanage

Patients	Onset (Date)	Symptoms	Lab Result		Outcome/Complications
			Antigen	RT-PCR	
Couple Adopters	08/03-27/21	No	-	Negative	-
Index child	08/18-25/21	Yes	Positive	Positive	None
Vaccinated Employees	09/01-16/21	Yes	Positive	Positive	None
New admission-Child	09/05-12/21	Yes	Positive	Positive	None
All the other Children	08/30-09/16/21	Yes	Positive	Positive	None
Guard	-	No	Negative	Positive	None

Description of how the orphanage dealt with the outbreak

With the declaration of the outbreak by the CHO, the orphanage was put on strict lockdown and the director of the orphanage was in constant communication with the CHO. Upon reporting of the cases to the CHO, they immediately sent staff to test the other children and employees. With most of them turning out positive, an outbreak in the orphanage was called.

Creation of the line list was done by the orphanage medical staff as well as monitoring of children and employees and direct reporting to the CHO.

Foremost in the outbreak response was to look after the medical needs of all children. Despite being symptomatic, the employees continued to attend to the needs of all children. While this is not ideal, the orphanage made do with what is available in their setting. With most children being symptomatic, the children with negative tests were initially isolated. Upon repeat testing of those who tested negative, half turned COVID-19 positive, thus isolation was not prioritized anymore on the assumption that all would have been already exposed to COVID-19 being in the same closed quarters. Since the children and employees' symptoms occurred within a few days from each other, there was little window of opportunity to isolate symptomatic individuals. One of the staff who had diabetes and obesity with severe cough was relieved from her duty.

The spirit of volunteerism was evident at the peak of the outbreak. Many donors/donations came to aid the orphanage. Food donations were more than adequate. Medical donations were likewise received. The older children knew of the outbreak and were able to adjust and adapt well. Academic classes during the outbreak had to be halted to give time for recovery. Play, simple activities, and prayer services were continued.

The CHO gave clearance and lifted the lockdown 14 days after the last documented positive COVID RT-PCR case following the Department of Health recommendations on isolation during that time.

DISCUSSION

An orphanage is a residential institution devoted to provide shelter to homeless children who are abandoned, orphaned, or surrendered.^{19,20} Its most significant purpose is the provision of temporary protection and assistance in the adoption process with the intent to link children to a new family and permanent home.¹⁹ A study conducted at the Duke University concluded that institutional care produced the same health outcomes when compared to care provided by relatives.²¹ However,

there are limitations in an environment where children are housed in a closed setting as this makes children highly susceptible to and favors the rapid spread of infection. Low caregiver to children ratio, volunteers instead of trained personnel, limited capacity for physical interventions and medical management and inadequate budget allocation are other common problems and challenges in this setting.²² The local orphanage in this study faced all the issues mentioned above with the low caregiver to children ratio being most significant at 1:10.

The local orphanage described in our study is a non-stock non-profit organization founded in August 1993.¹⁸ It is located in Quezon City in Manila, Philippines and is housed in a 4-storey structure with different areas intended for activities like sleeping, dining, and play. There are also offices to address administrative and medical concerns. Pre-pandemic, admissions came from referrals from the Department of Social Welfare and Development (DSWD), and from hospitals. About 15-20 adoptions and several foster care applications are processed throughout the year. Children are also sent for medical consultations, surgeries and therapy to different hospitals as needed. The children also attend regular school, the orphanage also employed teachers who provide instruction on several academic subjects, skills training and values formation. The caregiver to children ratio pre-pandemic was 1:10. Sleeping arrangement is 8-10 children in one air-conditioned 10 square meter room. The organization has a 51 man staff complement. Volunteers come from different countries and stay for several days to years. Funding comes from various donors all over the world.

The WHO European Region declared specific focus and actions on special populations in the context of the worldwide COVID-19 response. There are several recommendations with emphasis on efforts to find family-based care to move children out from orphanages. Adoption processes that have been initiated should be moved forward as a priority.⁵ The advantages of continuing strict lockdown as what was initially done by the

orphanage, in light of the great need to continue adoption processes became a delicate decision in this circumstance. The line listing done showed that while it is hard to exactly pinpoint the source of the outbreak, movement of persons in and out of a closed community brings in the strong possibility of introducing the virus in that led to an outbreak.

A published study in Wuhan, China, showed that there are limited reports of mortality in children due to COVID-19, but these cases had a clear role in viral transmission. On the other hand, there are a number of worrisome post-COVID conditions such as multi-system inflammatory response in children (MIS-C) linked to COVID-19 disease.²³⁻²⁶ A study showed that pediatric patients with MIS-C have severe clinical spectrum with a high mortality rate.²⁷ Children with comorbidities were 1.8 times more likely to have severe COVID-19 infection and/or require intensive care and are 2.8 times more likely to die compared to children without comorbidities.²⁸ In contrast to the above studies, all the children in the orphanage including the 19 children with co-morbidities had mild symptoms. The mild nature of the disease could be attributed to the COVID-19 variant circulating during the outbreak. These reported complications though remain to be the reasons why we continue to focus on averting outbreaks in orphanages. Noted likewise in this study, was the good health outcomes of all employees despite some of them having comorbidities such as obesity, diabetes mellitus and hypertension.

One international study recommended several strategies for the prevention and control of COVID-19 in closed communities. These are health management measures, wherein there should be an established health monitoring for early detection of cases, basic hygiene measures including proper ventilation in orphanages, use of personal protection measures and immediate isolation of symptomatic individuals.²⁹ Handwashing compliance in an orphanage is one of the major factors in slowing, if not totally breaking, the chain of viral transmission.³⁰ Ideally, children and staff who return from outside

should be quarantined for at least 14 days.³¹ This was done by the orphanage in the early part of the pandemic when one of the children was admitted in a hospital for pneumonia. Despite a negative RT-PCR, they quarantined the child and caregiver for 14 days. Although we cannot precisely pinpoint the exact source of the infection in this study, the sequence of events – resumption of adoption processes, employees going out for COVID vaccination, acceptance of new admissions into the orphanage were all possible sources of the outbreak. We can surmise that when the closed unit is not strictly maintained, introduction of a pathogen particularly the COVID-19 virus is almost inevitable. The above mentioned health management measures ideally should be implemented especially in closed settings like in this orphanage. What was evidently lacking in this circumstance was the early recognition and detection of the index case with immediate isolation. Despite tagging of the index patient by the physician at the visa services as a COVID-19 suspect, the institution did not deem it to be a possibility until 2 other children started to have respiratory symptoms.

This COVID-19 outbreak has led to a level of heightened vigilance and involved extra responsibility in caring for vulnerable children. The director of the orphanage maintained communication with the CHO in compliance to the DOH Memorandum ³² As part of the community mitigation measures to reduce COVID-19 transmission within closed communities, the Center for Disease Control and Prevention (CDC) recently highlighted interventions like contact tracing.³³ The highly contagious nature of the virus though and the closed setting of this local orphanage made contact tracing challenging and was not carried out by the CHO. Orphanages are vulnerable to rapid spread of infections due to limited mobility and the closed living setting. More intensive preventive practices and control measures are essential. The limitation in the number of staff, lack of ideal physical facilities, crowding, lack of support from government institutions and the need to process adoption sooner

than later are issues that are realities in most orphanages including this orphanage.

Specific steps in an outbreak response include verifying the diagnosis and confirming an outbreak, defining a case and case finding, line listing and tabulating data as to time, place, person and test results, taking immediate control measures, implementing and evaluating control measures and communicating findings.

There were missed opportunities for early action in this circumstance such as case diagnosis, contact tracing and intervention. This outbreak highlighted the consequences of delayed recognition of the first symptomatic child. Unfortunately, despite strict infection control measures a single break undermines all the efforts done to prevent an outbreak. A delicate balance between continuing on the goal of finding a family for the children should be weighed versus the occurrence of an outbreak that might lead to serious complications.

CONCLUSION AND RECOMMENDATIONS

The children and employees affected in this COVID-19 outbreak in this orphanage totaled to 162. Four percent of the children and 18 percent of the employees were asymptomatic. There were some cases with co-morbidities but all had a mild COVID-19 course with good outcome. Safety protocols implemented for the first 17 months of the pandemic that kept the orphanage COVID-19 free were the complete lockdown of the orphanage with employees staying-in with no external transactions except to attend to medical needs. Likewise, there was strict implementation of quarantine procedures for those who went outside despite a negative COVID19 RT-PCR. Factors identified in this study that could have led to the outbreak include the late recognition and isolation of the index case, resumption of adoption processes, employees going out for COVID-19 vaccination, acceptance of new admissions into the orphanage without strict requirements for testing and quarantine. Outbreak response mainly involved care of the children and employees and testing to confirm the diagnosis, and

keeping the unit on lockdown to prevent spread into the community. Our study recommends that all outbreaks in closed communities be reported promptly so that administrators of such communities will learn from others' experiences. Further, a more detailed outbreak response should be conducted.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Centers for Disease Control and Prevention. *COVID-19 Overview and Infection Prevention and Control Priorities in Non-U.S. Healthcare Settings* [Internet]. USA: CDC; 2021 [updated 2021 December 6; cited 2022 January 24]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/overview/index.html#background>
2. Elflein J. *Number of Cumulative Cases of Coronavirus (COVID-19) Worldwide* [Internet]. Europe: Statista; 2020. [updated 2023 February 28; cited 2022 January 24]. Available from: <https://www.statista.com/statistics/1103040/cumulative-coronavirus-COVID-19-cases-number-worldwide-by-day/>
3. Department of Health [PH]. *DOH COVID-19 BULLETIN # 657* [Internet]. Philippines: DOH; 2021. [updated 2021 December 31; cited 2022 January 24]. Available from: <https://doh.gov.ph/COVID-1919casebulletin657>
4. Camposano JAT, Ong-Lim ALT, Gonzales MALT, Pantig FMT, Tarnate PSO, Maramba-Lazarte CC, et al. *Interim Guidelines on the Screening, Assessment and Clinical Management of Pediatric Patients With Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) Version 4* [Internet]. Philippines: Pediatrics Infectious Disease Society of the Philippines; 2017. [updated 2021 February 6; cited 2022 January 24]. Available from: <http://www.pidsphil.org/home/guidelines-policies/>
5. World Health Organization. *Factsheet - Vulnerable populations during COVID-19 response - Children in orphanages and unaccompanied minors* [Internet]. Geneva: World Health Organization (WHO) Regional Office for Europe; 2020 [updated 2020 June; cited 2022 January 24]. Available from: <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-COVID-19/publications-and-technical-guidance/2020/factsheet-vulnerable-populations-during-COVID-19-response-children-in-orphanages-and-unaccompanied-minors-june-2020>

6. Singh J, Khare S, Sarma RS and Verghese TV. An Explosive Outbreak of Poliomyelitis in an Orphanage in Delhi: Risk Factors for the Unusually High Attack Rates. *Indian Pediatrics* [Internet]. 1996;34:135-139. Available from: https://www.researchgate.net/publication/13740114_An_explosive_outbreak_of_poliomyelitis_in_an_orphanage
7. Aurlpibul L, Puthnakit T, Kanjanavanit S, Sirisanthana T and Sirisanthana V. Measles Outbreak in an Orphanage. *Pediatric Infectious Disease Journal* [Internet]. 2010;29(2):167-69. Available from: https://journals.lww.com/pidj/Fulltext/2010/02000/M_EASLES_OUTBREAK_IN_AN_ORPHANAGE__HIV_INFECTED.19.aspx doi: <https://doi.org/10.1097/inf.0b013e3181b99e15>
8. Lertpiriyasuwat C, Kanlayanpotporn J, Deeying J and Kijphati R. Measles outbreak in an orphanage, Bangkok, Thailand, September-October 2000. *Journal of the Medical Association Thailand = Chotmaihet Thangphaet* [Internet]. 2002;85(6):653-7. Available from: https://www.researchgate.net/publication/11116840_Measles_Outbreak_in_an_Orphanage_Bangkok_Thailand_September-October_2000
9. Omega C. Outbreak of Cholera in an Orphanage, Delmas, Haiti, August 2015. *Open For Infectious Diseases* [Internet]. 2016;3(suppl1). Available from: https://academic.oup.com/ofid/article/3/suppl_1/1400/2635737 doi: <https://doi.org/10.1093/ofid/ofw172.1103>
10. Mwanaidi A, Furia F and Bakari M. Skin disorders among children living in orphanage centres in Dar es Salaam, Tanzania. *Tropical Medicine Health* [Internet]. 2020;48(29):1-7. Available from: <https://tropmedhealth.biomedcentral.com/articles/10.1186/s41182-020-00216-9> doi: <https://doi.org/10.1186/s41182-020-00216-9>
11. Norrenberg S, Monod M and Christen-Zaech S. Outbreak of Trichophyton Soudanense Causing Tinea Capitis in an Orphanage in Myanmar. *J Mycologie Médicale* [Internet]. 2020;30(4):1-9. Available from: <https://www.sciencedirect.com/science/article/pii/S156523320301256?via%3Dihub> doi: <https://doi.org/10.1016/j.mycmed.2020.101013>
12. O’Kane L. *COVID-19 Outbreak at Belarus Orphanage* [Internet]. Rome: Vatican News; 2020 [updated 2020 April 29; cited 2021 November 3]. Available from: <https://www.vaticannews.va/en/world/news/2020-04/covid-19-outbreak-at-belarus-orphanage.html>
13. Maher F. *Chernobyl Charity Aid Reaches Orphanage Fighting COVID-19 Crisis in Belarus* [Internet]. Ireland: Chernobyl Children International; 2020 [updated 2020 April 27; cited 2021 November 3]. Available from: <https://www.chernobyl-international.com/chernobyl-charity-aid-reaches-orphanage-fighting-COVID-19-crisis-in-belarus/>
14. Viernes F. *Hospicio De San Jose in Lockdown due to 23 COVID-19 Cases, Asks for Donations* [Internet]. Philippines: GMA News Online; 2021 [updated 2021 April 29; cited 2022 January 26]. Available from: <https://www.gmanetwork.com/news/lifestyle/content/785630/hospicio-de-san-jose-in-lockdown-due-to-23-COVID-19-cases-asks-for-donations/story/>
15. Hospicio de San Jose. *History of Hospicio de San Jose* [Internet]. Philippines: Hospicio de San Jose; 2020 [cited 2022 January 26]. Available from: <https://hospiciodesanJose.ph/>
16. Depasupil WB. *Manila Orphanage Appeals for Food, Cash Amid COVID-19 Spike* [Internet]. Philippines: The Manila Times; 2020 [updated 2021 August 24; cited 2022 January 26]. Available from: <https://www.manilatimes.net/2021/08/24/latest-stories/manila-orphanage-appeals-for-food-cash-amid-COVID-19-spike/1812159>
17. Malasig J. *Covid-stricken Orphanage in Quezon City Seeks Donations for its Residents, Staff Lockdown* [Internet]. Philippines: Interaksyon; 2021 [updated 2021 September 9; cited 2022 January 26]. Available from: <https://interaksyon.philstar.com/trends-spotlights/2021/09/09/199820/COVID-19-stricken-orphanage-in-qc-seeks-donations-for-residents-staff/>
18. Gentle Hands Inc. *Our People. Gentle Hands* [Internet]. Philippines: Gentle Hands, Inc; 2019 [updated 2019 January 24; cited 2022 January 26]. Available from: <https://gentlehandsorphanages.com/our-people/>
19. Bettmann JE, Mortensen JM, and Akuoko KO. Orphanage Caregivers' Perceptions of Children's Emotional Needs. *Children Youth Service Review* [Internet]. 2015;49:71-79. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0190740915000134> doi: <https://doi.org/10.1016/j.childyouth.2015.01.003>
20. Browne E. *K4D Helpdesk Report: Children in Care Institutions* [Internet]. United Kingdom: Institute of Development Studies; 2017 [updated 2017 January 6; cited 2022 January 30]. Available from: <https://www.ids.ac.uk/publications/children-in-care-institutions/>
21. McKenzie RB. *The Best Thing About Orphanages* [Internet]. USA: The Wall Street Journal; 2010 [updated 2010 January 14; cited 2022 January 20]. Available from: <https://www.wsj.com/articles/SB10001424052748703510304574626080835477074>
22. Care Reform Initiative (CRI) Ghana. *Why Not Orphanages?* [Internet]. Ghana: Orphans and

- Vulnerable Children Care Reform Initiative (CRI); 2015 [cited 2022 January 30]. Available from: http://www.ovcghana.org/why_not_orphanages.html
23. Kelvin AA and Halperin S. COVID-19 in Children: The Link in the Transmission Chain. *Lancet Infectious Diseases* [Internet]. 2020;20(6):633-34. Available from: [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30236-X/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30236-X/fulltext) doi: [https://doi.org/10.1016/s1473-3099\(20\)30236-x](https://doi.org/10.1016/s1473-3099(20)30236-x)
 24. Beroukhim R and Friedman KG. Children at Risk: Multisystem Inflammatory Syndrome and COVID-19. *JACC: Case Rep* [Internet]. 2020;2(9):1271-74. Available from: <https://www.sciencedirect.com/science/article/pii/S2666084920306744?via%3Dihub> doi: <https://doi.org/10.1016/j.jaccas.2020.06.016>
 25. Centers for Disease Control and Prevention. *Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with Coronavirus Disease 2019 (COVID-19)* [Internet]. USA: CDC; 2020 [updated 2020 May 14; cited 2022 January 30]. Available from: <https://emergency.cdc.gov/han/2020/han00432.asp>
 26. Hoang A, Chorath K, Moreira A, Evans M and Burmeister-Morton F. COVID-19 in 7780 Pediatric Patients: A Systematic Review. *E Clin Med* [Internet]. 2020;24:1-19. Available from: [https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370\(20\)30177-2/fulltext](https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(20)30177-2/fulltext) doi: <https://doi.org/10.1016/j.eclinm.2020.100433>
 27. Pereira M, Litvinov N, Farhat S, Eisenkraft A, Gibelli M, de Carvalho W, *et al.* Severe Clinical Spectrum with High Mortality in Pediatric Patients with COVID-19 and Multisystem Inflammatory Syndrome. *Clinics* [Internet]. 2020;75:1-7. Available from: <https://www.sciencedirect.com/science/article/pii/S1807593222004896?via%3Dihub> doi: <https://doi.org/10.6061/clinics/2020/e2209>
 28. Tsankov BK, Allaire JM, Irvine MA, Lopez A, Sauve L, Vallance B, *et al.* Severe COVID-19 Infection and Pediatric Comorbidities: A Systematic Review and Meta-Analysis. *International Journal of Infectious Diseases* [Internet]. 2020;103:1-33. Available from: <https://pubmed.ncbi.nlm.nih.gov/33227520/> doi: <https://doi.org/10.1016/j.ijid.2020.11.163>
 29. Sanyaolu A, Okorie C, Marinkovic AI, Patidar R, Younis K, Desai P, *et al.* Comorbidity and its Impact on Patients with COVID-19. *SN Comprehensive Clinical Medicine* [Internet]. 2020;2(8):1069-1076. Available from: <https://link.springer.com/article/10.1007/s42399-020-00363-4> doi: <https://doi.org/10.1007/s42399-020-00363-4>
 30. World Health Organization. *Hand Hygiene: Why, How & When?* [Internet]. Geneva: WHO; 2009:1-7 [updated 2009 August; cited 2022 January 30]. Available from: https://www.afro.who.int/sites/default/files/pdf/Health%20topics/Hand_Hygiene_Why_How_and_When_Brochure.pdf
 31. Aziz NA, Othman J, Lugova H and Suleiman A. Malaysia's Approach in Handling COVID-19 Onslaught: Report on the Movement Control Order (MCO) and Targeted Screening to Reduce Community Infection Rate and Impact on Public Health and Economy. *Journal of Infection and Public Health* [Internet]. 2020;13(12):1823-1829. Available from: <https://www.sciencedirect.com/science/article/pii/S1876034120306067> doi: <https://doi.org/10.1016/j.jiph.2020.08.007>
 32. Department of Health [PH]. *Updated Guidelines on Contact Tracing of Close Contacts of Confirmed Coronavirus Disease (COVID-19) Cases* [Internet]. Philippines: DOH; 2020 [updated 2020 April 17; cited 2022 February 1]. Available from: <https://doh.gov.ph/sites/default/files/health-update/dm2020-0189.pdf>
 33. Centers for Disease Control and Prevention. *CDC COVID-19 Global Response* [Internet]. USA: CDC; 2021 [updated 2021 July 20; cited 2022 January 31]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/global-COVID-19/community-mitigation-measures.html>