

Response to Outbreak at Densely Populated Settings, Identifying Fragilities and Closing Gaps

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Abstract

Scientific response to an infectious diseases outbreak is recognized as a key strategic element of successful containment of health threats. This study aims to identify key gaps in infectious disease outbreaks response, and to identify strategies to promote interactions between research and practitioner communities to begin to address these gaps. A major and long term chickenpox outbreak took place at one of the private primary school classes in Dubai for the period of 7th 2016 December to 1st of March 2017, a total number of 37 chickenpox cases were identified of different age, gender, national and immunization status background. The study revealed that the outbreak started at first with two cases of chickenpox. As outbreak origin appeared on seventh of December 2016, it was followed by other sporadic or multiple cases on different dates. The outbreak epidemic curve took the shape of propagated epidemic curve, which kept hick ting up and down but never declines to the zero index. Until 20 February, the investigation showed that 17 cases of the chickenpox outbreak occurred at age of 6 years, 13 cases at age of 7, and 5 cases at age of 8. This reflects the fact that the younger age group is more susceptible. The study results reflected that 70% of the outbreak population were male and 30% were females. As per nationalities, the outbreak distributed more among Arab nationalities from expatriates in Dubai (86.5%, followed by 8.1% non-Arab expatriates and only 5.4% among UAE Citizens). Despite routine and supplementary case investigation activities, Public Health team could not confirm any epidemiologic links between outbreak cases. The gaps in case detection and investigation revealed by this unusual outbreak can inform future outbreak response activities. Identifying and closing gaps in outbreak investigation and response is kept as an important opportunity to improve case outcomes and stopping further damages. The resources for any additional activities need to be weighed against what is already required to meet the current chickenpox outbreak investigation standards. There is a need to improve the ability and accurate description of the epidemiology of major and long term chickenpox outbreak among confirmed cases.

Keywords

Outbreak, Gaps, Epidemiological Exercise

Received: February 27, 2017 / Accepted: April 8, 2017 / Published online: October 30, 2017

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1. Introduction

Scientific response to an infectious diseases outbreak is recognized as a key strategic element of successful containment of health threats. However, despite evident improvements in recent years, there is still large evidence of ineffective management of outbreak events at any level, A

great issue that come together with a deep lack of knowledge on how to make preparedness plan effective. [1-4]

To address the potential gap in sensitivity identified through this outbreak investigation, early, repeated and active communication with primary care and emergency department

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networks during measles outbreaks may help reinforce the key signs and symptoms that trigger appropriate laboratory testing procedures. If fewer reports of persons under investigation are received because physicians know whom to report and test, public health resources could be reallocated to additional epidemiologic activities. To improve detection of cases during non-outbreak periods (i.e., in order to detect source cases), it is important to remind health care providers that symptoms may be attenuated in previously immunized people and to consider travel history from measles-endemic areas to inform the differential diagnosis. [5-7]

Investigators in the United States had undertaken a number of studies that evaluated staffing level, infrastructure, activities, and processes essential for hospital epidemiology and infection control programs in U.S. healthcare facilities. These studies had generated invaluable evidences that promoted effective infection control programs and supported hospital administrators and infection control professionals to attain necessary resources for infection control activities. [8-13]

2. Objectives

To identify key gaps in infectious disease outbreaks response, and to identify strategies to promote interactions between research and practitioner communities to begin to address these gaps.

3. Methodology

A major and long term chickenpox outbreak took place at one of the private primary school classes in Dubai for the period of 7th 2016 December to 1st of march 2017, a total number of 37 chickenpox cases were identified of different age, gender, national and immunization status background. They were all studied. An outbreak Governmental response team activated and investigated the outbreak at school level. Full socio-demographic data, clinical related data, immunization status were collected, organized, tabulated and analyzed to identify the gaps, and many measures were applied to break down the transition chain.

4. Results

The study revealed that the outbreak started at first with two cases of chickenpox. As outbreak origin appeared on seventh of December 2016, it was followed by other sporadic or multiple cases on different dates. The outbreak epidemic curve took the shape of propagated epidemic curve, which kept hick ting up and down but never declines to the zero index. Until the 20th of February, the investigation showed that 17 cases of the chickenpox outbreak occurred at age of 6 years, 13 cases at age of 7, and 5 cases at age of 8 in Figures 1 and Figures 2.

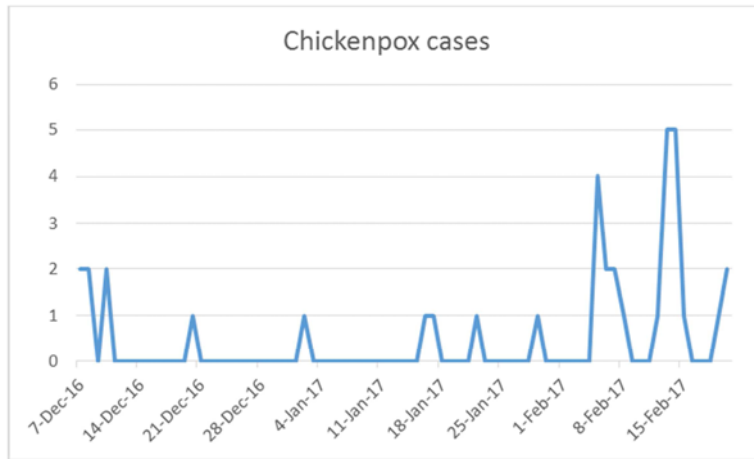


Figure 1. Chickenpox cases over the outbreak period.

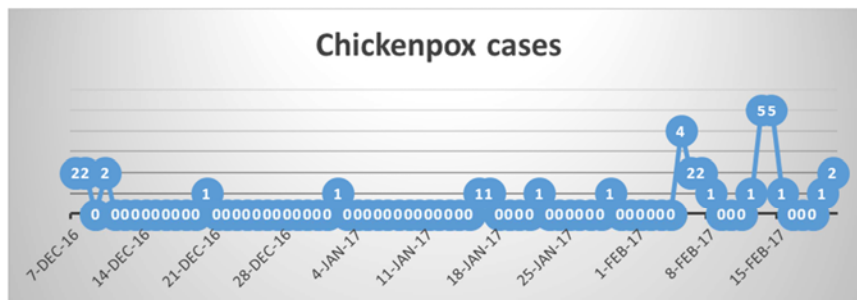


Figure 2. Number of cases of Chickenpox among students over two months extended period.

The study showed that about 17 cases of the chickenpox outbreak happen at age of 6 years old followed by 13 cases occurred to age 7 and 5 cases to age 8 which reflect the fact the younger ager group are more borne.

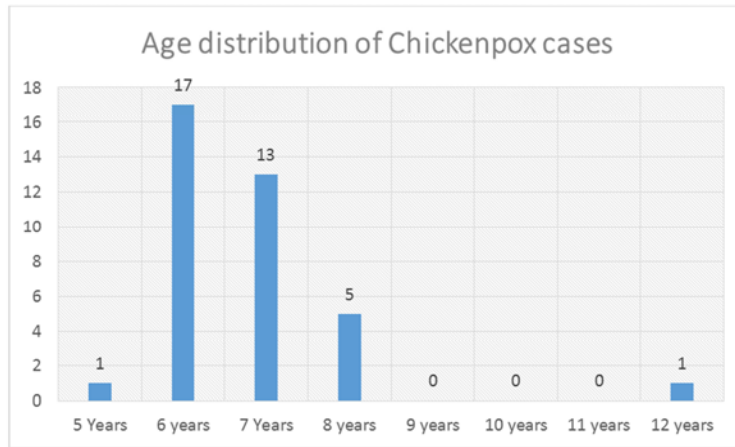


Figure 3. Distribution of cases per age among chicken pox outbreak population.

The study results reflected that 70% of the outbreak population were male and 30% were females as shown by figure 4

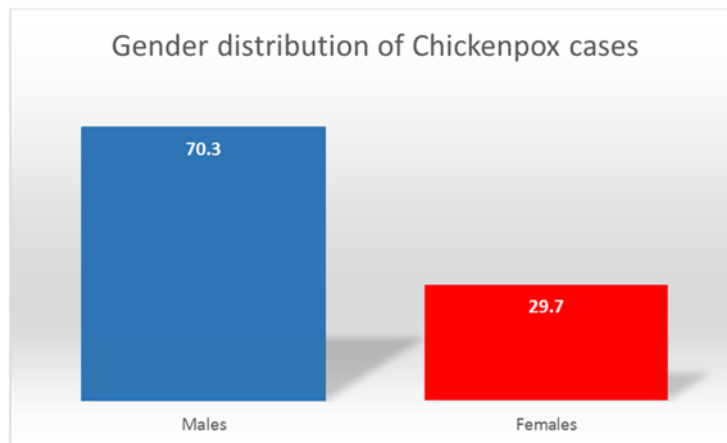


Figure 4. Distribution of cases per gender among chicken pox outbreak population.

As per nationalities, the outbreak distributed more among Arab nationalities from expatriates in Dubai (86.5%, Followed by 8.1% non-Arab expatriates and only 5.4% among UAE Citizens as shown by figure 5.

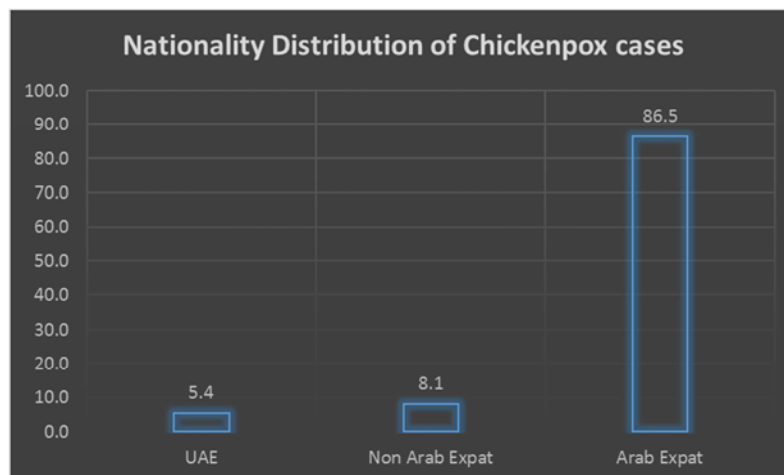


Figure 5. Distribution of cases per nationality among chicken pox outbreak population.

5. Discussion

Current study showed that the current outbreak profile as well as the epidemic curve reflects in expected propagated curve profile with continuous occurrence of cases over very long time without being able to stop it at certain point as in diseases highly contagious like chickenpox we usually expected an explosive with sharp rising and sharp decline epidemic curve profile unless there are some gaps in outbreak handling, investigations and response, the current outbreak showed the following gaps which needs to be properly addressed and identified in order to be able to be closed:

1. Risk assessment: the target population affected the outbreak were not assessed regarding their susceptibility and immune status whether previously vaccinated or infected.
2. Risk Communications: as the outbreak initiated three months back, the handling of the cases were based on sporadic based approach rather than whole risk communication approach for index cases, contacts and environment which left big epidemiological gap in containing the outbreak and make the outbreak change from explosive profile to propagated profile
3. Contact tracing process: as there are not clear policy of handling contact at school level and due to the pressure effect of parents to keep suspected cases to stay at school environment and early return back of isolated cases even before total clearance of the diseases and being still at its infectivity stage contribute to create steady status of news infections.
4. Children vaccinations: Due to being expensive and uncovered by health insurance or official authority, a major immunization gap was created and high susceptible population accumulated which maximize the risk.
5. Transmission Chain Breaking Down policy: Due to weaknesses in applying principles of transmission chain breaking down, cases kept to copiously appear over three months, environmental hygiene measures, personal hygiene, public health Measures.
6. Awareness and partnerships with families: awareness at school staff level, students level, parents and families level, and failure to initiating strong alliances and partnerships with parents create major gap in outbreak management.
7. Collection of comprehensive exposure: (both acquisition and transmission) information during case interviews is needed. This could include routinely asking cases to review time-stamped resources to help remind them of their activities and locations during their exposure and

communicability periods and using social networking visualization to deal with the complexity of this added information.

To address the potential gap in sensitivity identified through this outbreak investigation, early, repeated and active communication with primary care department networks during chickenpox outbreaks may help reinforce the key signs and symptoms with primary care providers. If fewer reports of persons under investigation are received because physicians know whom to report and test, public health resources could be reallocated to additional epidemiologic activities. To improve detection of chickenpox cases during non-outbreak periods (i.e., in order to detect source cases), it is important to remind health care providers that symptoms may be attenuated in previously immunized people. Continued efforts to increase immunization coverage and access to electronic records confirming immunization status may allow public health to both rely on herd immunity to interrupt measles transmission following an importation and shift the balance of public health resources from contact management to persons under investigation as well as suspect and confirmed cases. [13-28]

6. Conclusion

Despite routine and supplementary case investigation activities, Public Health team could not confirm any epidemiologic links between outbreak cases. The gaps in case detection and investigation revealed by this unusual outbreak can inform future outbreak response activities. Identifying and closing gaps in outbreak investigation and response is kept as an important opportunity to improve case outcomes and stopping further damages. The resources for any additional activities need to be weighed against what is already required to meet the current chickenpox outbreak investigation standards. There is a need to improve the ability and accurate description of the epidemiology of major and long term chickenpox outbreak among confirmed cases.

Conflict of Interest

The authors declare that they do not have any conflict of interest.

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