

H1N1 outbreak in a medical college of Pakistan: Implications of control in a resource poor setting

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doi: 10.3396/ijic.v8i1.005.12

Abstract

In early November 2009, a pandemic H1N1 virus infection outbreak occurred in a university setting of Karachi Pakistan. An unusually high number of students presented with influenza-like illness to the student health clinic and the emergency unit of Aga Khan University Hospital (AKUH) Karachi with a few requiring inpatient admission. We describe the clinical presentation and dynamics of this outbreak of suspected H1N1 as well as factors responsible for the outbreak and simple, cost-effective steps taken to tackle the situation.

A brief self-administered questionnaire was distributed amongst students living in university accommodation and a case definition for presumed H1N1 was derived. One hundred and forty nine of these students reported having any of the questionnaire symptoms in the month of November, out of which 58 met the case definition of presumed H1N1. The overall attack rate for an influenza-like illness that describes our case definition of presumed H1N1 in November 2009 at AKUH hostels was 14%.

In our study the initial lack of diagnostic facilities at the time of outbreak gives us limited information regarding the true number of H1N1 cases. In a resource limited setting, strategies such as communication and awareness can be most helpful in limiting the spread of the infection.

Key words

INFLUENZA A VIRUS, H1N1 SUBTYPE; DISEASE OUTBREAKS; SCHOOLS, MEDICAL; POVERTY

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Introduction

Since its discovery in Mexico in 2009, the novel influenza A (H1N1) has now been reported in over 170 countries and territories worldwide.^{1,2} The number of cases reported from each country, however is very disparate¹ and may reflect the prevailing diagnostic and surveillance capabilities of the country. The first official case of H1N1 in Pakistan was reported on August 11th 2009 and to date more than 650 suspected and 168 positive tested cases have been officially reported in Pakistan with a total of 14 deaths.³

H1N1 has been reported at a number of universities and school across the globe.⁴⁻⁸ These outbreaks present with different features and patterns and have been dealt with in a variety of ways. Regardless the lack of guidelines for H1N1 outbreaks in universities and schools prove to be a challenge in tackling such conditions.

In early November 2009, a medical student at the Aga Khan University Hospital (AKUH) Karachi presented to the emergency unit with fever and severe body and headaches. Given his non-specific complaints and the upsurge of dengue in October and November in Karachi, he was admitted as presumed Dengue fever. His initial investigations revealed a drop in his platelet counts to 102 cell/mm³ though contrary to typical dengue fever, he also developed a sore throat with a dry cough the following day. Nonetheless, he was hydrated and kept under observation and discharged 2 days later. Over the next few days a number of students presented with similar complaints to the student health clinic and the emergency unit. While only sporadic cases of the pandemic H1N1 had been detected in Karachi, a concern regarding a possible outbreak was raised. We therefore describe the clinical presentation and dynamics of this outbreak of suspected H1N1, as well as factors responsible for the outbreak and simple, cost-effective steps taken to tackle the situation.

Methods

In response to a possible outbreak, a team comprising of representatives from the student dormitory administration, infectious diseases consultants and student health services was created and students, especially those living in the dormitory, were informed about a possible outbreak. Informal teaching was

also initiated by doctors at student health clinics, as soon as a rise in influenza-like illnesses was noticed, about a possible outbreak and its implications. Students were given handouts and posters and these were also displayed on the notice boards throughout the university. This information was also provided to students in their e-mail inbox and the AKUH student's website. Advice included frequent and thorough hand washing especially after coughing or sneezing, coughing or sneezing into a tissue or elbow rather than hands, maintenance of healthy diet and encouraging good hydration. Students were also advised to report immediately to the student health physician if symptoms lasted for more than 48 hours. Students who were identified with such symptoms were given sick leave and advised to stay in isolation and avoid visitors until symptoms resolved. The use of face masks was also encouraged. A brief self-administered questionnaire was developed and students were asked about any symptoms consistent with an influenza-like illness including fever, diarrhoea, sore throat and body aches. The onset and resolution of symptoms as well as information about similar symptoms in other students were also inquired. Students were asked to report to the health care clinics or emergency units if they developed any influenza-like illness symptoms. Additionally education was provided to all on-campus students regarding prevention and precaution.

A case definition of presumed H1N1 was derived after assessing other outbreak reports. For the purpose of this outbreak investigation, any student with fever and either sore throat or body aches lasting for at least 48 hours was labeled as a case of presumed H1N1. Due to lack of H1N1 diagnostic facilities, students could not be tested at the onset of the outbreak. The hospital was however able to do so at the tail end of the outbreak, at which point all suspected cases tested positive for the pandemic H1N1.

A database was then created and analyzed on SPSS 17.

Results

A total of 316 of the 414 students living on-campus responded to the self-administered questionnaire. At the time of this study 171 male students and 243 female students were living on-site. One hundred and

forty nine of these students reported at least one of the questionnaire symptoms in the month of November, out of which 58 met the case definition of presumed H1N1. The prevalence of presumed and confirmed H1N1 cases amongst students in November 2009 at Aga Khan University Hospital is shown in figure 1. The average number of days for which students were symptomatic was 7.71. The demographics of the students are shown in Table I.

All of the 58 students complained of fever. Most also complained of a body ache (n=52, 89.7%) and sore throat (n= 49, 84.5%). Only 15 students had only one of these symptoms. Eleven students related their symptoms to patients seen in on-campus clinics, wards or offsite clinical visits.

The overall attack rate for influenza like illness that describes our case definition of presumed H1N1

in November 2009 at AKUH hostels was 14%, with male hostel attack rate being 11%, while female hostel attack rate being 16.05%. The incidence of presumed H1N1 cases is shown in figure 2.

In the month of November 2009 a total of 89 students required medical leave as opposed to 40 and 37 students in months of October and December 2009 respectively. The data from November 2008 also shows that the number of students with influenza-like illness was substantially lower.

Discussion

The Aga Khan University hospital has a total student population of around 700 nursing and medical students with 60% living on campus. It includes two on-campus dormitories for male and female students. The male hostel accommodates a total of 177 nursing and medical students. The female hostel comprises

Table I. Demographics of the H1N1 outbreak at Aga Khan University Karachi

	(n)	(%)
Total Number of students questioned	316	
Male Dormitory	111	35.1
Female Dormitory	205	64.9
Total number of students with symptoms	149	
Male Dormitory	40	26.8
Female Dormitory	109	73.2
Symptoms		
Fever	60	40.3
Sore throat	115	77.2
Body ache	102	68.5
Total number of students with presumed H1N1	58	
Male	19	32.8
Female	39	67.2
Symptoms		
Fever	58	100.0
Sore throat	49	84.5
Body ache	52	89.7

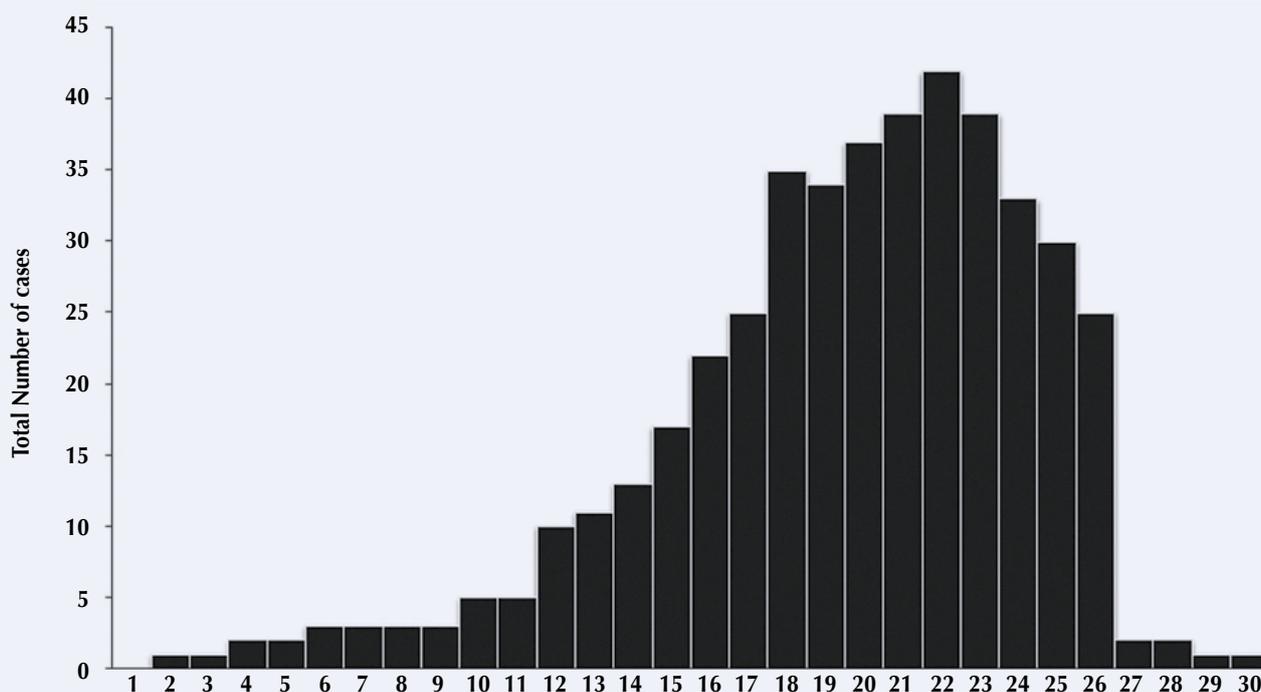


Figure 1. Prevalence of presumed and confirmed H1N1 cases in November 2009 at Aga Khan University Karachi

of 254 rooms for the medical and nursing students. During the month of November all the nursing and medical students had their respective study schedules ranging from lectures to clinical training in wards and outpatient clinics.

From November through December 2009, AKUH saw an increase in cases of respiratory illness presumably related to the only ever recognized university outbreak of H1N1 in Pakistan. During this period an increased number of students presenting to the AKUH students health clinic with respiratory symptoms. An increase in staff of the dormitories presenting to the clinic with influenza-like illness was also noted, however no formal record was maintained. The increase in cases in the students also corresponded to a similar increase in cases of H1N1 in the community.³ While, amongst the students, only 6 confirmed cases of H1N1 infection were eventually reported, the actual number of cases may have been higher for a number of reasons. Firstly a limited number of cases were tested due to initial unavailability of diagnostic facilities and later due to cost restraints. Secondly there may have been a number of subclinical cases or a number of students

who did not present to student health clinics due to milder symptoms.

It is unclear how the index student was infected. An interesting observation was that the outbreak occurred in November as opposed to April to June as noted in other reports.^{4-6,9-11} An outbreak was noted in Saudi Arabia in the month of October as well.

The overall attack rate for influenza-like illness that describes our case definition of presumed H1N1 in this study (14%) is comparable to an outbreak reported at a large university at Delaware (10%),⁶ although this is much higher than that seen in outbreaks at a school in China (4%)⁵ and a school in England (2%).⁴ One possible reason for the difference could be the fact that students at Delaware and Aga Khan University live on campus and hence the close contact increases the transmissibility of the virus. This can be supported by the attack rate of 17% reported in household contacts of the school children from outbreak study of the England school mentioned earlier.⁴ Attack rates of as high as 35% have also been reported at a school in New York.⁷

Rapid control of any outbreak is of key importance in minimizing its impact. According to CDC's guidelines for outbreak control in institutes, vaccination and prompt treatment using appropriate medications are the cornerstone for outbreak control.¹² CDC also describes surveillance and laboratory issues; communications; maintenance of community services; medical care; and supply and delivery of vaccines and drugs as the five major components of infection control.¹³ Unfortunately, controlling outbreaks in developing countries is particularly difficult due to the lack of resources.¹⁴ In our case, at the time of the initiation of the outbreak neither diagnostic capabilities nor the vaccine were available in the country. While oseltamivir was available, in most cases this was cost prohibitive. Therefore as in other resource limited settings, strategies such as communication and awareness were most helpful in limiting the spread of the infection. Since these interventions were

implemented simultaneously, the relative impact of each measure could not be assessed separately. Although we did see a sharp drop in the number of students presenting with influenza-like illness once informal awareness for students presenting to student health clinics and a formal mass awareness program for the whole campus was in place (see figure 2). This coupled with early case detection and asking students to report early to the student health physician helped to rapidly control the incident cases.

In our study the initial lack of diagnostic facilities at the time of outbreak gives us limited information regarding the true number of H1N1 cases. There must have been a number of individuals with asymptomatic or minimally symptomatic disease which were missed. Another limitation can be over or underreporting of symptoms by students and hence the attack rate might not be completely accurate.

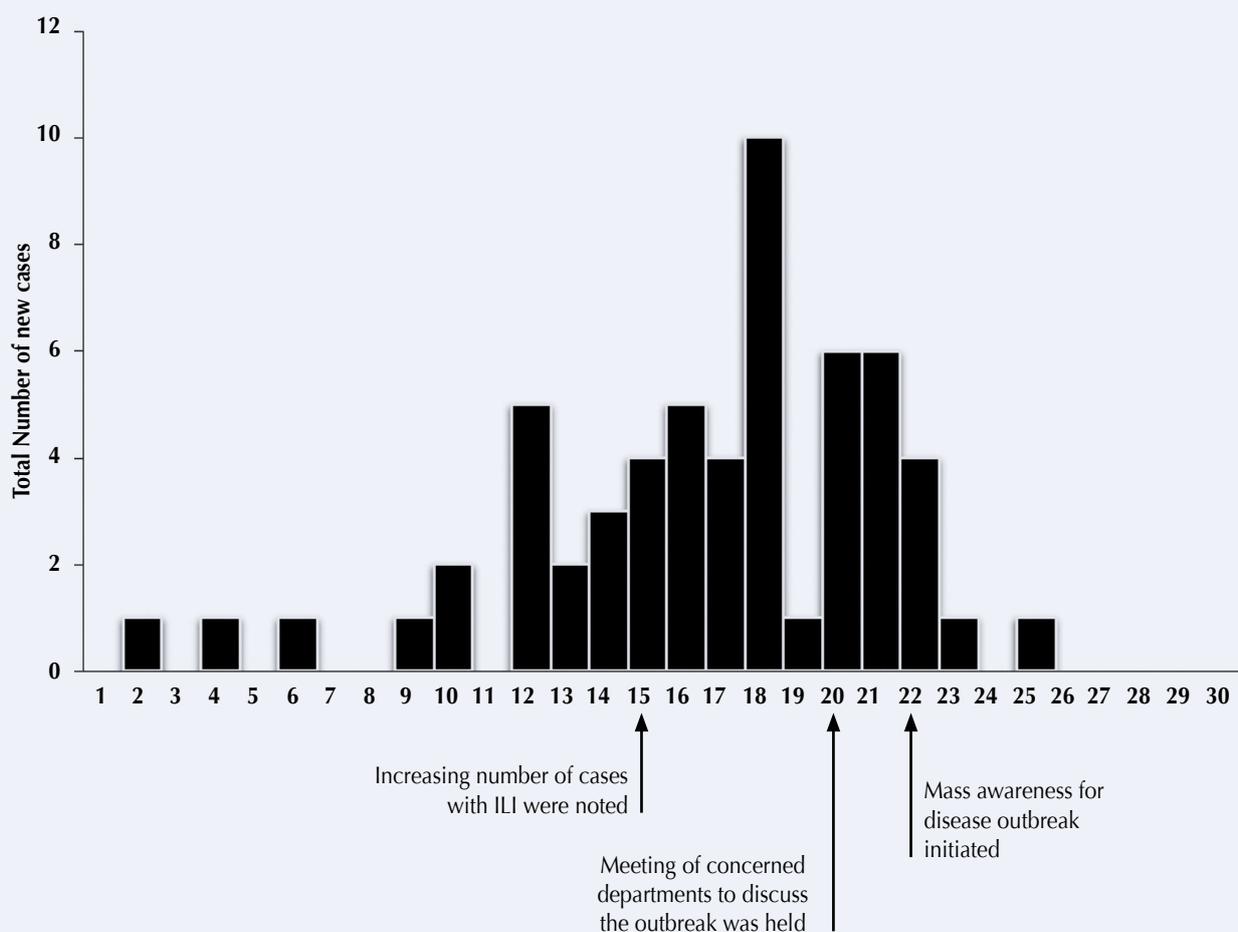


Figure 2. Incidence of the presumed and confirmed H1N1 at Aga Khan University Karachi during the month of November 2009

Flu and respiratory illness outbreak in universities have been reported previously as well.⁸ These outbreaks often result in increased absenteeism and poor academic performance with lack of interest in different activities. It is important here to understand that respiratory illness such as H1N1 can spread dramatically in student dormitories and hence pose a serious threat. It also becomes increasingly difficult to control such outbreaks due to their nature of transmission. It leads to a huge burden on the university health care system as well. Unlike AKUH, most of the universities in Pakistan do not have an on-campus student health clinic; nor can a response team such as in this case be generated. It must also be brought to attention that diagnostic tools are not readily available either, nor are the appropriate antivirals, and hence complications if occur can be devastating. Therefore early recognition of a possible outbreak based on clinical symptoms, as well as rapid implementation of low cost measures such as education and cohorting, are essential in controlling the outbreak in resource limited settings. We may need standardized guidelines and protocols to overcome such challenges in order to reduce morbidity, mortality and resources.

References

1. WHO. Coverage on H1N1. 2009. Available from <http://www.who.int/csr/disease/swineflu/en/>. (Last accessed on 10th June 2010)
2. CDC. Coverage on H1N1. 2009. Available from <http://www.cdc.gov/H1N1FLU/>. (Last accessed on 10th June 2010)
3. The Daily Times. 14 deaths from swine flu reported so far. January 07, 2010. Available from http://www.dailytimes.com.pk/default.asp?page=2010%5C01%5C07%5Cstory_7-1-2010_pg7_20. (Last accessed on 10th June 2010)
4. Calatayud L, Kurkela S, Neave PE, et al. Pandemic (H1N1) 2009 virus outbreak in a school in London, April-May 2009: an observational study. *Epidemiol Infect* 2010; **138**(2): 183-191. <http://dx.doi.org/10.1017/S0950268809991191>
5. Huai Y, Lin J, Varma JK, et al. A primary school outbreak of pandemic 2009 influenza A (H1N1) in China. *Influenza Other Respi Viruses* 2010; **4**(5): 259-266. <http://dx.doi.org/10.1111/j.1750-2659.2010.00150.x>
6. Iuliano AD, Reed C, Guh A, et al. Notes from the field: outbreak of 2009 pandemic influenza A (H1N1) virus at a large public university in Delaware, April-May 2009. *Clin Infect Dis* 2009; **49**(12): 1811-1820. <http://dx.doi.org/10.1086/649555>
7. Lessler J, Reich NG, Cummings DA, Nair HP, Jordan HT, Thompson N. Outbreak of 2009 pandemic influenza A (H1N1) at a New York City school. *N Engl J Med* 2009; **361**(27): 2628-2636. <http://dx.doi.org/10.1056/NEJMoa0906089>
8. Nichol KL, DHS, Ehlinger E. Colds and influenza-like illnesses in university students: impact on health, academic and work performance, and health care use. *Clin Infect Dis* 2005; **40**: 1263-1270. <http://dx.doi.org/10.1086/429237>
9. AlMazroa MA, Memish ZA, AlWadey AM. Pandemic influenza A (H1N1) in Saudi Arabia: description of the first one hundred cases. *Ann Saudi Med* 2010; **30**(1): 11-14.
10. Kar-Purkayastha I, Ingram C, Maguire H, Roche A. The importance of school and social activities in the transmission of influenza A(H1N1)v: England, April - June 2009. *Euro Surveill* 2009; **14**(33): pii: 19311.
11. Pedroni E, Garcia M, Espinola V, et al. Outbreak of 2009 pandemic influenza A(H1N1), Los Lagos, Chile, April-June 2009. *Euro Surveill* 2010; **15**(1): pii: 19456.
12. CDC. Using Antiviral Medications to Control Influenza Outbreaks in Institutions. 2008. Available from <http://www.cdc.gov/flu/professionals/infectioncontrol/institutions.htm>. (Last accessed 20th March 2010)
13. Gensheimer KF, Meltzer MI, Postema AS, Strikas RA. Influenza pandemic preparedness. *Emerg Infect Dis* 2003; **9**(12): 1645-1648.
14. Khan SI, Akbar SM, Hossain ST, Mahtab MA. Swine influenza (H1N1) pandemic: developing countries' perspective. *Rural Remote Health* 2009; **9**(3): 1262.