



Insights into H1N1 Outbreak in a developing country

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In the history of mankind, the Black Death, small pox and influenza epidemics have threatened our existence. However, unlike the others, the influenza epidemics have stayed with us for many decades. There has been several recorded influenza epidemics, notable ones include the Spanish flu in 1918-19 (H1N1), the Asian flu of 1958-59 (H2N2) and the Hong Kong Flu of 1968 (H3N2)¹. Before and after 1918, almost all influenza outbreaks started in Asia and spread to the rest of the world². The Spanish flu described as the greatest medical holocaust had unusual epidemiologic features and infected an estimated one third of the world's population and caused approximately 50 million deaths globally³. All epidemics thereafter have been descendants of the 1918 influenza virus⁴. Smaller outbreaks occurred in 1947 1976, 1977 and 2009⁵. Swine-origin influenza virus A (S-OIV), a recombinant influenza which involves a mix of human, avian and swine gene segments was first detected in Mexico and the United States in March and April, 2009 as a result of antigenic drift in the 1918 virus⁶. Pigs serve as the "mixing vessel" because they have receptors to both avian and human influenza virus strains resulting in novel progeny virus⁶. The estimated global death toll from the 2009 H1N1 epidemic was 284,000 according to the US CDC⁷.

Microbiology of influenza

Influenza viruses are negative sense enveloped RNA virus of the *Orthomyxoviridae* family with surface proteins Hemagglutinin (H) and neuraminidase (N)⁸. Hemagglutinin (H) allows the virus to bind to a specific cell and initiates an infection, Neuraminidase (N) on the other hand allows newly made viruses to be released in order to infect more cells. There are 3 genera A, B and C that can cause human flu⁸. It can also infect different animal species most notably birds and pigs. For immunological identification, there are eighteen H and eleven N types identified so far which can lead to a total of 198 potential subtypes⁹. Influenza A has a high mutation rate which the virus uses to evade acquired immunity in humans¹⁰. Diagnosis of influenza is via reverse transcription-polymerase chain reaction (rRT-PCR) Swine Flu Panel or culture of nasopharyngeal secretions. A rapid diagnostic test for influenza can provide results within 30 minutes and is available and can be applied in epidemic situations

Clinical Overview

Influenza is highly contagious and spreads mainly through aerosols created when infected people cough and sneeze, sometimes people may become infected by touching items with flu viruses on them and then touching their mouth, nose or eyes¹¹. H1N1 and H3N2 have maintained a continual presence during seasonal epidemics with symptoms including fever, cough, sore throat, body aches, headache, chills, fatigue, diarrhoea and vomiting. Much of the population have encountered the virus repeatedly either through infection or vaccination¹². Prognosis is generally very good without comorbidities with mortality highest in infants and the aged. An estimated 28,000-111,500 deaths in children under 5 can be attributed to influenza-associated lower respiratory tract infections¹³. Complications include primary influenza pneumonia and secondary bacterial pneumonia. There have been reports of myositis, myocarditis and pericarditis associated with influenza infections. Influenza causes a significant loss of working days and reduced working productivity.



Influenza Outbreaks in a Resource Limited Setting

In Ghana, there were 38 confirmed cases of the H1N1 in 2009 with no recorded deaths. On the 30th November, 2017, an outbreak of an undiagnosed illness in a Senior High school in Asokore Mampong Municipality was reported. This was confirmed to be an influenza outbreak on the 7th of December when 12 out of 19 initial throat swabs tested positive for Influenza A H1N1 2009 strain¹⁴. Students in the said school were quarantined and students showing signs of infection were treated and observed. Staff and students of this institution were vaccinated weeks after¹⁵.

Discussion

The critical measures in any epidemic are the disease burden and trajectory of spread. The susceptibility of the population, transmissibility and virulence of the virus impacts the disease burden. In developed countries a trivalent vaccine is made available just before the flu season and is effective against Influenza H1N1, H3N2 and Influenza¹⁶. The outbreak experienced in Ghana occurred when none of the population at risk had received influenza vaccines. The best under such circumstance is to identify individuals at risk and to prevent the spread of infection using basic public health methods as quarantining, treatment and vaccination. The initial panic among the students' population posed greater challenge in applying the best practice in public health as parents and care givers requested to move their wards away from the hotspot during the outbreak.

Reflecting on the recent outbreak, we need to strengthen our National Disease Surveillance System to improve case identification, data collection, analyses and serve as an epidemiologic alert system. It should be made more proactive and integrated into routine care with timely monitoring of hospital admissions and deaths attributable to influenza. Early planning and public health measures like prompt reporting, isolation and tracking of exposed individuals have proven effective in decreasing the spread of influenza.

Institutions need to effectively integrate infection prevention in their planning. There has to be clear and prompt communication of public health messages in outbreak situations.

There need to be an improvement in our research capacity focusing on improving diagnostic tests including those that could indicate the possibility of novel influenza strains. Influenza diagnostic tests are currently available at just a few research laboratories and Public health reference laboratories. Scaling up on the availability of rapid diagnostic test across the country may be helpful in addressing early detection and activation of public health measures.

Implementation of interventional measures such as suspension of activities that lead to a crowded population, cough and sneeze etiquette, frequent hand washing and wearing of nose masks could prove effective in decreasing spread.

All these measures when adequately put in place will make us better prepared to handle outbreaks of diseases.

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