

## Case report

# H1N1 influenza epidemic in Pune – Deenanath Mangeshkar Hospital experience

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**Keywords:** H1N1 influenza, epidemic, critical care

When the H1N1 Influenza pandemic broke out in India in the year 2009 and 2010, the panic reaction progressed very rapidly across the country. Pune was one of the cities affected considerably by this pandemic. Deenanath Mangeshkar Hospital is a 450 bedded tertiary care hospital in Pune with 55 bedded intensive care unit that received large number of

patients with H1N1 during this pandemic. During the pandemic, we had three distinct episodes of H1N1; first in August 2009, second in November 2009, and the third in 2010. Out of the total 1440 throat swabs evaluated for suspected H1N1, 440 were found to be positive. Nearly 100 patients with severe form of H1N1 were admitted to our ICU, 52 of these patients required mechanical ventilator support. High frequency ventilation (HFOV) was used in 20 of these patients. Our experience of this pandemic could be described under three headings:

- a) What was done?
- b) What was learnt?
- c) How can we be prepared for next epidemic?

During discussion of the H1N1 pandemic, one needs to consider issues related to properties of H1N1 virus, clinical features, treatment strategies, and preventive strategies. One also needs to pay attention to socioeconomic and socioemotional aspects of the pandemic. Considering these, we are going to discuss our experience on following issues will be discussed:

1. Preparedness of hospitals and outside health services
2. Knowledge and communication
3. Prophylaxis and prevention
4. Use of noninvasive ventilation
5. Invasive ventilation modalities
6. Experimental modalities
7. Prevention of hospital outbreaks
8. Socioemotional aspect

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**How to cite this article:** Jog S, Rajhans P, Hingane V *et al.* H1N1 influenza epidemic in Pune – Deenanath Mangeshkar Hospital experience. *Ind J Resp Care* 2013; 2:247-50.

## Preparedness of hospitals and outside health services

The first report of death due to H1N1 influenza in India created havoc and panic in the whole country. The roads were deserted and schools were closed. People were afraid to visit public places. There was no consensus in the scientific community too and there were no clear guidelines about treatment and prevention. Our hospital, like other hospitals was not prepared for this condition. There was scarcity of the vaccine, drugs and N95 masks. There was fearful atmosphere among health care workers and few of them were even apprehensive to treat H1N1 influenza patients.

What did we learn from this situation?: A triage wing was established like for any other calamity. A dedicated outpatient department for patients with fever was set up to diagnose suspected H1N1 influenza patients. A quarantine wing was also started in the hospital to treat H1N1 influenza patients and an intensive care unit was dedicated to isolate and manage the H1N1 affected patients with hypoxaemia. Special efforts were made to have counselling sessions for all the staff dealing with these patients. Each health care worker caring for these patients was equipped with *astronaut* like protective kits for personal protection.

With the experience gained from this pandemic, clear guidelines have now been established with no scope for any scientific dilemma. The hospital is now organised to handle large group of patients with the symptoms of flu. There is abundant store of personal protective equipment such as N95 masks, as well as drugs or vaccine for H1N1 influenza. The ICU staff are proud that they have handled such a pandemic efficiently.

## Knowledge and communication

There was significant dearth of authentic scientific information and data related to prevention and management of H1N1 influenza victims in the early period of the epidemic. An early case series was published from Mexico. There was industry

## Editor's Comments

✪ When the H1N1 influenza pandemic of 2009 manifested in India, there was panic everywhere. Pune, a city of south west India was the worst hit. A developing country such as India was largely unprepared for such a calamity. The authors of this article, who dealt with many of these cases in Pune, were invited to write up their experience during this H1N1 pandemic.

influenced literature and articles based on personal experiences available on the internet. Further, rumours and *breaking news* in the media such as internet, tabloids, newspapers and news channels added to the panic and confusion. Pune had the first hit of H1N1 and was rather unprepared for it.

Most important wisdom that we learnt from this experience is to say *No* to rumours and to pay attention to the information from trustworthy sources such as World Health Organisation (WHO) and journals such as New England Journal of Medicine (NEJM), Journal of American Medical Association (JAMA), *etc.* An important achievement from this experience is that there is now a good rapport between us and the government, press, and media.

## Prophylaxis and prevention

There was no H1N1 vaccine available in August 2009. The only prevention offered was N95 masks, goggles, gowns along with prophylactic oseltamivir. In the panic situation of early pandemic, it was a routine practice to prescribe oseltamivir to nearly all febrile patients. There were some incidents where healthcare workers kept *secret stock of oseltamivir* for personal emergency use. Several health care workers escaped from work by way of absenteeism to avoid exposure to H1N1 patients.

Availability of the H1N1 vaccine in May 2010 boosted the morale and confidence of the health care workers. It was also realised that vaccination against

H1N1 influenza was the proper way of primary prevention and not prophylaxis with oseltamivir. The community vaccination and development of herd immunity seemed possible after availability of vaccines. The polymerised chain reaction (PCR) runtime came down from days to hours. This helped in patient management as well as primary prevention. Early empirical treatment with oseltamivir in strongly suspected patients was found to be useful.

Therefore, now community vaccination is the main prophylactic measure while oseltamivir is reserved only for patients with strong suspicion of H1N1 influenza. Double dose of oseltamivir is now used on day one itself for strongly suspected patients requiring ICU admission.

### Use of noninvasive ventilation

Although there was no first hand experience of treating H1N1 victims with acute lung injury or acute respiratory distress syndrome during the first epidemic, the knowledge gained from the SARS epidemic regarding efficacy of noninvasive ventilation (NIV) in minimising the spread of disease to health care workers was useful. Therefore, NIV was used for several patients with H1N1. The ventilator settings were adjusted up to a positive end-expiratory pressure (PEEP) of 14 cm H<sub>2</sub>O, pressure support of 20 cm H<sub>2</sub>O and FIO<sub>2</sub> of 0.7 with NIV.

Important learning points from this experience included the following: Firstly, it was difficult to perform recruitment in patients after prolonged NIV. Secondly, NIV was not found to be beneficial in patients with PaO<sub>2</sub>/FiO<sub>2</sub> (PF ratio) < 150. Out of the 38 patients who were initially ventilated with NIV, 26 had PF ratio < 150 and their respiratory condition worsened with NIV requiring invasive ventilation. In contrast, 14 patients who had PF ratio more than 150, were successfully ventilated with NIV and discharged home. It was also found that NIV was not useful in patients who had carbon dioxide (CO<sub>2</sub>) retention and altered sensorium. Therefore, the threshold for invasive ventilation was lowered and

patients that did not show recovering trend at the end of 72 h of NIV were electively intubated.

The learning point from this experience was to use it only in patients with less severe hypoxia. Further, it appears that dedicated NIV machines tend to be superior to conventional ventilators for providing NIV.

### Invasive ventilation

The ARDS net protocol was stringently followed in the initial period. Also heavy sedation and liberal paralysis were used. When such techniques did not yield appreciable results, high PEEP up to 20 cm H<sub>2</sub>O, prone position ventilation, recruitment and inverse ratio ventilation were attempted. However, these were not always useful and in fact they proved to be detrimental on occasions. Tracheostomy was many times delayed due to uncertainty about the expected duration of ventilation. On the other hand, pre-emptive early tracheostomy proved to be a good strategic decision. HFOV appeared to provide better oxygenation and ventilation, although it was used as the last option for ventilator management. Univariate analysis of HFOV *versus* conventional invasive ventilation of 39 patients (20 of HFOV and 19 of conventional ventilation) showed statistically significant difference in the survival of patients. Requirement of PEEP > 12 cm H<sub>2</sub>O, FiO<sub>2</sub> > 0.7 or CO<sub>2</sub> retention appear to be the criteria that warrant early switch to HFOV.

### Experimental modalities

Nitric oxide, prostaglandin, intranasal interferon, omega 3 fatty acid infusion, glutamine infusion, steroid, neuromuscular blockade and extracorporeal membrane oxygenation (ECMO) were tried in patients with ARDS following H1N1. No convincing evidence could be found regarding the efficacy of these therapies. After the pandemic, these approaches still remain experimental modalities. There is no concrete data suggesting benefit from these modalities. There is some data to suggest usefulness of steroids but there is also evidence to the contrary. Therefore, the role of steroids

till remains controversial. Only ECMO showed some beneficial effect in severely hypoxaemic patients.

### **Prevention of hospital outbreaks**

A dedicated hospital building (annex building) was reserved to treat H1N1 patients in the initial part of the pandemic. Unfortunately, health care workers and patient relatives from other areas of the hospital isolated the health care workers from this hospital building for fear of getting infected. However, contrary to severe acute respiratory syndrome (SARS), there was no reported mortality amongst health care workers in India. Oseltamivir is effective in preventing acute infection when taken within 48 h after appearance of flu like symptoms. This might have helped in preventing serious morbidity or mortality in health care workers. Further, availability of vaccines also might have made an impact. Following these encouraging results, the health care workers were more forthcoming in participating in treatment of patients with H1N1. Subsequent to these developments, the astronaut-like protective wear was no more used while treating these patients. Finally, the patients were treated in the main hospital building without isolation. With improved understanding of the disease, availability of vaccine and medication to treat, now H1N1 is just

treated as 'flu' and not considered as a dreaded entity any more.

### **Socioemotional angle**

The initial period was typically distinguished by fear and panic. There were non-indicated ICU admissions, fear and apprehension. The other causes of breathlessness were forgotten and oseltamivir became 'panacea' for all patients with fever. On the other hand, there was denial of the diagnosis and rush for the second opinion. The print and electronic media had a huge impact on the public as well as health care workers. The death scores from country occupied the whole picture of the H1N1 pandemic.

However, this calamity like condition made government and nongovernment organisations work hand in hand. The death scores were neglected and no weightage was offered to rumours. Quick steps were taken at the policy maker's level that resulted in the public appreciating efforts of the caregivers.

In the end, what the country suffered in 2009 and 2010 due to H1N1 has become an experience with a potential to enrich and strengthen us to face such epidemic in future. The knowledge and outcomes of that terrifying pandemic has made us wiser.