

Mortality from Influenza A/H1N1 in a tertiary care teaching institution in North India

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Abstract

Background: The recent influenza A/H1N1 pandemic has caused considerable morbidity and some mortality and is therefore a severe threat to certain individuals. Up to 31 January 2010, there had been 1,229 confirmed deaths from Influenza A/H1N1 in India.

Methodology: This study was a retrospective analysis of deaths caused by RT-PCR-confirmed cases of Influenza A/H1N1 in a tertiary care institution in North India from September 2009 until January 2010.

Results: Among 125 patients admitted to the Influenza A/H1N1 ward of the hospital, a total of 16 deaths had occurred in patients who were positive for Influenza A/H1N1. Two deaths were in the paediatric age group. Most patients who died had some predisposing illness, such as pregnancy, underlying chronic respiratory illness, diabetes, obesity, etc.

Conclusions: In the present study, deaths from Influenza A/H1N1, as with seasonal influenza, appeared to occur primarily in individuals with underlying illness. In India, such individuals may be considered first for preventive strategies, including vaccination.

Key words: influenza A, retrospective study, comorbidity

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Introduction

Influenza is a virus that causes an acute respiratory illness of variable severity. The phenomenon of antigenic shift imparts the ability of this orthomyxovirus to cause pandemics from time to time, the first in 1918 (Spanish flu) and three more since then. The recent origin of the novel swine influenza virus (H1N1) initiated a new pandemic which tested the public health capabilities of many nations around the globe. The developing world, in wake of the poor health-care infrastructure prior to beginning of the epidemic, had to initiate measures aimed at tackling not just the spread of infection but also at resource creation for the management of severe infections.

In India, the Influenza A/H1N1 pandemic first appeared in May 2010, and the first mortality in August caused extreme panic in the community [1]. Although the Indian population has an acceptable level of knowledge of influenza, a study has noted a poor behavioural response to the pandemic [2]. The number of confirmed cases by the end of January 2010 in India was 28,810 with 1,229 deaths. We present the mortality statistics from a tertiary care teaching hospital from Delhi, the capital of India,

which was one of the centres earmarked for treatment of severe cases of Influenza A/H1N1.

Materials and methods

From September 2009 to January 2010, the Influenza A/H1N1 ward at our institution in Delhi admitted 210 cases suspected to be infected with the novel strain of influenza. The nasopharyngeal and throat swabs were tested by RT-PCR at the National Institute of Communicable Disease, Delhi. Among 125 confirmed cases admitted to the Influenza A/H1N1 ward, 16 deaths occurred due to RT-PCR confirmed Influenza A/ H1N1. This study was a retrospective analysis of mortality data from case files of confirmed cases of Influenza A/H1N1 and the authors who conducted the analysis also cared for these patients. The study conforms to the ethical practices in the country.

Results

Upon review of the 16 patients who died of positive Influenza A/ H1N1 infection, the mean age was found to be 38 years \pm 15.3 (range 10 to 65 years) two of whom were in the paediatric age group (10 and 11 years). The ratio of males to females was

found to be 1:1. Of the total deaths, two patients had pregnancy-related complications. In one of these cases, the patient developed features of Influenza A/H1N1 in the immediate postpartum phase; the child had been delivered earlier by a lower segment Caesarean section. In the other case, the duration of gestation was eight weeks.

The average duration of stay in the hospital for the patients who died was 2.67 days \pm 3.093; however, five patients were declared dead on the same day of admission. All the patients admitted were from Delhi and the surrounding states of Uttar Pradesh and Haryana. The clinical picture was characterized by fever (100%) with an average duration of 5.7 days \pm 2.6; cough (87.5%) for 5.4 days \pm 3.08; dyspnoea (87.5%) for 3.57 days \pm 1.9; sore throat (43.75%) for 2.1 days \pm 1.4; rhinorrhoea (18.8%); GI symptoms including diarrhoea, vomiting, and loose stools (18.8%). The vital signs of these patients were also assessed. Tachycardia was present in 15 out of the 16 patients who died, and 14 of the 16 patients who died were tachypneic (respiratory rate $>$ 18/min). Of the 16 patients, two had hypotension at the time of presentation. A review of medical records of patients with confirmed Influenza A/H1N1 infected deaths requiring intensive care showed that chest radiographic findings were abnormal in all patients, with most demonstrating bilateral patchy alveolar opacities suggestive of bronchopneumonia. Of the 16 cases who died, 12 (75%) were diagnosed to have acute respiratory distress syndrome (ARDS). Of the 16 subjects, obese patients (body mass index [calculated as the weight in kilograms divided by height in meters squared] $>$ 30 kg/m²) accounted for three (18.8%) of the cases requiring intensive care. Previous history of respiratory illness (chronic obstructive pulmonary disease, asthma, past tuberculosis) was found in three cases (18.8%). History of hypertension was present in six cases (37.5%), four of whom were also diabetics.

Of the four patients presenting with concurrent history of diabetes and hypertension, one subject also had a history of chronic alcoholism and smoking and eventually died of type 1 respiratory failure and shock. Three patients developed acute renal failure, one of whom was among the patients who had a concurrent history of diabetes and hypertension. Table 1 depicts the major clinical symptoms and predisposing conditions of the study group. The complete blood count data (hemoglobin, hematocrit, leucocytes, and platelets) of these 16 patients were found to be significantly disrupted in some patients.

Anaemia (Hb-10 gm/dL) was present in three patients. Total Leukocytes were raised in five ($>$ 11,000/ μ L) and was low in 5 ($<$ 4,000/ μ L). Therefore, only six patients of the 16 who died had a normal leukocyte count. One patient had severe thrombocytopenia ($<$ 50,000/ μ L). Table 2 depicts the vital signs and major biochemical findings of the study group.

Discussion

The recent pandemic of Influenza A/H1N1 has brought to focus the lack of preparedness of the developing nations to tackle the pandemic situation. Moreover, virtually no real data has emerged on the causes of mortality from this pandemic in India. This study, therefore, attempts to fill this gap. Of course the limitation of the study is that it is based on findings from a single institution, but it provides an insight into the situation in India.

The most remarkable fact noticed in these mortality statistics is the high occurrence of features of metabolic syndrome (obesity, diabetes, and hypertension) in the group. This observation has implications for India, which is the diabetes capital of the world and has an ever increasing overweight population. This epidemic of metabolic syndrome will predispose the population to worse outcomes of infectious illness, as has been witnessed with tuberculosis in the past and now with Influenza A/H1N1. Most patients presented late in the illness, resulting in adverse outcomes. Another important finding is that most patients who died had at least some predisposing chronic illness, which is in agreement with the results of earlier studies on seasonal influenza [3]. Also significant is that the patients who died had tachycardia or tachypnea in most cases. These findings may help in triaging the most serious patients who need admission. Abnormal total leukocyte count was also common amongst patients who died of Influenza A/H1N1

Only a few previous studies have reported on the mortality statistics vis-a-vis the present pandemic. A study from Canada noted that a longer interval from symptoms to initiation of antiviral therapy and the presence of an underlying comorbidity predicted the development of severe H1N1 influenza necessitating admission to the intensive care unit [4]. A report from California confirmed these findings [5]. One patient in the present report was in the geriatric age group ($>$ 65 years). A report from Spain has indicated that the pandemic flu may not be

Table 1. Clinical symptoms and predisposing factors of the patients who died of Influenza A/H1N1

No.	Age/Sex	Symptoms (duration in days)						Predisposing conditions
		Fever	Cough	Sore Throat	Dyspnoea	Rhinorrhea	GI	
1	51/M	5	1	0	5	0	0	DM, HTN
2	32/M	5	5	3	2	0	0	Obesity
3	36/F	7	7	2	3	3	2 (diarrhoea)	HTN
4	27/M	5	0	2	2	0	0	Obesity
5	31/F	6	5	2	2	0	0	Pregnancy
6	52/F	0	7	0	5	0	0	DM, HTN
7	11/F	4	3	0	2	0	0	
8	55/M	2	2	2	3	2	0	HTN
9	23/F	10	5	0	0	0	1 (diarrhoea)	Postpartum
10	45/M	7	7	0	4	7	0	HTN, DM, ALCOHOLISM, SMOKING
11	36/F	7	10	4	0	0	0	
12	40/F	5	5	0	6	0	5 (vomiting)	Obesity
13	65/M	7	11	0	7	0	0	
14	51/M	10	8	4	6	0	0	DM, HTN, CAD
15	10/M	6	0	0	1	0	0	
16	38/F	6	5	0	2	0	0	

Table 2. The vital signs and haematological features from the patients who died of Influenza A/H1N1

S.No.	Signs			Lab Findings				
	B.P	R.R	P.R	TLC	Sugar	Hb Count	Urea	Platelet
1	High	26	120	27,600	359	10.6	108	190000
2	Normal	28	110	2900	92	14.3	20	210000
3	High	32	108	2000	109	14.7	83	240000
4	Normal	24	84	12,700	95	14.5	41	280000
5	Normal	24	108	5600	100	8.7	47	320000
6	High	16	114	20,700	197	12	73	170000
7	Low	30	115	39,000	110	11	52	180,000
8	High	35	134	7,100	108	11.4	12	160000
9	Normal	17	110	3400	100	6.6	67	170000
10	High	29	112	8,900	156	13.2	21	150000
11	Normal	30	108	4500	96	12.8	12	140000
12	Normal	24	122	1400	98	12.5	39	180000
13	Normal	28	132	13700	100	15.7	37	16,000
14	High	30	126	4700	172	7.1	82	161000
15	Low	36	116	2100	104	11.8	18	183000
16	Normal	38	118	7,500	108	12.3	23	190000

responsible for excess mortality in the geriatric group [6].

Two of the patients who died were either pregnant or in immediate postpartum (day 3 of the postpartum period). Although seasonal influenza is believed to be more dangerous during pregnancy, a recent report from Singapore noted the absence of any mortality from Influenza A/H1N1 in pregnant females [7]. In contrast, a study from California reported an increased risk of death and complications in pregnant females, including those in the immediate postpartum period [8].

A study of the paediatric age group from India has reported that features in Influenza A/H1N1 were similar to those of seasonal influenza [9]. A study from Iran has noted a higher percentage mortality in extremes of ages, albeit lesser than that of seasonal influenza. The Iranian study noted lack of mortality in pregnant females [10].

In conclusion, the results of this study show that Influenza A/ H1N1, like seasonal influenza, is more likely to cause serious illness in individuals with underlying chronic illness or in those who are in the paediatric age group or pregnant. Public health efforts should focus on providing appropriate support and preventive services, including vaccination, to these groups. This is especially important with regard to the developing world, where the necessary resources are scarce. The epidemic presented developing countries such as India the opportunity to enhance their public health infrastructures, which can be helpful in tackling future problems. For instance, the procurement of ventilators and the enhancement of diagnostic facilities for H1N1 (only two to begin with) indicate that some benefits have accrued to the infrastructure as a response to the pandemic. However, very little data has emerged to account for the reasons and risk factors for mortality. There is a need for more descriptive studies from other centres in India to adequately describe the contours of the pandemic in India

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