A Death Audit of H1N1 Influenza Cases in a Tertiary Care Hospital in Southern Rajasthan (Current Out Break - 2017)

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ABSTRACT

Background: Swine flu deaths are preventable, Clinico-epidemiological profile of the H1N1 infected patients varies with place and time. Death audit unravels the circumstances that lead to these avoidable deaths and help save other patients. The study was conducted to identify clinico-epidemiological profile of the H1N1 confirmed deaths, to know the Onset-to-hospitalization (OH) time, hospitalization to death time and pre hospitalization management by other health care providers.

.**Methods:** Death audit of H1N1 positive cases was done at RNT Medical College, Udaipur during the outbreak from July'17 to December'17.

Results: Deaths were higher in 20 years to 40 years age group, male:female = 1.1:1. Overall fatality was 6.6%. Majority (52.5%) reported with breathlessness, fever and cough. Only five received oseltamivir within 48 hours, 95% had Anemia and Diabetes. 26.3% females were pregnant. Mean OH time was 5.8 days ± 2.81. 60 % died within 72 hours of hospitalization

Conclusion: Mortality was high in adult, male:female =1.1:1. Most had reported after 48 hours with severe illness and co-morbid conditions and had not received Oseltamivir. Most deaths occurred within 72 hours of hospitalization.

Key words: Death audit, Outbreak, H1N1 Positive Deaths, Oseltamivir , Co morbidities

INTRODUCTION

Swine flu is an acute infection of respiratory tract, caused by swine origin influenza A (H1N1) virus. Antigenic drift and shift of this virus is responsible for epidemic or pandemic in different parts of the world from time to time[1]. Last pandemic started in 2009 at Mexico and USA, and spread globally with in a very short period of time[1]. In India it began on May 2009[2].There have been post pandemic resurgences since 2010 continuing in 2017-18.

It is one of the diseases that the Indian population is most threatened by in recent times. What makes this disease worse is the fact that its symptoms resemble those of regular flu. But given how potent it is, thousands of lives have already been lost in India, with more cases emerging every day, especial ly in Rajasthan[3].

According to a latest report on seasonal influenza (H1N1) released by the ministry of health and family welfare's Integrated Disease Surveillance Programme (IDPS), 8,543 people succumbed to deadly swine flu virus between 2010 and October 2017. More importantly, the number of cases across the country the year 2017 has seen a more than 20-fold rise from last year[4].235 deaths have been reported from Rajasthan only in last year[4].

Swine flu deaths are preventable, Death audit unravels the circumstances that led to these avoidable deaths. It assess whether what is recommended was done or not for these amenable deaths[5] and help save other patients.

Rajasthan being one of the worst hit states[3] and the fact that clinico-epidemiological profile of the H1N1 infected patients varies from place to place and from time to time[6]. It becomes important to conduct audit of deaths in each resurgence phase.

The Objective of present study is to identify clinico-epidemiological profile of the H1N1 confirmed deaths, to know the Onset-to-hospitalization (OH) time, hospitalization to death time and pre hospitalization management by other health care providers.

METHODS

It was a retrospective descriptive study. A qualitative and quantitative analysis of the clinical records of laboratory-confirmed (by RT –PCR) H1N1 positive deaths in Swine Flu block ICU of RNT Medical College, Udaipur, from 1st January 2017 to 31st December 2017 was done after taking permission from the institute head and approval from Ethical Committee. All 40 H1N1 positive deaths in that period were included. Information was collected from the case sheets additional information if required was collected by telephonic conversation or home visits and interview with relatives and friends of deceased persons. The tool used was pretested structured questionnaire also called death audit form. The questionnaire included information regarding socio demographic profile , presenting complains, time interval since onset of symptoms and seeking health care, receiving Oseltamivir , hospitalization , throat or nasal swab collection , shifting to ICU and death. Details of radiological and laboratory investigations were also recorded. The data thus collected was entered on a master chart in Microsoft excel sheet, tabulated and analyzed using SPSS software version 16. Frequency with percentage, Median along with range and Mean with Standard Deviation were calculated.

RESULTS

Total 606 patients tested positive at our center out of which 40 deaths were recorded .The Case Fatality Ratio (CFR) was 6.6% .Out of the 40 deaths recorded, 21 (52.5%) were male and 19 (47.5%) were females. Half of the deaths were in 21 to 40 years age group (50%) followed by 41 to 60 years age group (42.5%). Majority of females were in 20-40 years age 11 (57.9%), while males were distributed almost equally in both 20-40 years, 9 (42.9%) and 41-60 years,10 (47.6%) age groups. Mean age = 42.5 years ±13.02 was noted. Most of the patients were from rural area, 26 (65%). By occupation nearly half were agriculture workers (Table 1).

Majority (52.5 %) of the deceased persons had reported with breathlessness , fever and cough , 2.5 % with Fever and Loss of Consciousness (LOC) 12.5% (5 females) presented with pregnancy and flu like symptoms and rest (32.5%) came with fever with chills, cough and diarrhea or other associated risk factors . (Table 2)

Table 1: Demographic profile of H1N1 Influenza confirmed deaths (n=40)

Variables	Male (n=21)	Female (n=19)	Total (n=40)
Age in years*			
≤20	0	0	0
21-40	9 (42.9)	11 (57.9)	20 (50)
41-60	10 (47.6)	7 (36.8)	17 (42.5)
>60	2 (9.5)	1 (5.3)	3 (7.5)
Residence			
Rural	15 (71.4)	11 (57.9)	26 (65)
Urban	6 (28.6)	8 (42.1)	14 (35)
Occupation			
Agriculture workers	10 (47.6)	7 (36.8)	17 (42.5)
Self employed	6 (28.6)	5 (26.3)	11 (27.5)
Un employed	5 (23.8)	7 (36.8)	12 (30)
Health Care provider	0	0	0

*mean age=42.5 ±13.02 years

Table 2: Presenting complains at the time of reporting (n=40)

Complains	Cases(%)
Fever, cough and breathlessness	21 (52.5)
Fever and loss of consciousness	1 (2.5)
Pregnancy with flu like symptoms or breathlessness	5* (12.5)
Fever, myelgia, diarrhea, vomiting and associated risk factors	13 (32.5)

*5 out of 19 females were pregnant

Table 3: Associated co-morbid conditions and risk factors

Co morbid conditions/ Risk Factors	Cases (n=40) (%)
Moderate to severe Anemia (Hb <10 gm %)	27 (67.5)
T2DM	11 (27.5)
Smoking ,Alcoholism, Tobacco chewing	7 (17.5)
CLD	7 (17.5)
Second trimester Pregnancy*	5 (26.3)
Hypertension	4 (10)
Acute infection †	3 (7.5)
Hypothyroidism	2 (5)
CVA	2 (5)
Obesity	2 (5)
Others	6 (15)

*5 out of 19 females †Dengue, Malaria, Scrub typhus
T2DM :Type 2 Diabetes Mellitus , CLD: Chronic Liver Disease , CVA: Cerebro Vascular Accident
Observations are mutually exclusive as 22.5% deceased persons had more than one co morbid condition

Table 4: Radiological and laboratory parameters at the time of presentation

Parameters	Cases (%)
Chest X-Ray finding	
B/L heterogenous opacity	38 (95)
Only Right Lung opacity	2 (5)
Only left lung opacity	0 (0)
Blood counts	
TLC<4000	17 (42.5)
TLC4000-11000	5 (12.5)
TLC >11000	18 (45)
Lymphocytes < 20%	29 (72.5)
Lymphocytes>20 %	11 (27.5)
Platelet counts<150,000	11 (27.5)
Platelets 150,000 to 450,000	24 (60)
Platelets >450,000	5 (12.5)

TLC : Total Leukocyte Count

Table 5: Course of events since onset of symptoms (n=40)

Event	Cases(%)
Reported to peripheral or private clinic ≤ 48 hours of onset of symptoms	8 (20)
Received Oseltamivir at peripheral or private clinic ≤ 48 hrs of onset of symptoms	0 (0)
Reported to Hospital ≤ 48 hrs of onset of symptoms*	5 (12.5)
Received Oseltamivir at Hospital ≤ 24 hrs of reporting	40 (100)
Shifted to ICU after reporting to hospital (mean =19.71±30.04 hrs)	
≤ 2 hours	24 (60)
2hours -24 hours	10 (25)
>24 hours	6 (15)
Interval since Hospitalization to death (mean =4.02days ± 3.66)	
<24 hours	11 (27.5)
1-3 days	13 (32.5)
4-7 days	10 (25)
>7 days	6 (15)

ICU : Intensive Care Unit; * (Mean : 5.8 days ± 2.81)

Commonly associated co morbid conditions were Anemia (Hb < 10 gm %) (67.5%) and Diabetes Mellitus Type 2 (DM 2) (27.5%) followed by Chronic Liver Disease (CLD) 7 (17.5%). Smoking, alcoholism and tobacco chewing were the associated risk factors in 7 (17.5%) deaths. 4 (10%) cases were hypertensive. 5 out of 19 (26.3%) females were pregnant in second trimester. (Table 3)

Chest x-ray of maximum 38 (95%) deceased persons showed bilateral heterogeneous opacities. Blood count showed that 17 (42.5%) had leucopenia (TLC<4000) and 18 (45%) had leukocytosis (TLC>11000), 29 (72.5%) had relative lymphopenia (Lymphocytes < 20%), 11 (27.5%) had Thrombocytopenia & 5 (12.5%) had Thrombocytosis. (Table 4)

In first 48 hours since onset of symptoms 8 (20%) patients received health care at peripheral or private clinics. None received Oseltamivir in first 48 hrs of onset of symptoms. Only 5 (12.5%) patients reported to our hospital within 48 hours and all received Oseltamivir. Mean interval from onset of symptoms to hospitalization was 5.8 days ± 2.81 and that to death was 9.7 days ± 4.8. Out of the 40 deaths, 11 (27.5%) occurred within 24 hours of hospitalization, 23 (57.5%) died within 1-7 days and only 6 (15%) survived beyond seven days. Mean survival = 4.02 days ± 3.66 .Majority of deceased 24 (60%), were admitted to ICU within two hours of reporting to the hospital, 10 (25%) within three to 24 hours and only 6 (15%) were admitted to ICU more than 24 hours after reporting. Mean interval from reporting to shifting to ICU was 19.71 ±30.04 hours. (Table5)

DISCUSSIONS

During the 2017 resurgence of H1N1, 606 laboratory confirmed (by RT –PCR) cases reported to RNT Medical College and Associated Group of Hospitals. Out of these 224 were admitted in swine flu block and 40 patients succumbed to the infection, all between August to December. Most deaths (82.5%) were reported in August and September. During 2015 resurgence, peak mortalities were reported between January to May at our center and in other areas of Rajasthan.[7,8] This shows that there is seasonal variability in occurrence of H1N1 resurgences in Rajasthan. .

The Case Fatality Ratio (CFR) was 6.6% (40/606), it is only an approximate value as it does not include the cases that were tested positive at this hospital but opted to go to other places for treatment and died there. Other studies during previous outbreaks In Rajasthan have reported CFR to be, 7.18% in Bikaner (2015),[8] 17.9 % in Jaipur (2013),[7] and 19.1% in Jodhpur (2012).[9]

Deaths were reported mainly among patients from Udaipur, Pratapgarh and Banswara districts of Rajasthan and Neemuch from MP.

Almost equal number of deceased persons were males and females (male:female =1.1:1). Amravathi et al[10] have also reported equal distribution of deaths among both genders. Contrary to this , higher female mortalities have been reported in previous resurgences from Rajasthan and Gujarat.[8,9,11]

The majority (92.5%) deceased persons were almost equally distributed in 20-40 years and 40-60 years age groups. (Mean age = 42.5 years ± 13.5). No deaths were recorded in cases less than 20 years age. Surendra Kumar[8] also reported the mean age of death as 44.69 years at Bikaner, Rajasthan during 2015 resurgence, whereas Singh M et al[9] have reported 51.7% deaths in 15-30 years age

group and 22.4% in 13 to 45 years age group in Jodhpur in 2012.

Females were mostly of 20-40 years age group while males were distributed almost equally in both 20-40 years and 41-60 years age groups. People in these age groups are working actively and are more prone to exposure to the virus.

Most (65%) deceased persons were rural habitants. During 2015 resurgence, rural predominance was reported in North- West Rajasthan[8] while predominantly urban mortalities (63.5%) were reported from Jaipur.[7] These studies being hospital and laboratory based hence do not compare the actual rural and urban mortality rates .

Majority (52.5%) reported with symptoms like Breathlessness along with Fever and Cough followed by 32.5% presented with Fever, myelgia, diarrhea, vomiting and associated risk factors.

Presence of co-morbid conditions is a high risk factor for development of critical illness and mortality. Most deaths (95%) had Co morbid conditions or risk factors and 22.5% had more than one co morbidities. Other studies from Rajasthan and West Bengal support this observation [1,7,8,] Amaravathi *et al*.[10] found through their study that the severity of the disease (category C) , occurrence of pneumonia and mortality were higher among patients with co morbid conditions.

Anemia 27 (67.5) was the most common co morbid condition, followed by T2DM (27.5%). Others were being CLD, alcoholism and tobacco intake. Other studies [1,8] have also reported high existence of Diabetes Mellitus in H1N1 Positive mortalities. Mortality was high in Pregnancy. 26.3% (5 out of 19) , but it is difficult to draw a conclusion as the number of pregnant women was small but this observation is supported by the fact that the past outbreaks have shown that pregnant women are at risk of complications from H1N1 Influenza virus. During 2009 pandemic in United States 22% pregnant women required ICU admission and 8% died [12]. Studies in Rajasthan and Karnataka [9, 10] showed that mortality was higher among pregnant women compared to non pregnant women.

The immune system modifies in pregnancy, enlarging uterus presses on the diaphragm causing changes in the lungs such as reduced tidal volume, congestion and localized edema, which make the woman more prone to complications such as pneumonia and Adult Respiratory Distress Syndrome (ARDS).[13]

All pregnant deaths in the present study were in second trimester of pregnancy. This is contrary to other studies, [10,14] where most deaths were reported in third trimester pregnancy and puerparium. On the other hand, Siston et al [15] have reported that outcome in severely ill pregnant women was independent of gestational age. After severe illness is established, the death rate amongst hospitalized patients within each gestational age group was remarkably uniform.

Most (95%) deceased person's chest radiographs showed bilateral heterogeneous opacities. 72.5% had relative lymphopenia (lymphocytes <20%). Relative lymphopenia is one of the risk factors for poor outcome of swine flu H1N1 infection.[16] Asmitha et al [17] also showed bilateral pneumonia and lymphopenia as independent risk factors associated with mortality or need of mechanical ventilation.

Timely and correct diagnosis is the key to better prognosis and to control the spread of the H1N1 Influenza. Out of the 40 deceased persons eight (20%) had approached peripheral or private clinics within 48 hours of onset of symptoms but none of them was prescribed Oseltamevir. Only five (12.5%) were hospitalized within 48 hours .All fatalities received Oseltamivir immediately after reporting to hospital. Mean Onset-to-hospitalization (OH) time was 5.8 days ± 2.81 ,Despite current outbreak being the third resurgence in this area since 2009 pandemic, clinicians at periphery and in private sector still did not initiate Oseltamivir , this might have lead to worsening of the clinical picture. Most of the deaths , 28 (70%) occurred within 10 days of onset of symptoms. Jadawala et al from Gujarat have also reported 60% deaths within 10 days of onset of symptoms.[11]

Once hospitalized, all 40 patients received Oseltamivir immediately and their throat swab was taken and sent for testing Within 24 hours. This suggests prompt diagnosis and management of H1N1 Influenza cases once they reported to this hospital. 60%of H1N1fatalities had shifted in swine flu ICU within 2 hours after admission and 11 (27.5%) fatalities occurred within 24 hours of hospitalization which shows that patients presented to our center in critical condition. Mean time from hospitalization to shifting to ICU was 19.71 ±30.04hours. Only 6 (15%) patients survived beyond seven days of hospitalisation. Mean survival time was = 4.02days ± 3.66.

Other studies from Rajasthan during past out breaks showed higher mortalities within first 2-3 days of hospitalization,53.4% deaths, within 48 h of admission at Jodhpur[9], of which 77.4% deaths were within 24 h of admission. 62% mortality within 72 hours of hospitalization at Jaipur [7] and 76.92% deaths within 3 days of hospitalization at Bikaner[8].

This study has tried to identify the clinical and epidemiological profile of H1N1 mortalities during

current (2017) resurgence in Southern region of Rajasthan. The results will add to the pool of literature on impact of Post Pandemic Out breaks and aid in public health research in this direction.

Limitations : Data has been collected from the medical records of deceased persons only hence the Onset to Hospitalization time and co morbidities present could not be associated with mortalities due to lack of proper denominator. The study was restricted to a small geographic area, more studies in different geographic areas will be needed for generalization of results.

CONCLUSION

In conclusion, the study showed high mortality in adult population. Most of

The deceased persons had reported with severe illness and co-morbid conditions. Mean Onset to Hospitalization time was 5.8 days and hospitalization to death time was 4.02days More death audit studies of current and future resurgences will give better insight in mortality profile.

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