

## Role of Hospital in Pandemic: Our Experience

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**Abstract: Background:** Flexible guidelines have been laid down by various international and national authorities for pandemic preparedness and response of Health-care Facilities during various phases of the pandemic, which are updated and widely communicated to the nations worldwide. The hospitals are responsible for adopting these guidelines and prepare themselves for any eventuality. Current study presents the role played by a Tertiary Care Hospital (SKIMS) in Northern India in the recent H1N1 flu pandemic.

**Methodology:** Review of the records pertaining to H1N1 management was performed to assess the preparedness of the hospital in dealing with the pandemics. Further, comparison of the Hospital's Preparedness with the recommended guidelines was performed to identify scope for improvement.

**Observations:** The hospital started preparations for the pandemic in June 2009, when some states in India were already affected. A multidisciplinary H1N1 committee was framed which participated in the pandemic preparedness plan and laid down recommendations conforming to the national and international guidelines. Nodal office was established for coordination of the pandemic management. An isolation ward with separate access was readied after some requisite engineering modifications and more space identified in anticipation of a surge. Logistic support in the form of durables and consumables were procured from the contingency fund and stockpiled. Communication with external and internal agencies was vital to the effective pandemic management. Awareness and training were imparted across all sections of the Hospital employees. Vaccines were made available and employees vaccinated. Public awareness and education was created at every opportunity. Recording and reporting was a regular feature. A total of 100 suspected patients were admitted till January 2011. Of these 16 were confirmed positive, four patients expired. Gaps between the hospital's preparedness and recommended guidelines were identified for future preparedness and response.

**Conclusion:** Lesson learnt is that the hospitals should have a Pandemic Plan akin to a Disaster Plan, in view of the viruses lurking at various phase levels in our immediate environment.

**Keywords:** H1N1 Flu Pandemic, Pandemic preparedness, Interim Guidelines for H1N1.

### INTRODUCTION

A pandemic has been defined as "An epidemic usually affecting a large proportion of the population<sup>1</sup>, occurring over a wide geographic area such as a section of a nation, the entire nation, a continent or the world. Pandemics of viral influenza occur after every 30-40 years. In the 20<sup>th</sup> century some devastating pandemics occurred esp.; the 1918 or Spanish flu pandemic which claimed around 20-100 million lives with a case fatality rate of >2.5%. The devastation was worse than world war 1<sup>2</sup>. In the present century the epidemics of SARS (corona virus infection), Avian influenza (H5N1 infection) and the latest H1N1 flu infection leading to either local outbreaks, epidemics or pandemics has forced the International and National Health Care Authorities to frame and emphasize pandemic preparedness plans. The preparedness planning becomes all the more necessary in view of the already meager resources available for healthcare in the developing nations. In response to the potential viral threats the WHO, CDC and other health care authorities have laid down flexible and adaptable guidelines on pandemic planning for Health care Facilities which have been adopted by the nations worldwide, including India. Further the healthcare facilities should also check with the national and local health authorities for local guidance in addition to consideration of their unique circumstances and needs that may not be addressed otherwise.

The Ministry of Health & Family Welfare, Government of India has also laid down guidelines for pandemic management in Hospitals and identified public Hospitals in all the states and Union Territories for management of the H1N1 flu pandemic, one such Hospital being Sher-I-Kashmir Institute of Medical Sciences (SKIMS), located in a Northern state of Jammu and Kashmir, India.

The current study presents the preparedness and response of SKIMS Hospital which is a 625 bedded Tertiary Care Hospital, in the management of recent H1N1 Influenza pandemic. It also endeavours to identify the gaps and scope for improvement for future preparedness for pandemics.

### OBJECTIVES

Study the preparedness of the Hospital for the management and handling of

H1N1 flu pandemic.

Compare the pandemic preparedness of the SKIMS hospital with recommended International and National guidelines.

### MATERIALS AND METHODS

The study was based on retrospective review of the records for the year 2009 -2010, related to the preparedness and response of the hospital for the H1N1 pandemic which included:

- Review of Internal and external correspondences pertaining to H1N1 flu.
- Review of the case management records
- For comparison of the Hospital Pandemic Preparedness and response to H1N1 with reference standards, updated guidelines by International Health authorities, such as World Health organization (WHO), Department of Health and Human Services US (HHS) Centres for Disease Control, US (CDC), Occupational safety & Health Administration (OSHA) and National Health Authorities, like Ministry of Health and family Welfare (MoH&FW) were reviewed. The gaps between the Standard Guidelines and Hospital's Pandemic Preparedness plan were identified so that a practical Pandemic Preparedness plan could be framed for future use.

### OBSERVATIONS AND DISCUSSION

SKIMS hospital had a total of 100 suspected H1N1 flu admissions, out of which 16(16%) were confirmed positive. First patient was admitted in August 2009. The cases were clustered around the winter of 2009-2010, although two cases were reported in the summer of 2010. The youngest patient was aged 14 years and the oldest 60 years. Mean age was 34.9 years. Five(31.25%) were females. Four (25%) patients expired and 06 (37.5%) with ARDS needed Intensive care management. Two patients had associated comorbidities, rest were healthy adults. One patient who expired, had multiple co morbidities including hypertension, old MI, COPD and drug addiction (Table 1).

**Review of the correspondence** pertaining to management of H1N1 flu reveals that preparations for the pandemic began in the month of June

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**Table 1:** Profile of Confirmed H1N1 Inpatients

Date-of Admission	Age	Sex	Travel history	Comorbidity conditions	Care	Outcome
20.08.09	40	M	No	Nil	Intermediate	Cured
01.12.09	21	F	No	Nil	Intensive	Expired
18.12.09	55	M	Yes	+	Intensive	Expired
19.12.09	50	M	Yes	Nil	Intermediate	Cured
27.12.09	40	F	No	Nil	Intensive	Cured
29.12.09	50	M	Yes	Nil	Intermediate	Cured
07.01.10	50	F	No	Nil	Intermediate	Cured
16.01.10	60	M	No	+	Intensive	Cured
21.01.10	23	M	No	Nil	Intermediate	Cured
17.02.10	18	F	No	Nil	Intermediate	Cured
20.02.10	32	M	NO	Nil	Intermediate	Cured
11.03.10	31	M	Yes	Nil	Intermediate	Cured
17.07.10	14	M	No	Nil	Intensive	Cured
21.07.10	26	M	No	Nil	Intensive	Expired
27.12.10	25	M	No	Nil	Intermediate	Cured
17.01.11	25	F	No	Nil	Intensive	Expired

2009.

Meetings chaired by the Medical Superintendent were held in which 7-8 members including Head Internal medicine, Head microbiology, consultant Hospital Administration, Senior Resident Hospital Administration, Nursing Superintendent, Hospital Infection Control Nurse and Materials Management Officer participated. A three member team consisting of Head Department of Internal & pulmonary Medicine, Consultant Hospital Administration and Joint Nursing Superintendent was formed to facilitate the management of patients with H1N1 flu. A nodal office with Consultant Hospital Administration as nodal officer assisted by two Residents of Hospital Administration was established to facilitate implementation of the plan.

**Facility and facility access:** A 16 bedded isolation ward was prepared after some requisite engineering modifications for infection control. Glass partitions were raised in the ward between cubicles. Air Handling units of the ward were sealed and negative pressure was maintained with the help of exhaust fans discharging to an open area, while procurement of negative pressure equipment was initiated. A triage area was identified and made functional for patients of Influenza like illness (ILI) on the emergency side of the Hospital. In order to restrict the spread, the area was connected with the isolation ward through a separate access for admitted flu patients without the need to traverse the main hospital corridor. Visitor restrictions to the triage and ward area were maintained with the help of hospital security. Additional space in the form of a 32 bedded ward was identified in anticipation of a surge. In spite of all these preparations some patients needed admission to the Critical Care Unit of the Hospital for intensive monitoring and mechanical ventilation.

**Logistic Support:** Durables like ventilator were procured from the contingency fund. Procurement process for negative pressure equipment for the Isolation Ward was also initiated. Consumables like N95 respirators, Personal protective equipment (PPE), hand sanitizers, etc., were also procured and stockpiled. Some material support was extended by the State Nodal Centre in the form of provision of PPE, sample collection kits, N95 masks and antiviral drugs (oseltamivir) etc.

**Hospital Surveillance:** Surveillance in the emergency department and wards was increased to detect cases of influenza like illness (ILI). Any ILI among the patients and Hospital staff was viewed with suspicion of H1N1 flu. As no testing facility was available in the Hospital, their samples were sent to the National Center for Disease Control (NCDC) lab, New Delhi for confirmation and reporting.

**Communication:** Information exchange that was accurate and timely was a key to the effective management of the pandemic flu.

**External communication:** written as well as verbal communication was held with following agencies:

- **MoH & FW:** Written (mail, E-mail, fax) and verbal (telephonic) communication was held between the Hospital and ministry regarding guidelines, feedback on planning and implementation of

preparedness plan, reporting of cases and number of vaccinations performed. MoH&FW also cautioned the hospital against a resurgence/2<sup>nd</sup> wave of H1N1 pandemic in June-July 2010.

- **NCDC Delhi:** which was the nearest designated testing facility for the hospital for coordination of H1N1 testing and reporting of tests, was communicated with telephonically and through fax.
- **Media:** Public media was used to create awareness among the masses. Senior faculty of the hospital delivered interactive sessions over mass media channels like television, daily newspapers etc. A Public relations officer was designated to answer the queries of the media and state authorities.
- **Public:** Attendants of the patient needed reassurance and were informed and explained about home isolation precautions regarding the patient and themselves.
- **State Nodal Center:** Communication with State Nodal Center was held for provision of logistic aid.
- **Airport Authority:** Airlifting of samples to NCDC required proper information, labeling of carriers and other communication with the airlines and airport authorities.

**Internal communication:** Internal communication was necessary for the coordination of patient care with various Departments, like Internal & Pulmonary Medicine, Critical Care Unit, Emergency Department, Materials Management Department, Housekeeping Department etc.

**Education and Training:** Training programs in the form of CME, Table Top Exercises, were held for doctors, nurses and paramedical staff. Awareness programs were held for nursing and other paramedical staff regarding prevention and control of H1N1 flu infection.

A Table Top Exercise for Pandemic preparedness on H1N1 flu was organized in collaboration with the MoH&FW in which the faculty and residents of the hospital participated. Case discussions at grand rounds and mortality meetings were also held.

**The Hospital Infection Control Office** published pamphlets for circulation among Hospital staff for prevention and control of infection. Posters for public regarding respiratory hygiene and cough etiquette were displayed in waiting areas of Outpatient Department and Emergency Department.

**On the Job Trainings** were provided by the HICN for use of Personal Protective Equipment, hand washing technique and waste handling and management.

The patients and their attendants were counseled regarding control of spread, treatment and prophylaxis.

However, it was difficult to convince the hospital staff including doctors and nurses to avail vaccination although the H1N1 specific vaccine (panenza) was provided by the Government of India (GOI) free of cost. Utilization of the vaccine was only 50%.

**Occupational Health:** Healthcare safety of employees was ensured through provision of infection control logistics like hand sanitizers, N95 masks to those working in the isolation ward. PPE when high risk procedures like lifting of nasopharyngeal or throat swabs, endotracheal suction, etc. were anticipated. Vaccination was provided. Few HCW who fell ill were given special permission to stay at home till they recovered. Antiviral medication (oseltamivir) was provided to HCW who had acquired the infection.

## STANDARD GUIDELINES VIS-À-VIS PANDEMIC PREPAREDNESS AT SKIMS HOSPITAL

Guidelines for pandemic preparedness existed much before the H1N1 pandemic occurred<sup>3,4</sup>. Based on the WHO classification system prepared in 1999 and reviewed in 2005 for phasing various stages of the pandemic development/progress, the MoH & FW developed an Influenza Preparedness and response Plan for the country in which hospital systems received

<p><b>Interpandemic Period</b></p>	<p>Assess availability of hospital beds for general treatment /critical care and identify gaps. Develop infrastructure to augment critical care support. Hospitals to evolve/ strengthen hospital disaster plan for managing mass casualties/fatalities. Develop protocols for clinical case management. Evolve infection control policies. Prepare bio safety and Waste Management protocols and ensure its implementation. Training of Laboratory Personnel for handling clinical samples. Increase awareness.</p>
<p><b>Pandemic Alert Period</b></p>	<p>Review hospital disaster manuals with special attention to surge capacity for managing critically ill patients; managing fatalities and availability of requisite manpower. Ensure provision of isolation facilities and strict infection control practices. Assess effectiveness of clinical management protocols and review. Conduct CME to all levels of staff for management of cases and infection control practices. Pre test existing arrangements through simulation exercises /mock drills</p>
<p><b>Phase 3:</b> Human infection/s with a new subtype but no human to human spread or at most rare instances of spread to a close contact.</p>	<p>Ensure that the cases are reported as per surveillance protocol. Create additional surge capacity to cope large scale morbidities and mortalities in both Govt and Private Sector. Continue assessing effectiveness of clinical management protocols. Review infection control practices and enforce implementation as per protocol</p>
<p><b>Phase 4</b> Small cluster/s with limited human to human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans.</p>	<p>Hospital systems to contain and reduce human to human virus Transmission to limit morbidity and mortality among the affected population. Ensure that the cases are reported as per surveillance protocol. Create additional surge capacity to cope large scale morbidities and mortalities in both Govt and Private Sector. Continue assessing effectiveness of clinical management protocols. Review infection control practices and enforce implementation as per protocol</p>
<p><b>Phase 5:</b> Larger cluster/s but human to human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans, but may not yet be fulltransmissible (Substantial Pandemic risk).</p>	<p>To monitor public health resources for pandemic response to ensure health system in readiness for triage and treatment. Prevent spread of infection through nosocomial route Create surge capacity within existing hospital systems and generate additional resources by establishing day care centers and temporary hospitals. Establish triage system. Ensure availability of adequate health personnel; if required mobilize from other states. Ensure safety of health care workers by vaccination/ prophylaxis, barrier practices, use of PPEs and skill update training. Ensure correct waste disposal practices, including terminal disinfections Enforce implementation of recommended infection control practices. Implement guidelines for management of mass fatalities.</p>
<p><b>Phase 6:</b> Increased and sustained transmission in general population</p>	<p>To monitor public health resources for pandemic response. to ensure health system in readiness for triage and treatment Prevent spread of infection through nosocomial route. Create surge capacity within existing hospital systems and generate additional resources by establishing day care centres and temporary hospitals. Establish triage system. Ensure availability of adequate health personnel; if required mobilize from other states. Ensure safety of health care workers by vaccination/ prophylaxis, barrier practices, use of PPEs and skill update training. Ensure correct waste disposal practices, including terminal disinfections. Enforce implementation of recommended infection control practices. Implement guidelines for management of mass fatalities</p>
<p><b>Post Pandemic Period</b></p>	<p>Hospital systems Strengthen hospitals for next pandemic wave Review effectiveness of treatment and counter measures identify deficiencies and fill gaps. Replenish stock of anti virals and other essential drugs/ consumables. Ensure that overworked staff has opportunities for rest.</p>

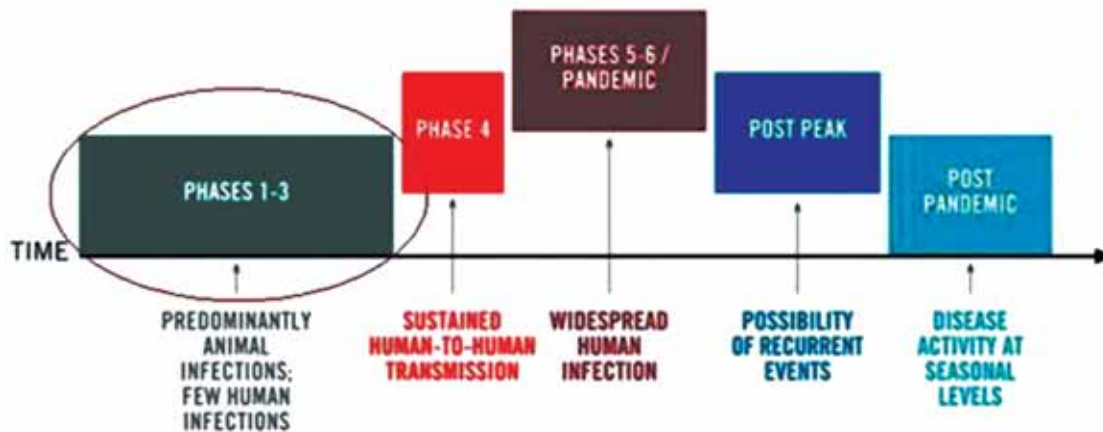


Fig1: Pandemic flu Phases(Source:WHO Global Alert and Response)

specific guidelines for capacity building and infrastructure upgradation as per pandemic phase as under:<sup>5</sup> The U.S. Department of Health & Human Services (HHS) has recommended planning according to the phase (Fig1) of the pandemic<sup>6</sup>. Healthcare facility responsibilities in the inter-pandemic and pandemic alert periods as per HHS guidelines include:

- Develop planning and decision making structures for responding to pandemic influenza.
- Develop written plans that address (a) disease surveillance in the hospital (b) hospital communications (c) education and training (d) triage, clinical evaluation, admission procedures (e) facility access (f) occupational health (g) use and administration of vaccines and antiviral drugs (h) surge capacity (i) Supply chain and access to critical inventory needs (j) mortuary issues.

According to the CDC facilities should review, and if not already in place, develop *written pandemic preparedness plans* anticipating widespread transmission of 2009 H1N1 influenza in communities<sup>7</sup>.

Checklists have been developed by the WHO<sup>8</sup>, CDC<sup>9</sup> etc for quick review of pandemic preparedness of a Healthcare facility including hospitals. OSHA (Occupational safety and health Administration) has also developed guidance for healthcare settings for occupational safety of the HCW<sup>10</sup>.

For Prevention and Control of Infection Standard Guidelines have been laid down by all the authorities including CDC, which have been updated from time to time.

Recommendations<sup>11</sup> of CDC for prevention and control of infection include:

- Promote and administer seasonal influenza vaccine
- Take Steps to Minimize Potential Exposures
- Monitor and Manage Ill Healthcare Person
- Adhere to Standard Precautions
- Adhere to Droplet Precautions
- Use Caution when Performing Aerosol-Generating Procedures
- Manage Visitor Access and Movement within the Facility
- Monitor Influenza Activity
- Implement Environmental Infection Control
- Implement Engineering Controls
- Train and Educate Healthcare Personnel
- Administer Antiviral Treatment and Chemoprophylaxis of Patients and Healthcare Personnel when Appropriate
- Considerations for Healthcare Personnel at Higher Risk for Complications of Influenza

SKIMS hospital began preparations for the H1N1 pandemic in June 2009 only after receiving a letter from Ministry of Health regarding the preparedness status of the hospital. WHO declared H1N1 a pandemic in June 2009.

All the above mentioned responsibilities such as steps to minimize potential

exposure, isolation facility, triage (engineering controls), surveillance, infection control practices (administrative controls), concern for occupational health, communication etc, were carried out well during the pandemic by SKIMS hospital but a written pre-pandemic plan was lacking. Biosafe lab facility was not developed and mortuary issues were not anticipated. Although training and awareness to all the categories of HCW was provided but they needed counseling and education regarding the foremost protective and preventive measure i.e., vaccination. Checklists should also have been adopted or laid down by SKIMS to assess its state of preparedness. However an incident Command Centre in the form of a nodal office was established as recommended in a WHO checklist<sup>8</sup>, which facilitated excellent coordination during the pandemic peak.

## CONCLUSION

WHO Director General declared the end of H1N1 pandemic on 10<sup>th</sup> August 2010. But at the same time she cautioned the world about the unpredictability of the pandemics. Avian flu which is presently at phase 3 is a lurking global threat. The study which presents the role played by a Hospital in Northern India is probably a model of other such hospitals in the developing world, constrained by lack of resources, meager health budget allocations and lack of scientific planning. A Pandemic Preparedness plan is expected to go a long way in preparing these resource crunched hospitals to deliver an efficient response. Pre-existing guidelines await adoption and implementation with / without modifications to suit the needs of these hospitals for future pandemic preparedness.

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