

Novel H1N1 Pandemic- An International Public Health Emergency
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Introduction & History: The term Influenza was first used in Italy and later in Europe to describe a sudden appearance of epidemic disease thought to be under the influence of stars. Occurrence of Influenza is ubiquitous. Influenza “flu”, Grippe or “Virus” afflicts man and animal since ancient times. The first description of Influenza was authored by the Greek physician Hippocrates in 412 BC. ⁽¹⁾ It occurs in all countries and affects millions of people every year and its behavior is till date unpredictable. Due to the ability of the influenza A virus to change its character (drift & shift described later) frequently, this is the only disease which presents both in epidemic or pandemic forms. Every year it is estimated that 5-15% of the global population suffers from Influenza and it affects in epidemic waves. Though majority of the cases are mild but still 3-5 million people suffer severe illness and the case fatality rate is 0.05% with an estimated death of 250,000- 500,000.⁽²⁾ This is also the single common disease causing repeated pandemics. The first influenza pandemic was recorded in 1580. ⁽³⁾ Since then 31 influenza pandemics have been described; the five most recent ones are in 1989,1900,1918,1957, 1968.) Intervals between the pandemics were 11, 18, 39, & 11 years.^(6,12) Pandemics recorded for extensive spread and mortality are “ Asiatic Flu” 1889–1890, purportedly caused by the H2N8 type of flu virus was first reported in May 1889 in Bukhara Uzbekistan and spread as far as North & south America. India was also affected by 1890 so also Australia. It had a very high attack rate & fatality rate about 1 million people died in this epidemic.^(4,5,6,7,) The “Spanish Flu” (1918-19) was first identified in March 1918 in US troops at Camp Funston, Kansas. By the year end it spread to the nook and corner of the whole world and affecting about one third of the entire population roughly about 500 million. It peaked up very quickly and vanished completely within 18 months. The case fatality rate was 2.5% It is estimated that at least 50 million were dead some say the figure can be double. In India alone 17 million died and in USA it is estimated that 675000 and in UK 200,000 died. The virus was recently reconstructed by scientist at CDC from the remains of a soldier and identified as of H1N1 type.^(8,11) In 1957-58 The whole world was under the grip of another pandemic known as “Asian Flu”. The causative organism was H2N2 and was first identified in China in late February 1957 and traveled to America by June 1957. The case fatality rate was 0.1%.The total estimated death all over the world was about 2 million in USA alone it caused a mortality of 70,000. In The last influenza pandemic was observed in 1968-69. This was caused by the Sub Type H3N2 virus and the first case detected was at Hong Kong and that’s why the pandemic is also known as Hong Kong Flu. The fatality rate was 0.1% and it took a toll of one million death world wide. The virus is still in circulation. ^(7, 9, 10). Novel H1N1 infection or swine flu is an emerging variant of common communicable disease-Influenza. The current flu virus was first detected in Mexico and later in United States in March and April 2009. The first H1N1 patient in United States was confirmed by laboratory testing at CDC on April 15 2009. And within a period of 3 months, it spread like wild fire. And on June 11th.World Health Organization (WHO) signaled that a Global Pandemic of Novel Influenza A (H1N1) was underway by raising the world wide pandemic alert level to Phase 6. (www.cdc.gov/h1n1flu/background.htm).

The agent of Infection: The causative organism of Influenza is a virus. The virus belongs to the family of *Orthomyxoviridae*. It has two genera: influenza A & B and influenza C virus. Of these viruses Influenza B & C viruses are almost exclusively isolated from man. In contrast Influenza A virus infects avian and mammalian hosts including poultry, horses, pigs and man. The virus is

spherical or filamentous in morphology with a diameter of 80-120nm.. It is enveloped with a lipid membrane which is derived from the host cell in which the virus has replicated. From the outer surface of this envelop extends two trans-membrane Glycoprotein- haemoagglutinin (HA) and neuraminidase (NA). These are commonly known as spikes. In the inside of the envelop Matrix protein (M) gives the structure to the virus and encapsidates the ribonucleoprotein (RNP) complexes. It consists of ribonucleic acid (RNA) associated with nucleoprotein (NP) as well as polymerases PA, PB1 & PB2 that are responsible for RNA replication and transcription. Two non structural proteins are also associated with the virus: NS2 is found in the virion and NS1 is found only in the infected cell. Basing on the antigenic differences between their nucleoproteins (N) & matrix protein (M) the three types can be distinguished from one another- Influenza A,B, C. Type A virus can be subdivided into sub types based on the antigenic nature of their surface haemoagglutinin (HA and neuraminidase(NA). So far 15 different HAs (H1 to H15) and 9 NAs (N1 to 9) have been found among all influenza viruses. A unique system of naming the virus was introduced in 1980 based on the type, host, place, strain number (if any), year of isolation and antigenic sub type of a virus. For example a swine influenza virus isolated in Mexico in 2009 would be designated as A/Swine/Mexico/1/09(H1N1). The influenza virus has a unique ability to change its H & N molecule. These genetic changes may be small and continuous or large and abrupt. Small, continuous changes happen in Type A and B influenza virus as the virus makes copies of itself. The process is due to spot mutation or missense mutations of the viral RNA causing minor changes in the make-up of the influenza virus, known as "Antigenic Drift". The drifting is frequent enough to make the new strain of virus often unrecognizable to the immune system of men. This is why Influenza surveillance system monitors the changes in the Antigenic characteristics and produce new vaccine to combat it. Type 'A" Influenza also undergoes infrequent but sudden changes which is known as antigenic "Shift". Scientists believe that Antigenic Shift occurs when two different flu strains infect the same cell and exchange genetic material. The novel assortment of HA or NA proteins in a shifted virus creates a new influenza sub type. If Swine virus is mixed with a human virus, this could create a new strain that has Swine type HA and human type NA. The commonest virus which is in circulation and are causing epidemics of Influenza are mainly A/H3N2, A/H1N1, and B (13,14) The swine flu of 1918 was known as H1N1, while in a later date the HA changed it was named as H2N1 and still later when the NA also undergone change it was named as H2N2 (double antigenic shift). (Silverstein)(15). If we examine the evolution of the Swine influenza virus from 1930 to late 90, it is observed that besides the classical influenza A (H1N1) which underwent little change, multiple strains and subtypes (H1N1, H3N2 & H1N2) of triple reassortant swine influenza A(H1) virus containing avian, human and pig swine influenza virus segments had evolved and predominantly circulating among North American Pig herds. (13, 14,15).

Sylvatic Cycle: Influenza "A" infection is a Zoonotic diseases. The natural hosts of Influenza "A" virus are Ducks and waterfowls with all 15 HA & 9 NA virus sub types circulating among them. In these species influenza virus affects the gastrointestinal system and not respiratory system, it replicates in the gut and are shed with the birds' droppings. The infection is sub clinical in the birds after infection it sheds virus for a long period as long as 30 days. This nature of infection in the migratory fowl along with its migratory habit and the ability of influenza virus to persist in cold water make it a natural reservoir of the virus. Frequently this natural reservoir comes into contact with the domesticated birds mostly ducks and then to chicken, pigs, horses, minks and

aquatic animals and directly transmitting the virus in these species. The infection in the mammals is associated with varying severity. (9). Sometimes avian derived influenza virus may infect man directly one such example is the F5N1 virus isolated in 1997 from patients in Hong Kong. Six out of eighteen people infected died (15, 16,17).The avian influenza virus H5N1 which emerged in the Guangdong province of China in 1996 spread all over the continents in the poultry population and from many of the countries human infection was reported.(24,25) The worst affected were Indonesia (140.) Vietnam (111.) Egypt (81.) China (38.). A complete list of the H5N1 infection in different countries of the world is available in the WHO *website on timeline of Major avian influenza A (H5N1) events*. Fortunately the virus continues to show inefficient spread both from animals to human and human to human.. probably the virus has not yet adapted for human to human transmission. In India also we had epizootic transmission in several states like West Bengal, Tripura, Assam and Sikkim but no human cases were reported. The current outbreak of influenza in Mexico in April 2009 which has turned to a pandemic was caused by a virus consisting of North American & Eurasian components. This novel influenza variant is believed to be the result of a recent reassortment of three distinct swine influenza virus lineage, resulting in a novel hybrid of H1N1. This included North American swine haemagglutinin (H1) Eurasian neuraminidase (N1) and matrix proteins and contribution of remaining segments from the classic reassortant swine virus.(18)

Role of Pig as intermediary host in the chain of natural infection Practices, of Poultry and Pig rearing in different communities increases the frequency of contact between poultry and pig, pig and pig and pig and human and thus providing an ideal opportunity for co-circulation of viruses and genetic reassortment. Pigs have the cell surface receptors for both human and avian viruses and thus it becomes easy for the establishment of the infection (19). It is also established that genetic reassortment of influenza viruses occurs frequently in pigs.(20,21,22). The transmission from the Pigs to human beings can occur in three different forms; i) The virus may be **directly transferred** from an infected pig as it happened in 1918 H1N1 Spanish Flu. (ii) The avian and human influenza virus may undergo **Genetic reassortment** in the infected pig and than the reassorted virus being transmitted to human being as observed in the 1957 pandemic due to” Asian flu virus” (H2N2) and outbreak of Hong Kong flu in 1968 (H3N2). (iii) The third possibility is the **reemergence of a virus** that may have caused an epidemic many years earlier. (23). The current infection with the triple reassortment swine influenza A H1 virus containing the genes of three species, avian, pig and man influenza virus became a enzootic in the herds of pigs in North America during late 1990s. Shinde and his colleague reported the first 11 cases of infection of humans with the newly emerged triple reassortant swine influenza virus from “December 2005 to February 2009 until just before the current epidemic of Swine influenza A (H1N1).(37) The data is based on the CDC’s routine national influenza surveillance reports and from joint case investigation by public & animal health agencies. (37). The transition period for the species jump from pigs to human beings seems to be about 4 years.

Human to Human transmission: In case of influenza the natural reservoir of infection of influenza is the birds & pigs. But as explained earlier it is evident that human being can get the infection directly from the birds or from the pigs either with a old strain or a new strain of virus by a process of recombination of genes of human, bird and animal viruses. The bird to human

infection does not convert to human to human transmission, but the pig to human transmission may cause human to human transmission consequently it may turn to a pandemic. The source of human infection is a case with symptoms or a sub clinical case. The secretion of the respiratory tract of an infected person is infective. Spread or transmission is person to person by droplet infection or droplet nuclei produced by coughing, sneezing or even talking. Droplet infection is caused by the direct projection of a spray of droplets of saliva and naso-pharyngeal secretion during coughing, sneezing, talking & spitting in the surrounding environment. And if a person is there within a distance of 30-60 cm the expelled droplets may impinge directly on the oral & respiratory mucosa, skin, conjunctiva and particles of 5 μ m or less will be able to penetrate deeply and reach the alveoli of the lung. One can also get the infection through the hand to his mouth or nose if his hand is contaminated by contacting any material (e.g. Door knobs, railings) surface contaminated with the naso-pharyngeal & oral secretion of an infected person directly or through droplet nuclei. (13)

Dynamics of transmission in the Community & 2009 Pandemic: Generally influenza is a seasonal disease and in India outbreaks are observed in summer and in winter also. In America outbreaks usually occur in the late fall and winter. It spreads through communities creating epidemics. During epidemics the number of cases reaches the peak in about three weeks and subsides by another 3 or 4 weeks. As schools are an excellent place of transmission of the infection families with school children are more susceptible and on an average one third of the family members are infected each year. In India we do not have the data of the incidence of infection. But as per CDC estimates the incidence is 5-15% of the total population and the fatality 0.05%. (2) The above epidemiological scenario is observed when the prevalent Influenza virus is in circulation. But when a new strain (Shift) emerges in any community either originating or enters from outside the country the outcome is different. As the individuals in the community do not have any immunity against the newly emergent virus its attack rate may be same or high and fatality will also be variable depending on the existing community immunity. As stated earlier the current pandemic was preceded by an enzootic infection among pigs herds in North America since late 1990. (26,27,28,29,30) And the human index case of pandemic (H1N1) 2009 appeared in the town of La Gloria in the state of Veracruz, a region containing large scale industrial pig farms. By 15th March it spread to Mexico City. In the earlier period of transmission the spread was sporadic but later human to human transmission was sustained and it was amplified after the people returned from holiday (5th- 19th April). (38). It may also be possible that the initial pig to human transmission was also going on in Mexico for a long time as in USA or the adapted virus in human from USA might have been transported to Mexico as it is observed that the focal point of initial infection started in a place with industrial pig farms. The pandemic is just 5 months old and the source of infection was the infected travelers from infected places. Like any other man to man to transmission through airborne route it will have three phase the first phase or initial phase persons from abroad (primary source) with infection will introduce the infection in the community and then the secondary infection to the other susceptible. Secondary attack rate, Generation time and community infection rates are the important disease transmission parameter on which our strategy for control has to be based. Secondary attack SAR reflects the risk of someone being infected with a disease by a contact with ill person. Generation time is the doubling time or the time required for the number of infections to get doubled community infection rate gives us an idea of

number of expected number of cases in a similar community. CDC has reported a secondary attack rate (SAR) of Acute Respiratory illness as 18-19% and 8-12% for Influenza like illness in American community. The New York Health department has released a preliminary finding from household survey conducted between May 1 and May 20 2009 that the 6.9% of New Yorkers may have experienced flu like illness. They have also worked out the generation time of the Novel Influenza A (H1N1) flu infection in several states of Mexico indicates that the Generation time for ARI is 2.0-3.1 days and Influenza like illness (ILI) as 2.4-3.1 days. (35) Babak et al in the Mexico outbreak using novel contact network methodology, incorporating dates of symptoms onset and hospitalization, variation in contact rates, extrinsic social factors and also uncertainties of under reporting and disease progression deducted the Reproduction number based on suspected cases and confirmed cases. The Reproduction number for suspected cases is 1.51 (95% cl/ . 1.32-1.71). The reproduction Number of Confirmed Case after correction for ascertainment is 1.43 (95% cl/ 1.29-1.57).(32). So the case reproduction number is not very high (in TB 10-12) but as the contact period is very short there is a possibility of clustering as it has been observed in each city. The other parameter is the age distribution of the affected. In the table below

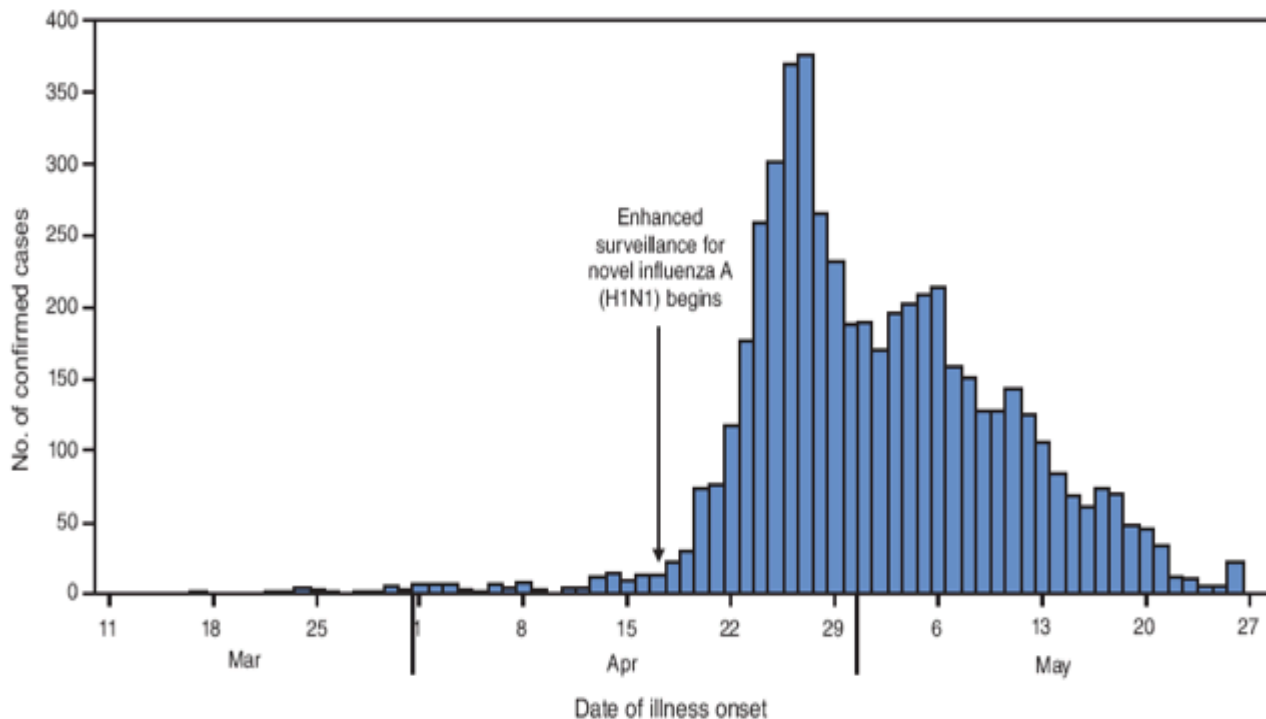
TABLE.1 Number of suspected,* tested, and laboratory-confirmed novel influenza A (H1N1) cases and deaths --- Mexico, March--May 2009

Age group (yrs)	No. suspected cases	No. tested	No. laboratory-confirmed positive†	(%)	Rate per 100,000 population	Deaths among laboratory-confirmed cases (% of confirmed deaths)		2009 population§
						(%)	(%)	
0--4	6,428	3,520	695	(13.2)	7.26	5	(5.2)	9,578,579
5--14	7,742	4,229	1,517	(28.7)	7.11	7	(7.2)	21,327,734
15--29	11,568	7,591	1,704	(32.3)	5.83	26	(26.8)	29,221,168
30--59	12,687	8,507	1,251	(23.7)	3.26	54	(55.7)	38,330,279
≥60	2,249	1,016	112	(2.1)	1.23	5	(5.2)	9,092,937
Age missing	1,324	264	58	---	---	---	---	---
Total	41,998	25,127	5,337	(100.0)	4.96	97	(100.0)	107,550,697

* The initial definition of suspected novel influenza A (H1N1) virus infection included any hospitalized patient with severe acute respiratory illness. On May 1, this definition was expanded to include any person with acute respiratory illness defined as fever and either sore throat or cough. On May 11, the definition of suspected case was changed again to include any person with fever, cough, and headache, plus at least one of the following: rhinorrhea, coryza, arthralgia, myalgia, prostration, sore throat, chest pain, abdominal pain, or nasal congestion. In children aged <5 years, irritability replaced headache. † Reported as of May 29, 2009. FIGURE 2. Number (N = 5,305) of laboratory-confirmed cases of novel influenza A (H1N1) virus infection,* by date of illness onset --- Mexico, March--May 2009

§ From Consejo Nacional de Población. Available at http://www.conapo.gob.mx/index.php?option=com_content&view=article&id=36&Itemid=234.

In table 1 we observe that the age group maximum affected is 15-29 yr followed by 5-14 and 30-59 yrs. And the fatality is highest in the younger age group 5-14 followed by 15-29. Basing on the distribution one can hypothesized that probably the elderly group has some immunity from earlier pandemics or it may be due to chances of contact only. We can also see the progression of the out break from the time series graphs of the disease. As the demography and other social and behavioral attributes of the population are more or less same we can use the data for initial program planning and later when we shall analyze and have our own surveillance data we can utilize it for refining our strategy and programs for control.



- Includes all confirmed cases with onset data reported as of May 29, 2009. Does not reflect all cases because of a backlog of untested specimens. The figure above shows the number (N = 5,305) of laboratory-confirmed cases of novel influenza A (H1N1) virus infection, by date of illness onset in Mexico from March through May 2009. The peak number of confirmed cases (375) had onset of April 27. As of May 29, all states in Mexico had reported laboratory-confirmed cases of novel influenza A (H1N1) virus.

Moreover we had a natural experimentation in Maharashtra where just after the initial occurrence of cases a large congregation occurred in different areas due to Ganesh Chaturthi where the possibility of person to person infection was immense and if we don't have double number of cases by another 7-8 days than we should presume that the infection will not take a epidemic proportion.

Clinical Spectrum: Generally Influenza infection is characterized by a shorter incubation period (typically 1-4 days), pre clinical virus shedding and peak infectiousness shortly after illness onset. (38,39). The Triple reassortant Swine Influenza A (H1) in Humans as reported by Shinde et al. that the time from the last known exposure to the infected pig and onset of symptoms in their observed series was 3 to 9 days. In their observation the predominant symptom was Cough (100%), Fever (90%), Head ache (60%) and diarrhea (30%).(37) Babak et al in their report on initial human transmission dynamics of the Pandemic H1N1 2009 Virus in North America reported that the Latency Period is average 3 days (range: 1-5 Days), Asymptomatic Infectious period is 1 day (0-2 days), and Symptomatic Infectious period 7 days (4-10). Median interval between contact with a confirmed symptomatic case and development of symptoms is 6 days (95% CI 5-7 days).(32) In the Mexican outbreak they defined a suspected case as a person having fever, cough, and headache, plus at least one of the following: rhinorrhea, coryza, arthralgia, myalgia, prostration, sore throat, chest pain, abdominal pain, or nasal congestion. In children aged <5 years, irritability was replaced headache.(40)

Influenza illness has a wide clinical spectrum including mild or asymptomatic infection with a overall, case fatality rate below 2% even during the worst pandemic on record (1918) and 10 fold lower still during subsequent pandemic (3). Of the 11 patients four patients were hospitalized, two of whom underwent invasive mechanical ventilation and four patients received antiviral treatment and there was no mortality (Shinde et al.)

Prevention & Control:

Control of Spread: Unlike Swine influenza SARS had a relatively long incubation period 4-6 days and the peak infectious period that was delayed till 10th day of severe illness (32).More over SARS was transmitted predominantly in the health care settings with a case fatality rate exceeding 10%. These features made easy to detect and control the spread by measures like contact tracing before substantial spread and case isolation. Though the reproduction numbers of the two infections are not dramatically different but the transmission dynamics are quite different and as such to contain Influenza infection in a community will need a different set of population based social distancing and mitigation measures. The strategy to be adopted in case of Pandemic Influenza are as follows::

Screening of Air Traveler's & Quarantining:: In India the source of the infection is from outside the country and the communicable period is very short so one can restrict the entry of the infected source by Strict surveillance of Incoming passengers from the affected area with signs and symptoms suggestive of Swine Influenza and quarantine those who shows the signs and symptoms. The universal sign is fever basing which one can screen. The screening should not be by self declaration

but by thermo sensors. So that it becomes effective. We should change our Airport screening program of self declaration immediately. All those who travels from infected countries whether with or without symptom should be advised to attend a swine flu designated centre if the symptoms appeared where containment measures could be taken. Those who are categorized as suspect should be quarantined strictly unless proved otherwise. They should also counsel that this step is taken so that they are protected from secondary infection (after infection with Swine flu or any flu virus immune system is compromised so one can get infection from others). This must be emphasized more than they are held for not infecting others. Unfortunately our surveillance & containment program at the Airport needs to be overhauled and make it effective. The steps to be taken are providing thermo sensor in all International Airports, training of our public health staff & also doctors to specifically for Airport screening with counseling and communication skills, and last but not the least amending the archaic Indian Epidemic Act. At the same time we should improve our existing quarantine facilities. Those who are without the symptom but have traveled in the affected countries should be advised that if the following signs arise within the first week of their arrival they should immediately report to the Flu designated centre of the area.

Early Diagnosis of Severe infection and complication: The objective of early diagnosis and prompt treatment is two fold. One is related to personal care and the other is for preventing the spread in the community. The generation time for flu like illness in Mexico was observed as 2.4-3.1 days (35) and asymptomatic latency phase was observed as 1-5 days. So we can compute that the communicable period of Swine Influenza may be 5-10 days. So if a suspect can be segregated during the first 5 days with the symptom than we can control the spread. Accordingly the strategy to be taken is graded segregation & isolation and containment. We have to plan our strategy according to the chronological events occurring in the natural history of the current disease. This can be done after carrying out the case series analysis of all the cases occurred till date. Generally the disease starts with mild symptoms and remains mild for all the days. These are the cases who can be asked for self segregation and have plenty of fluid and easily digestible food etc. They should not come out and contact others as they are more vulnerable for getting secondary infection and suffer from complication. If the fever and other symptoms become sever at any point of time they should immediately visit the flu designated centre where the doctors will examine and provide package of service as per the common protocol circulated by the authority. The protocol should be suited to our country and based on the clinical evidence, which can be obtained by computing the natural history of the current swine flue from case series analysis. Decision to undertake diagnostic test and prophylactic treatment should be based on a thorough cost effective study. Ministry of health Government of India has already made a diagnostic & management protocol which seems to be adequate. But a constant monitoring has to be done to find out the efficacy of the Protocol.

Strengthening the Infrastructure- Designated flu treatment & diagnostic centre should be earmarked for each area. And the location should be widely advertised so that every one in the locality knows about it.

Designated Flu treatment Centers: It may be public or private. To have an equitable distribution and universal accessibility it should established in all parts of the Urban areas as in the urban areas as we don't have a good infrastructure. The flu treatment centre doctors should be well versed and should keep a track of the patient. Here the patients can report and doctors after assessing categories the patient as per Govt. Protocol and collect blood for diagnosis and send to designated diagnostic centre and if necessary dispense prophylactic treatment. They will also decide whether the patient requires hospitalization or domiciliary treatment. Those who are under domiciliary treatment should be counseled for self segregation and take all preventive measures for protecting himself from secondary infection and infecting others in the family.

Diagnostic Centre: Each of the cities must have a designated diagnostic centre. Here the patient should not be sent as we have observed that during the initial period all the suspected patients congregated in theses centers and probably we encouraged transmission by doing so.

Continuing Education to all Health care providers & their Involvement in Decision making: This is the most crucial area in the successful implementation of any containment program. The role of the doctor and the paramedical both government and private is paramount and strictly follow the protocols. The reason is very simple to understand that in many of the viral fever cases it is observed that the patient do not die up the infection but due to the haphazard drug administration either by OTC drugs or prescribed ones. It will be a interesting to do a audit and find out the drug prescribing pattern in the cases of flu like illness and then one can find out why the death rates are so high. As both the public and private health personnel are involved we have to take the help of the professional association like IMA, API, AAP, IAPH for continuing medical education on rational diagnosis and rational use of test and drugs. This is the area till date the government has neglected. Involvement of professional Association will go a long way rather than involving few selected health care provider in decision making.

Surveillance: Disease surveillance of our country is still not effective. Otherwise by this time we should have some information on the important parameters of the outbreak available for peer review by health experts for suggesting effective intervention. Moreover our disease surveillance system is focused to disease surveillance report of human being only and do not include data on environmental quality viz. water, air, or surveillance data from Animal Husbandry to assess the epidemiological situation and use the same in formulating intervention against the prevailing health problems. There is a great need to review our existing disease surveillance mechanism and make it more comprehensive to include surveillance of the determinant of disease along with current integrated disease surveillance system. During this pandemic we shall have to be particularly cautious so that our pig population does not go to an enzootic stage and the disease gets a permanent foothold. As a public Health measure we should establish a well planned surveillance program in the pig population as we have presumably done for avian flu and link it with our disease surveillance program. This will also serve to plan effective programs against other Zoonotic diseases.

Vaccination: Vaccination is theoretically the panacea for control of Swine flu. But before we make it a National policy and allocate a huge resource we should study the results of a community intervention. Decision makers are requested to go through an article by Joel Warner "The sky is falling: An analysis of the swine Flu Affair of 1976".

BCC: The emphasis should be to convince the people that majority of the swine flu cases will behave as a common cold with symptoms like mild fever, cough head ache and will not require any treatment except bed rest and plenty of fluid and nutritious easily digestible food. Visit your nearest designated Flu treatment centre and get the doctors advice. Don't take any OTC drugs. Take drugs for flu after consulting a doctor. The other important component of behavior change is improving the personal hygiene by improving the cough etiquette and hand hygiene. This is the time when people are receptive so we should utilize the occasion.

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