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Management of Avian Influenza

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ABSTRACT

To challenge the epizootic of **avian influenza A (H5N1) viruses** among birds continues to cause human disease with high mortality and threat of a pandemic, an **updates 2005 report** was reviewed recently by World Health Organization (WHO) including Highly pathogenic avian influenza A (H5N1) viruses that evolve into **many phylogenetically** among poultry in parts of Asia, Africa, and the Middle East, **incidence and demographic characteristics, surveillance** for cases (focused on patients illnesses, villagers living with backyard poultry, markets, and health care workers) and t**ransmission** of H5N1 virus direct from avian-to-human or other domestic mammals. More than 90% of case clusters have occurred among blood-related family members, suggesting possible **genetic susceptibility..Incubation period** generally appears to be 2-9 days in variety. Bronchiolar and alveolar cells, but not epithelia from the trachea or upper respiratory tract, **express detectable 2,3-linked sialic acidreceptors.** The detection of viral RNA by means of conventional or real-time reverse-transcriptase polymerase chain reaction remains the best method for the initial diagnosis of influenza A (H5N1). **Clinical** manifestations as severe pneumonia is often progresses rapidly to the acute respiratory distress syndrome. Less frequent gastrointestinal symptoms have been reported since 2005, Manifestations of each clade may differ. **Treatment and hospitalisation** for patients with suspected or proven influenza A (H5N1) should be done for isolation due to clinical monitoring, diagnostic testing, and antiviral therapy; is based on supportive care with supplementary oxygen and mechanical ventilation. Early treatment with oseltamivir is recommended and late initiation of therapy appears to be a major factor for the mortality. The oral bioavailability of oseltamivir in patients with severe diarrhea or gastrointestinal dysfunction related to influenza A (H5N1) virus infection or those in whom the drug has been administered extemporaneously (e.g., by means of a nasogastric tube) is uncertain. A higher dose of oseltamivir (e.g., 150 mg twice daily in adults) and an increased duration of therapy, for a total of 10 days, may be reasonable especially if there is pneumonic disease at presentation or evidence of clinical progression. **Other treatments** are for nosocomial complications. Using corticosteroids shown no effective and can result in serious adverse events. Antiviral prophylaxasis and immunization is proposed to complete the strategies .Healthcare worker should protected by high-efficiency masks (NIOSH-certified N-

95 or equivalent), long-sleeved cuffed gowns, face shield or eye goggles, and gloves. **Prevention** should be done because Avian influenza A viruses are readily inactivated by a variety of chemical agents and physical conditions. Guidelines for the prevention of infection with influenza A (H5N1) virus in various risk groups, including poultry workers, travelers, and health care workers are managed by U.S. Centers for Disease Control and Prevention. Some influenza A (H5N1) viruses isolated from humans have acquired **mutations** that permit binding to both α2,3-linked sialic acid receptors and α2,6-linked sialic acid receptors. The changes in multiple viral genes are generate a potentially **pandemic influenza A (H5N1)** virus.. The world is presently (January 2006) in **phase 3** and **WHO Global Influenza Preparedness Plan** (WHO 2005) in different phases are made in order to face pandemic influenza A (H5N1). The International co-operation are needed. General measures should accessible to everyone and risk of communication develop generation of fear and panic should be avoided. **Five essential action strategies** to reduce the risk of a pandemic outlined by the WHO fare should start as soon as possible.

FULL PAPER

The unprecedented epizootic of avian influenza A (H5N1) viruses among birds continues to cause human disease with high mortality and to pose the threat of a pandemic, an **updates 2005 report** was reviewed recently by World Health Organization (WHO). Highly pathogenic avian influenza A (H5N1) viruses has evolved into **many phylogenetically** distinct clades and subclades are entrenched among poultry in parts of Asia, Africa, and perhaps the Middle East. The influenza A (H5N1) viruses that have infected humans have been entirely avian in origin, and they reflect strains circulating locally among poultry and wild birds.

Incidence and demographic characteristics shows that the median age of patients with influenza A (H5N1) virus infection is approximately 18 years, with 90% of patients 40 years of age or younger and older adults underrepresented. The overall case fatality proportion is 61%; it is highest among persons 10 to 19 years of age and lowest among persons 50 years of age or older. Whether preexisting immunity, differences in exposure, or other factors might contribute to the apparently lower frequency of infection and lethal illness among older adults is uncertain. Most patients with influenza A (H5N1) virus infection were previously healthy. There in no cases have been identified among short-term travelers visiting countries affected by outbreaks among poultry or wild birds, although clinicians should consider this possibility. In one quarter or more of patients with influenza A (H5N1) virus infection, the source of exposure is unclear, and environment-to-human transmission remains possible.

Surveillance for cases of influenza A (H5N1) has focused on patients with severe illness, milder illnesses in children, villagers living with backyard poultry, workers in live-poultry markets, and health care workers.

Transmission of H5N1 virus is direct from avian-to-human and it is the predominant means of human infection. The exact mode and sites of influenza A (H5N1) virus acquisition in the respiratory tract are incompletely understood. Handling of sick or dead poultry during the week before the onset of illness is the most commonly recognized risk factor. The influenza A (H5N1) virus can also infect mammalian hosts such as domestic cats and dogs and have an important role for viral adaptation to mammals. It is unknown whether influenza A (H5N1) virus infection can begin in the human gastrointestinal tract. In several patients, diarrheal disease preceded respiratory symptoms, and virus has been detected in feces. Acquisition of influenza A (H5N1) virus infection in the gastrointestinal tract has been implicated in other mammals. Drinking potable water and eating properly cooked foods are not considered to be risk factors, but ingestion

of virus-contaminated products or swimming or bathing in virus-contaminated water might pose a risk. More than 90% of case clusters have occurred among blood-related family members, suggesting possible **genetic susceptibility**. Respiratory secretions and bodily fluids, including feces, should be considered potentially infectious. In some of patients the source of exposure is unclear, and environment-to-human transmission remains possible.

Incubation period generally appears to be 2-9 days in variety. After exposure to infected poultry, the incubation period generally appears to be 7 days or less, and in many cases this period is 2 to 5 days. In clusters in which limited, human-to-human transmission has probably occurred, the incubation period appears to be approximately 3 to 5 days, although in one cluster it was estimated to be 8 to 9 days.

Pathogenesis of viral and host factors that determine host-restriction and disease manifestations are incompletely understood. The primary pathologic process that causes death is fulminant viral pneumonia. The target cells for replication of the influenza A (H5N1) virus include type 2 alveolar pneumocytes and macrophages. Bronchiolar and alveolar cells, but not epithelia from the trachea or upper respiratory tract, express detectable α2,3-linked sialic acid receptors. Limited data show that patients with influenza A (H5N1) disease may have detectable viral RNA in the respiratory tract for up to 3 weeks, presumably because of negligible preexisting immunity and possibly viral evasion of immune responses. One patient with fatal infection treated with both antiviral agents and corticosteroids had viral antigen and RNA in tracheal samples on day 27 after the onset of illness. Viral loads in the pharynx are higher and plasma viral RNA is detected more often in patients with fatal disease than in those with nonfatal disease, indicating that levels of viral replication influence the outcome. The reported presence of infectious virus in the blood, cerebrospinal fluid, or viscera of several patients with fatal disease indicates that, as in birds and several mammalian species, disseminated infection occurs in some humans. Infectious virus and viral RNA have been detected in feces and intestines, suggesting that the virus sometimes replicates in the gastrointestinal tract.

Pathological findings of the few reported autopsies of patients with influenza A (H5N1) virus infection have shown diffuse alveolar damage with hyaline membrane formation and acute inflammation presumably result from host cytokine responses and viral infection. Edema and degeneration of myocytes in the heart and extensive acute tubular necrosis in the kidney have been observed. As a **Host Responses** there are higher plasma level both proinflammatory and antiinflammatory cytokines (interleukin-6, interleukin-10, and interferon-γ) particularly in patients with fatal infection that correlate positively with pharyngeal viral loads. Knowledge of the mechanisms of hypercytokinemia is insufficient to guide safe, rational immunomodulatory treatment at present.

Laboratory Diagnosis is made by detection of viral RNA by means of conventional or real-time reverse-transcriptase polymerase chain reaction and remains the best method for the initial diagnosis of influenza A (H5N1). Leukopenia, lymphopenia, mild-to-moderate thrombocytopenia, and elevated levels of aminotransferases are common.and all of this is associated with a poor prognosis. Other reported abnormalities include elevated levels of creatine phosphokinase, hypoalbuminemia, and increased d-dimer levels (indicative of disseminated intravascular coagulopathy). The nonspecific clinical presentation of influenza A (H5N1) disease has often resulted in misdiagnosis of subsequently confirmed cases.

Clinical manifestations as severe pneumonia is often progresses rapidly to the acute respiratory distress syndrome. The time from the onset of illness to presentation (median, 4 days) or to death (median, 9 to 10 days) has remained unchanged from 2003 through 2006. Febrile upper respiratory illnesses without pneumonia in children have been reported more frequently. Less frequent gastrointestinal symptoms have been reported since 2005, Manifestations of each clade may differ.

Treatment and hospitalisation for patients with suspected or proven influenza A (H5N1) should be done for isolation due to clinical monitoring, appropriate diagnostic testing, and antiviral therapy. The management is based on supportive care with supplementary oxygen and mechanical ventilation with certain approach. Early treatment with oseltamivir is recommended and data from uncontrolled clinical trials suggest that it improves survival although the optimal dose and duration of therapy are uncertain. Mortality remains high despite administration of oseltamivir; late initiation of therapy appears to be a major factor. Uncontrolled viral replication, as reflected in the detection of persistent pharyngeal RNA after completion of standard therapy, is associated with a poor prognosis. Higher levels of viral replication and slower clearance of infection probably occur in the lower respiratory tract.[3] The oral bioavailability of oseltamivir in patients with severe diarrhea or gastrointestinal dysfunction related to influenza A (H5N1) virus infection or those in whom the drug has been administered extemporaneously (e.g., by means of a nasogastric tube) is uncertain. A higher dose of oseltamivir (e.g., 150 mg twice daily in adults) and an increased duration of therapy, for a total of 10 days, may be reasonable, given the high levels of replication of the influenza A (H5N1) virus, observations of progressive disease despite early administration of standard-dose oseltamivir (75 mg twice daily for 5 days in adults) within 1 to 3 days after the onset of the illness, and the proven safety of higher doses in adults with seasonal influenza, especially if there is pneumonic disease at presentation or evidence of clinical progression.

Other treatments for nosocomial complications remains fundamental in the management of influenza A (H5N1) disease. Corticosteroids should not be used routinely because shown to be not effective and prolonged or high-dose of corticosteroids can result in serious adverse events including opportunistic infections such as central nervous system toxoplasmosis. A fatal influenza A (H5N1) infection in one pregnant woman who received corticosteroids for treatment of the disease was associated with virus infection of the brain, placenta, and fetus. Healthcare worker should protected by high-efficiency masks (NIOSH-certified N-95 or equivalent), long-sleeved cuffed gowns, face shield or eye goggles, and gloves.

Prevention should be done because Avian influenza A viruses are readily inactivated by a variety of chemical agents and physical conditions, including soaps, detergents, alcohols, and chlorination. Guidelines for the prevention of infection with influenza A (H5N1) virus in various risk groups, including poultry workers, travelers, and health care workers, are available from the U.S. Centers for Disease Control and Prevention and the WHO.

Antiviral Chemoprophylaxis from WHO guidelines for the use of antiviral agents for prophylaxis in persons who have been exposed to influenza A (H5N1) viruses in the current pandemic-alert period have been published. Mathematical models of an emerging outbreak of influenza A (H5N1) in rural Asia predict that a strategy of mass, targeted antiviral chemoprophylaxis and social-distancing measures might extinguish or delay pandemic spread of the virus. The WHO has a stockpile of oseltamivir for this purpose and is working with partners for implementation of its distribution in the event of an outbreak.

Immunization as a one of prevention metode may have importance. Safe and immunogenic inactivated H5 vaccines have been developed.[6] Reverse genetics permits the rapid generation of seed viruses with attenuated virulence, but the changing antigenicity of circulating strains of influenza A (H5N1) viruses calls for new candidate vaccines from different lineages[6] and the development of vaccines that elicit cross-clade immunogenicity. H5 hemagglutinin appears to be a weak human immunogen. The antibody levels required for protection against human influenza A (H5N1) illness are unclear. The durability of antibody responses is limited, but boosting with a homologous vaccine[70] or virus vaccine with viral antigen from another clade[75] appears to be effective in persons who have received two priming doses. Prepriming might allow single doses of a homologous vaccine to be sufficient for an antigenically drifted pandemic virus. However, decisions regarding the use of vaccine before a pandemic and stockpiling require complex risk–benefit and cost–benefit analyses that include effects on the seasonal capacity of vaccine production, because the timing

and cause of the next influenza pandemic are unknown, and it is unclear whether immunization of large populations could have adverse consequences. Initial studies in children and elderly persons suggest that antibody responses to subvirion vaccines at high doses (45 or 90 µg) are similar to those in young adults. Approximately 15 to 20% of older adults have some baseline neutralizing antibodies to H5N1 virus and may have a response to a single dose.[6] The mechanisms leading to these antibodies are uncertain. Other studies to date have shown that intradermal H5 vaccines at low doses are poorly immunogenic and may be associated with injection-site reactions.[6] Intranasal live attenuated H5 vaccines are highly effective in animal models,[76] but they show a variable ability to replicate in humans and to induce immune responses. Various investigational approaches, including conserved antigen vaccines, vectored H5 vaccines, and other adjuvants, are being explored.

Some influenza A (H5N1) viruses isolated from humans have acquired **mutations** that permit binding to both α2,3-linked sialic acid receptors and α2,6-linked sialic acid receptors, but these mutations appear to be insufficient for efficient human-to-human transmission. Changes in multiple viral genes are probably required to generate a potentially **pandemic influenza A (H5N1)** virus.

Previous Influenza Pandemics (worldwide epidemics) are known to have occurred, all caused by influenza A viruses

- This happened in 1918 (the "Spanish flu", caused by a H1N1 subtype)
- In 1957 (the "Asian flu" caused by a H2N2 subtype)
- In 1968 (the "Hong Kong flu", caused by a H3N2 subtype).

Conservative estimates suggested that the mortality from the 1918 pandemic was 20 to 40 million. However, recent studies from Africa and Asia suggest that the number of victims worldwide might have been closer to 50-100 million (Johnson 2002). Influenza experts have estimated that in industrialised countries alone, the next influenza pandemic may result in up to 130 million outpatient visits, 2 million hospital admissions and 650,000 deaths over two years. The impact is likely to be even greater in developing countries (WHO 2004). A 1918-type influenza pandemic today is projected to cause 180-360 million deaths globally (Osterholm 2005).

H5N1 Pandemic Threat

So far (January 2006), nine countries in the Far East have reported poultry outbreaks of a highly pathogenic H5N1 avian influenza virus: the Republic of Korea, Vietnam, Japan, Thailand, Cambodia, Laos, Indonesia, China, and Malaysia. The outbreaks in Japan, Malaysia, and the Republic of Korea were successfully controlled, but the virus seems to have become endemic in several of the affected countries. The Southeast Asian outbreaks resulted in the death or destruction of more than 150 million birds and had severe consequences for agriculture, most especially for the many rural farmers who depend on small backyard flocks for income and food.

The recent outbreaks of the same virus strain in birds in Russia, Kazakhstan, Turkey, Romania, and Croatia provide evidence that it has spread beyond the initial focus (WHO 2005a, WHO 2005b).

Human cases of avian influenza A (H5N1), most of which have been linked to direct contact with diseased or dead poultry in rural areas, have been confirmed in six countries: Vietnam, Thailand, Cambodia, Indonesia, China, and Turkey (see Table 1). The figures for confirmed human cases of avian influenza A (H5N1) infection reported to the WHO are regularly updated on the WHO webpage.

Influenza Pandemic Preparedness

Planning is essential for reducing or slowing transmission of a pandemic influenza strain and for decreasing or at least spreading out the number of cases, hospitalisations and deaths over time. Preparedness will help to maintain essential services and to reduce the economic and social impact of a pandemic (WHO 2004). The pandemic risk in developing countries is closely related to human exposure. In some African, Latin American and Southeast Asian countries, people sleep in the same places as poultry. In Southeast Asia and beyond, markets with live poultry pose a risk of human transmission (Webster 2004). Reducing human exposure requires education about handling poultry and a fundamental change in cultural attitudes towards human-animal interactions in many parts of the world (World Report 2005). Simple precautionary measures for food preparation, poultry handling, and avoidance of contaminated water are essential until effective human vaccines for H5N1 viruses become available (Hayden 2005). Therefore, pandemic preparedness in developing countries should consider funds for public education to generate cultural changes and improvements in hygiene.

Pandemic Phases

In order to define the sequence of actions during certain key events, the WHO Global Influenza Preparedness Plan (WHO 2005d) distinguishes different phases. The world is presently (January 2006) in phase 3, as a new influenza virus subtype is causing disease in humans, but is not yet spreading efficiently and sustainably among humans.

Interpandemic Period

- Phase 1 No new influenza virus subtypes have been detected in human
- Phase 2 No new influenza virus subtypes have been detected in human. However, a circulating animal influenza virus subtype poses a substantial risk[a] of human disease

Pandemic Alert Period

- Phase 3 Human infection(s) with a new subtype, but no human-to human spread
- Phase 4 Small cluster(s) with limited human-to-human transmmision
- Phase 5 Larger cluster(s) but human-to-human spread still localised, suggesting that the virus is becoming increasingly better adapted to human

Pandemic period

- Phase 6 Pandemic phase: increased and sustained transmission In the general population

Postpandemic period Return to interpandemic period.

Pandemic surveillance (systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practices) should include monitoring of the following events: hospital admissions of suspected or confirmed cases of pandemic strain influenza, deaths among suspected or confirmed cases of influenza due to the pandemic strain, workforce absenteeism in services designated as essential, vaccine usage for routine and pandemic strain influenza vaccines (if these are available), adverse vaccine events attributed to the pandemic strain vaccine (if available), data collection for later use in the calculation of effectiveness of the pandemic strain vaccine, monitoring pneumococcal vaccine use and adverse events associated with its use (if this vaccine is available and being used), and

monitoring of antiviral use and adverse events that may be attributed to antiviral use, if applicable. (WHO 2005e).

Implementation of Laboratory Diagnostic Services. The minimal laboratory capacity for these laboratories include immunofluorescence (IF) and reverse transcriptase polymerase chain reaction (RT-PCR). In the absence of laboratories able to offer routine influenza diagnosis, typing and subtyping, countries may use commercial rapid antigen detection kits.

Under optimal conditions, a national inventory of laboratories with biosafety security levels (BSL) 3 and 4 should be available. However, usually developing countries have no BSL-4 and have very few or no BSL-3 laboratories. Therefore, the available BSL-3 laboratories should be adapted to work locally (this way the diagnosis would be faster), or arrangements with BSL-3 and BSL-4 laboratories in other countries may be facilitated by the WHO. In the early stages of a pandemic, increased testing will be required when the diagnosis of pandemic strain influenza in patients with influenza-like illness cannot be assumed. Once the pandemic is established, testing of all cases will not be possible

Vaccines

Antiviral therapy and vaccination are the only options for controlling an influenza virus infection (Yen 2005, Korsman 2006). Vaccination represents the best protection against influenza (van Dalen 2005), but an appropriate vaccine cannot be developed before a new virus strain emerges. Normally, it takes at least six months to develop a vaccine and manufacture it on a large scale (Flemming 2005). But even then, most countries without production facilities will have no access to vaccines during the first pandemic wave, as a result of limited global production capacity and concentration of these facilities in developed countries.

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Plans for pandemic vaccine use should include: designation of mass immunisation clinics, strategies for staffing and staff training, strategies to limit distribution to persons in the priority groups, vaccine storage capacity of the cold chain, identification of current and potential contingency depots, vaccine security (theft prevention) during its transport, storage and use in clinics. Some examples of priority groups are animal or bird cullers, veterinarians and farmers in the case of animal or avian influenza; healthcare workers and workers in essential services when a pandemic is imminent or established (WHO 2005e).

Antiviral Drugs. Antiviral drugs include M2 inhibitors, which are ion channel blockers (amantadine and rimantadine), and the neuraminidase inhibitors (oseltamivir and zanamivir) (Hoffmann 2006b). The emergence of resistant variants is a concern with the use of any antiviral drugs. The authors conclude that strategies aimed at improving antiviral efficacy (e.g., the use of higher doses, longer durations of therapy, or combination therapy) deserve further evaluation and new routes of administration of antivirals should also be explored, as altered pharmacokinetics in severely ill influenza patients, who may be affected by diarrhoea, have been reported (Hien 2004).

Drug Stockpiling

Some governments have recently opted for stockpiling of oseltamivir. For example, the Dutch government has stockpiled approximately 225,000 courses of oseltamivir (Groeneveld 2005). However, many developing countries may not be able to afford to stockpile antiviral drugs.

Three strategies for the use of oseltamivir during a pandemic were defined: therapeutic use, long-term pre-exposure prophylaxis, and short-term postexposure prophylaxis for close contacts of influenza patients (with index patients under treatment)

- As soon as possible following the appearance of the first symptoms; started within 48 hours
- Patients with serious respiratory, pulmonary or cardiovascular abnormalities or dysfunction, who, if infected with the pandemic influenza virus, would be at serious risk of pulmonary or cardiovascular function decompensation, patients with an insulin-dependent form of diabetes
- All persons responsible for the diagnosis, treatment and care of influenza patients, or for logistic management of the necessary resources
- Where considered appropriate by the doctor in charge of the individual patient
- Following vaccination and while the virus is circulating.

Antibiotics should be stockpiled for the treatment of *Staphylococcus aureus* and other secondary infections by each hospital.

General Measures

Non-medical interventions have been shown to be relevant for controlling emergent infectious diseases. In Thailand, **community participation** at different levels was considered in the national program against H5N1 avian influenza. The fact that 17 patients were infected with H5N1 during 2004, while only 5 were infected during 2005 in Thailand, might be reflecting an initial success in this nation's national program against H5N1 avian influenza (WHO 2005c). Intersectoral co-ordination involving non-health sectors (especially agriculture, economic, social and internal affairs) is needed

Training activities for healthcare professionals directed specifically at pandemic preparedness are useful in increasing healthcare workers' compliance with personal protective equipment and infection control procedures.

Pandemic simulation exercises are useful for learning what to do in case a pandemic occurs.

Seasonal Influenza Vaccination

- Routine influenza vaccine should be administered to risk groups persons aged $\geq$ 65 years;

- residents of nursing homes and other chronic-care facilities that house persons of any age who have chronic medical conditions;
- adults and children who have chronic disorders of the pulmonary or cardiovascular system, including asthma (hypertension is not considered a high-risk condition);
- adults and children who required regular medical follow-up or hospitalisation during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, haemoglobinopathies, or immunosuppression (including immunosuppression caused by medications or by human immunodeficiency virus [HIV]);
- adults and children who have any condition (e.g., cognitive dysfunction, spinal cord injuries, seizure disorders, or other neuromuscular disorders) that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk of aspiration;

- children and adolescents (aged 6 months - 18 years) who are receiving long-term aspirin therapy and, therefore, might be at risk of developing Reye's syndrome after influenza infection;
- women who will be pregnant during the influenza season; and
- children aged 6-23 months.

Political Commitment

One of the most significant factors is political and social willingness to acknowledge and report disease dissemination

Legal and Ethical Issues ;Appropriate legislation must be in place before the pandemic event arrives. In a national disaster situation such as that of a pandemic, there are public health measures that need the support of the national legal system to be efficiently implemented

Funding Resource-limited countries need to formulate a feasible national influenza pandemic preparedness plan based on existing resources and the size and structure of the population

Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza : Wild bird migration routes. Increased surveillance, detection capabilities and emergency preparedness will be required

Pandemic Period

. It has been said that success depends on early identification of the first cluster of cases caused by the pandemic strain (Ferguson 2004), and on detection of a high proportion of ongoing cases (Ferguson 2005). Therefore, optimal surveillance at this point is essential for successful containment.

Surveillance

Pandemic surveillance should include monitoring of the following events: hospital admissions of suspected or confirmed cases of pandemic strain influenza, deaths among suspected or confirmed cases of influenza due to the pandemic strain, workforce absenteeism in services designated as essential, vaccine usage for routine and pandemic strain influenza vaccines (if these are available), adverse vaccine events attributed to the pandemic strain vaccine (if available), data collection for later use in the calculation of effectiveness of the pandemic strain vaccine, monitoring pneumococcal vaccine use and adverse events associated with its use (if this vaccine is available and being used), and monitoring of antiviral use and adverse events that may be attributed to . antiviral use, if applicable. (WHO 2005e).

Treatment and Hospitalisation

Patients with suspected or proven influenza A (H5N1) should be hospitalised in isolation for clinical monitoring, appropriate diagnostic testing, and antiviral therapy. The management is based on supportive care with provision of supplementary oxygen and ventilatory support.. Patients with suspected influenza A (H5N1) should promptly receive a neuraminidase inhibitor pending the results of diagnostic laboratory testing (WCWHO 2005)..

Human Resources: Healthcare Personnel

Healthcare worker should protected by high-efficiency masks (NIOSH-certified N-95 or equivalent), long-sleeved cuffed gowns, face shield or eye goggles, and gloves. The number of healthcare workers with direct patient contact and the access to the environment of patients should be limited

Geographically Targeted Prophylaxis and Social Distancing Measures

Measures to increase the social distance have been used in past pandemics and remain important options for responding to future pandemics (WHO 2005f). These measures including **t**ravel or movement restrictions (leaving and entering areas where infection is established), closure of educational institutions, prohibition of mass gatherings, isolation of infected persons and those suspected of being infected, and quarantine of exposed individuals or travellers from areas where pandemic strain influenza infection is established (WHO 2005e

Tracing of Symptomatic Cases

Influenza is predicted to be very difficult to control using contact tracing because of the high level of presymptomatic transmission. In addition, contact tracing for influenza would probably be unfeasible because of the very short incubation (2 days) and infectious (3-4 days) periods of that disease (Fraser 2004).

Border Control

During the SARS outbreak, body temperature screening was commonly performed on air passengers. This way, individuals with fever were prohibited from boarding aeroplanes.

Hygiene and Disinfection

Recommendations for "respiratory hygiene" such as covering one's mouth when coughing and avoiding spitting, wash hands have been made more on the basis of plausible effectiveness than controlled studies (CDC 2003). The influenza virus can remain viable on environmental surfaces and is believed to be transmissible by hands or fomites (WHO 2006

Risk Communication

The most appropriate and effective media that can be employed should be identified.. The spokesperson(s) would ideally be someone associated with authority. Generation of fear and panic should be avoided, while practical information should remain accessible to everyone (PPHSN 2004).

Five essential action strategies to reduce the risk of a pandemic outlined by the WHO are:

- Reduction of human exposure
- Intensifying capacity for rapid containment (stockpiling of enough cycles of antiviral drugs for targeted prophylaxis combined with social distance measures)
- Strengthening early warning systems
- Rapid investigation of cases and clusters
- Building general capacity for healthcare.

If transmission of a new pandemic strain begins in human beings, the speed at which influenza spreads will depend on how early it is detected, and how fast the international community can mobilise and deliver

assistance, including providing antiviral drugs for prophylactic use. "Without international co-operation, no nation can consider itself safe",

Once the pandemic starts, it will be too late. So international co-operation such as prevention, antiviral chemoprophylaxis, immunization , antiviral drugs and vaccination are should start as soon as possible. A major influenza pandemic will have devastating consequences, with uncalculable risks for human health, global economy and political and social stability in most countries. Robust financial resources and a good medical infrastructure may help alleviate some of these consequences; however, developing countries are likely to be faced with insufficient

Refference

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