

PANDEMIC SWINE INFLUENZA VIRUS: PREPAREDNESS PLANNING

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Abstract

The novel H1N1 influenza virus that emerged in humans in Mexico in early 2009 and transmitted efficiently in the human population with global spread was declared a pandemic strain. The introduction of different avian and human influenza virus genes into swine influenza viruses often result in viruses of increased fitness for pigs that occasionally transmit to humans.

The novel virus affecting humans is derived from a North American swine influenza virus that has acquired two gene segments (Neuraminidase and Matrix) from the European swine lineages. This reassortant appears to have increased fitness in humans. The potential for increased virulence in humans and of further reassortment between the novel H1N1 influenza virus and oseltamivir resistant seasonal H1N1 or with highly pathogenic H5N1 influenza stresses the need for urgent pandemic planning.

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INTRODUCTION

Effective pandemic preparedness and response should involve all sectors of government and civil society because a pandemic is likely to affect entire communities^{1,2}. In less affluent countries, human and material resources are often scarce and other sectors of government may be called upon to maintain essential services. To develop a preparedness plan requires engagement of decision makers and technical staff from a spectrum of offices including Ministries of Health, Agriculture, Defense, Internal Affairs, Finance, Labour, Transportation, Communications, and Education. The initial act is to appoint a pandemic planning committee comprised of stakeholders from both private and public sectors, with oversight of ongoing preparedness³. The committee's role includes assigning technical members to draft specific plan segments, setting timelines, reviewing policy, and periodically meeting to verify progress. The roles of the technical staff are to become familiar with the influenza research and adapt international standards to local realities⁴.

Before drafting a plan, staff should project the surge demands a pandemic might place on health care and other infrastructure. Modeling programs

(e.g. FluAid, FluSurge, and FluWorkLoss free-ware) are available to assist in making projections⁵. It may be necessary to survey national and local infrastructure to determine capacity. Health-seeking behaviours are likely different in developing countries and the models are meant to provide only reference points⁶. Once surge requirements have been estimated, policy decisions may be needed to enhance critical infrastructure. Once a pandemic preparedness plan is drafted, the planning committee must ensure micro-plans are written and operational at sub-national levels.

A comprehensive pandemic plan includes: objectives and principles; incident management structure; surveillance; communication; mitigation measures; maintenance of essential services; agenda to address gaps in knowledge ; and review, testing and revision of plans⁶.

Objectives and Principles

The plan should identify the preparedness goals during each pandemic phase and provide a formal risk assessment. Preparedness goals may include slowing the spread of the virus, decreasing morbidity and mortality, and maintaining essential services during the pandemic phase. General principles of preparedness, such as equity,

transparency and citing of scientific underpinning, should be discussed.^{6,7}

Incident Management Structure:

Defined lines of authority are essential to coordinate a multi-sector response. This section should describe the duties of all members of the incident management structure and their leader. Laws should address the authorization of the formation of a planning committee and member's authority to declare an emergency, restrict travel and mass gatherings, close schools and businesses, isolate or quarantine^{3,7}.

Surveillance:

Surveillance is critical for early detection of a pandemic and to monitor its progress. National influenza surveillance, community-based surveillance, event-based surveillance and rumour reporting including reporting, laboratory testing, and case definitions, should be described. Plans should detail necessary improvements to build integrated epidemiology and laboratory capacity^{3,8}.

Plans should detail triggers for shifting from routine surveillance to pandemic phase surveillance.

As a pandemic begins, surveillance objectives include monitoring the geographic spread of the disease, impact on infrastructure (e.g hospital bed occupancy), and morbidity and mortality in distinct populations.

Risk Communication:

Communication goals, strategies, and messages will evolve during a pandemic. This section should discuss communicating disease prevention measures to the public; case reporting and treatment guidelines to providers; surveillance findings to decision makers; and the information on new strains to international agencies during different pandemic phases^{3,7}. Plans should anticipate the frequency, mechanism, and format of risk communications with media. Guidance for minimizing transmission in special settings (e.g schools, residential institutions, workplaces, and public transportation) and messages for families caring for sick persons are needed.

Mitigation Measure :

Implementation of mitigation measures during each phase of a swine pandemic is critical. These include management of individual cases during clusters of novel swine influenza, potential

containment operations, and mitigating disease during the pandemic^{3,7}.

a) Case Management:

This involves recommendations for management of suspected novel influenza cases and contacts including infection control measures, isolation, and treatment of cases^{3,8}. Guidelines for the duration and method of monitoring contacts, indications for quarantine, and antiviral prophylaxis are needed. Plans should discuss the role of voluntary or involuntary isolation of cases and quarantine of contacts, implementation thresholds, and of enforcement agency responsible. Detailed infection control measures to encourage respiratory and hand hygiene and whether to recommend and provide masks to the general public should be considered⁹. This sub-section should also include guidance for infection control in non-medical settings with a greater risk of person-to-person transmission (e.g dormitories, military barracks, prisons, and psychiatric residential facilities).

b) Community Mitigation Activities:

This sub-section is critical for countries in resource-poor settings. For plans that address school closures/dismissals, limited public gatherings, changes to public transportation to reduce crowding, and other strategies for increasing social distancing, the following components should be included:

- i. Specifications of the agency responsible; the role of law enforcement and the military; and which threshold criteria will be used (e.g when >10% of children at school have influenza symptoms);
- ii. Methods for communicating decisions to responsible agencies and the public;
- iii. Measures to minimize unintended consequences (e.g impact on workforce if parents stay at home to care for children);
- iv. Monitoring the effectiveness and duration of mitigation measures (e.g 14 day school closure^{2,9}).

c) Pharmaceutical Interventions:

Plans should reflect the results of assessments on antiviral and antibiotic manufacturing and purchasing; plans should detail the use of limited pharmaceuticals and which groups will be prioritized for treatment or prophylaxis⁹. Plans should cite the justification for the prioritization scheme and describe how pharmaceuticals will be securely stored, distributed (e.g cold chain), administered, and tracked.

Maintenance of Essential Services:

A severe pandemic may disrupt essential services including power, water, sanitation, commerce, and healthcare. This section of the plan should discuss mechanisms for ensuring the continuity of key sectors of the economy as a pandemic evolves.^{9,10} Sector-specific micro-plans should identify critical activities; which can be reduced, which can be delayed/postponed; which can be moved/transferred; which staff/functions are essential and how to cross-train back-up personnel; the reliance on backup systems and how they are tested. Assessments of the current mortuary systems and plans to enhance capacity to handle, store, and track corpses are important.¹⁰

Review, Testing and Revision of Plans:

Many pandemic plans lack calculations of demand during the pandemic, protocols to meet surge capacity, details of non-pharmaceutical intervention, or operational details.¹¹ To avoid gaps in planning, committees can use tools like the United States Health and Human Services Inventory for Pandemic Preparedness or the WHO Checklist to assess their preparedness. National committees should test preparedness using desktop exercises, drills, and simulations to identify gaps. Plans should specify the timeframe and responsible parties tasked to regularly revise the plan to address gaps or changing circumstances.¹¹

RECOMMENDATIONS

1. Establishment and adequate funding of swine influenza control units by government and non-governmental organizations.
2. Review, testing and revision of swine influenza pandemic preparedness plan by relevant agencies.
3. Incorporation of preventive and control measures for influenza in educational curriculum.

CONCLUSION

Cases of swine influenza in humans, combined with seroepidemiological studies demonstrating increased risk of swine influenza in occupationally exposed workers, highlight the crucial role that this group play in the development of new strains of influenza virus. Persons who work with swine should be considered for sentinel influenza surveillance and may be an important group to include in pandemic planning. Successful planning requires active involvement of all levels and sectors of government and thorough, periodic, and

independent plan review, adoption of the latest paradigm in pandemic preparedness.

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