Laboratory biorisk management for laboratories handling pandemic influenza A (H1N1) 2009 virus

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This recommendation updates and replaces the recommendations published in November 2009. If necessary, this document will again be reviewed and updated. WHO continues to monitor the situation closely and is a source of additional data to help and support countries in their decision-making process to identify and implement laboratory biorisk management approaches.

The first version of this document, dated May 2009, recommended the adoption of detailed containment measures for handling of human specimens. At that time, the virus was still poorly characterized, and in agreement with the global biosafety community, WHO advocated for a cautious approach.

In November 2009, a revised version was published. At that time, the pandemic influenza A (H1N1) 2009 virus had spread widely, infected persons generally exhibited mild symptoms and monovalent vaccines were becoming available. The revised version provided details of current knowledge about the virus. Based on these, including on local epidemiological data and naturally acquired immunity, on access to protective measures including vaccines for laboratory staff members, the document requested countries to identify and implement locally appropriate containment measures for virus isolation studies. In absence of such mitigation measures, higher containment practices were still recommended, while work with lower virus titres (diagnostic laboratory work) was endorsed at lower containment level (BSL2).

This newly revised version further updates the knowledge of the pandemic virus, requests countries to assess local risks associated with its handling and storage, and to take full responsibility for the adoption and implementation of locally appropriate mitigation and containment measures for laboratory settings.

This document is divided into four parts:

1. Summary of current knowledge of pandemic (H1N1) 2009 virus.
2. WHO biorisk management recommendations to countries and laboratory facilities
3. Shipping requirements for pandemic (H1N1) 2009 virus specimens
4. Biosafety guidelines for the production of human influenza pandemic vaccines

Summary of current knowledge relating to pandemic (H1N1) 2009 virus, and concerns associated with handling and storage

a. Pathogenicity

The percentage of pandemic (H1N1) 2009 virus infections that result in serious disease cases compared to milder cases of illness is generally considered low and comparable to those of seasonal influenza virus infections. However, the pandemic (H1N1) 2009 virus infections differ from seasonal influenza virus infections in two key aspects. First, serious complications from the pandemic virus occur more often in people younger than 65 in comparison to those who are 65 and older. Second, the pandemic virus appears to cause viral pneumonias substantially more often than seasonal influenza viruses. Viral pneumonia is difficult-to-treat and can require prolonged care in an intensive care unit.

The following underlying health conditions have been identified as placing persons infected by the pandemic virus at higher risk of developing severe or complicated disease:

- pregnancy, especially during the third trimester
- chronic pulmonary disease (e.g. asthma, COPD)
- chronic cardiac disease (e.g. congestive cardiac failure)
- metabolic disorders (e.g. diabetes)
- chronic renal disease; chronic hepatic disease; certain neurological conditions (including neuromuscular, neurocognitive, and seizure disorders); haemoglobinopathies; or immunosuppression, whether due to primary immunosuppressive conditions such as HIV infection, or secondary conditions such as immunosuppressive medication or malignancy
- morbid obesity

b. Epidemiology

The virus is now present in almost all countries worldwide.

c. Preventive measures (vaccines)

Pandemic (H1N1) 2009 monovalent vaccines have been approved by regulatory agencies in many countries. Where vaccines are now available, their use may be an option for protection of laboratory staff and health-care workers.

d. Treatment

The virus is susceptible to the neuraminidase inhibitors oseltamivir and zanamivir. Where these two antivirals are available, they may be an option for treatment of infected laboratory workers.

e. Laboratory-specific concerns: risks associated with virus isolation studies

Certain experimental procedures may carry additional risks of developing reassortant viruses (outside of the scope of vaccine production, as an example) with increased pathogenicity or

viruses with altered antigenicity or drug susceptibility. Microbiological risk assessments should be conducted and specific risk reduction measures adopted, before any work is conducted that may unnecessarily increase the risk of creating conditions that may favour the appearance of reassortant viruses of potential public health concern.

WHO biorisk management recommendations to countries and laboratory facilities

The following three steps are recommended to countries and laboratory facilities wishing to handle and/or store pandemic influenza A (H1N1) 2009 virus, based on the considerations above, and referring to two information resources, the WHO *Laboratory biosafety manual, 3rd edition*, 2004, and the *CWA15793 Laboratory Biorisk Management*, 2008

1. Assess biorisks associated with handling and storage of pandemic H1N1 virus

2. Identify specific biorisk mitigation measures applicable to local laboratory conditions, to control or reduce biorisks to acceptable level in relation to employees, the community and the environment.

3. Final responsibility for the identification and implementation of appropriate containment measures for handling and storage of pandemic (H1N1) 2009 virus lies with individual countries and facilities. Accordingly, needs may vary from country to country based on the variables mentioned above, and decisions should be taken in light of currently available knowledge and context. The global biosafety community is moving away from recommending the use of strict biosafety level (BSL) definitions (*CWA15793 Laboratory Biorisk Management*, 2008). Accordingly, WHO will only provide more detailed containment guidance when cautious approaches will be warranted.

Shipping requirements for pandemic (H1N1) 2009 virus

Shipping requirements for pandemic (H1N1) 2009 virus are described under:
http://www.who.int/csr/resources/publications/swineflu/instructions-shipments/en/

Biosafety guidelines for the production of human influenza pandemic vaccines

Biosafety guidelines for the production of human influenza pandemic vaccines is described under:
http://www.who.int/csr/resources/publications/swineflu/LaboratoryHumanspecimensinfluenza/en/