

LABORATORY BULLETIN

2009 – October 26

Bulletin # 2009– 16

To: Alberta Health & Wellness, All Physicians, Chief Medical Examiner of Alberta, CDC Nurses, Infection Prevention & Control, Infectious Disease Physicians, Laboratory Managers & Directors, Medical Officers of Health

Re: Guidelines for autopsies of patients who died of known or suspected infections with Pandemic A (H1N1) 2009.

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Purpose:

This document provides clients with guidance on:

- indications for performing an autopsy on known or suspected cases of infection with Pandemic A (H1N1) 2009
- minimum biosafety precautions to be followed during the autopsy
- recommended microbiological samples to be obtained on postmortem samples .

Indications for the ordering of an autopsy:

- There are no provincial requirement for autopsies of patients dying of pandemic influenza ⁽¹⁾
- In cases of death investigated by a Medical Examiner, the decision to proceed with an autopsy lies solely with the Medical Examiner ⁽¹⁾
- Autopsies can be performed, with permission of next of kin, in those cases where a physician requests one, as per non-pandemic protocols ⁽¹⁾.
- Indications for an autopsy may include:
 - Undiagnosed severe respiratory illness (SRI)
 - Stillborn birth occurring during an infection with Pandemic A(H1N1) 2009
 - Unusual clinical presentation of infection with Pandemic A(H1N1) 2009

Minimum biosafety precautions recommended for autopsies of suspected cases of Pandemic (H1N1) 2009:

Background

Influenza virus infections can be acquired through large droplets or aerosols ^(2, 3), and since some autopsy procedures can generate aerosols (e.g. oscillating saws), appropriate room and set up and protective equipment must be used.

Procedure

Autopsies on deceased patients with proven or suspected Pandemic A (H1N1) 2009 infection must follow standard autopsy precautions (Routine Practice) as specified by institutional protocols. Additional points, or points to be emphasized, are listed below.

Autopsies should be performed in autopsy suites with 6 (old construction) to 12 (new construction) air exchange/hour. Ideally, air should be exhausted to the outside or passed through a HEPA filter prior to recirculation. The use of local airflow control (e.g. laminar flow systems) is recommended if available to direct aerosols away from personnel. The use of such systems does not eliminate the need for PPE ⁽⁴⁾.

Use containment devices whenever possible; use biosafety cabinets for the handling and examination of smaller specimens; when available, use vacuum shrouds for oscillating saws to contain aerosols and reduce the volume released into the ambient air environment ⁽⁴⁾.

Personal protective equipment (PPE) should include ^(4,5):

- N95 respirators (or better)
- Goggles (and/or face shield) for eye protection
- Waterproof long sleeved gown
- Gloves (ideally double surgical gloves with interposed layer of cut-proof synthetic mesh glove)

Protective outer garments should be removed when leaving the immediate autopsy area and discarded in appropriate laundry or waste receptacles, either in an antechamber to the autopsy suite or immediately inside the entrance if an antechamber is unavailable.

Hand hygiene should be performed immediately after PPE removal.

Recommended microbiological samples:

Background

Pandemic Influenza A (H1N1) 2009 has been shown to infect both the upper and lower respiratory tract, the latter resulting in more severe disease ^(3,6,7). The histopathological features of influenza pneumonia are those of an adult respiratory distress syndrome (ARDS) and are not specific or pathognomonic for influenza A ⁽⁸⁾. Specific tests for influenza A, such as immunohistochemistry and/or molecular tests ought to be done.

Viral antigens and viral nucleic acids may be distributed focally and sparsely in patients with influenza. Extensive sampling increases the likelihood of detecting the virus ⁽⁹⁾. Classically, most fatal cases of influenza are associated with bacterial pneumonia or sepsis, including in the previous pandemics. Pandemic A (H1N1) 2009 appears unusual in that to date, most deaths have occurred as the result of a viral pneumonia without bacterial superinfection ^(6,7) although this is still undergoing investigation ⁽¹⁰⁾. Viral infection of the gastro-intestinal tract appears possible with this influenza strain as there is a higher frequency of GI symptoms reported ⁽⁶⁾; since respiratory and GI viruses season overlap significantly, co-infection may be relevant (especially in pediatric deaths). As the strain continues to evolve, involvement of other organs may need to be investigated ⁽⁹⁾.

Procedure:

Pathologists performing the autopsy should label the requisition to indicate it is an “autopsy” to allow for appropriate testing prioritization. Sample labels should include the caption “Autopsy”.

Sample collection ^(5,9)

a) Swabs for virological testing

If swabs from the upper respiratory tract are felt to be indicated, they should be put in universal transport medium (UTM) and kept at 4° C. Acceptable samples include:

- Nasopharyngeal swabs
- Throat swabs

b) Tissue samples

- Tissue samples for microbiological testing should ideally contain 0.2 – 0.5 g of tissue.
- Tissue samples for virological molecular assays should be put in dedicated sterile containers without additive/preservatives and ideally sent on dry ice (fresh-frozen tissue).

- Tissue samples kept on ice pack will be accepted if shipped as promptly as possible to the laboratory.
- Tissue samples for bacteriological culture should be put in dedicated sterile containers without additive/preservatives and kept at 4° C.

Sites of tissue sampling should include:

- Trachea (proximal and distal)
- Bronchi (right and left primary)
- Central (hilar) lung with segmented bronchi
- Representative pulmonary parenchyma from right and left

Additional organs can be sampled, depending on clinical symptoms, suspected organ involvement or finding at autopsies, for example myocardium, CNS, skeletal muscle or gastrointestinal tract.

Other specimens to be collected:

- Blood culture (from cardiac puncture at start of the autopsy), if indicated.
- Clotted blood and blood anticoagulated in EDTA (from cardiac puncture at the beginning of the autopsy) should be collected for archiving and future testing.
- Bowel contents (5 ml in sterile container), if indicated, for electron microscopy and detection of Pandemic (H1N1) 2009
- Other samples as suggested by the clinical circumstances (e.g. urine for Legionella antigens).

Samples for virological analysis should be sent to the ProvLab (Edmonton or Calgary).

Samples for bacteriological analysis should be sent to the appropriate local/zonal laboratory.

Appropriate laboratory requisitions (Provlab and/or local laboratories) must be completed.

References:

1. Dowling, G Provincial Pandemic Influenza Plan Caring for the Dead Alberta June 2009
2. Tellier R. Review of aerosol transmission of influenza A virus. *Emerg Infect Dis.* 2006 Nov; 12(11): 1657-62
3. Munster VJ et al: Pathogenesis and transmission of swine origin 2009 A(H1N1) influenza virus in ferrets. *Science* 2009; **325**, 481-483.
4. CDC: Post mortem care and safe autopsy procedures for novel H1N1 influenza http://www.cdc.gov/h1n1flu/post_mortem.htm
Accessed August 11, 2009
5. Ontario Agency for Health Protection and Promotion: Novel H1N1 influenza A – autopsy specimen collection guidelines for microbiology testing prepared for the Office of the Chief Coroner
<http://www.oahpp.ca/publichealthabstracts.php>
6. WHO: Human infection with new influenza A(H1N1) virus: clinical observations from Mexico and other affected countries. *Weekly Epidemiological Record* 22 May 2009 21; 84: 185-189.
7. CIDRAP: Novel H1N1 influenza (Swine Flu) update August 5, 2009
<http://www.cidrap.umn.edu/cidrap/content/influenza/swineflu/biofacts/swinefluoverview.html>

Accessed August 6, 2009.

Craighead J.E. Pathology and Pathogenesis of Human Viral Disease. San Diego Academic Press 2000

- 8. CDC: Guidelines for the submission of tissue specimens for the pathological evaluation of influenza virus infections
<http://www.cdc.gov/h1n1flu/tissuesubmission.htm>
 Accessed August 6, 2009
- 9. CIDRAP. CDC cites bacterial infections in some H1N1 deaths.
<http://www.cidrap.umn.edu/cidrap/content/influenza/swineflu/news/sep2809coinfect2.html>
 Accessed 28 September 2009

Questions:

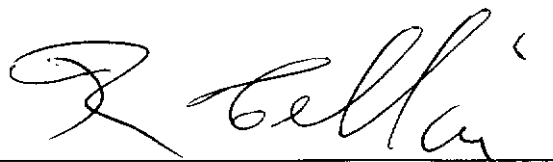
Contact the Virologist-on-Call:

Edmonton Laboratory – Phone: 780 407 7121 (ask for VOC) or 780 407 8822 UAH Switchboard (ask for VOC)	Calgary Laboratory – Phone: 403 944 1200 (ask for VOC)
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 - Infection Prevention and Control, Alberta
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