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Emerging Infectious Respiratory Viruses: An update on MERS-CoV and other viruses
Objectives of presentation

• Overview of MERS-CoV and other emerging respiratory viruses
  • Known epidemiology to date
• Health Unit Roles in event of identification of MERS-CoV
  • Reporting
  • Case Management
  • Contact Management
• Triage, screening and management in acute care
• Additional resources
MIDDLE EASTERN RESPIRATORY SYNDROME CORONAVIRUS (MERS-COV)
Breaking news, June 2012

NEW STRAIN OF SARS-LIKE VIRUS
Symptoms include fever & severe respiratory problems
# Types of coronaviruses

<table>
<thead>
<tr>
<th>Alpha</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human CoV-229E</td>
<td>Human CoV-OC43</td>
<td>Turkeys</td>
<td>Birds</td>
</tr>
<tr>
<td>Human CoV-NL63</td>
<td>SARS</td>
<td>Chickens</td>
<td></td>
</tr>
<tr>
<td>Pigs</td>
<td>MERS-CoV</td>
<td></td>
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<tr>
<td>Dogs</td>
<td>Pigs</td>
<td></td>
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<tr>
<td>Cats</td>
<td>Cows</td>
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<tr>
<td></td>
<td>Rats</td>
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<tr>
<td></td>
<td>Bats</td>
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</tbody>
</table>
Virus origin?

• Dromedary camels found positive for MERS-CoV

• Genetically identical virus fragment from bats

• Intermediate host?
Key events, March 2012 to December 2013
Confirmed cases of MERS-CoV by Month (n=178)

Distribution of confirmed MERS-CoV cases by place of reporting, March 2012 to January 23, 2014

Confirmed cases by age and gender, March 2012 to January 23, 2014

MERS-CoV

- Mild to severe illness (role of asymptomatic infection unclear)
- Limited person to person transmission has occurred
- Individuals with underlying illnesses at greater risk of complications
Three transmission patterns to date

1. Sporadic cases in communities
   - ? Non-human exposure
2. Clusters of infection in families
3. Clusters in health care
# Laboratory Testing for MERS-CoV

<table>
<thead>
<tr>
<th>Testing for MERS-CoV</th>
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<tbody>
<tr>
<td>NP swab/BAL if indicated</td>
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<tr>
<td>EDTA blood tube</td>
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<tr>
<td>Urine</td>
</tr>
<tr>
<td>Stool if patient has GI symptoms</td>
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<tr>
<td>Acute and convalescent (21 to 28 days later) serology</td>
</tr>
</tbody>
</table>

Call PHO Laboratories Customer Service at 416-235-6556 or 1-877-604-4567 prior to submitting

Emerging Infectious Respiratory Diseases

PREPAREDNESS
A good travel history is our best surveillance tool

- PIDAC – Triage, Screening and Patient Management of Middle East Respiratory Syndrome Coronavirus
- “Initial Decision Making and Management of Patients Who May Have an Emerging Infectious Respiratory Disease” – screening algorithm for ARI

Where in the world has the patient travelled in the last 14 days?
OTHER EMERGING PATHOGENS
## Natural hosts of influenza viruses

<table>
<thead>
<tr>
<th>Haemagglutinin subtype</th>
<th>Neuraminidase subtype</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>N1</td>
</tr>
<tr>
<td>H2</td>
<td>N2</td>
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<td>H3</td>
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<td>H15</td>
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</tbody>
</table>

Source: http://www.pitt.edu/~super1/lecture/lec21431/005.htm
Confirmed cases of avian influenza A(H7N9) virus by week of onset and degree of severity, week 8, 2013 to week 6, 2014, China (n=308)
Distribution of confirmed A(H7N9) cases by age and gender, 31/03/2013-07/02/2014, China (n=303*)

* 5 cases where age or gender is missing have been excluded
Distribution of confirmed A(H7N9) cases by place of reporting, week 14/2013 to 06/2014 (n=308)
Other emerging influenza viruses

Jiangxi death first human case of H10N8 bird flu strain, expert says

Elderly woman is first confirmed to have caught H10N8 strain, disease expert says

Staff Reporter

PUBLISHED: Wednesday, 18 December, 2013, 4:22am
UPDATED: Wednesday, 18 December, 2013, 4:22am

H5N1 case identified in North America

H5N1 bird flu death confirmed in Alberta, 1st in North America

Officials say no risk of human-to-human transmission

By Laura Payton, CBC News  Posted: Jan 08, 2014 3:15 PM ET  |  Last Updated: Jan 09, 2014 7:29 AM ET

South Korea steps up measures to contain bird flu

SEOUl | Sun Jan 19, 2014 10:49pm EST

(REUTERS) - South Korea is stepping up efforts to prevent the spread of bird flu ahead of the Lunar New Year holidays, after migratory birds were found to be infected with the same strain of the virus that hit poultry farms last week.

The Ministry of Agriculture, Food and Rural Affairs said in a statement on Monday that it suspects a flock of migratory birds found dead last week brought the latest outbreak of the H5N8 strain of bird flu.

Source: http://www.reuters.com/article/2014/01/20/us-korea-birdflu-idUSBREA0J06B20140120
Emerging infectious respiratory viruses: An update on MERS-CoV and other viruses

Thomas Appleyard
Tuesday, February 11, 2014
Emergency Management Branch, Ministry of Health and Long-Term Care
Overview

- Ministry released the Public Health Management of Cases and Contacts of Middle East Respiratory Syndrome Coronavirus in Ontario in November 2013
  - provides public health units (PHUs) with guidance on how to implement case & contact management, including tools and links to other resources
  - developed with contributions from Public Health Ontario (PHO) based on current available scientific evidence and expert opinion
  - aligns with guidance from the Public Health Agency of Canada (PHAC)
  - subject to change as new information about MERS-CoV is identified and understood
  - principles in this guidance document could be adapted for other emerging infectious respiratory diseases, such as avian influenza A(H7N9)
Case & contact management

• Identification of a presumptive confirmed, confirmed or probable case will trigger an investigation by the PHU to:
  • assess potential sources of exposure in the 14 days prior to symptom onset of the case
  • evaluate potential disease transmission among close contacts
• Results of this investigation will:
  • assist in preventing further transmission
  • improve knowledge about the epidemiology of the virus by providing information about the duration and type of exposures that facilitate virus transmission
Terminology

• Trigger for using the document is the identification of a presumptive confirmed, confirmed or probable case
  • presumptive confirmed case = individual with a positive polymerase chain reaction (PCR) test conducted by the PHO Laboratory
  • confirmed case = individual with a positive PCR that has been confirmed by PHAC’s National Microbiology Laboratory
  • probable case = person with an acute respiratory infection with clinical, radiological, or histopathological evidence of pulmonary parenchymal disease AND no possibility of laboratory confirmation for MERS-CoV either because the patient or samples are not available for testing AND close contact with a confirmed case
Activation

- Once a presumptive confirmed, confirmed or probable case has been identified in Ontario, the ministry moves to Activation Status:
  - the ministry follows the procedures outlined in the Ministry Emergency Response Plan, which includes activating its Ministry Emergency Operations Centre and establishing an operational cycle
  - PHO is engaged in the ministry’s emergency response structure to provide technical & scientific advice
  - ministry response actions are closely coordinated with PHAC, the Ministry of Labour, and the Office of the Fire Marshal and Emergency Management
  - affected PHU(s) and health system partners will be notified and supported through the MEOC
    - targeted support to affected PHU(s) to assist them to implement case management

Source: Ministry Emergency Response Plan, May 2013, Ministry of Health and Long-Term Care
Reporting to PHAC

- PHAC must report cases of novel infection to the World Health Organization as per the International Health Regulations.

- To enable PHAC to fulfill its reporting requirements, the ministry must submit data to PHAC within 24 hours of the identification of a presumptive or probable case.
  - guidance document outlines data requirements.
  - MEOC and PHU(s) will collaborate to gather the data quickly.
  - procedures may be modified if MERS-CoV becomes a reportable disease through the Health Protection and Promotion Act.
Case management

• The guidance document provides recommendations to PHUs to manage a presumptive confirmed, confirmed or probable case:
  • conduct case follow-up
  • provide public health advice in household settings
  • provide infection prevention & control advice in health care settings, including acute care, primary health care and home care
Contact management

- 14 days is the routine period to conduct contact management activities
  - contact management activities recommended for close contacts
  - enhanced monitoring period may be required; MEOC will support PHU(s) in making that decision

- Close contacts are defined as:
  - anyone who provided care for (e.g., bathing, toileting, dressing or feeding) the presumptive confirmed, confirmed or probable case while the case was symptomatic, including a health worker, family member, or individual who had other similarly close physical contact OR
  - anyone who stayed at the same place (e.g., lived with, visited) while the case was symptomatic
Contact management (cont’d)

- Contact management may involve collaboration between PHUs and acute care settings
  - PHUs lead contact management for close contacts in the community
    - includes close contacts that were exposed in an acute care setting/other health care setting and live in the community, as well as close contacts that were exposed during their hospital admission and discharged prior to completing the 14 day monitoring period
  - acute care settings lead contact management for close contacts exposed in the hospital and currently admitted (i.e., inpatients)
    - acute care settings also lead contact management for employees exposed at work; see PIDAC’s Tools for Preparedness: Triage, Screening and Patient Management for MERS-CoV Infections in Acute Care Settings for more information
The guidance document provides recommendations to PHUs to manage close contacts of a presumptive confirmed, confirmed or probable case:

- conduct close contact tracing
- conduct close contact follow-up and monitoring
  - quarantine of asymptomatic close contacts is not recommended at this time
- provide public health advice to close contacts
- work with the MEOC to manage close contacts of a case that travelled while symptomatic, including by aircraft, rail or bus
Questions

• Contact the ministry’s Emergency Management Branch:
  • email: emergencymanagement.moh@ontario.ca
  • Health Care Provider Hotline: 1-866-212-2272
ACUTE CARE
Triage, screening and patient management in acute care settings

Tools for Preparedness: Triage, Screening and Patient Management for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infections in Acute Care Settings

Provincial Infectious Diseases Advisory Committee (PIDAC)

http://www.publichealthontario.ca/PIDAC
Asking the “travel” question

• The importance of asking about travel history and recording this information on a laboratory requisition is critical

• A positive travel history cascades IPAC measures and laboratory testing that will enable the detection of emerging infectious respiratory diseases

• Samples with a travel history also undergo molecular testing instead of culture for laboratory staff protection
Testing - if a presumptive test result is found...

PHOL shares results with

• requesting health care provider,
• relevant PHU and;
• MOHLTC

• Results for the first few positive specimens will be confirmed by the NML
• MOHLTC Emergency Operations Centre (MEOC) activated and becomes primary source of information, support and provincial coordination
• MEOC Health Coordination Teleconference with all relevant stakeholders and implementation of the Public Health Case and Contact Management Document
Screening and Patient Management Algorithm for Middle East Respiratory Syndrome Coronavirus (MERS-CoV)¹

1. Is testing for MERS-CoV positive?
   - NO: Continue Droplet/Contact precautions plus N95 respirator and AIIR.
   - YES: Use precautions specific to the pathogen.

2. Has an aetiology been determined?
   - NO: Continue Droplet/Contact precautions plus N95 respirator and AIIR.
   - YES: Continue Droplet/Contact precautions and test for routine ARI pathogens.

3. Has patient travelled to, or resided in, the Arabian peninsula or a neighbouring country in the 14 days prior to onset of illness?
   - NO: ROUTINE PRACTICES
   - YES: Is the patient a close contact of a person with ARI who has travelled to, or resided in, the Arabian peninsula or a neighbouring country in the 14 days prior to the onset of illness?
     - NO: Continue Droplet/Contact precautions or pathogen specific precautions.
     - YES: Discontinue N95 respirator and AIIR.

4. Has patient have acute respiratory infection (ARI) and lower respiratory tract involvement (e.g., pneumonia or ARDS)?
   - NO: ROUTINE PRACTICES
   - YES: Does patient have an aetiology?
     - NO: Continue Droplet/Contact precautions plus pathogen specific precautions.
     - YES: Continue Droplet/Contact precautions and test for routine ARI pathogens.

Notes:
1. This algorithm is intended to be applied to individual cases presenting to Emergency Departments (and urgent care centres) and should not be used to identify clusters. For a complete list of exposure criteria visit: [http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/guidance.aspx](http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/guidance.aspx).
2. Acute Respiratory Infection (ARI): Any new onset acute respiratory infection that could potentially be spread by the droplet route (either upper or lower respiratory tract), which presents with symptoms of a new or worsening cough or shortness of breath and often fever (also known as febrile respiratory illness, or FRI). It should be noted that elderly people who are immunocompromised may not have a febrile response to a respiratory infection.
3. Arabian peninsula and neighbouring Middle East countries of concern for MERS-CoV: Saudi Arabia, Qatar, Jordan, United Arab Emirates, Bahrain, Iran, Iraq, Israel, Kuwait, Lebanon, Oman, Palestinian Territories, Yemen, Syria. Updates are available at: [www.ontario.ca/novelcoronavirus](http://www.ontario.ca/novelcoronavirus).
4. Contact PHOL microbiologist prior to submission of specimens.


**ROUTINE PRACTICES**

- Use precautions specific to the pathogen.
- Initiate Droplet/Contact Precautions and test for routine ARI pathogens.
- Continue Droplet/Contact precautions or pathogen specific precautions.
- Discontinue N95 respirator and AIIR.
Acute Care Awareness

• Emergency Department ARI screening, travel questions are important at all times
  • Evaluate or audit the processes in place
• Health unit as a resource for information on emerging infections, geographic areas of concern, testing etc
• Processes in to ensure ongoing communication to staff
Remember the basics!

• Don’t come to work when ill with acute respiratory illness (or any illness)
• Routine Practices
• Prompt initiation of additional precautions for patients with respiratory symptoms
• No reason why asymptomatic staff who travelled to the Middle East (or China) shouldn’t be able to come to work
Resources

- Local health unit

- PHO’s respiratory virus reports (seasonal virus circulation)
  - Ontario Respiratory Virus Bulletin
  - Laboratory Based Respiratory Pathogen Report
    http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/PHO-Laboratories-surveillance-updates.aspx
Resources

• MOHLTC
  • MERS-CoV website www.ontario.ca/novelcoronavirus
  • MOHLTC H7N9 website www.ontario.ca/avianinfluenza


• ECDC http://www.ecdc.europa.eu/EN/HEALTHTOPICS/CORONAVIRUS-INFECTIONS/Pages/index.aspx
Questions?