

Emerging Disease Threats, What's on the Horizon: MERS-CoV and Avian Influenza A/H7N9

Middlesex London Health Unit's Infection Prevention and Control Workshop/Education Day

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Objectives of presentation

- Overview of the significance of emerging infectious disease threats
- Current Emerging Infectious Disease threats on the horizon
 - MERS-CoV
 - Avian influenza A/H7N9
- What does this mean for you?
- Additional resources

Global impact of infectious diseases: Respiratory

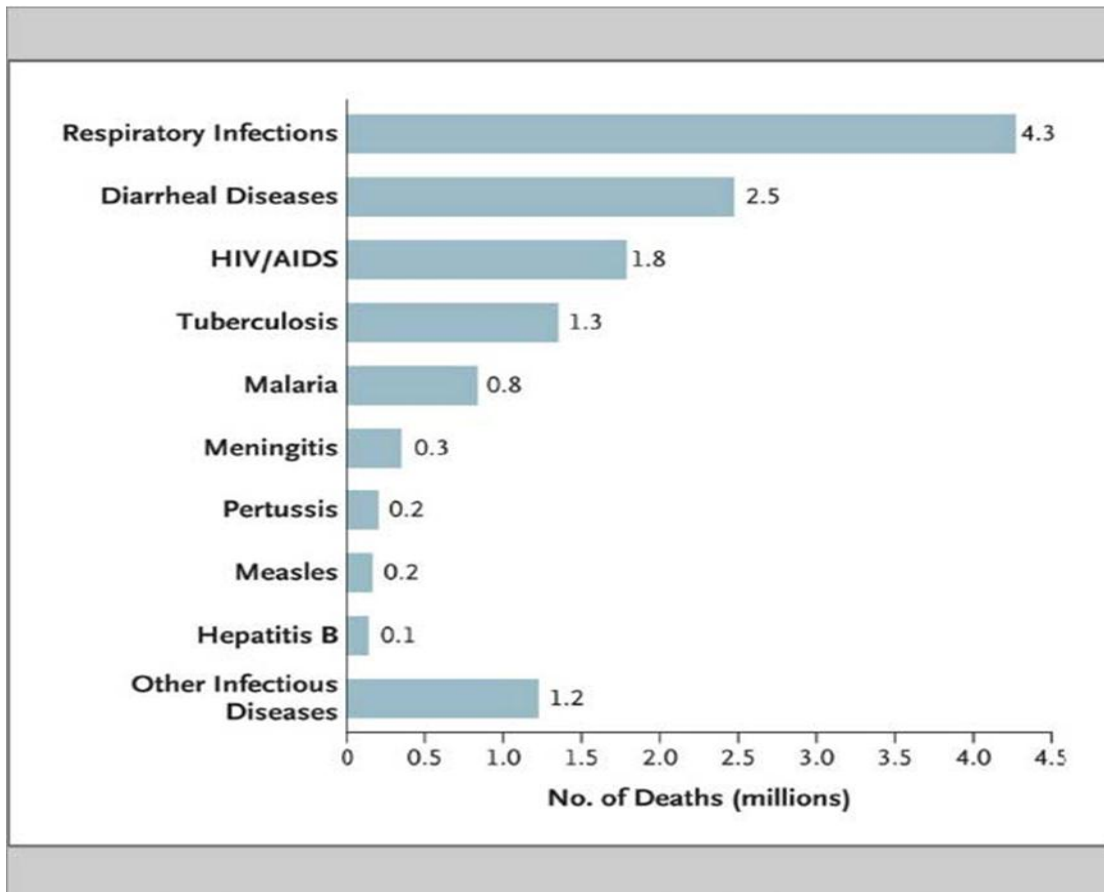


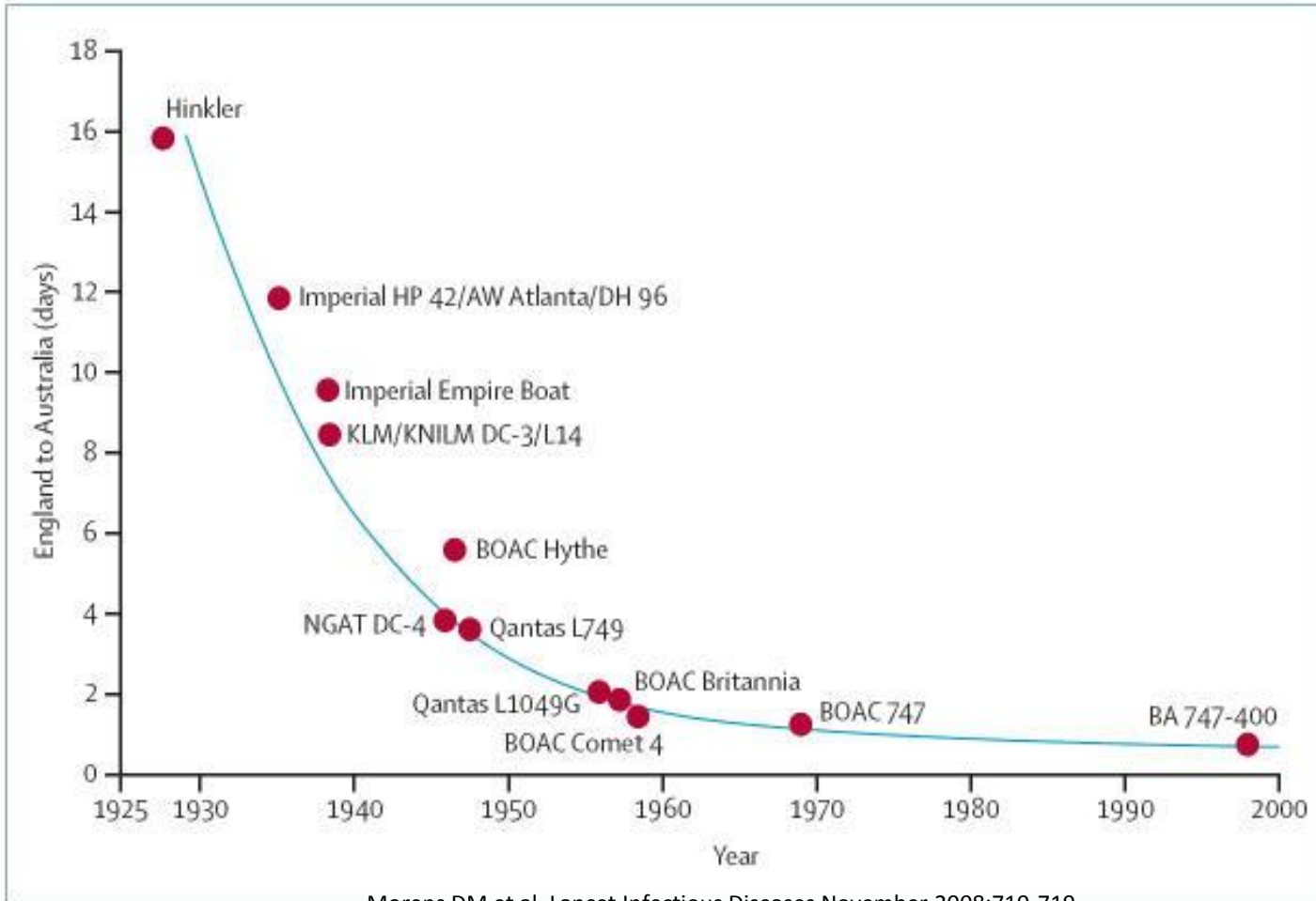
Figure 1. Leading Causes of Global Deaths from Infectious Diseases.

Of an estimated 58.8 million annual deaths worldwide, approximately 15.0 million (25.5%) are believed to be caused by infectious diseases. Cause-specific mortality estimates are provided by the World Health Organization.^{43,44} The data do not include deaths from secondary infectious causes, such as rheumatic fever and rheumatic heart disease, liver cancer and cirrhosis, or other chronic diseases.

“There is nowhere in the world from which we are remote and no one from whom we are disconnected”

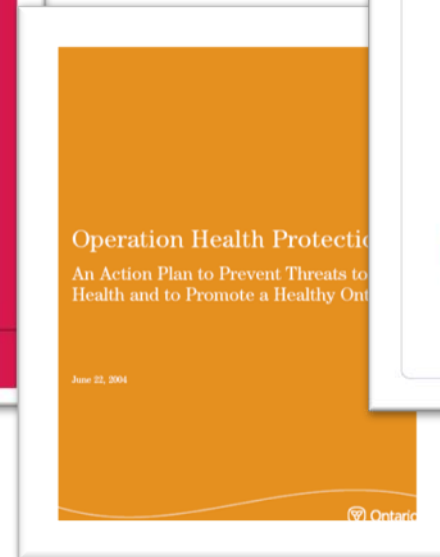
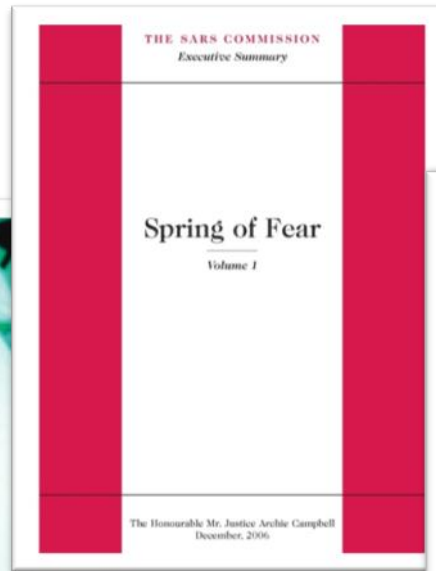
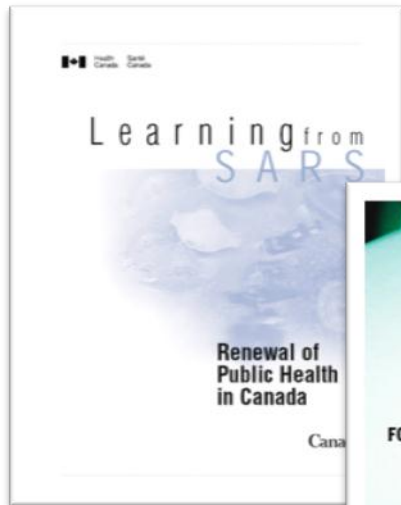
Microbial threats to health in the US. IOM 1992

Reduced travel times in the last 90 years



Morens DM et al. Lancet Infectious Diseases November 2008:710-719

Learning from SARS: PHO foundational reports

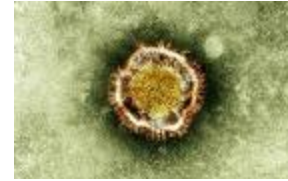


PHO at a glance



Ongoing monitoring for emerging diseases

- Monitoring of global surveillance reports
- Enhance provincial and local detection (e.g. awareness, screening, lab testing)
- Collaboration and information sharing with national, provincial and local stakeholders
- Proactive development of containment/management/response strategies
- Risk assessment
- Monitoring of seasonal respiratory diseases



“Cronut burger” vs. Coronaburger



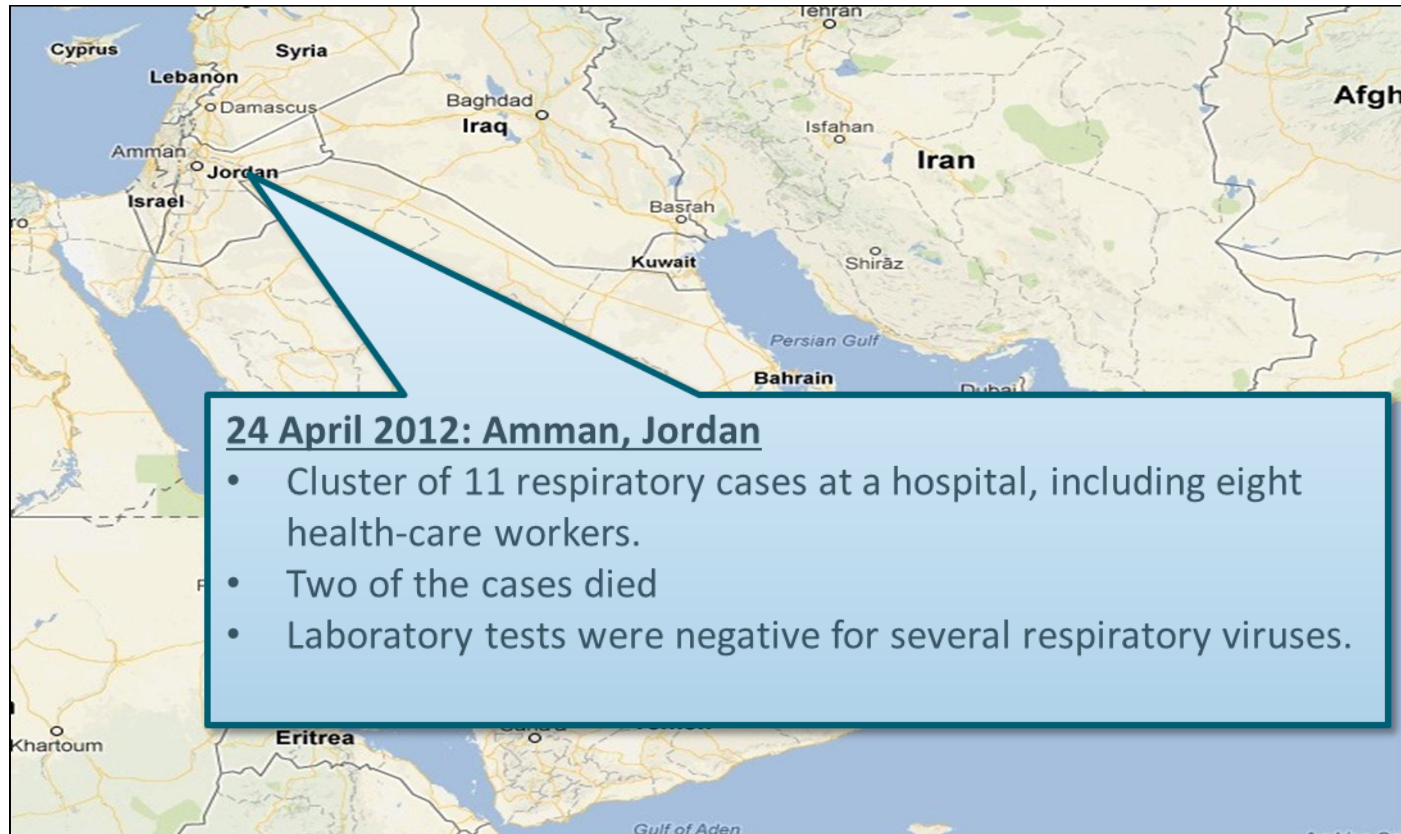
Types of coronaviruses

Alpha	Beta	Gamma	Delta
Human CoV-229E	Human CoV-OC43	Turkeys	Birds
Human CoV-NL63	SARS	Chickens	
Pigs	MERS-CoV		
Dogs	Pigs		
Cats	Cows		
	Rats		

Breaking news, June 2012



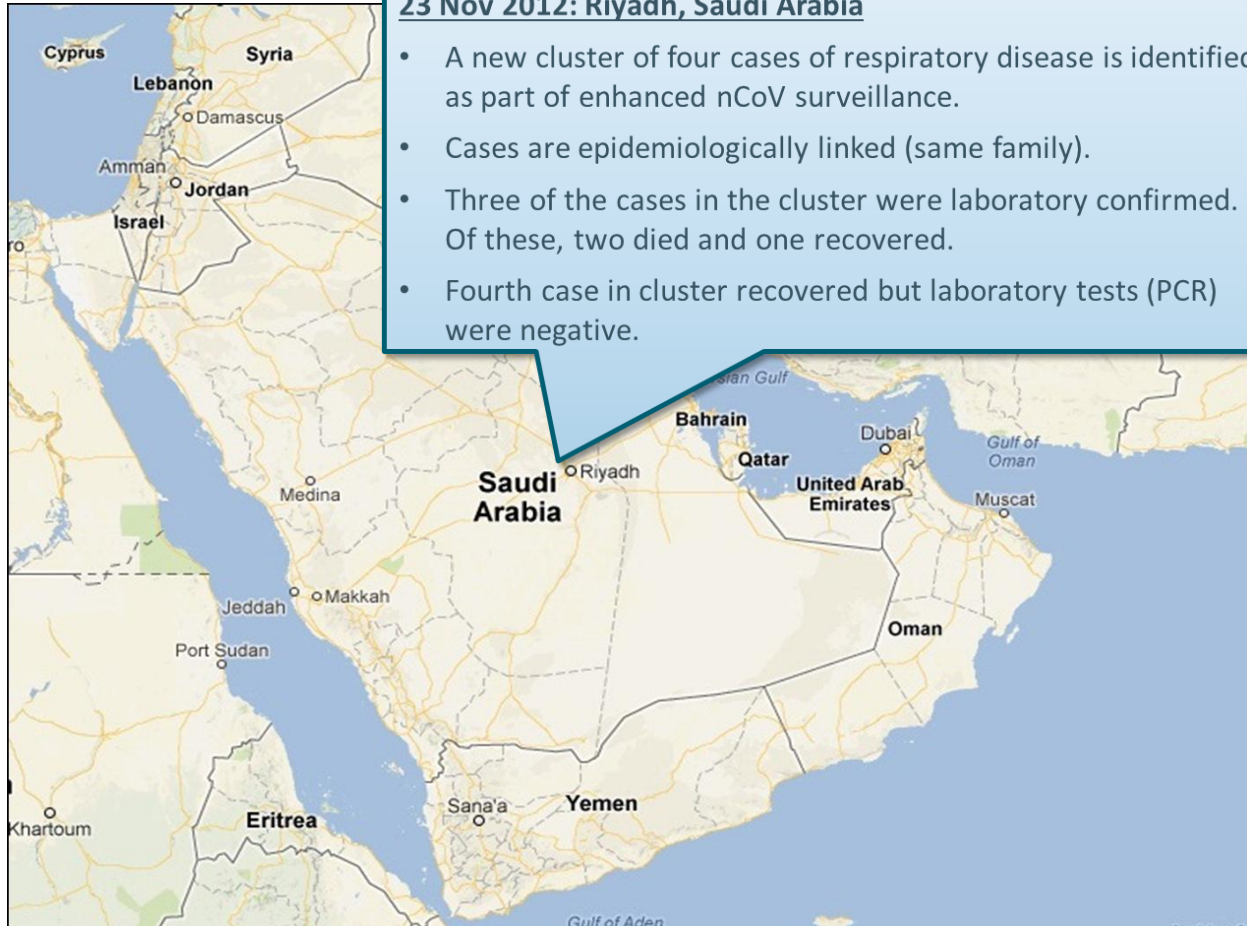
How it began....



Timeline references: Butler, D. Nature News 2012, WHO GAR, Sept 23, Nov 30, Dec 21/2012, ProMed-Mail, ECDC Rapid Risk Assessment Sept 24th, Dec 7th 2012, Pebody et al., Bermingham et al., Eurosurveillance 2012., Google maps, The Guardian Feb 11/2013, ECDC News Release Feb 11/2013, HPA Press Release Feb 11, Feb 13, Feb 15 2013.







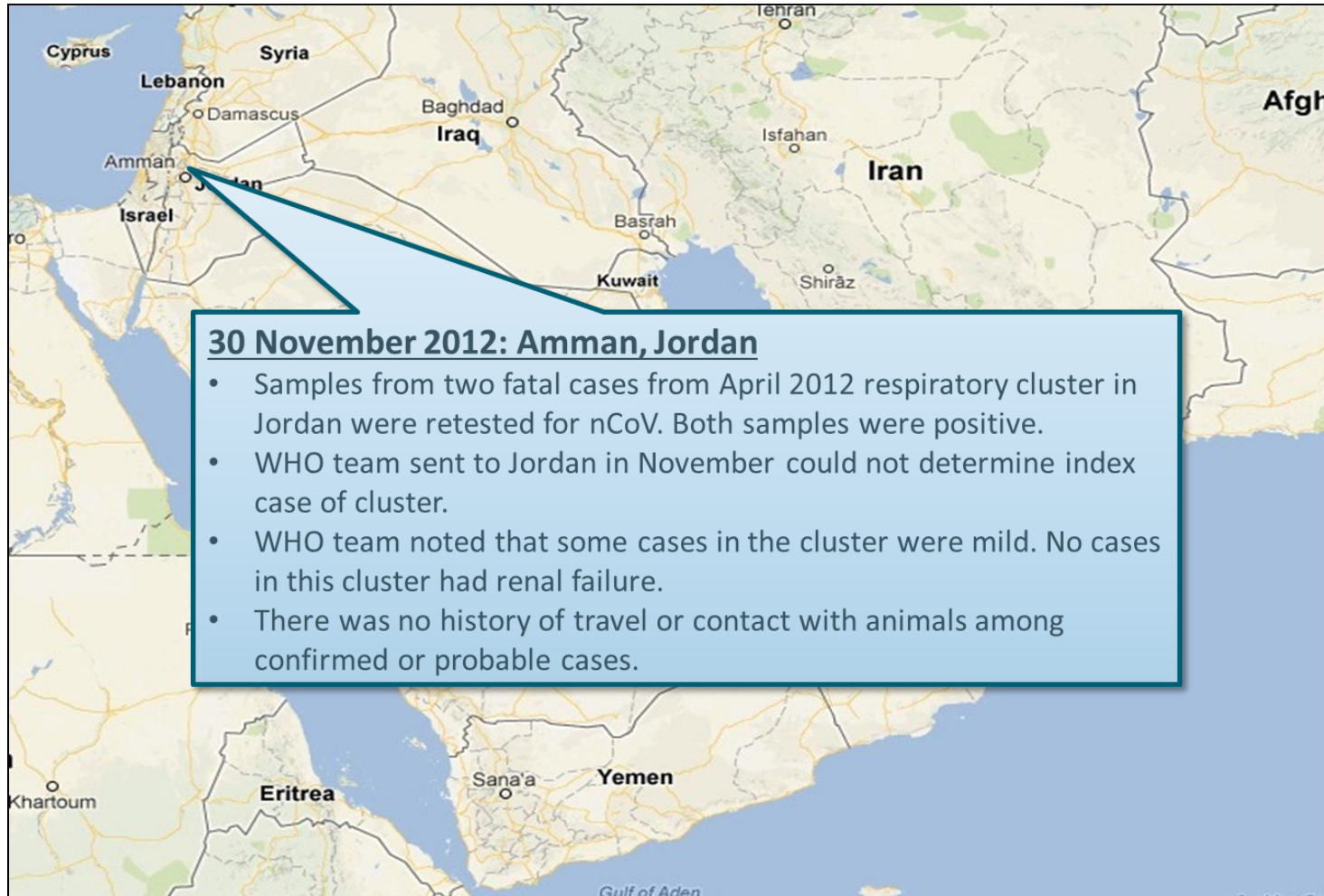
23 Nov 2012: Riyadh, Saudi Arabia

- A new cluster of four cases of respiratory disease is identified as part of enhanced nCoV surveillance.
- Cases are epidemiologically linked (same family).
- Three of the cases in the cluster were laboratory confirmed. Of these, two died and one recovered.
- Fourth case in cluster recovered but laboratory tests (PCR) were negative.

23 Nov 2012: Doha, Qatar and Germany

- A second Qatari case is announced by Germany's Robert Koch Institute (RKI).
- Case developed symptoms in October, and was transferred to Germany .
- nCoV detected in samples by both the HPA and RKI.
- Case recovered.





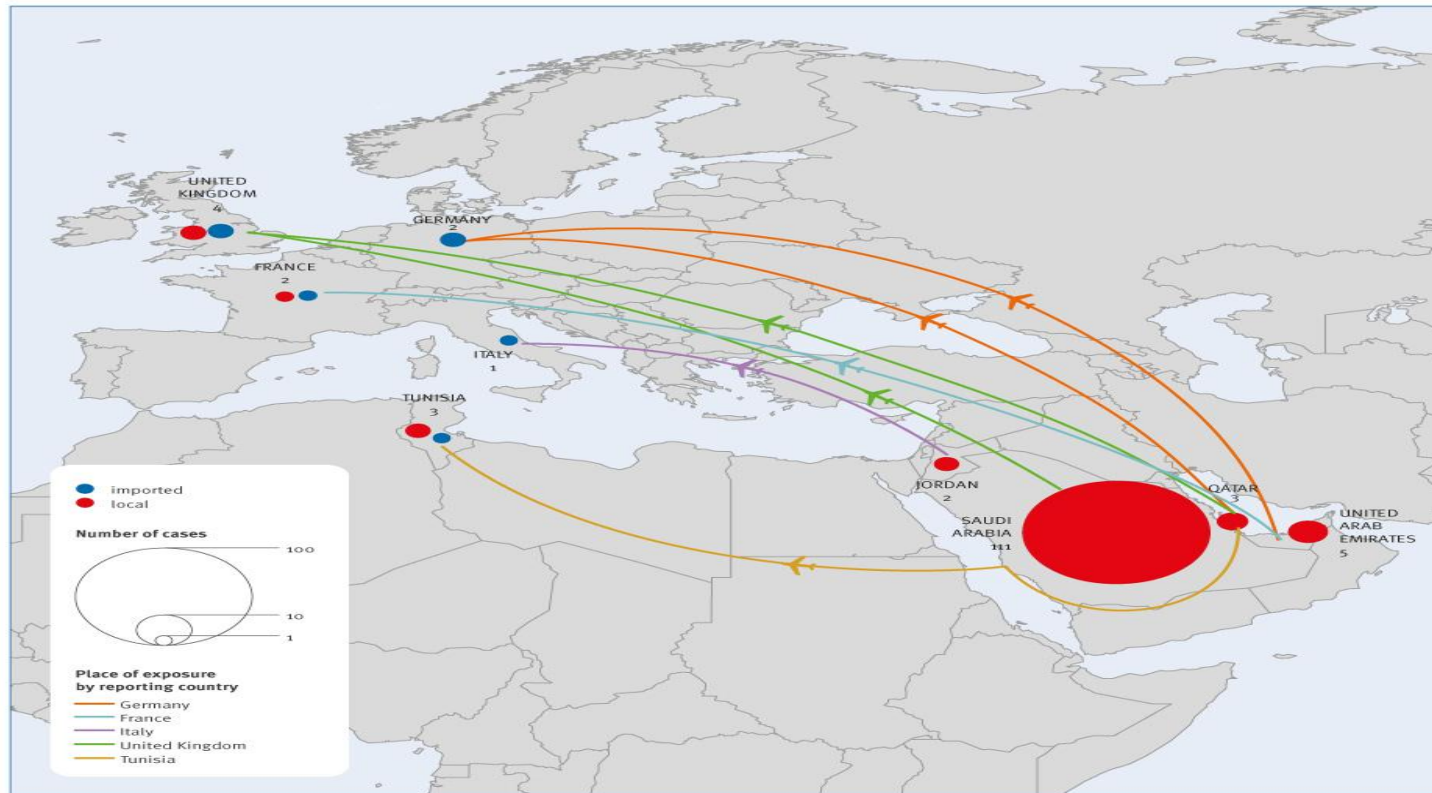
Virus origin?

- Dromedary camels found positive for MERS-CoV using serologic testing
- Genetically identical virus fragment from bats
- Intermediate host?



Location of MERS-CoV cases by reporting country, September 25, 2013

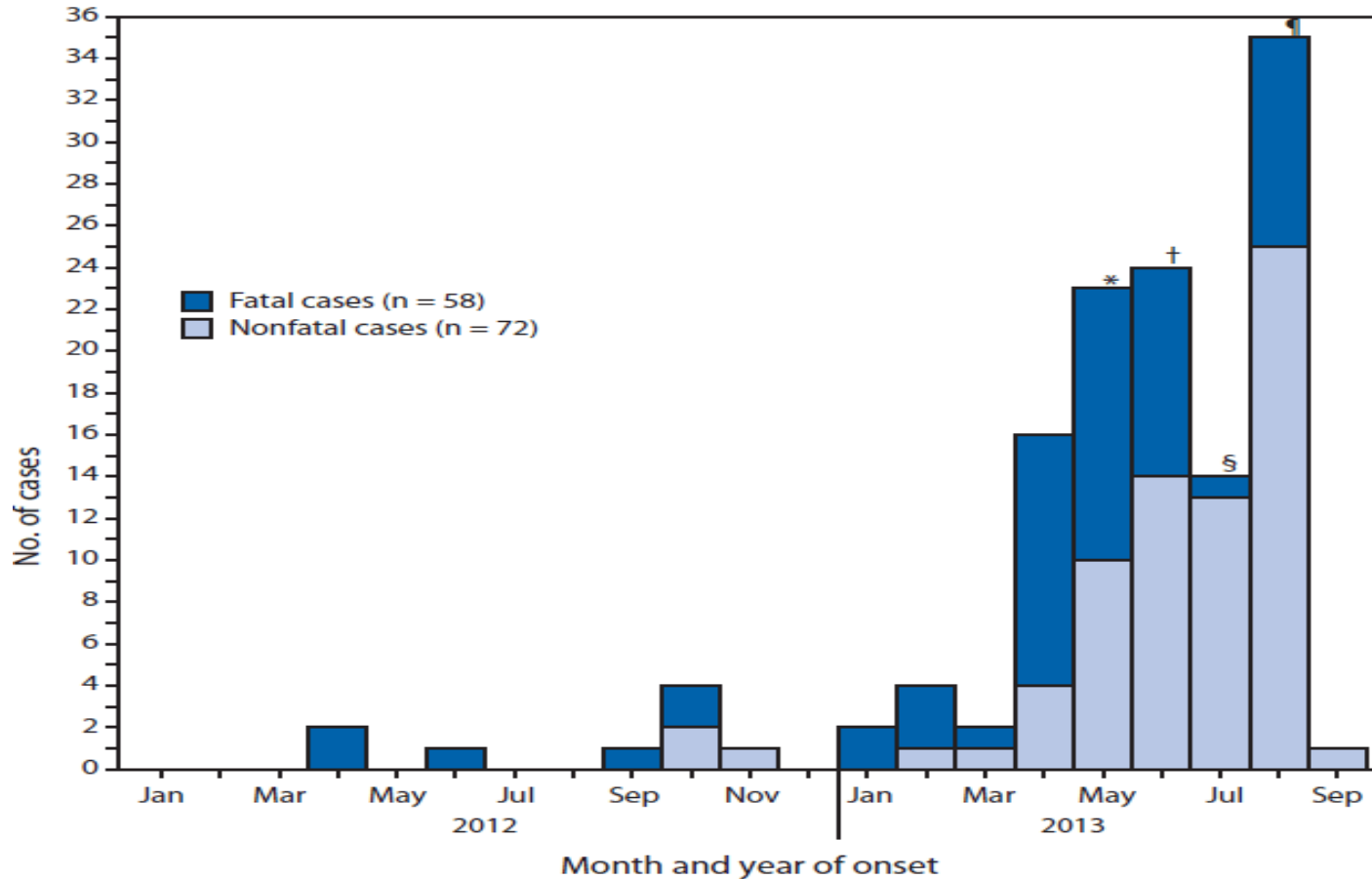
FIGURE 1
MERS coronavirus cases by reporting country, as of 25 September 2013 (n=133)



Source: [25].

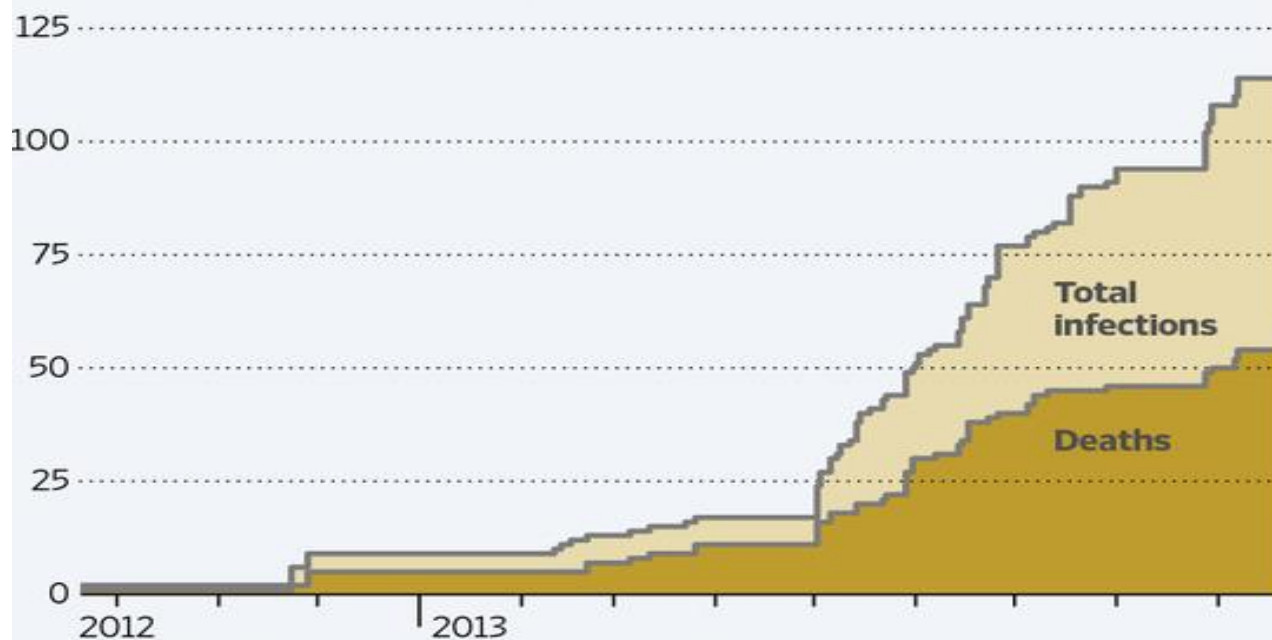
MERS: Middle East respiratory syndrome.

MERS-CoV cases reported WHO, September 20, 2013, by month of illness onset



Emerging Infection

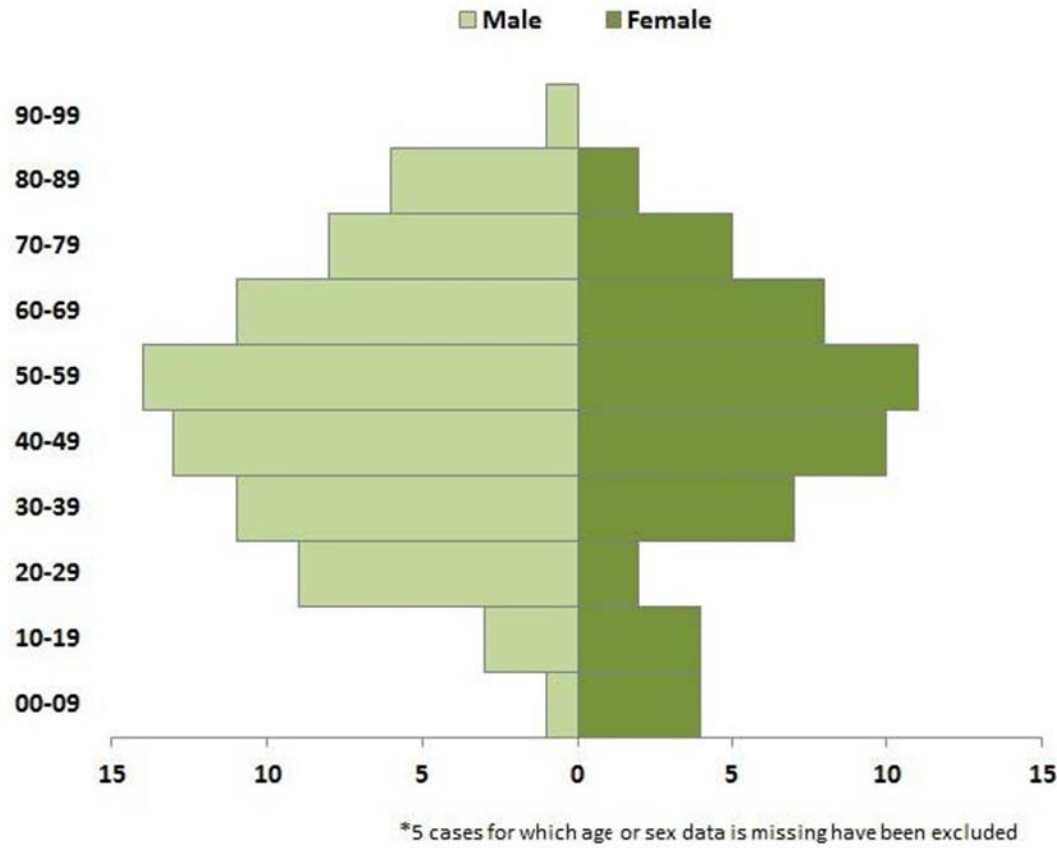
The first known MERS cases appeared in April 2012, and the virus that causes it was identified in September 2012. Lab-confirmed cases:



Source: World Health Organization (dates in chart reflect when news alerts were published)

Distribution of confirmed cases of MERS-CoV, March 2012 - 19 September 2013 (n=130*)

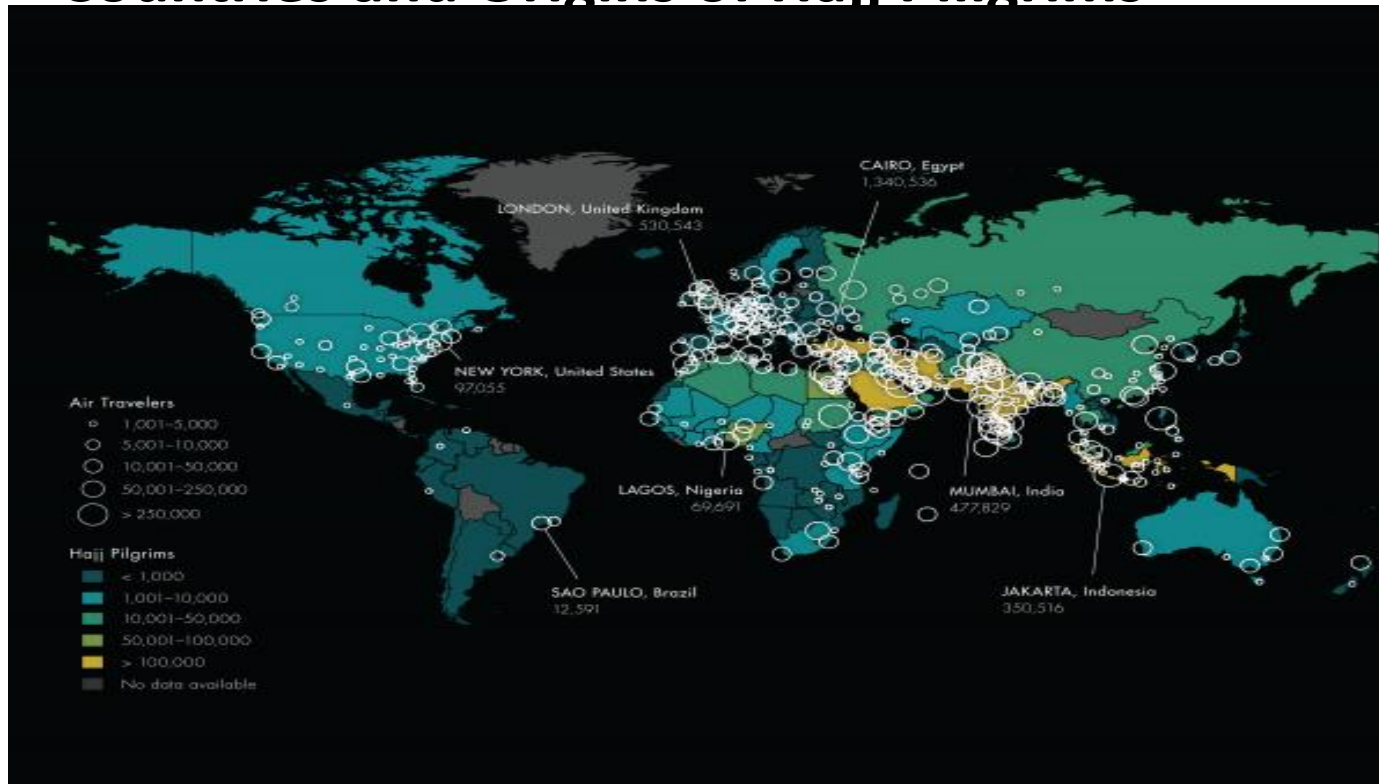
ECDC



Hajj October 13-18, 2013



Destinations of Air Travelers Departing MERS-CoV Source Countries and Origins of Hajj Pilgrims



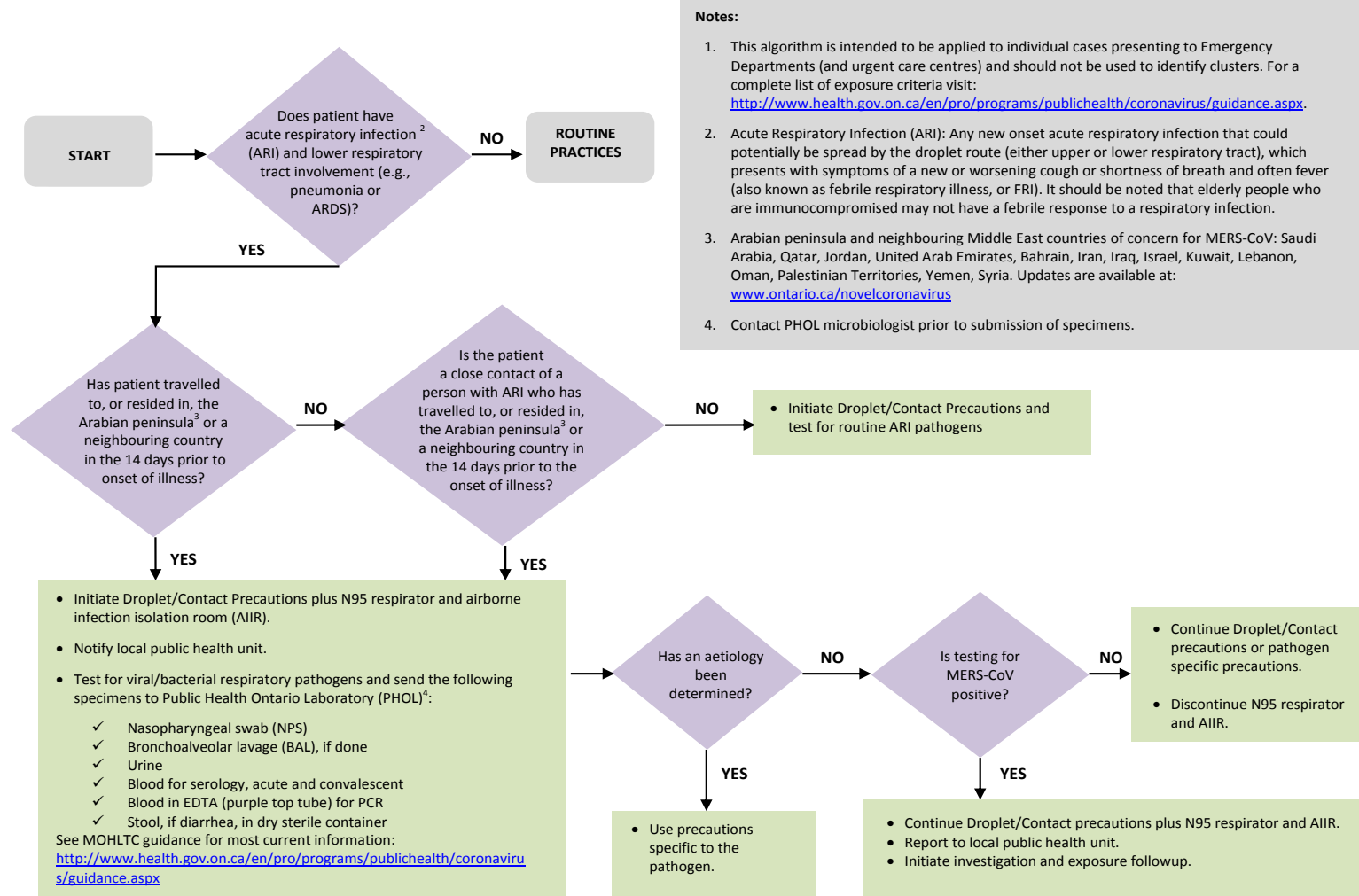
<http://currents.plos.org/outbreaks/article/assessing-risk-for-the-international-spread-of-middle-east-respiratory-syndrome-in-association-with-mass-gatherings-in-saudi-arabia/>

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)

Screening and Patient Management Algorithm for Middle East Respiratory Syndrome Coronavirus (MERS-CoV)¹



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>.
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
4. Contact PHOL microbiologist prior to submission of specimens.

Summary MERS-CoV

- Mild to severe illness (role of asymptomatic infection)
- Limited person to person transmission has occurred
- Individuals with underlying illnesses at greater risk of complications
- Nosocomial transmission (patients and HCWs) has occurred, however adherence to recommended IPAC measures unknown
- Screening and surveillance are key

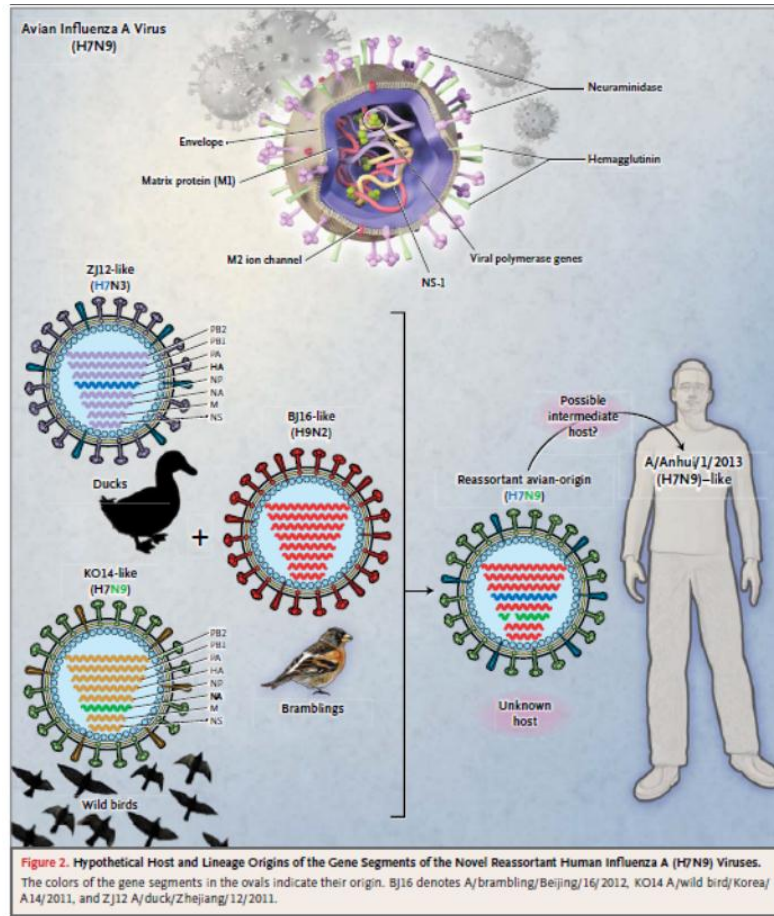
Avian influenza A/H7N9

Background

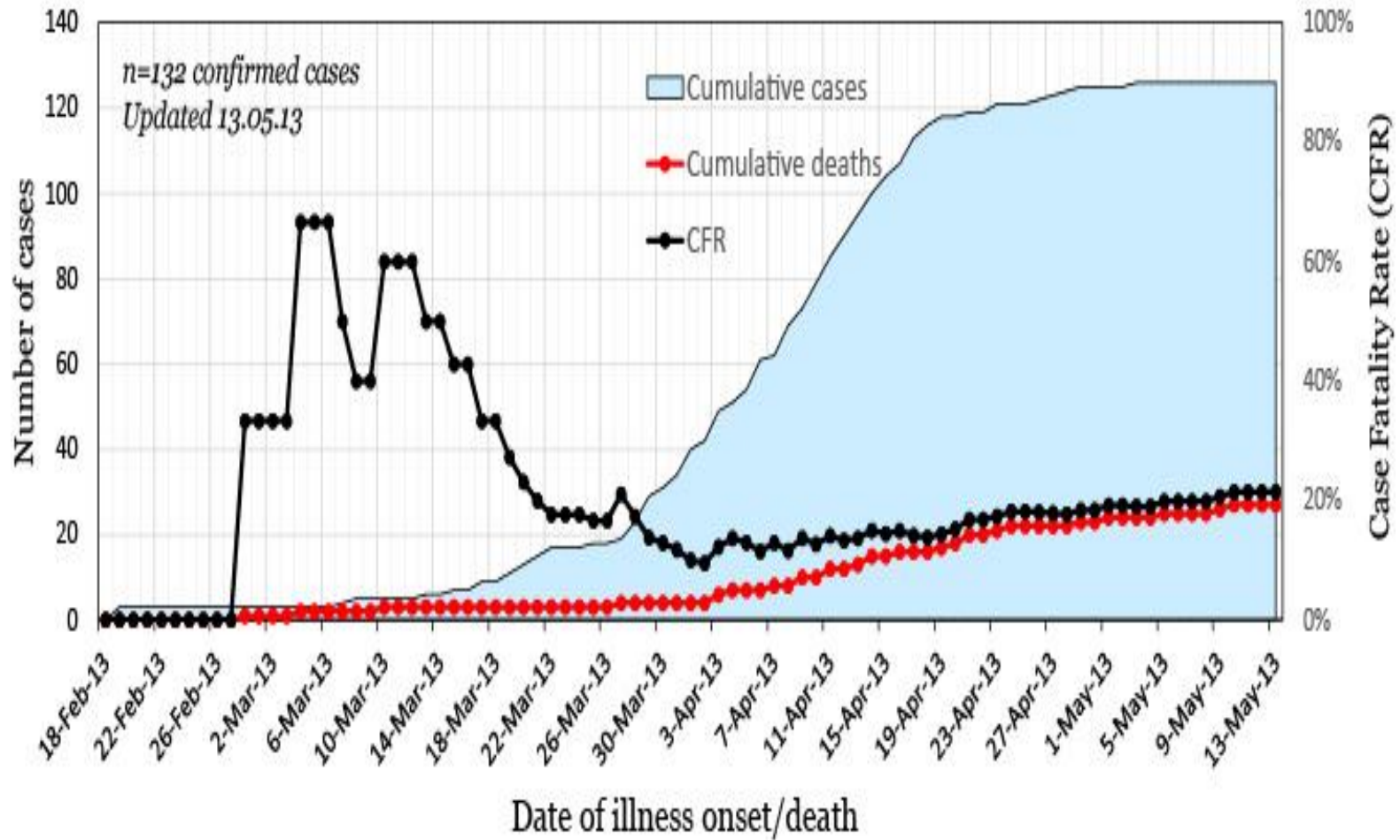
- On March 31, 2013 China notified WHO that a novel influenza A/H7N9 infection was causing severe illness in humans
- Human infections with other subgroups of H7 influenza viruses (H7N2, H7N3, and H7N7) reported previously. The infections mainly resulted in conjunctivitis and mild upper respiratory symptoms



Genetic origins of avian influenza A/H7N9



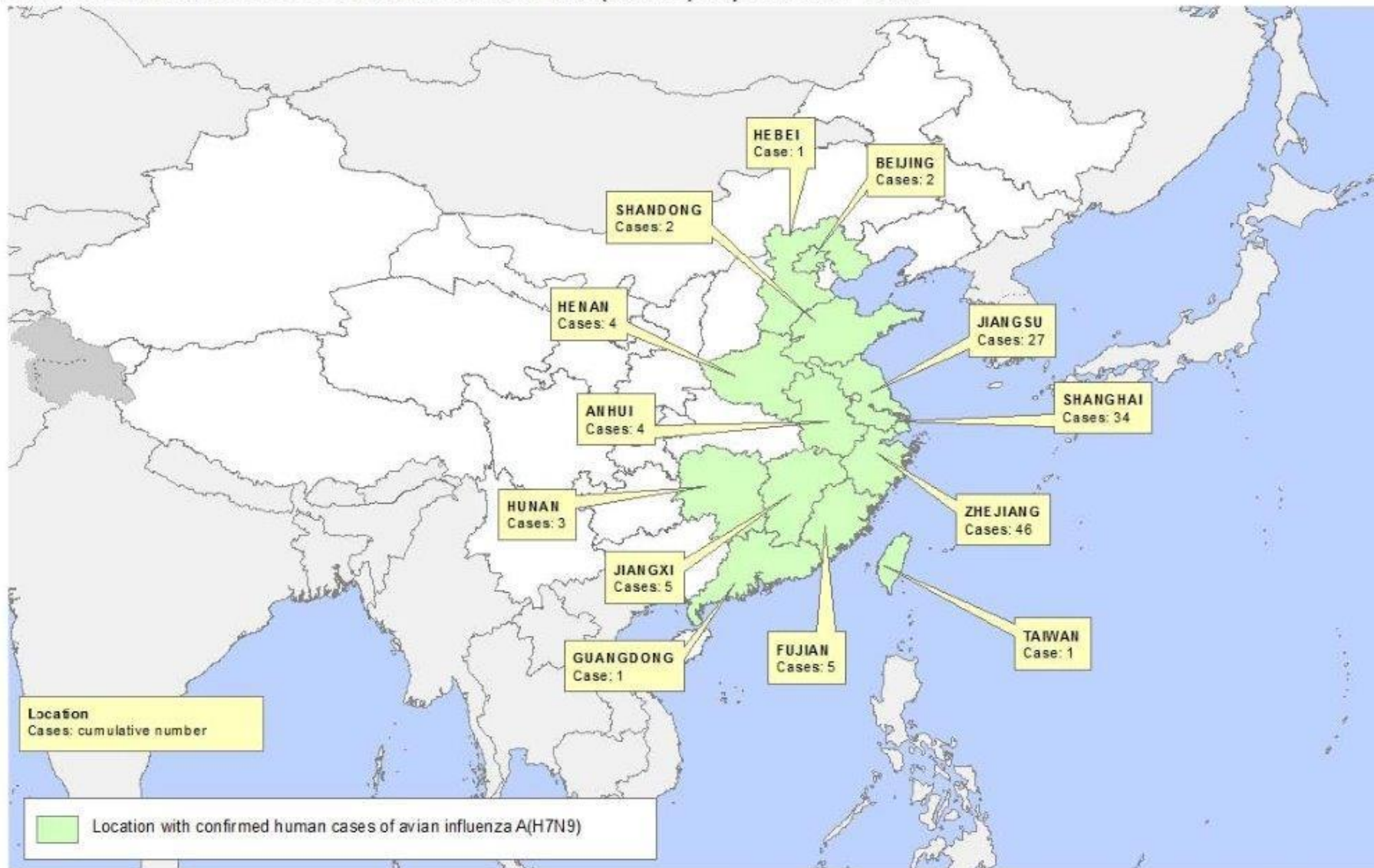
Avian influenza A(H7N9) virus cases and fatalities



http://www.uq.edu.au/vdu/VDUInfluenza_H7N9.htm

Geographical location

Confirmed human cases of avian influenza A(H7N9) reported to WHO



Cumulative number of confirmed cases of avian influenza A(H7N9) reported to WHO, by month, 2013

	February		March		April		May		June		July		unknown month of onset		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Total	2	2	30	12	88	7	3	0	0	0	2	0	10	23	135	44

Total number of cases includes number of deaths
WHO reports only laboratory cases
All dates refer to onset of illness

Data in WHO/HQ as of 12 August 2013, 14:45 GMT+1
Source: WHO/GIP

Summary avian A/H7N9

- Mild to severe illness (role of asymptomatic infection)
- Limited person to person transmission has occurred
- Individuals with underlying illnesses at greater risk of complications
- Unknown disease reservoirs
- Screening and surveillance are key

Risk assessment for MERS-CoV and H7N9

- Both are emerging respiratory diseases that can cause severe illness
- Human to human transmission has occurred BUT evidence to date has shown that spread is limited
- **However:**
- Insufficient information about MERS-CoV
- Spectrum of illness for both diseases is unknown
- Non human reservoir is unknown (MERS-CoV)

Keeping up with the constant stream of information

- Since H7N9 was first described in mid-April 2013 there have been more than 200 publications on the topic
- Since the terminology MERS-CoV has been used there have been more than 50 publications
- This does not include surveillance and other reports disseminated by WHO, ECDC and other health authorities or informal sources (e.g. ProMed)
- Surveillance information for seasonal respiratory viruses
- *How to keep up with the flow of information?*

What do you need to do?

Acute care:

- ED screening – FRI travel questions
- Higher alert during the Hajj
- Health unit as a resource
- Communication to staff

LTC settings (includes retirement homes):

- General awareness about influenza-like illness
- Routine surveillance of residents
- Health unit as a resource

Remember the basics!

- Don't come to work when ill with influenza-like illness (or any illness)
- Routine Practices
- 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
- Important Health Notices (IHNs)
(<http://www.health.gov.on.ca/en/pro/programs/emb/ihn.aspx>)
- PHO's respiratory virus reports (seasonal virus circulation)
 - Ontario Respiratory Virus Bulletin
<http://www.publichealthontario.ca/en/ServicesAndTools/SurveillanceServices/Pages/Ontario-Respiratory-Virus-Bulletin.aspx>
 - Laboratory Based Respiratory Pathogen Report
<http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/PHO-Laboratories-surveillance-updates.aspx>

Resources

- MOHLTC website
<http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/faq.aspx>
- PHAC website for travel advisories
<http://travel.gc.ca/travelling/health-safety/travel-health-notice/novel-coronavirus>

Questions?