One Health: What Does Occupational and Environmental Medicine Have To Do With It?

Peter M. Rabinowitz, MD, MPH
University of Washington Center for One Health Research
Seattle, WA USA

NAOEM Conference September 9, 2016
Outline

• One Health Concept
• Animal workers - need for OEM approach
  – Zoonotic and emerging diseases
  – Injury
  – Allergy
• Travel Medicine and One Health
• Animals as sentinels
Case 1:
Veterinarian Goes to the Doctor

• 35 year old veterinarian seen by his primary care physician for acute onset of fever, headache, myalgias, and abdominal pain

• No recent foreign travel
Physical Exam:

- Temperature 39.2C
- conjunctival injection
- right upper quadrant tenderness.
- lungs clear to auscultation and percussion,
- no focal pain in the arms or legs.
Initial Labs:

- WBC count 7700 cells/mL (18% bands, 66% PMNs, 7% monocytes, 6% lymph, and 3% atypical lymphocytes)
- Hematocrit 40.5%,
- Platelet count of 214,000 platelets/mL.
- AST 176 IU/mL and ALT 360 IU/mL
- Alkaline phosphatase and bilirubin levels normal.
- Urinalysis: specific gravity 1.030, 1+ protein, and 6–10 WBCs per high-powered field
Initial Diagnosis

- Possible viral hepatitis
- Possible mononucleosis
Follow up

- Patient returns in renal failure
- Diagnosed with leptospirosis
- Despite (delayed) treatment, requires kidney transplant

- (Had been treating infected dog- recent outbreak in local canines)
One Health: A Definition

• “One Health is a transdisciplinary concept connecting human, animal, and environmental health to address emerging disease challenges”
Why Do We Need One Health?

Emerging and Reemerging infections - 70% vector-borne or zoonotic

Arthropod-borne Rodent-borne Other (including bats)
Why Do We Need One Health?

Sally Trufan, UW Center for One Health Research. Data source: FAO
Urbanization
Intensification of Agriculture
Climate Change/Water Resources

Courtesy J. Mazet
Silos

HUMAN HEALTH
ANIMAL HEALTH
ENVIRONMENT
One Health: CDC Definition

“the health of humans is connected to the health of animals and the environment.”

• http://www.cdc.gov/onehealth/
One Health Concept Endorsed by:

- American Medical Association
- Several state medical associations
- American College of Preventive Medicine
- APHA
- CDC
- WHO
- World Medical Association
- Gates Foundation
- European Union
- Etc.
- Not yet ACOEM!
One Health: What’s OEM got to do with it?
Figure 3. Historical and predicted world production of pig meat.
Trends in hog operations in the United States.

Figure 1. History of Reassortment Events in the Evolution of the 2009 Influenza A (H1N1) Virus.
The eight segments shown within each virus code for the following proteins of the influenza A virus (top to bottom): polymerase PB2, polymerase PB1, polymerase PA, hemagglutinin, nuclear protein, neuraminidase, matrix proteins, and nonstructural proteins. The segments of the human 2009 influenza A (H1N1) virus have coexisted in swine influenza A virus strains for more than 10 years. The ancestors of neuraminidase have not been observed for almost 20 years. The mixing vessel for the current reassortment is likely to be a swine host but remains unknown.
La Gloria, Mexico
The A/H1N1 virus

An unusual cocktail of avian, swine and human viruses

Bird flu  Human flu

Swine flu
Pigs may harbour several flu viruses simultaneously. The pathogens may mix to create a new viral strain

Transmission
Pig to human
By inhaling viral particles (there is no risk from eating cooked pork)

Symptoms
High fever
Coughing, sneezing
Breathing difficulties
Loss of appetite

Human to human
By inhaling viral particles
Risk of Transmission to Swine

The A/H1N1 virus
An unusual cocktail of avian, swine and human viruses

Bird flu
Human flu
Swine worker

Swine flu
Pigs may harbour several flu viruses simultaneously. The pathogens may mix to create a new viral strain

Transmission
Pig to human
By inhaling viral particles (there is no risk from eating cooked pork)

Symptoms
Human to human
By inhaling viral particles

High fever
Coughing, sneezing
Breathing difficulties
Loss of appetite
The A/H1N1 virus

An unusual cocktail of avian, swine and human viruses

Bird flu  Human flu

Swine flu
Pigs may harbour several flu viruses simultaneously. The pathogens may mix to create a new viral strain

Transmission

Pig to human
By inhaling viral particles (there is no risk from eating cooked pork)

Symptoms

Swine worker

Swine worker

Human to human
By inhaling viral particles

High fever
Coughing, sneezing
Breathing difficulties
Loss of appetite

Bridge to the Community
"Reverse Zoonosis"

Figure 1. Onset of influenza-like illness among humans and swine during an outbreak of pandemic influenza A on a Canadian swine farm in 2009.
Emerging Infectious Diseases as an OEM Problem (Zoonoses)

- SARS: market workers, food workers
- Avian flu: poultry handling, markets, veterinarians
- MERS: camel contact
- Nipah virus: swine workers, palm sap harvesters
- Hendra virus: horse handlers
- Ebola: health care workers
Occupational Health of Animal Workers

• One Health is Occ Health: Animals, Humans, Environments

• Occ Health Team should include:
  – Physician (OEM)
  – Veterinarian
  – Industrial hygienist (Exposure assessment and control)
PREDICT Wildlife Surveillance Project

Several hundred new animal viruses identified
Avian Influenza in WA 2015
Case 2: Sneezing Lab Worker

- Patient referred from occupational medicine clinic
- Complaining of sneezing, rhinitis, nasal discharge, conjunctivitis, and tearing, eyelid swelling, itching, and dermatitis.
History

• Previous mild atopy
• Smokes ½ ppd
• Has worked at current job 2 years
• Recent symptoms began about 1 year ago
• Works with mice in a small pharmaceutical company
• Responsible for changing bedding and cleaning cages
Exam

- Mild conjunctivitis
- Rhinitis
- Occasional wheeze
Lab Animal Allergy (LAA)

• Potential allergens:
  – Animals (especially rodents, rabbits):
    • animal urine
    • dander
    • saliva
  – Animal Environments
    • Bedding
    • Feed
    • mold
    • Insects (including dust mites?)
Lab Animal Allergy- How Common?

Prevalence:
- Varies between studies: up to 30% of lab animal workers
- Healthy worker effect
Animal Injuries
WA Veterinary Medical/Animal Care
Workers at High Risk for Injury

- Injury rates among animal workers substantially higher than those in human healthcare

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>7308 Pet Stores, Grooming, Shelters and Kennels</td>
<td>2581</td>
<td>2289</td>
<td>2564</td>
<td>2011</td>
<td>1575</td>
</tr>
<tr>
<td>6107 Veterinary Services</td>
<td>1588</td>
<td>1566</td>
<td>1367</td>
<td>1370</td>
<td>1548</td>
</tr>
<tr>
<td>6109 Physicians &amp; Medical Clinics</td>
<td>375</td>
<td>353</td>
<td>316</td>
<td>336</td>
<td>308</td>
</tr>
</tbody>
</table>

6.5x
4.4x
Ref
OEM and Animal Workers

• Assess and reduce risk (preplacement exams, etc.)
• Medical surveillance programs for high risk workers
• Recognition of sentinel cases
• Injury management and return to work:
  – Worker
  – Animals
  – The environment
Clinic Environment (CE)
- Dimensions and layout
- Sounds
- Available animal restraint equipment (HB)
- (Un)familiar space (AB)

Animal Behavior
- Memory/Past Experiences
- Health Status
- Procedure (HB)
- Fear and/or Pain threshold(s)

Worker Behavior & Practices
- Communication
- Competency in animal behavior (AB)
- Patience
- Pet Owner support
- Self-efficacy
- Skill set

Human Behavior & Practices
- Communication
- Competency in animal behavior (AB)
- Patience
- Time constraints
Occupational Health Team for Animal Workers
New Program at UW: Occupational Health at the Human Animal Interface (OHHAI)

- Farm workers
- Veterinary workers
- Animal care workers
- Lab workers
- Aquarium workers
- Etc.!
Travel Medicine: One Health Risk Assessment

- Ask about animal contacts- think broadly!
- Consider high risk environments for zoonotic diseases
Agrotourism
Contaminated environments
New Program at UW: Occupational Health at the Human Animal Interface (OHHAI)

- Farm workers
- Veterinary workers
- Animal care workers
- Lab workers
- Aquarium workers
- Etc.!
Animals as Sentinels
59 year old man referred to Yale Occupational and Environmental Medicine because of persistently elevated urine mercury. Works in factory making fluorescent light bulbs
• Patient removed from worksite
• 1 month later, urine mercury level has increased
• Company accuses patient of deliberately “spiking” urine with mercury.
Quicksilver in the Boots

- On follow-up appointment, patient reports bringing his work boots home and wearing them during bad weather for several weeks
- Found mercury under insoles of boots
- Site visit made to home
Dog Urinalysis Confirms Mercury Contamination of Home

- Dog urine mercury: 5X “normal” level
- Workers compensation accepts case
- Dog and owner relocated
Conclusion: One Health needs OEM Expertise:

• A new niche for practice?
• Animal workers
  – Zoonoses, emerging infectious diseases
  – Injuries
  – Allergies
• Travel Med
• Animals as Sentinels
  – Improve environments for both humans and animals
Thank You!

http://deohs.washington.edu/cohr/