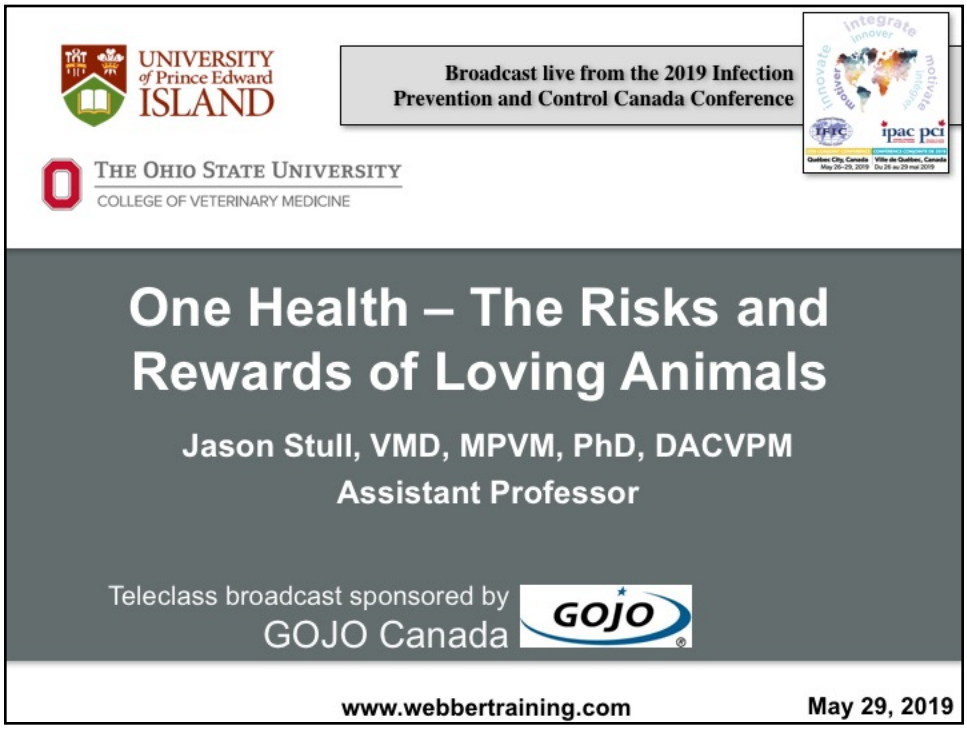
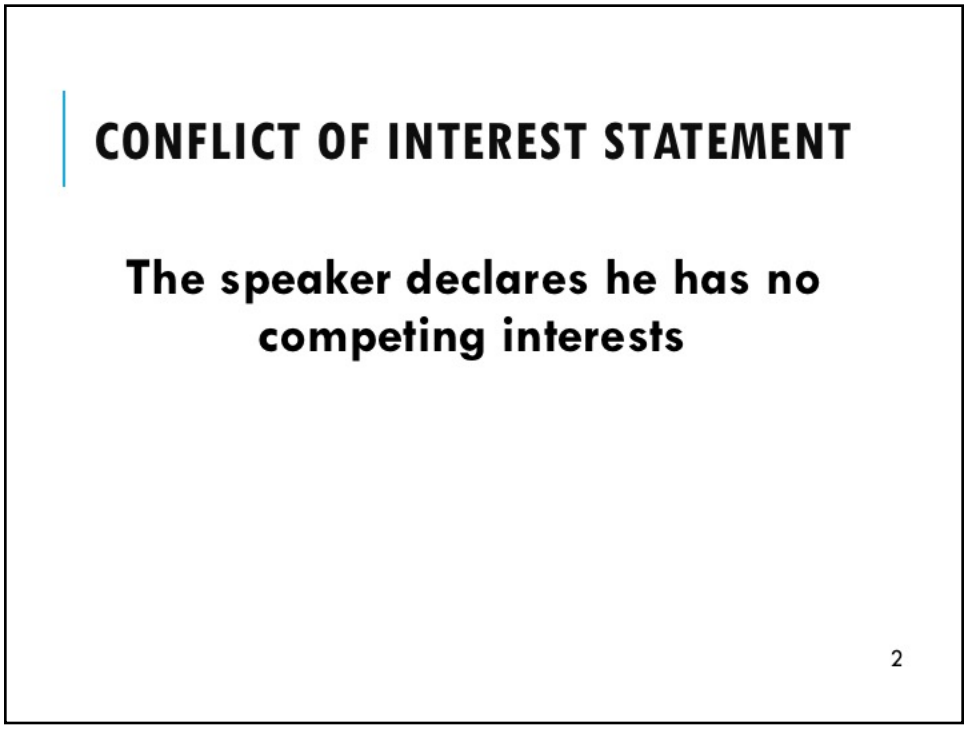

UNIVERSITY of Prince Edward ISLAND
Broadcast live from the 2019 Infection Prevention and Control Canada Conference
THE OHIO STATE UNIVERSITY
COLLEGE OF VETERINARY MEDICINE
One Health – The Risks and Rewards of Loving Animals
Jason Stull, VMD, MPVM, PhD, DACVPM
Assistant Professor
Teleclass broadcast sponsored by
GOJO Canada
www.webbertraining.com
May 29, 2019


CONFLICT OF INTEREST STATEMENT
The speaker declares he has no competing interests
2

OBJECTIVES

- Relationships between human, animal and environmental health and the public health challenges and opportunities these links present
- Impact on health due to the human-animal bond
- One Health impacts of globalization and migration of humans and animals

3

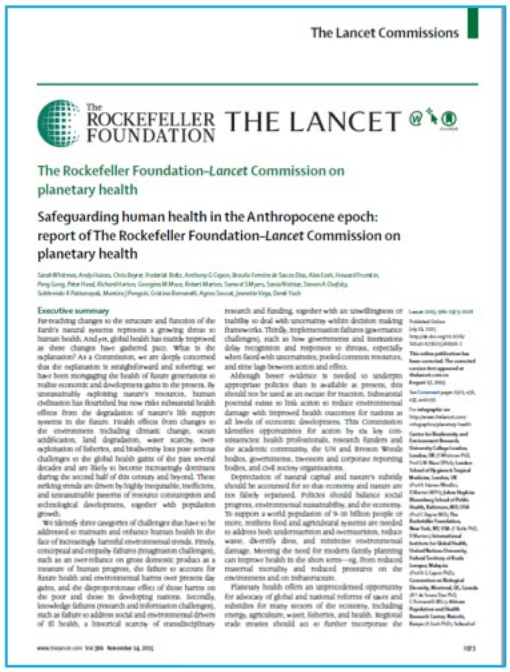
PAST ~ 70 YEARS

Improvements in human health

- Global life expectancy ↑ 25 yrs
- Global infant mortality ↓ to 30 per thousand

Environmental changes

Animal population changes



The Lancet Commissions

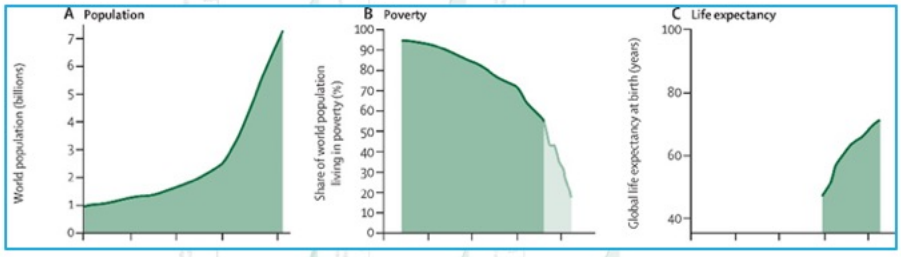
The ROCKEFELLER FOUNDATION THE LANCET

The Rockefeller Foundation-*Lancet* Commission on planetary health

Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation-*Lancet* Commission on planetary health

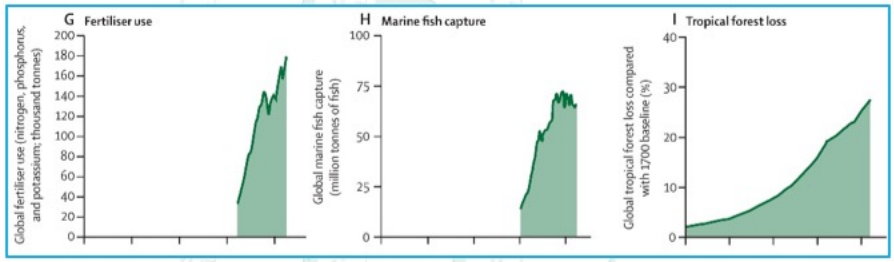
Executive summary

Whitmee S, et al. 2015



For Years 1800 – 2010

Whitmee S, et al. 2015



For Years 1800 – 2010

Whitmee S, et al. 2015

ONE HEALTH

Recognize connections (human, animal, environmental health) for optimal benefits

Address areas at interface results in benefits of all

Thompson 2013

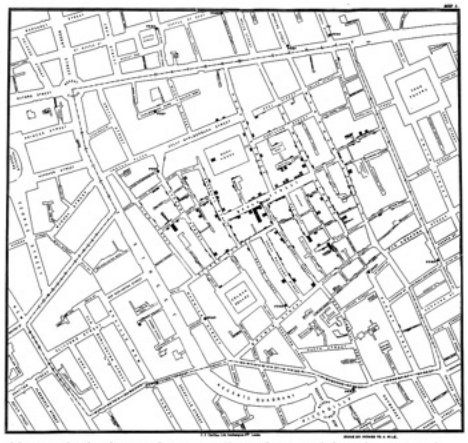
7

SOMETHING OLD, SOMETHING NEW...

Concept of One Health not new

New technologies & approaches allow unique benefits

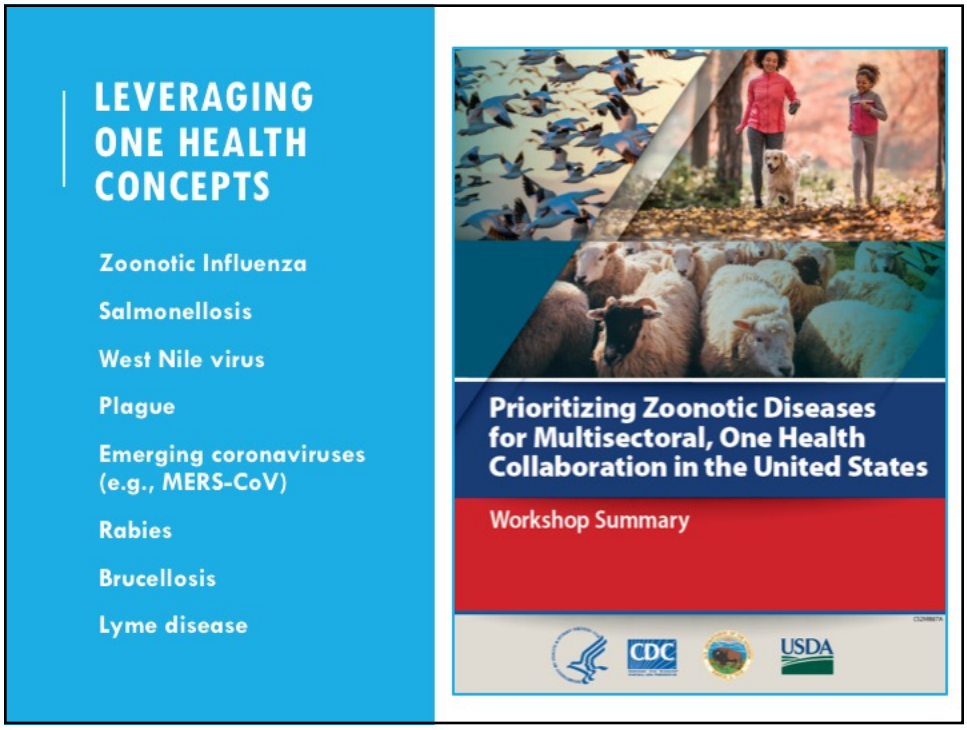
Lack of awareness across health disciplines – limited action



Map of cholera clusters (London epidemic, 1854)

8


ONE HEALTH
ecosystem
collaboration
wildlife
communications
Multi-disciplinary
integrated approach
Human animal environment interface
food safety and security
disease prevention
training
Scale
land use
capacity building
surveillance systems
research
cross sectoral
integrated systems
information sharing
public health
emerging disease
clinical medicine
9
Stephen C, Karesh WB, 2014


LEVERAGING ONE HEALTH CONCEPTS
Zoonotic Influenza
Salmonellosis
West Nile virus
Plague
Emerging coronaviruses (e.g., MERS-CoV)
Rabies
Brucellosis
Lyme disease
Prioritizing Zoonotic Diseases for Multisectoral, One Health Collaboration in the United States
Workshop Summary
CDC
USDA

Think Globally, Act Locally

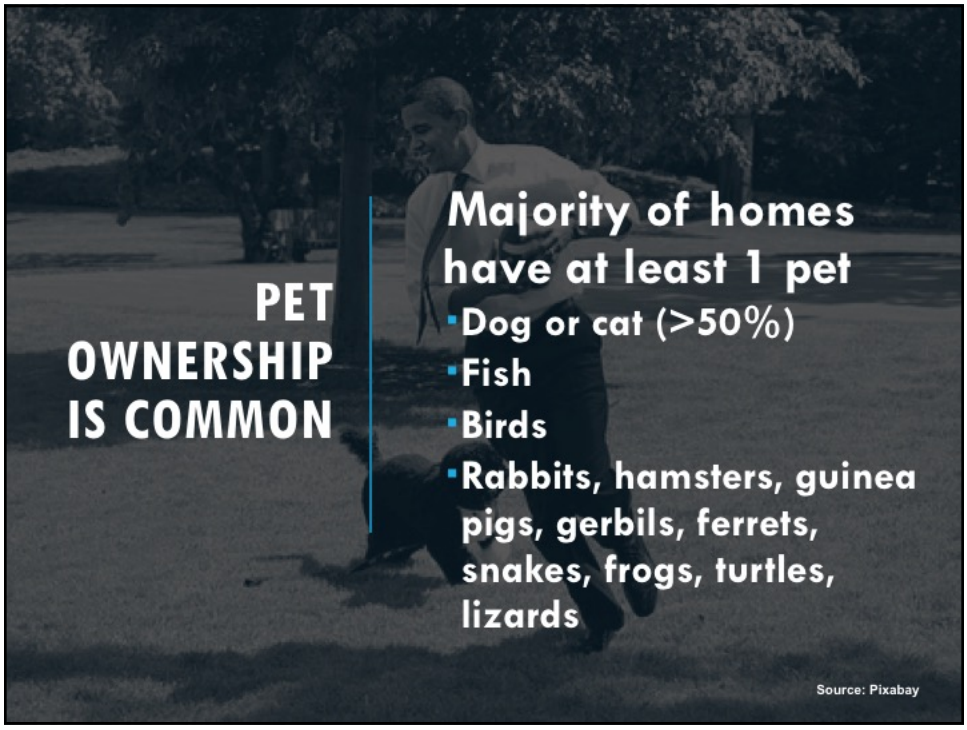
How does a One Health paradigm assist us in local Infection Prevention and Control?

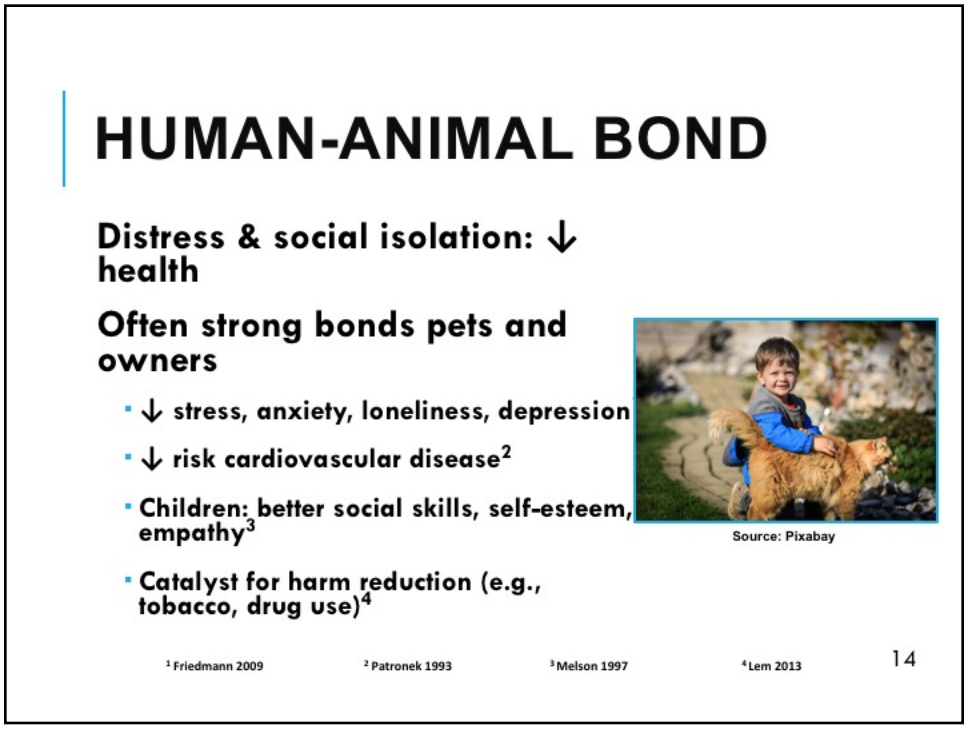
Source: Pixabay

ONE HEALTH AND ANIMALS: CASE EXAMPLES

- Animals in human healthcare facilities
- Dogs on livestock farms
- Pets as human disease sentinels
- Transboundary animal diseases

12


PET OWNERSHIP IS COMMON
Majority of homes have at least 1 pet
Dog or cat (>50%)
Fish
Birds
Rabbits, hamsters, guinea pigs, gerbils, ferrets, snakes, frogs, turtles, lizards
Source: Pixabay


HUMAN-ANIMAL BOND
Distress & social isolation: ↓ health
Often strong bonds pets and owners
↓ stress, anxiety, loneliness, depression
↓ risk cardiovascular disease[2]
Children: better social skills, self-esteem, empathy[3]
Catalyst for harm reduction (e.g., tobacco, drug use)[4]
Source: Pixabay
[1] Friedmann 2009
[2] Patronek 1993
[3] Melson 1997
[4] Lem 2013
14

IMMUNOCOMPROMISED

Source: Pixabay

Mental & physical isolation

HIV-infected[1]

- Pet as family member
- Source of support and affection
- Protect against loneliness
- Pet-owners with AIDS less depression than non-pet owners

Cancer patients[2]

- High level of attachment to pets
- Having a pet provided health benefits (67%)

Immunocompromised children[3]

15

[1] Siegel 1999 [2] Larson 2010 [3] Stull 2014

PETS INCORPORATED INTO HUMAN HEALTHCARE[1]

Builders of social capital

Harm reduction

Motivators for healthy behavior change

Participants in treatment plans

Source: Pixabay

[1] Hodgson et al., 2015

16

ZOONOSES

Naturally transmitted from animals to people

Of 1,415 species pathogenic to people[1]

- 61% zoonotic
- 75% emerging pathogens zoonotic

17

[1] Taylor 2001

PET-ASSOCIATED DISEASE

70+ pathogens of pets transmissible to people

Pets often subclinical shedding

Emerging & remerging diseases

Animal and human reservoirs

Dogs visiting human healthcare facilities[1]

- *C. difficile* (OR=2.4)
- MRSA (OR=4.7)

Source: Pixabay

18

[1] Lefebvre 2009

PET-ASSOCIATED DISEASE RISKS

Disease risk greatest
- Extremes of age (<5 yrs, ≥ 65 yrs)
- Pregnant
- Immunocompromised

Source: Pixabay

Higher risk groups
- Particular pathogens
- Longer duration
- More severe/unexpected complications

Pet factors

19

(SOME) ANIMAL-ASSOCIATED HUMAN OUTBREAKS, USA (2011-2019)

- Pet store puppies (campylobacteriosis)
- Live poultry (salmonellosis)
- Poultry at slaughter plant (Psittacosis)
- Pet turtles (salmonellosis)
- Pet crested geckos (salmonellosis)
- Pet bearded dragons (salmonellosis)
- Pet frogs (salmonellosis)
- Pet hedgehogs (salmonellosis)
- Pet guinea pigs (salmonellosis)
- Pet rats (salmonellosis)

20

Source: Centers for Disease Control and Prevention (https://www.cdc.gov/healthypets/outbreaks.html)

RISKS AND BENEFITS OF PETS IN NURSING HOMES[1]

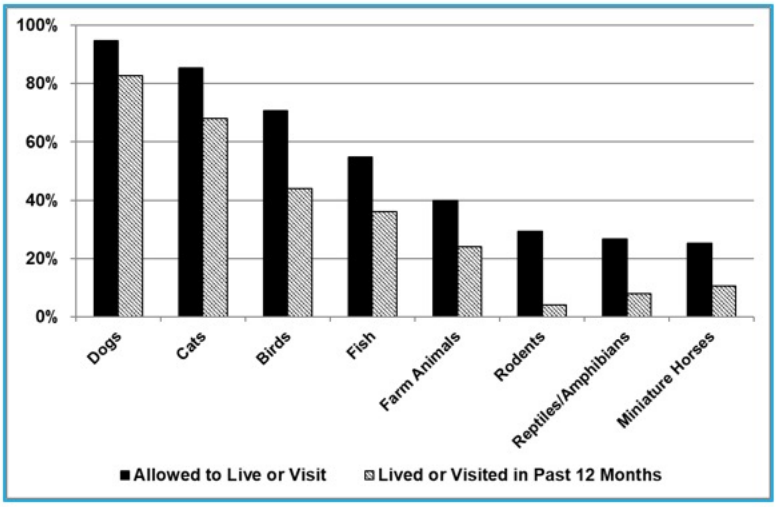
95 respondents (different OH facilities)

97% allowed animals to visit

- Family pet
- Socialization-directed
- Physical therapy

[1] Stull et al, 2018

22



Responding facilities ($N = 75$) that allowed pets to live in or visit the facility and reported presence of species within the facility in the past 12 months

[1] Stull et al, 2018

BENEFITS AND RISKS

Perceived health benefits

- Residents frequently ask to spend time with animals
  - 58% (birds) to 94% (dogs/cats)
- Useful in calming agitated residents
  - 61% (birds) to 94% (dogs)

No reported pet-associated infections

Health and safety concerns low (25%)

25

BENEFITS AND RISKS

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  - 61% (birds) to 94% (dogs)

No reported pet-associated infections

Health and safety concerns low (25%)

25

ONE HEALTH CHALLENGES

Accurately measuring health benefits and risks from animal contact

Needed to best weigh advantages and disadvantages

26

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

SHEA EXPERT GUIDANCE

Animals in Healthcare Facilities: Recommendations to Minimize Potential Risks

Rekha Murthy, MD;[1] Gonzalo Bearman, MD, MPH;[2] Sherrill Brown, MD;[3] Kristina Bryant, MD;[4] Raymond Chinn, MD;[5] Angela Hewlett, MD, MS;[6] B. Glenn George, JD;[7] Ellie J.C. Goldstein, MD;[8] Galit Holzmann-Pazgal, MD;[9] Mark E. Rupp, MD;[10] Timothy Wiemken, PhD, CIC, MPH;[4] J. Scott Weese, DVM, DVSc, DACVIM;[11] David J. Weber, MD, MPH[12]

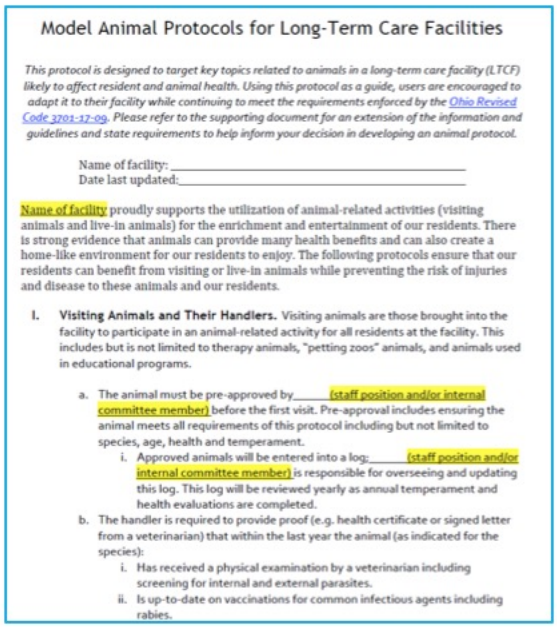
PURPOSE

Animals may be present in healthcare facilities for multiple reasons. Although specific laws regarding the use of service animals in public facilities were established in the United States in 1990, the widespread presence of animals in hospitals, including service animals to assist in patient therapy and research, has resulted in the increased presence of animals in acute care hospitals and ambulatory medical settings. The role

guidance on the management of AHC in four categories: animal-assisted activities, service animals, research animals, and personal pet visitation. Institutions considering these programs should have policies that include well-organized communication and education directed at healthcare personnel (HCP), patients, and visitors. Appropriately designed studies are needed to better define the risks and benefits of allowing animals in the healthcare setting for specific purposes.

Murthy R, et al. Animals in healthcare facilities: recommendations to minimize potential risks. *Infect Control Hosp Epidemiol.* 2015

27



Model Animal Protocols for Long-Term Care Facilities

This protocol is designed to target key topics related to animals in a long-term care facility (LTCF) likely to affect resident and animal health. Using this protocol as a guide, users are encouraged to adapt it to their facility while continuing to meet the requirements enforced by the Ohio Revised Code 3701-17-09. Please refer to the supporting document for an extension of the information and guidelines and state requirements to help inform your decision in developing an animal protocol.

Name of facility: _____
Date last updated: _____

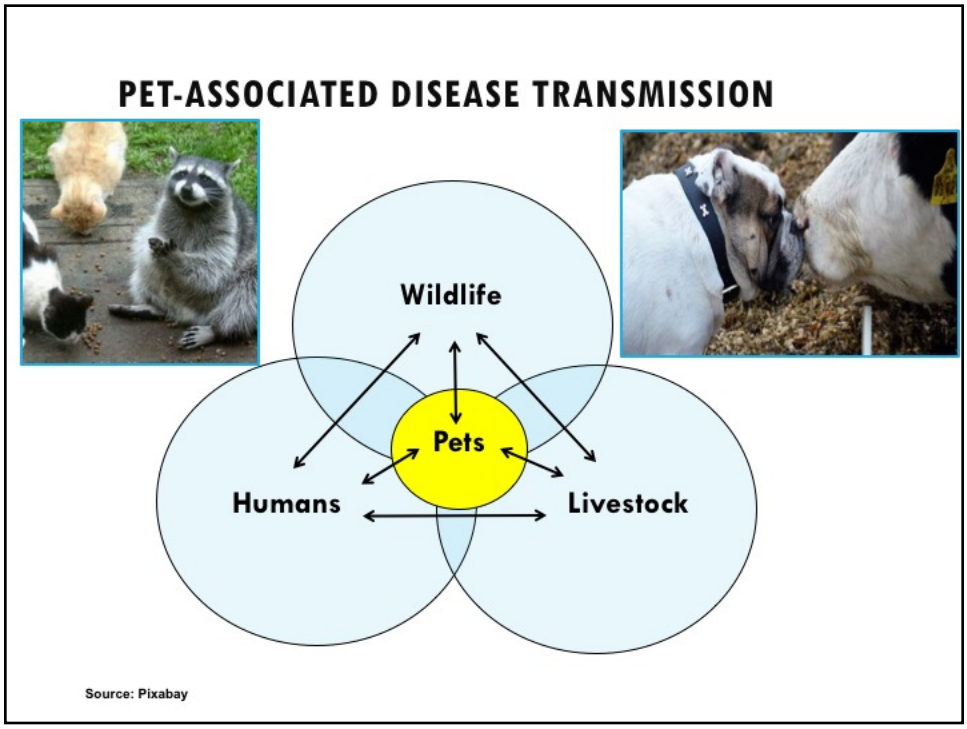
Name of facility proudly supports the utilization of animal-related activities (visiting animals and live-in animals) for the enrichment and entertainment of our residents. There is strong evidence that animals can provide many health benefits and can also create a home-like environment for our residents to enjoy. The following protocols ensure that our residents can benefit from visiting or live-in animals while preventing the risk of injuries and disease to these animals and our residents.

I. **Visiting Animals and Their Handlers.** Visiting animals are those brought into the facility to participate in an animal-related activity for all residents at the facility. This includes but is not limited to therapy animals, "petting zoos" animals, and animals used in educational programs.

a. The animal must be pre-approved by _____ (staff position and/or internal committee member) before the first visit. Pre-approval includes ensuring the animal meets all requirements of this protocol including but not limited to species, age, health and temperament.
   i. Approved animals will be entered into a log; _____ (staff position and/or internal committee member) is responsible for overseeing and updating this log. This log will be reviewed yearly as annual temperament and health evaluations are completed.
b. The handler is required to provide proof (e.g. health certificate or signed letter from a veterinarian) that within the last year the animal (as indicated for the species):
   i. Has received a physical examination by a veterinarian including screening for internal and external parasites.
   ii. Is up-to-date on vaccinations for common infectious agents including rabies.

http://www.go.osu.edu/nhpets


Source: Pixabay


PET-ASSOCIATED DISEASE TRANSMISSION
Wildlife
Pets
Humans
Livestock
Source: Pixabay

LIVESTOCK FARMS: UNIQUE ONE HEALTH OPPORTUNITIES

People

- Aging population (mean 58 yrs; 33% over 65)
- On- and off-farm professions

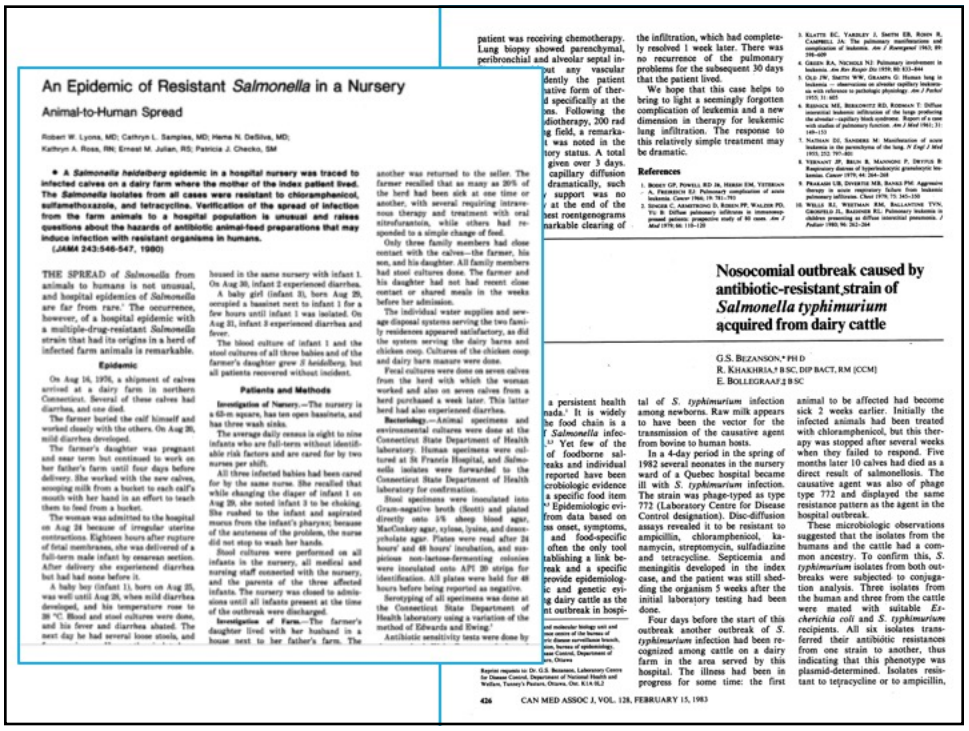
Livestock

- Diverse species
- Many zoonotic pathogens shared with people & dogs
- Infection control principles key to health

Dogs

- Many with dual purposes (on-farm and household)

31



An Epidemic of Resistant *Salmonella* in a Nursery

Animal-to-Human Spread

Robert W. Lyons, MD; Cathryn L. Sampies, MD; Hema N. DeSilva, MD; Kathryn A. Ross, RN; Ernest M. Julian, RS; Patricia J. Checko, SM

• A *Salmonella heidelberg* epidemic in a hospital nursery was traced to infected calves on a dairy farm where the mother of the index patient lived. The *Salmonella* isolates from all cases were resistant to chloramphenicol, sulfamethoxazole, and tetracycline. Verification of the spread of infection from the farm animals to a hospital population is unusual and raises questions about the hazards of antibiotic animal-feed preparations that may induce infection with resistant organisms in humans.
(JAMA 243:546-547, 1980)

THE SPREAD of *Salmonella* from animals to humans is not unusual, and hospital epidemics of *Salmonella* are far from rare.[1] The occurrence, however, of a hospital epidemic with a multiple-drug-resistant *Salmonella* strain that had its origins in a herd of infected farm animals is remarkable.

Epidemic

On Aug 16, 1976, a shipment of calves arrived at a dairy farm in northern Connecticut. Several of these calves had diarrhea, and one died.

The farmer buried the calf himself and worked closely with the others. On Aug 20, mild diarrhea developed.

The farmer's daughter was pregnant and near term but continued to work on her father's farm until four days before delivery. She worked with the new calves, scooping milk from a bucket to each calf's mouth with her hand in an effort to teach them to feed from a bucket.

The woman was admitted to the hospital on Aug 24 because of irregular uterine contractions. Eighteen hours after rupture of fetal membranes, she was delivered of a full-term male infant by cesarean section. After delivery she experienced diarrhea but had had none before it.

A baby boy (infant 1), born on Aug 25, was well until Aug 29, when mild diarrhea developed, and his temperature rose to 39 °C. Blood and stool cultures were done, and his fever and diarrhea abated. The next day he had several loose stools, and housed in the same nursery with infant 1. On Aug 30, infant 2 experienced diarrhea.

A baby girl (infant 3), born Aug 29, occupied a bassinet next to infant 2 for a few hours until infant 1 was isolated. On Aug 31, infant 3 experienced diarrhea and fever.

The blood culture of infant 1 and the stool cultures of all three babies and of the farmer's daughter grew *S heidelberg*, but all patients recovered without incident.

Patients and Methods

Investigation of Nursery.—The nursery is a 63-m square, has ten open bassinets, and has three wash sinks.

The average daily census is eight to nine infants who are full-term without identifiable risk factors and are cared for by two nurses per shift.

All three infected babies had been cared for by the same nurse. She recalled that while changing the diaper of infant 1 on Aug 29, she noted infant 3 to be choking. She rushed to the infant and aspirated mucus from the infant's pharynx; because of the acuteness of the problem, the nurse did not stop to wash her hands.

Stool cultures were performed on all infants in the nursery, all medical and nursing staff connected with the nursery, and the parents of the three affected infants. The nursery was closed to admissions until all infants present at the time of the outbreak were discharged.

Investigative of Farm.—The farmer's daughter lived with her husband in a house next to her father's farm. The another was returned to the seller. The farmer recalled that as many as 20% of the herd had been sick at one time or another, with several requiring intravenous therapy and treatment with oral nitrofurantoin, while others had responded to a simple change of feed.

Only three family members had close contact with the calves—the farmer, his son, and his daughter. All family members had stool cultures done. The farmer and his daughter had not had recent close contact or shared meals in the weeks before her admission.

The individual water supplies and sewage disposal systems serving the two family residences appeared satisfactory, as did the system serving the dairy barns and chicken coop. Cultures of the chicken coop and dairy barn manure were done.

Fecal cultures were done on seven calves from the herd with which the woman worked and also on seven calves from a herd purchased a week later. This latter herd had also experienced diarrhea.

Bacteriology.—Animal specimens and environmental cultures were done at the Connecticut State Department of Health laboratory. Human specimens were cultured at St Francis Hospital, and *Salmonella* isolates were forwarded to the Connecticut State Department of Health laboratory for confirmation.

Stool specimens were inoculated into Gram-negative broth (Scott) and plated directly onto 5% sheep blood agar, MacConkey agar, xylose, lysine, and desoxycholate agar. Plates were read after 24 hours' and 48 hours' incubation, and suspicious non-lactose-fermenting colonies were inoculated onto API 20 strips for identification. All plates were held for 48 hours before being reported as negative.

Serotyping of all specimens was done at the Connecticut State Department of Health laboratory using a variation of the method of Edwards and Ewing.[2]

Antibiotic sensitivity tests were done by

patient was receiving chemotherapy. Lung biopsy showed parenchymal, peribronchial and alveolar septal in- ut any vascular dently the patient ative form of ther- d specifically at the ns. Following the diotherapy, 200 rad g field, a remarka- t was noted in the tory status. A total given over 3 days. capillary diffusion dramatically, such support was no at the end of the est roentgenograms narkable clearing of the infiltration, which had completely resolved 1 week later. There was no recurrence of the pulmonary problems for the subsequent 30 days that the patient lived.

We hope that this case helps to bring to light a seemingly forgotten complication of leukemia and a new dimension in therapy for leukemic lung infiltration. The response to this relatively simple treatment may be dramatic.

References

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3. KLATTE EC, YARDLEY J, SMITH ER, ROSS R, CAMPBELL JA: The pulmonary manifestations and complications of leukemia. *Am J Roentgenol* 1965; 89: 598–609
4. GREEN RA, NICHOLS NJ: Pulmonary involvement in leukemia. *Am Rev Respir Dis* 1959; 80: 833–844
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6. REDDICK ME, BERKOWITZ RD, ROSEMAN T: Diffuse interstitial leukemic infiltration of the lungs producing the alveolar–capillary block syndrome. Report of a case with studies of pulmonary function. *Am J Med* 1961; 31: 149–153
7. NATHAN DJ, SANDERS M: Manifestation of acute leukemia in the parenchyma of the lung. *N Engl J Med* 1955; 252: 797–801
8. VERHANT JP, BRUN B, MANNONI P, DEVYLIS B: Respiratory distress of hyperleukocytic granulocytic leukemias. *Cancer* 1979; 44: 264–268
9. PRAKASH UB, DIVERTIE MB, BANKS PM: Aggressive therapy in acute respiratory failure from leukemic pulmonary infiltrates. *Chest* 1978; 73: 345–350
10. WELLS RJ, WEITMAN RM, BALLANTINE TVN, GROSFELD JL, BASINGER RL: Pulmonary leukemia in children presenting as diffuse interstitial pneumonia. *J Pediatr* 1980; 96: 262–264

Nosocomial outbreak caused by antibiotic-resistant strain of *Salmonella typhimurium* acquired from dairy cattle

G.S. BEZANSON,* PH D
R. KHAKHRIA,† B SC, DIP BACT, RM (CCM)
E. BOLLEGRAAF,‡ B SC

a persistent health nada.[1] It is widely he food chain is a f *Salmonella* infec- .[2] Yet few of the of foodborne sal- eaks and individual reported have been crobiologic evidence a specific food item [3] Epidemiologic evi- from data based on ns onset, symptoms, and food-specific often the only tool tablishing a link be- eak and a specific provide epidemiologic and genetic evi- g dairy cattle as the nt outbreak in hospi-

tal of *S. typhimurium* infection among newborns. Raw milk appears to have been the vector for the transmission of the causative agent from bovine to human hosts.

In a 4-day period in the spring of 1982 several neonates in the nursery ward of a Quebec hospital became ill with *S. typhimurium* infection. The strain was phage-typed as type 772 (Laboratory Centre for Disease Control designation). Disc-diffusion assays revealed it to be resistant to ampicillin, chloramphenicol, kanamycin, streptomycin, sulfadiazine and tetracycline. Septicemia and meningitis developed in the index case, and the patient was still shedding the organism 5 weeks after the initial laboratory testing had been done.

Four days before the start of this outbreak another outbreak of *S. typhimurium* infection had been recognized among cattle on a dairy farm in the area served by this hospital. The illness had been in progress for some time: the first animal to be affected had become sick 2 weeks earlier. Initially the infected animals had been treated with chloramphenicol, but this therapy was stopped after several weeks when they failed to respond. Five months later 10 calves had died as a direct result of salmonellosis. The causative agent was also of phage type 772 and displayed the same resistance pattern as the agent in the hospital outbreak.

These microbiologic observations suggested that the isolates from the humans and the cattle had a common ancestry. To confirm this, *S. typhimurium* isolates from both outbreaks were subjected to conjugation analysis. Three isolates from the human and three from the cattle were mated with suitable *Escherichia coli* and *S. typhimurium* recipients. All six isolates transferred their antibiotic resistances from one strain to another, thus indicating that this phenotype was plasmid-determined. Isolates resistant to tetracycline or to ampicillin,

Reprint requests to: Dr. G.S. Bezanson, Laboratory Centre for Disease Control, Department of National Health and Welfare, Tunney's Pasture, Ottawa, Ont. K1A 0L2

426 CAN MED ASSOC J, VOL. 128, FEBRUARY 15, 1983

DOG-OWNING LIVESTOCK FARMERS (OH, USA)[1]

67% (297/446) livestock farm owners had dog(s) on the farm

Household demographics

- < 5 yrs: 7%
- ≥ 65: 32%
- Immunocompromised: 32%

- High-risk households: 52%

Source: Pixabay

[1] Moran et al, 2018

33

DOG HUSBANDRY

Fed to the dogs

- Home killed meat (6%)
- Raw meat/raw eggs (11%)
- Raw milk (5%)
- Raw animal treats (11%)

- Any high-risk: 24%

DOG-LIVESTOCK CONTACT

Dog access to livestock (70%)
- Stalls/pens (71%)
- Sick/isolation pen (40%)
- Contact with new livestock (46%)
- Eat by-products, e.g., placenta (27%)

- One or more higher-risk practice (85%)

Visit other farms (12%)

35

DOG-PERSON CONTACT

High emotional attachment

Dog tends to sleep
- Indoors
  - Free access to living areas (25%)
  - Family member bed (13%)

Little/no concern for disease transmission
- Livestock to dogs (90%)
- Dogs to livestock (87%)
- Dogs to people (94%)

Need for education

36

ONE HEALTH CHALLENGES

Surveillance programs (human, animal, environment) unconnected

Transmission not easily documented

Pet-associated disease

- Poorly understood
- Most not reportable
- Numerous exposure sources
- Subclinical carriage/shedding

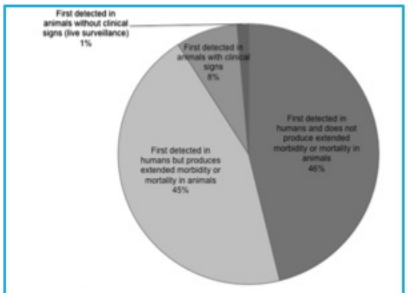


Figure 1. Proportion of emerging infectious human pathogens of zoonotic origin (Jones et al. 2008) that were first detected in humans versus animals (domestic or wild) prior to or concurrent with signs of illness in humans in relation to their pathogenicity in non-human hosts.

Bisson et al, 2015

37

EFFECTS OF CLIMATE CHANGE...

- Biodiversity
- Emergence of new zoonoses
- Negatively impact economies
- Reduce infectious disease control
- Increase densities of infectious agents
- Increased migration (people, pets, wildlife)

39

ANIMALS AS SENTINELS?

Vector-borne pathogens not directly transmissible from animal to person

Many cause similar disease in humans as they do in other species

Many vector-borne diseases of dog/cats and humans share the same tick vectors and likely risk factors for infection

CANINE SENTINELS FOR HUMAN LYME RISK

Canine *B. burgdorferi* seroprevalence > 5% associated with increased human risk of Lyme disease[1]

Ease and regular occurrence of testing dogs

- Data readily available
- Typical canine lifestyle with tick/pathogen exposure

Source: Pixabay

41

[1] Mead et al., 2011

https://petdiseasealerts.org/

TRANSBOUNDARY ANIMAL DISEASES (TADS)

Move through a population of animals and cause considerable economic and societal harm

- Damage to human and environment

43

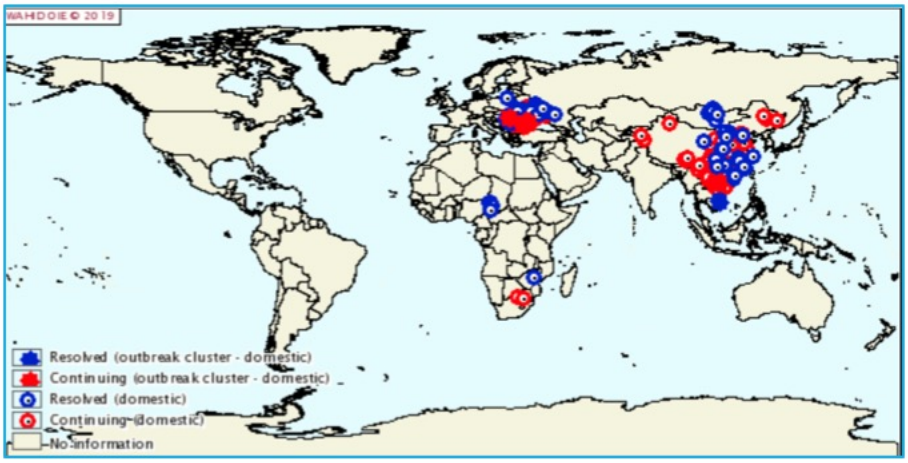
44

CURRENT EXAMPLES OF TADS

Newcastle disease

African Swine Fever

Key prevention tool is infection control (no treatment, no vaccine or of limited use)



OIE. African Swine Fever Reports (Jan – May 2019)

Source: AsiaNews.it. Jan 17, 2019

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Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

DECLARE AT THE BORDER

PROTECT CANADA FROM FOREIGN ANIMAL DISEASES

As an international traveller, here is what you can do to reduce the risks spreading foreign animal diseases:

- ✓ DO declare ALL animal and food products at the border
- ↳ If you don't, you could be fined up to $1300 at the border
- ✓ DO take precautions when visiting farms
- ✓ DO wash or dispose of all clothing and footwear worn while visiting a farm outside of Canada
- ✓ DO declare all farm visits at the border when you return to Canada

DO NOT visit any farms in Canada within 14 days of being in contact with farm or wild animals abroad.

Canada

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GLOBALIZATION AND MIGRATION

1 million pounds of pork seized at US border amid deadly Chinese outbreak

By David Aaro

Published March 17, 2019

Fox News

GLOBALIZATION AND MIGRATION

Source Rainey, T (Hunterdon C. Dept Public Safety)

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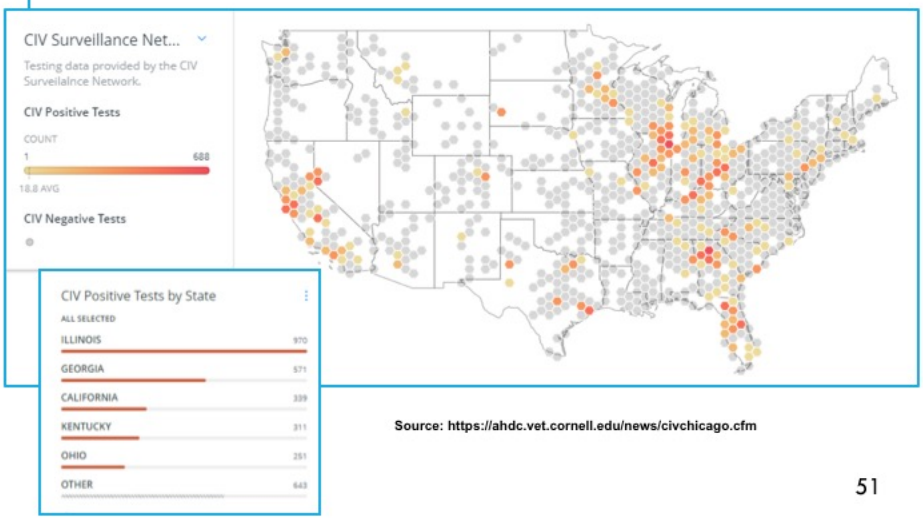
Source: Pixabay

GLOBALIZATION AND MIGRATION



Source: https://ahdc.vet.cornell.edu/news/civchicago.cfm

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GLOBALIZATION AND MIGRATION

Identified in NJ, USA 2017

Broad host range: livestock, companion animals, humans

Vector

- ***Anaplasma phagocytophilum*, *Ehrlichia chaffeensis*, *Babesia* spp?**
- **Severe fever with thrombocytopenia syndrome virus (SFTS)?**

Highly adaptive, cold tolerant

How did it arrive?

Source Rainey, T (Hunterdon C. Dept Public Safety)

Longhorn tick

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ACTING LOCALLY

Minority of PHPs knew which patients had pets; 13% had asked[1]

Training: health benefits/risks & methods for asking patients about pets

Follow-up, ~1/3 routinely asking about pets

When talking about their animals, patients revealed

- Social determinants of health
- Conversations about risk and benefits of pets more common

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[1] Hodgson et al., 2017

ONE HEALTH MOVING FORWARD

Stay informed

Adoption/buy-in across the disciplines

Developing and fostering interdisciplinary partnerships

Prioritizing preventive medicine

Integrated leadership with action

Using a One Health point-of-view in problem solving and future planning

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One Health – The Risks and Rewards of Loving Animals
Prof. Jason Stull, Ohio State University
Broadcast live from the 2019 IPAC Canada Conference

www.webbertraining.com/schedulep1.php

June 5, 2019	*(South Pacific Teleclass)* **THE ROLE OF ACTIVE SURVEILLANCE CULTURE IN RESOURCE-LIMITED SETTINGS** Speaker: **Prof. Anucha Apisarnthanarak**, Thammasart University Hospital, Pratumthani, Thailand
June 13, 2019	*(FREE Teleclass)* **SSI SURVEILLANCE STRATEGIES IN UNDER-RESOURCED SETTINGS** Speaker: **Dr Joseph S Solomkin**, University of Cincinnati College of Medicine, and World Surgical Infection Society ***Sponsored by the World Surgical Infection Society*** WSIS
June 25, 2019	*(European Teleclass)* **GETTING TO GRIPS WITH HEALTHCARE-ASSOCIATED GRAM-NEGATIVE BLOODSTREAM INFECTION SOURCES** Speaker: **Prof. Jon Otter**, Imperial College London

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