One Health – The Risks and Rewards of Loving Animals

Jason Stull, VMD, MPVM, PhD, DACVPM
Assistant Professor

CONFLICT OF INTEREST STATEMENT

The speaker declares he has no competing interests

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
PAST ~ 70 YEARS

Improvements in human health
- Global life expectancy ↑ 25 yrs
- Global infant mortality ↓ to 30 per thousand

Environmental changes
Animal population changes

For Years 1800 – 2010
ONE HEALTH

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

Address areas at interface results in benefits of all

Thompson 2013

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)

ONE HEALTH

Stephen C. Karesh WBS, 2014
LEVERAGING ONE HEALTH CONCEPTS
- Zoonotic Influenza
- Salmonellosis
- West Nile virus
- Plague
- Emerging coronaviruses (e.g., MERS-CoV)
- Rabies
- Brucellosis
- Lyme disease

Think Globally, Act Locally
How does a One Health paradigm assist us in local Infection Prevention and Control?

ONE HEALTH AND ANIMALS: CASE EXAMPLES
- Animals in human healthcare facilities
- Dogs on livestock farms
- Pets as human disease sentinels
- Transboundary animal diseases
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, depression¹
- ↓ risk cardiovascular disease²
- Children: better social skills, self-esteem, empathy³
- Catalyst for harm reduction (e.g., tobacco, drug use)⁴


Source: Pixabay

IMMUNOCOMPROMISED

Mental & physical isolation
HIV-infected¹
- Pet as family member
- Source of support and affection
- Protect against loneliness
- Pet-owners with AIDS less depression than non-pet owners

Cancer patients²
- High level of attachment to pets
- Having a pet provided health benefits (67%)

Immunocompromised children²

¹ Siegel 1999 ² Larson 2010 ³ Stull 2014

Source: Pixabay
PETS INCORPORATED INTO HUMAN HEALTHCARE

- Builders of social capital
- Harm reduction
- Motivators for healthy behavior change
- Participants in treatment plans

Source: Pixabay

ZOONOSES

Naturally transmitted from animals to people
Of 1,415 species pathogenic to people
- 61% zoonotic
- 75% emerging pathogens zoonotic

Source: Pixabay

PET-ASSOCIATED DISEASE

70+ pathogens of pets transmissible to people
Pets often subclinical shedding
Emerging & reemerging diseases
Animal and human reservoirs
Dogs visiting human healthcare facilities
- C. difficile (OR=3.4)
- MRSA (OR=4.7)

Source: Pixabay
PET-ASSOCIATED DISEASE RISKS

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

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

Pet factors

(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)

Source: Centers for Disease Control and Prevention
https://www.cdc.gov/healthypets/outbreaks.html
RISKS AND BENEFITS OF PETS IN NURSING HOMES

95 respondents (different OH facilities)
97% allowed animals to visit
- Family pet
- Socialization-directed
- Physical therapy

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

FACILITY POLICIES RELATED TO ANIMALS

Most (93%) had a policy concerning animals

Gaps in
- Hand hygiene (21 - 47%)
- Training of staff (18 - 33%)
- Within-facility location and species restrictions (23 - 55%)
- Animal age restrictions (2%)
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%)
PET-ASSOCIATED DISEASE TRANSMISSION

Humans  Pets  Livestock  Wildlife

Source: Pixabay

Animals in Ohio long-term care facilities
Keep residents safe while enjoying pets

A guide for administrators, family members, and others

Ohio State University

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

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)

DOG-OWNING LIVESTOCK FARMERS (OH, USA)

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: Moran et al., 2018
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%)

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
ONE HEALTH CHALLENGES

Surveillance programs (human, animal, environment) unconnected
Transmission not easily documented
Pet-associated disease
• Poorly understood
• Most not reportable
• Numerous exposure sources

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)
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 disease¹
Ease and regular occurrence of testing dogs
- Data readily available
- Typical canine lifestyle with tick/pathogen exposure

¹ Mead et al., 2011

Source: Pixabay
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

CURRENT EXAMPLES OF TADS

Newcastle disease
African Swine Fever

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

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

By David Zvon
Published: June 17, 2019

![Image of police officers at the border]

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### GLOBALIZATION AND MIGRATION

Canine Influenza virus

Source: Pixabay

Longhorn tick

Source: Pixabay
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?

LONGHORN TICK

MINORITY OF PHASES KNEW WHICH PATIENTS HAD PETS; 13% HAD ASKED¹
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

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