Enhancing Family Health Connections in Clinical Practice – A One Health Approach

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Faculty/Presenter Disclosure

- **Faculty:** David N. Fisman MD and Erin Leonard DVM

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  - **Other:**
    - **DF:** Employee of the University of Toronto.
    - **EL:** Employee of the Government of Canada.

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- This program has received financial support from Public Health Agency of Canada in the form of a consulting agreement with Dr. Fisman.
- **Potential for conflict(s) of interest:**
  - None identified.

Mitigating Potential Bias

- Presenters have been unable to identify a coherent and plausible narrative that would place this presentation at risk for bias!
  - If you identify one, please let us know and we'll mitigate it!

CLINICAL VIGNETTE*

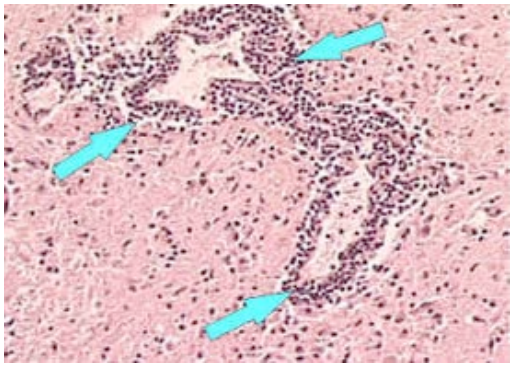
*Thanks to Drs. David McNeely and Elizabeth Rea for guidance related to this case.

- 41 year-old man, returns to Canada in April 2012. Working for several years as bartender at resort in Dominican Republic.
- 10 day history of increasing neck and shoulder pain, arm tingling and numbness, difficult swallowing water, and fever. Swallowing difficulties result in referral to ENT clinic for endoscopy.
- Suffers confusion, fever, observed generalized seizure after clinic visit.
- “A diagnostic procedure was performed.”

CLINICAL VIGNETTE (2)

- Astute ID clinician (not me!) notes dysphagic symptoms relative to water, and in context of foreign work and other symptoms suggests nuchal skin biopsy.





(http://www.cdc.gov/rabies/diagnosis/histologic.html)

THE IMPACT

- Dies after prolonged Neuro ICU stay at Toronto Western Hospital.
  - Milwaukee protocol (ketamine, midazolam, amantadine, [ribavirin]).
- Post-exposure prophylaxis: 5 close contacts, 16 HCW, 15 contacts in D.R., 0 fellow airline passengers.
- Virology: viral strain seen in dogs and mongooses in Caribbean. No known dog exposure, but prior travel to Haiti 3 and 5 months before illness.
  - "Trivial" dog exposure? Licked by stray?

Learning Objectives

At the end of this session, participants will be able to:

1. Understand the One Health approach and how it can apply to and improve family medicine practice

2. Recognize clinical situations and utilize strategies for implementing One Health in family medicine

3. Appreciate that the health of families is intimately connected to the human-animal-ecosystem interface

Background

- **One Health** is an approach that recognizes the linkages among **human**, **animal** and **ecosystem** health.

- Working locally, nationally, and globally to attain optimal health for:
  - People
  - Domestic animals
  - Wildlife
  - Plants
  - Environment



Not a new idea…

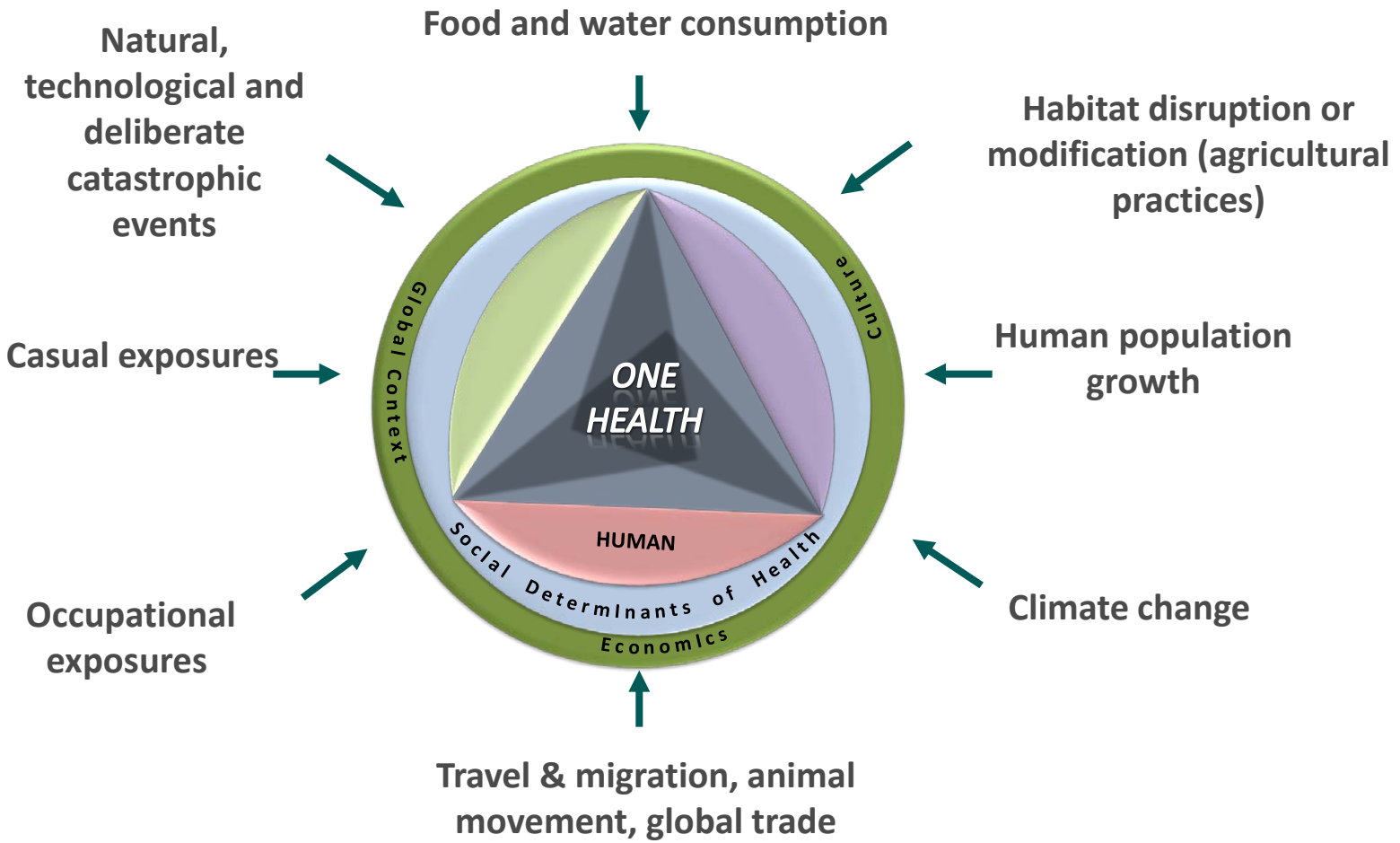






- The connection between human health, animal health and ecosystem health is not new, it has been discussed since the time of Hippocrates
- Sir William Osler, Rudolf Virchow, Giovani Maria Lancisi, Felix Vicq d'Azyr
- "Between animal and human medicine there are no dividing lines – nor should there be."

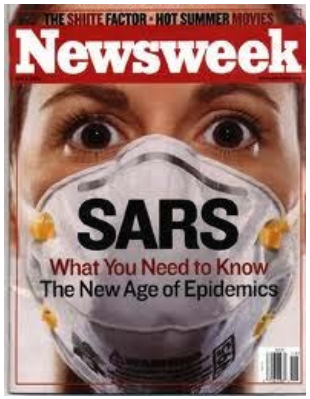
Drivers of Emerging Health Threats



Why One Health?

- Environmental health may affect human and animal health through contamination, pollution and poor conditions that may lead to new infectious diseases or toxicological exposures.
- The human-animal bond beneficially impacts the health of both people and animals
- Uses networks of professionals to facilitate the exchange of knowledge and expertise (collective problem solving and decision making)
  - Locally, nationally and internationally

Emerging Infectious Diseases









- Rapid emergence, global reach, high morbidity and mortality
- Complexity of infections and their treatment – an example of need for multiple dimensions

An International Effort

WILDLIFE CONSERVATION SOCIETY

FAO FIAT PANIS

CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

World Health Organization





Oie



Pan American Health Organization
Regional Office of the World Health Organization

THE WORLD BANK
Working for a World Free of Poverty

Zoonotic Infectious Diseases

- 61% of infectious diseases affecting humans are zoonotic
- 75% of new or emerging diseases around the world are zoonotic.
  - *Taylor LH, Latham SM, Woolhouse ME. 2001.*

Examples

- Rabies
- Toxoplasmosis
- *Salmonella, Campylobacter, E. coli*
- Parasites
- Leptospirosis
- Fungal infections
- Giardia
- West Nile virus
- MRSA

Not Just Zoonoses…

- Antimicrobial Resistance
- Diseases with trade impacts - agriculture
- Food safety / food security
- Common environmental exposures
- Wildlife and farm animal exposure
- Non-communicable/chronic diseases
  - Cancer, Diabetes
- Positive benefits to human health / Zooeyia
- Family roles – pet involvement in relational dynamics and tensions
- Animals as Sentinels
- Pet bereavement

Bovine Spongiform Encephalitis in Alberta

- Social and economic impacts
  - More than 40 countries imposed import restrictions on live ruminant animals (cattle, sheep, goats, bison, elk, deer), meat products and animal by-products from Canada
  - 2004 economic impact from BSE of $6.3 billion
    - direct economic cost ~ $3.3 billion plus $3.0 billion loss in equity to the cow-calf sector
  - Loss of 75,000 Canadian jobs
  - Negative impact on mental health of cattle farmers
    - Ongoing uncertainty and stress

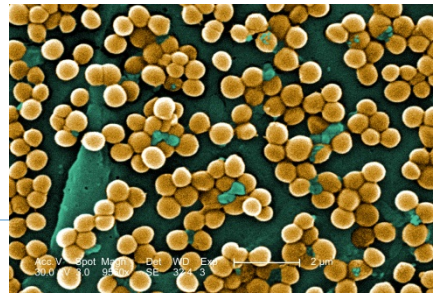
Antimicrobial Resistance (AMR)

- Antimicrobial use in humans, animals and agriculture
  - Selective pressure for antimicrobial resistance to emerge and disseminate among bacteria
- Sources of antimicrobial resistance genes:
  - Foodborne: resistant bacteria contaminating food products (*Salmonella, Campylobacter, Enterococci)*
  - Waterborne or soil: organisms containing genes present in human resistant infections

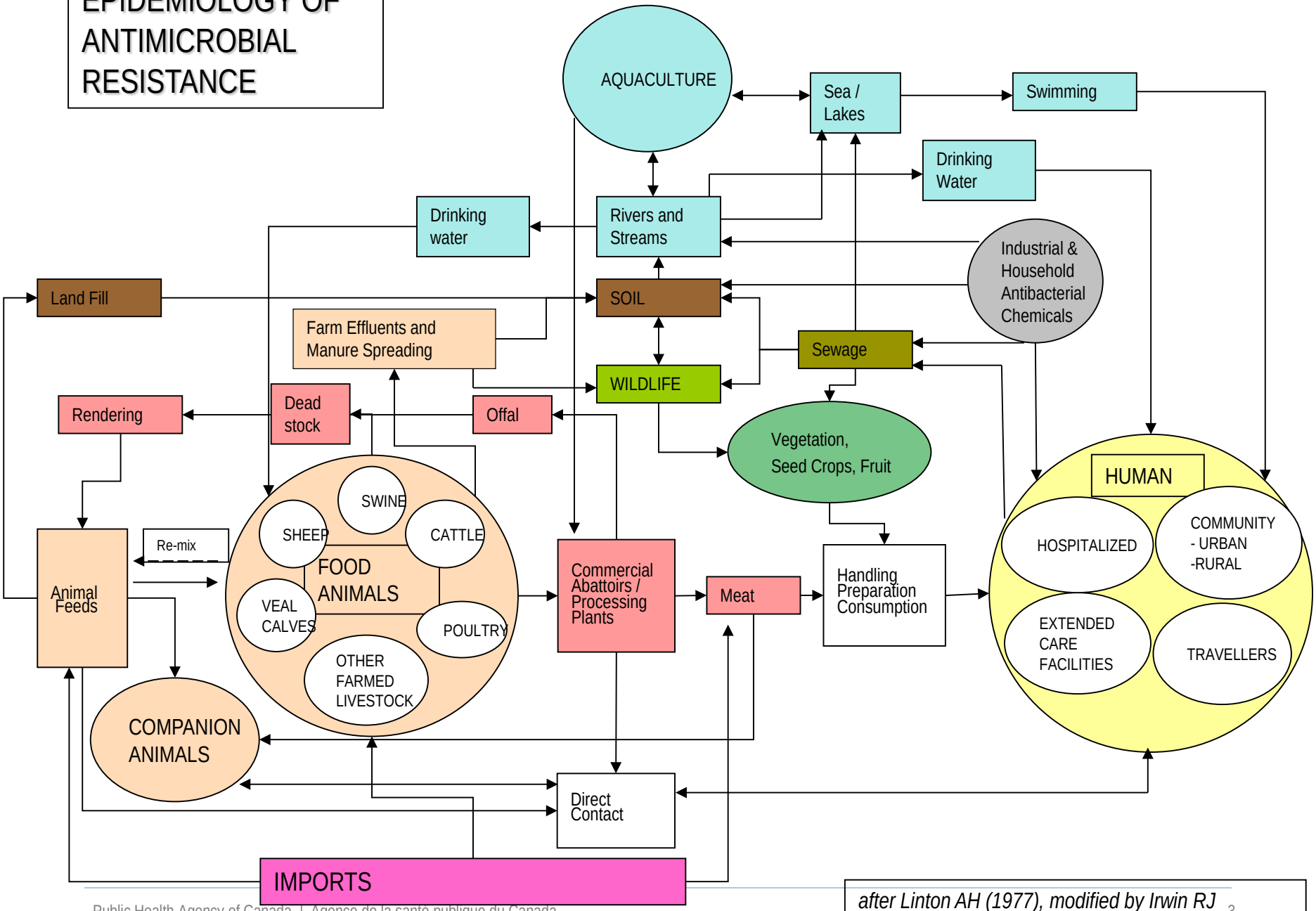


Antimicrobial Resistance (AMR)

- Community/hospital acquired infections
  - C. difficile, MRSA, VRE
- MRSA – human-animal household infections
  - Manian FL (CID 2003)
    - Recurrent wound MRSA infection, nasal MRSA colonization in second household member
    - Nasal samples from dog = identical PFGE as owners
    - Further recurrence prevented after eradication of MRSA in dog



EPIDEMIOLOGY OF ANTIMICROBIAL RESISTANCE



after Linton AH (1977), modified by Irwin RJ

Vector-borne Diseases



- West Nile virus
  - Entered North America in 1999
    - Importation of infected birds/infected mosquitoes in cargo or movement of infected people
  - First confirmed in Canada 2001 in wild birds
  - Confirmed in 2002 in both horses and people
  - Canada coordinates surveillance with US CDC



Vector-borne Diseases

- Lyme
  - Lyme is an emerging tick-borne disease in Canada
  - In 2010, Lyme disease became a nationally reportable disease in Canada
  - Caused by the bacterium *Borrelia burgdorferi* and transmitted to humans and pets by ticks from wildlife (rodents, deer, birds)
  - Pets and wildlife can carry infected ticks into homes and yards



Diagnosing Lyme Disease



- Gold standard is culture but very low sensitivity
- Mainstay of laboratory diagnosis is ‘two tier’ serological test
  - Diagnostic testing for Lyme disease is available in P/T labs directly or via National Microbiology Laboratory
- PHAC recommends treatment without laboratory results for erythema migrans (EM) (antibodies develop later) and lack of a positive lab test result does not preclude treatment of possible disseminated lyme disease when clinical signs are convincing
- The Association of Medical Microbiology and Infectious Disease Canada (AMMI) recommended that practitioners follow the Infectious Disease Society of America (IDSA) guidelines

Lyme Disease in Humans

Early Lyme Disease

Characterised by area of erythema spreading from the tick bite = erythema migrans (EM)

Appears within 1-2 weeks of tick bite in most (80%) cases.

Non itchy, non painful, non scaling and spreads >5cm to 30cm or more.

Classical EM has central clearing (bulls eye appearance) but frequently no clearing occurs; disappears after days to several weeks

Patient unwell with 'flu like' symptoms

Early disseminated disease

Follows transient haematogenous spread of bacteria to tissues

Multiple EM

Neuroborreliosis:

- Peripheral nerve dysfunction: radiculopathy, cranial neuropathy, and mononeuropathy multiplex – sensory, motor,
- CNS: lymphocytic meningitis, encephalomyelitis, focal abnormalities, cognitive disorders

Cardiomyopathy: intermittent atrioventricular heart block, sometimes associated with myopericarditis

Late disseminated disease

Occurs if early disseminated Lyme is not treated

Lyme arthritis:

- Affects one or a few joints (mostly the knee)
- Swelling out of proportion to pain
- Resolves then re-occurs

Late neuroborreliosis – encephalomyelitis, peripheral neuropathy, encephalopathy

Enteric Illnesses

- Pet food and pet treats
- Companion animals
- Exotic pets and reptiles
- Raw milk
- Drinking and recreational water
- Seafood







Food & Water Safety and Security

- Food & water safety intimately linked to human, animal and environmental health
    - Walkerton Outbreak (2000 – *E.coli* O157:H7), North Battleford (2001 - Cryptosporidium), Maple Leaf Meats (2008 - Listeria)
- National integrated surveillance programs
    - National Integrated Pathogen Surveillance Program (C-EnterNet) - source attribution
    - Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS)
- Health promotion and nutrition
    - Prevention of obesity and chronic illness related to consumption of non-nutritious food

One Health and First Nations

- Climate change is impacting northern country food safety & supply

- Hunting and fishing can lead to the handling and frequent consumption of wild animals – with the potential for exposure to environmental contaminants like PCBs

- Traditional practices can contribute to knowledge generation and understanding of animal-human-ecosystem interaction





Wildlife Exposures

- Urban sprawl
- Habitat encroachment
- Wildlife displacement
- Cottages and camping
- White-nose syndrome - bats







Rabies

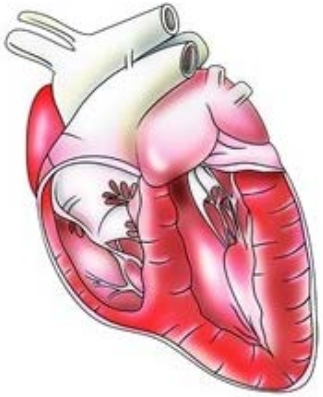
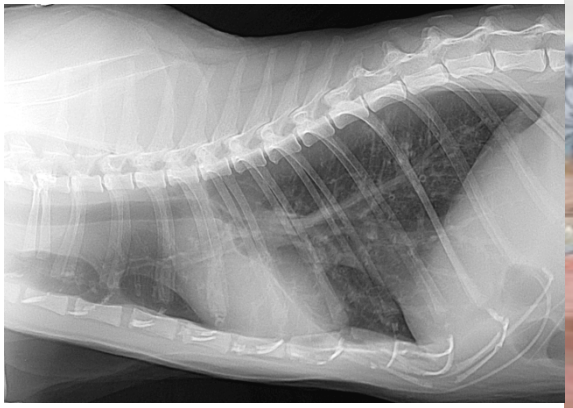
- Wildlife - In Canada, most animal rabies cases are in bats, foxes, skunks and racoons
- Importance of pet, livestock vaccination





Comparative Medicine & Surgery

- Animals suffer from many of the same chronic diseases such as heart disease, cancer, diabetes, asthma, and arthritis as humans.
  - New information, common exposures, and treatment & technique breakthroughs can be shared between human & veterinary practitioners



Zooeyia – the health benefits of animals



- Enhanced social interaction
- Exercise
- Improved health
- Companionship
- Animals used in the production of food for human consumption
- Animals as models for research of human diseases
- Animals as sentinels
- Pet assisted therapy
- Service animals



So how does that apply to me and my family medicine practice?



Today's families are not just humans

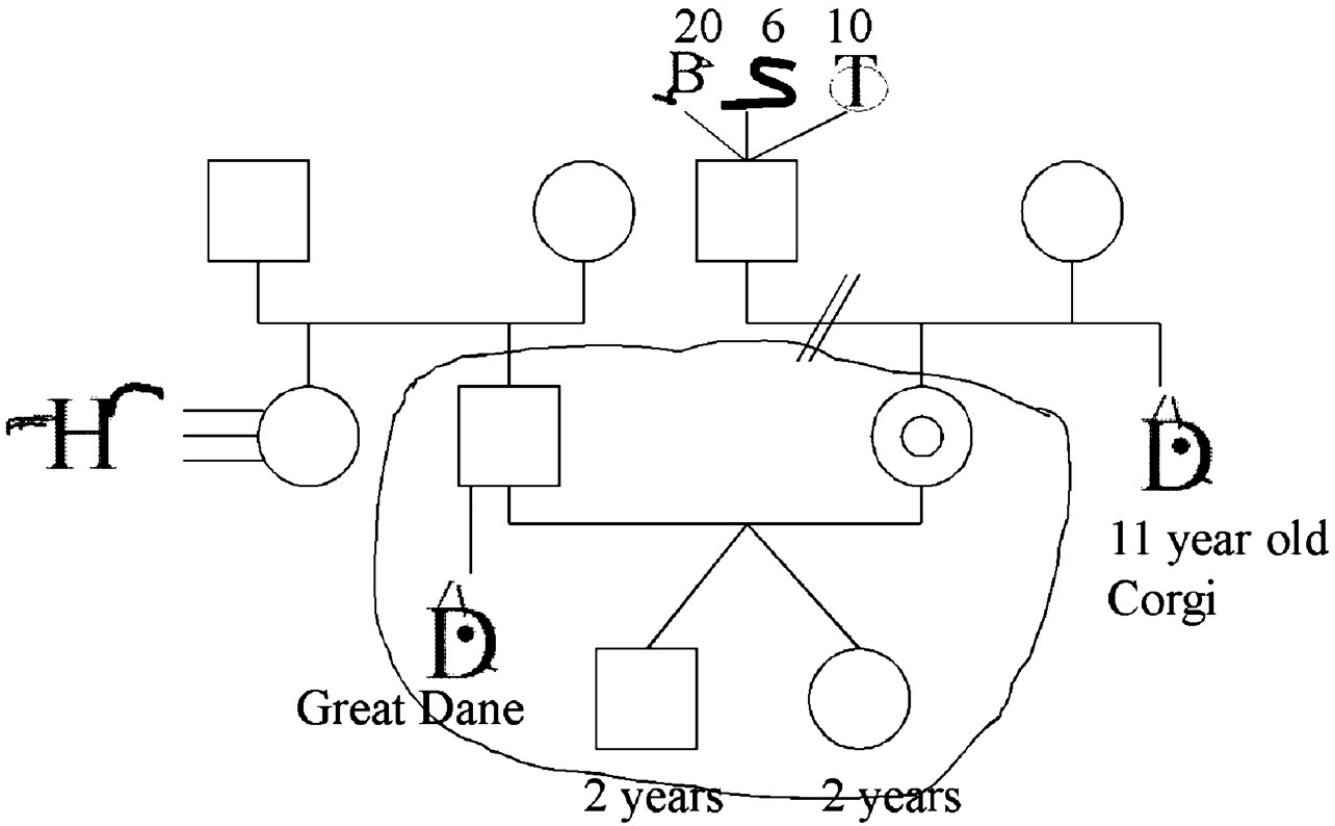
- 2010 Canadian survey
  - ~ 36% of households have at least 1 dog
    - approximately 6.4 million dogs
  - ~ 37% of households have at least 1 cat
    - approximately 8.5 million cats
- These numbers do not include reptiles, birds, pocket pets, fish, horses

Canadian Animal Health Institute
http://www.cahi-icsa.ca/companion-animal-health/

Pets in the Family: Practical Approaches

Hodgson and Darling, 2011

- Consider including pets in the family genogram



Health Benefits of Animals

- The Child Heart and Health Study in England revealed that 9- to 10-year-old children with dogs were significantly more active than those without.
- In a recent smoking cessation study, concerns about second-hand smoke affecting pets was found to be a strong motivator to stop smoking, to stop smoking in the home, and to encourage other household members to quit smoking.
- A recent study showed that the mere presence of a pet had a significant and positive effect on the cardiovascular parameters of stress in their owners.

Mental Health

- Kids and pets
  - Improvements in children with Autism
  - Suicide prevention
  - Improved social interaction, language
- Pet-assisted Therapy
  - Alzheimer's disease
  - Psychiatric disorders, schizophrenia
  - Improved well-being





Patients for Special Consideration

YOPIs

- **Y**oung
- **O**ld
- **P**regnant
- **I**mmunocompromised



The Role of the Public Health Agency of Canada

- PHAC is exploring the application of the One Health approach to AMR, enteric illness, biosecurity, West Nile and Lyme disease surveillance
- PHAC is interested in considering One Health issues within the broader context of the social determinants of health
- PHAC provides resources and guidance to stakeholders in many sectors and disciplines

PUBLIC HEALTH AGENCY *of* CANADA
AGENCE DE SANTÉ PUBLIQUE *du* CANADA

One Health Endorsement

- American Medical Association
- American Public Health Association
- American Academy of Paediatrics
- American Veterinary Medical Association
- Association of Academic Health Centers
- Association of American Medical Colleges
- Association of American Veterinary Medical Colleges
- American Nurses Association
- American Physiological Society
- US Centers for Disease Control (CDC)
- European Union - European External Action Service
- Italian Society of Preventive Medicine
- National Environmental Health Association (NEHA)

Moving Forward with One Health

- Recognize new ways of working together with other health partners
  - Connect with your local vets and ecologists!
- Improve sharing of information and surveillance/research data at local, provincial, national and international levels and across sectors
- **We need to change our health culture to apply One Health in our everyday work and lives**

Local Contact Information

- Canadian Veterinary Medical Association
  - http://canadianveterinarians.net/
- College of Veterinarians of Ontario
  - http://www.cvo.org/
- Public Health Ontario
  - http://www.oahpp.ca/
- Ontario Ministry of Natural Resources
  - http://www.mnr.gov.on.ca/en/
- Ontario Ministry of Agriculture Food and Rural Affairs
  - http://www.omafra.gov.on.ca/

Websites & Resources

- PHAC One Health page
  - http://www.phac-aspc.gc.ca/owoh-umus/index-eng.php
- CDC One Health Office
  - http://www.cdc.gov/onehealth/
- One Health Global Network
  - http://www.onehealthglobal.net/
- One Health Commission
  - http://www.onehealthcommission.org/
- One Health Initiative
  - http://www.onehealthinitiative.com/
- Practicing “One Health” for the Human Health Clinician
  - http://www.onehealthinitiative.com/publications/Final%20PracticingOneHealth.pdf

Our
Necessity
Encourages

Humans,
Ecosystems and
Animals
Living
Together
Harmoniously



(Dr. Brian Evans, Chief Food Safety Officer/Chief Veterinary Officer for Canada)