

Exotic pets and public health & safety

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Quick summary of zoonoses

- Zoonoses are diseases shared and transmissible between non-human and human animals.
- 61% of human diseases have a potentially zoonotic origin.
- 75% of global emerging human diseases have a wild animal link (eg vector borne disease).

Types of zoonoses

200+ zoonoses, of following origins

- **Viral** - eg avian influenza
- **Bacterial** - eg salmonellosis
- **Parasitic** - eg worms (toxocariasis)/mites (scabies)
- **Mycotic/fungal** - eg dermatophytosis (ringworm)
- **Prion** - eg bovine spongiform encephalopathy ('mad cow disease')/ Creutzfeldt-Jakob disease (vCJD)

Range, scale & sources

- 200+ zoonoses known to derive from both free-living and captive wildlife.
- 70 associated with captive animals, inc zoos and pets.
- At least 40 zoonoses associated with captive reptiles and amphibians.

Transmission sources and routes

- **Direct & indirect contact with animals and their environments...**
- **Faecal oral (contaminated hand-to-mouth)**
- **Orbital (eye socket/tear duct)**
- **Aural (ear/eustachian tube)**
- **Transdermal (contact/skin scratches/open wounds/sores)**
- **Fomite (contaminated debris/organic detritus/surfaces/inanimate items)**
- **Aerosolisation (droplets in air)**
- **Blood transfusion (contaminated blood)**

Signs & symptoms

Gastrointestinal (stomach cramps, nausea, vomiting, diarrhoea, fever)



Signs & symptoms

Influenza-like (malaise, fever, respiratory) photos Edw;Steadyhhealth



Signs & symptoms

Dermal (rashes, fever, pain)



Detection

- Difficult - many zoonoses superficially resemble everyday maladies, only usually more serious and difficult to treat.
- Deferred association.
- Means zoonoses are being masked among general disease, disguising prevalence.

Most zoonoses are not well known or understood

- Most zoonoses although known to affect people, have yet to be properly studied for risk and prevalence.

Some zoonoses, are well known and understood, Eg...

- Reptile pet related salmonellosis caused 280,000 cases of disease from turtles alone in USA in 1960s & 70s until trade was banned, in US in 1975, Canada in 1976.
- US ban resulted in 77% drop in human disease in 1 year.
- Currently approx 70,000 cases of RRS annually in USA due to increase in pet snakes and lizards.
- Estimated 6,000 cases of pet RRS annually in UK.
- RRS responsible for 27% hospitalised children (salmonella infections) under 5 years

Other recent health issues involving reptiles

- Campylobacter
- Botulism
- Zoonoses increasing, not abating
- Antibiotic resistance largely ornamental fish trade
- Allergic reactions - invertebrate-feed associated asthmas

International trade is a mixing pot for potential pathogens

- Diverse reservoir
- Cumulative microbial concentrations
- Obscure / indeterminate origin
- Possibility of viral combinations?

Basic pathogen survey of 9 snakes

TABLE 3
Laboratory Test Results for Example Animals

<i>Animal</i>	<i>Culture</i>	<i>Specimen</i>	<i>Result</i>
Snake A: <i>Xenochrophis piscator</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake B: <i>Python regius</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake C: <i>Rhadinophis frenatum</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake D: <i>Boa constrictor</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake E: <i>Epicrates cenchria</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake F: <i>Boa constrictor</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake G: <i>Dinodon rufozonatum</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake H: <i>Pantherophis guttatus</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake I: <i>Epicrates cenchria</i>	Salmonella	Feces	<i>Salmonella</i> sp.
Snake A: <i>Xenochrophis piscator</i>	Fecal flotation	Feces	<i>Kalicephalus</i> 3+
Snake B: <i>Python regius</i>	Fecal flotation	Feces	<i>Capillaria</i> sp. 3+
		Feces	<i>Kalicephalus</i> 1+
		Feces	Pinworm 1+
Snake C: <i>Rhadinophis frenatum</i>	Fecal flotation	Feces	<i>Strongyloides</i> ova 3+
		Feces	<i>Capillaria</i> sp. 1+
		Feces	<i>Kalicephalus</i> 1+
Snake D: <i>Boa constrictor</i>	Fecal flotation	Feces	<i>Strongyle</i> ova 3+
		Feces	Pinworm 3+
		Feces	Nematode ova 3+
Snake E: <i>Epicrates cenchria</i>	Fecal flotation	Feces	Pinworm 2+
Snake F: <i>Boa constrictor</i>	Fecal flotation	Feces	Ascarid ova 1+
Snake G: <i>Dinodon rufozonatum</i>	Fecal flotation	Feces	Nematode ova 3+
Snake H: <i>Pantherophis guttatus</i>	Fecal flotation	Feces	Pinworm 1+
Snake I: <i>Epicrates cenchria</i>	Fecal flotation	Feces	Pinworm 3+

Note. Tests requested for samples were for salmonella culture, giardia, cryptosporidium, and fecal flotation. Analysis: Texas Veterinary Medical Diagnostic Laboratories.

Scientific/medical public health reports

ACCESS Freely available online

Healthy Animals, Healthy People: Zoonosis Risk from Animal Contact in Pet Shops, a Systematic Review of the Literature

Christine L. Casey¹, Amanda L. Walsh¹, Colin Campbell², Kirsty Hewitt^{1,3}, Dilys Morgan¹

TITLE **Open Access**

13th 2013, 13:520
doi:10.1186/1471-2458/13/520

journal homepage: www.elsevier.com/locate/scitotenv

The carriage of antibiotic resistance by enteric bacteria from imported tokay geckos (*Gekko gekko*) destined for the pet trade

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RESEARCH ARTICLE

13th 2013, 13:520
doi:10.1186/1471-2458/13/520

The Influence of the Commensal Gas Wild-Caught Tokay Geckos

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ABSTRACT: This study investigates the potential of the pet wild animals are captured and transported, to influence the flora and the prevalence of pathogens shed by Tokay geckos. The effects of importation on commensal enteric composition, conducted to mimic stressful overcrowding conditions in the top three most frequently cultured genera were *Citrobacter* (n = 15). *Citrobacter* was the most frequently cultured genus from spp. increased significantly from 55% among all individuals. The prevalence of *Salmonella enterica* subspecies *arizonae*, a core was ≤1% in individually housed geckos compared to 12% cultured in individually housed geckos to 4% from all the combined animals.

control practices risks in Ontario, Canada

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Pet husbandry related to

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Short Communication

Pet reptiles as potential reservoir of *Campylobacter* species with zoonotic potential

M. Giacomelli, A. Piccirillo

Campylobacter represents a public health concern worldwide, with thermophilic *Campylobacter* species as the most commonly reported agents of acute gastroenteritis in humans (Horrocks and others 2009). However, a range of under-recognised *Campylobacter* species has been associated with human gastroenteritis, as well as septicaemia and

C. fetus subsp. *fetus* was isolated from *serpentina* and three *Testudo hermanni*, *Tropidurus torquatus*, *C. hyemalis* and *Chelonia mydas* from one chelonian (*Geochelone sulcata*). All snakes tested negative. Five *Campylobacter* were isolated from reptiles kept in separate cabinets in the reptile store. All were distinct househol...

Campylobacter are primarily transmitted through consumption of infection in humans may also be from animals, including pets (Horrocks and dogs and cats, clearly recognised as a source of these pathogens. Indeed, the first study of *Campylobacter* in reptiles has been published (others 2013). In that study, *C. fetus* was isolated from human-raised and pet snakes and snakes) in Taiwan. In contrast, *Campylobacter* in 200 free-living native animals and others 2013). Similarly to the study...

Highlights

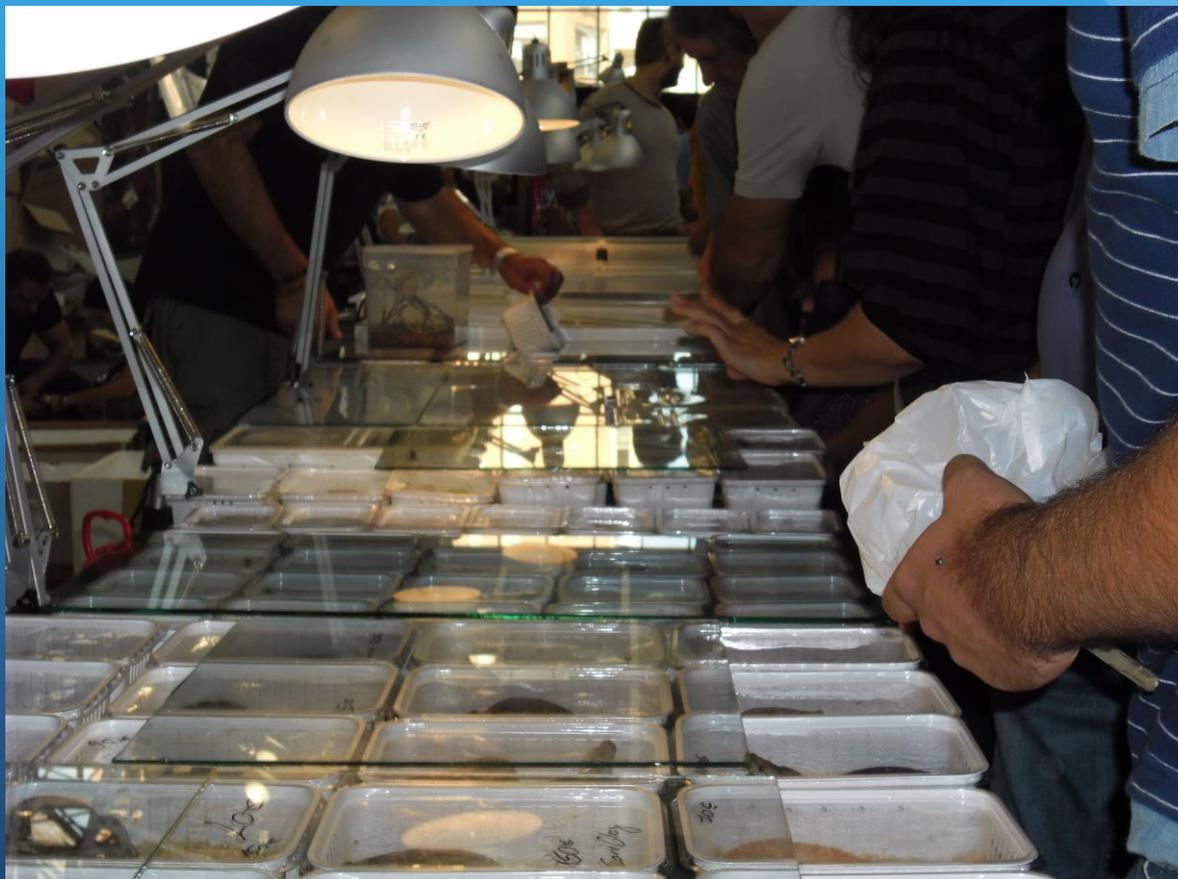
Salmonella

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Salmonella Homepage > 2014 Outbreaks

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Pet markets



Exotic pets - the new Trojan horse

- *“In effect, an exotic animal may harbour a raft of potentially infective microbes and macroparasites making any animal a possible Trojan Horse of infection and infestation”*
- Warwick, C., Arena, P.C., Steedman, C. and Jessop, M. (2012) A review of captive exotic animal-linked zoonoses. *Journal of Environmental Health Research*, 12:9-24
- *“Exotic wildlife pets and bushmeat are Trojan horses that threaten humankind at sites where they are collected in the developing world as well as the United States.*
- Smith KM, Anthony SJ, Switzer WM, Epstein JH, Seimon T, et al. (2012) Zoonotic Viruses Associated with Illegally Imported Wildlife Products. *PLoS ONE* 7(1): e29505. doi:10.1371/journal.pone.0029505

Antibiotic resistance

www.wormsandgermsblog.com



Antibiotic resistance

- General physicians may face threat of being barred from practice for over-prescribing antibiotics
- Fish traders use mass induction antibiotics as prophylactics against stress-related immunosuppression

Antibiotic resistance

- 32 freshwater fish of various species
- 77 percent tetracycline positive
- S Rose, R Hill, L E Bermudez, T Miller-Morgan. Imported ornamental fish are colonized with antibiotic-resistant bacteria. *Journal of Fish Diseases*, 2013

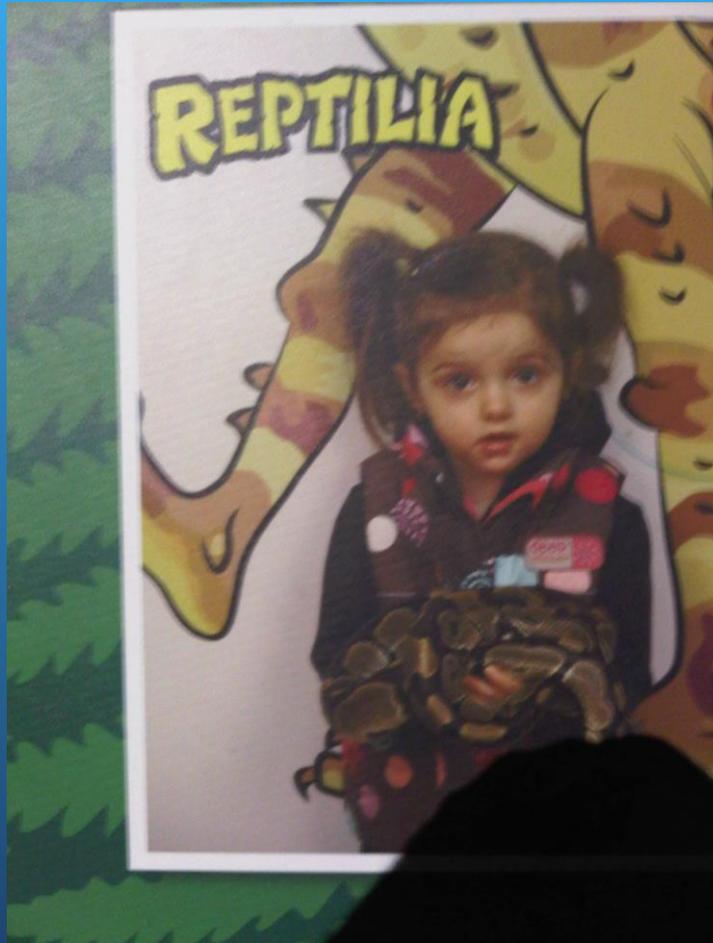
Antibiotic resistance

- *“The range of resistance is often quite disturbing,”*
- *“It is not uncommon to see resistance to a wide range of antibiotic classes, including beta-lactams, macrolides, tetracyclines, sulphonamides, quinolones, cephalosporins and chloramphenicol.”*
- S Rose, R Hill, L E Bermudez, T Miller-Morgan. **Imported ornamental fish are colonized with antibiotic-resistant bacteria.** *Journal of Fish Diseases*, 2013;

Irresponsible industry messaging



Irresponsible industry messaging



Toy vs living animal



- No sharp edges
- Parts (eg eyes) secure
- Cleanable
- Fire resistant
- ID labels confirm safe standards
-



Bite, scratch
Easily harmed
Impossible to clean
Almost certainly infective
Virtually impossible to care for well
ID labels would confirm unsafe

Hand washing?

- Regular? (2 mins)
- Surgical? (scrub up)
- 5-10% nosocomials
- Wear gloves - trans membrane pathogen migration
- Indirect/fomite
- Incidental recontamination of 'cleaned' hands
- Incidental contamination of wider environment
- Contamination cycle proliferates

Hygiene - how? Best practice advice

- Do not rely on hand washing
- Presume animal and entire environment (shop, home, people) contaminated
- Caution towards colleagues, own home and extended contacts
- Advice to clients, only way to pragmatically avoid contamination is not to keep or have contact with exotic pets

Information to local government

A review of captive exotic animal-linked zoonoses

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Abstract

Captive exotic animal-linked zoonoses are part of a major global emerging disease problem. Exotic animals are notably represented in the pet trade, zoos, and to a far lesser extent in circuses, with exotic pets being the primary concern. Combined, in the UK there may be approximately 42 million exotic pets (including fishes) in private homes, an unknown number in zoos, and in circuses less than 40 individuals. A wide range of species is involved, and a large and expanding array of potentially pathogenic agents. Sixty-one percent of human diseases have a potentially zoonotic origin and 75% of global emerging human diseases have a wild animal link.

Exotic pets in particular may represent a source of largely unrecognised and unrecorded microbes and macroparasites in the domestic environment. Pet markets constitute an especially high risk of infection and these risks are fundamentally uncontrollable. Future guidance may include advising against keeping exotic animals as pets unless excellent monitoring for diseases and essential husbandry practices are pursued. Zoos and circuses also involve zoonotic risks but may be relatively low because public visits and exposure are infrequent.

The prevalence of exotic animal-linked zoonoses in the UK is unknown. Many cases of zoonotic disease are probably misdiagnosed as other conditions and under-reporting in general is a likely major factor in under-ascertainment of cases. In addition, border and domestic biosecurity is lacking. New guidance on zoonoses monitoring, prevention and control is included as well as upgraded public health guidance that emphasises special caution against over-reliance on hand washing and other widely recommended measures.

Animal facilities should be required to provide independently sanctioned guidance on health risk and maintain strict record-keeping that includes detailed animal inventories, treatment data and post-mortem reports as well as pet purchaser details to assist in contact tracing in the event of outbreaks. Local authorities should also liaise with animal facilities to develop obligatory zoonotic disease response plans.

Key words: Exotic pets, zoos, circuses, zoonoses, disease, prevention, control

Introduction

Captive exotic animals are notably represented in the pet trade (and keeping) and in zoos, and to a far lesser extent in circuses. Combined, in the UK there may be approximately 42 million exotic pets (including fishes) in private homes, an unknown number in zoos, and less than 40 in circuses. Actual numbers are very difficult to accurately determine owing to the poor regulation of the market and the high animal death rates, in particular for the pet trade, and generally deficient inventory keeping for zoos. The prevalence of exotic animal-linked zoonoses in the UK is unknown. However, many cases of zoonotic disease are probably misdiagnosed as other conditions and under-reporting in general is a likely major factor in under-ascertainment of cases (Warwick, 2004).

Potential health threats from captive exotics probably vary according to captive context. For example, for exotic pets direct public contact with animals and their cages and other intermediary surfaces is common, whereas for zoo and circus animals public contact is less frequent.

Zoonoses, as defined by the World Health Organisation, includes "any disease or infection that is naturally transmissible from vertebrate animals to humans and vice-versa" (Anon, 2011). Some zoonoses have a long association with people. It is probable that for at least as long as humans have killed animals for food they have inadvertently contracted food-borne parasites. Since at least the Middle Ages 'the plague', tapeworm infestation and other zoonoses afflicted humans, as animals became our cohabitants either incidentally with rodents or deliberately with farmed species (Wilson and Sornie, 2001; Hubdek and Rudolf, 2011).

Accordingly, zoonotic infections and infestations are not new, but today they form part of the phenomenon of emerging human diseases because they constitute a growing, and in many cases, novel health threat (Brown, 2003; Chamei et al., 2007; Wolfe et al., 2005; Zinsstag et al., 2007). This pathological renaissance is largely attributable to two factors, both of which can substantially be controlled. One factor is that the efficiency and economics of modern transportation offers humans convenient access to increasingly remote areas of the world – introducing people to novel environments within hours or days (Weber and Rutala, 2001; Brown, 2004). Another factor is that wild animal species are conveniently transported from distant regions of the world to the domestic market, in particular for pet purposes, again within a very short period of time.

EXOTIC PETS

HYGIENE AND CAUTIONS

IMPORTANT: Hygiene measures, such as hand-washing, where performed thoroughly and with correct chemicals, can significantly reduce the amount of germs on your hands but *does not* guarantee protection against becoming sick or remove the possibility of passing germs directly or indirectly to others.

Advice included here can help to *reduce* but not *eliminate* the risk of contracting illness from exotic pets.

Ownership of exotic as pets such as fishes, amphibians, reptiles, birds, and mammals such as raccoons and primates involve special risks to the health of animal keepers and to the health of those around them. *It is not advisable to keep exotic animals as pets.* Many people, however, already have exotic pets, and this most likely causes thousands of cases of human illness annually and occasional deaths.

It is important to note that because exotic pets occupy the home, and that germs are easily spread around surfaces, walls, door-handles, clothes and other items, even thoroughly cleaned hands can quickly become contaminated again by simple contact with any of these items. Pet stores and the people who work there should also be regarded sources of contamination. Thorough cleaning of exotic pet-related germs from the home may be practically impossible.

- Children should be supervised so that they do not put their mouths close to or kiss exotic animals.
- Do not eat, drink or smoke whilst handling an exotic animal.
- Always wash your hands thoroughly after touching or handling any exotic animal, their cage or any other equipment.
- Dispose of waste water and droppings from exotic pets down the toilet – and not in the sink or bathtub.
- Always wash your hands immediately and thoroughly after feeding your exotic pet and after handling raw (including frozen or defrosted) mice, rats and chicks.
- Ensure that all surfaces that come into contact with exotic pet animals, (including areas that you may have touched), and raw or defrosting exotic animal food are cleaned thoroughly afterwards.
- Do not use kitchen sinks to bathe exotic pets or to wash their cage or equipment. If you use a bathroom sink or bathtub, it must be cleaned thoroughly with disinfectant afterwards.
- It is strongly advised that anyone handling an exotic animal or an object that may have been in contact with an exotic animal should wash their hands immediately and thoroughly afterwards. First use antibacterial soap and water, taking care to rub hands vigorously together, being careful to clean all areas. Second, apply an alcohol-based cleaning agent.
- If you touch any exotic animal, avoid further touching your hair, clothes (including pockets), doors and other items (including car doors, steering wheels and gear change levers) until you have thoroughly cleansed your hands.
- Thoroughly cleaning hands is particularly important before touching or feeding a baby or young child. Not to do so would pose a strong health risk to the infant.
- Local authorities, doctors, vets facility managers should advise their patients and customers of the health risks associated with having an exotic animal as a family pet and should provide appropriate health protection advice.

Figure 1.0
Avoiding animal-linked disease associated with exotic pets

Guidance to hospitals

CLINICAL REVIEW



Managing patients for zoonotic disease in hospitals

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Summary

Zoonoses involve infections and infestations transmissible from animals to humans. Zoonoses are a major global threat. Exposure to zoonotic pathogens exists in various settings including encroachment on nature; foreign travel; pet keeping; bushmeat consumption; attendance at zoological parks, petting zoos, school 'animal contact experiences', wildlife markets, circuses, and domesticated and exotic animal farms. Under-ascertainment is believed to be common and the frequency of some zoonotic disease appears to be increasing. Zoonoses include direct, indirect and aerosolized transmission. Improved awareness of zoonoses in the hospital environment may be important to the growing need for prevention and control. We reviewed relevant literature for the years 2000 to present and identified a significant need for the promotion of awareness and management of zoonoses in the hospital environment. This article provides a new decision-tree, as well as staff and patient guidance on the prevention and control of zoonoses associated with hospitals.

Introduction

The frequency of some zoonotic disease appears to be increasing, although the overall prevalence of zoonoses in general as well as in the hospital environment is unknown. However, the risk of zoonotic pandemics has been acknowledged as a major global threat to human health.¹ Hospitals are often an early portal for infection cases and must be equipped to promptly and effectively diagnose and control the spread of zoonotic disease. Hospital staff who are not aware of or have not implemented appropriate disease prevention and control measures may incidentally facilitate the spread of zoonotic pathogens.

Under-ascertainment is believed to be common because numerous zoonoses superficially resemble common illnesses such as gastrointestinal, respiratory and dermal disease and thus may go undiagnosed. Monitoring is also highly incomplete.² Furthermore, despite increasing governmental and nongovernmental efforts at prevention and control, public adherence to cautionary guidance has not resolved epidemiological occurrence or expansion, and frequency of some zoonotic disease appears to be increasing.³ For example, in the United States in the 1960s, pet turtle-related salmonellosis was found to be responsible for approximately 14% of all *Salmonella* infections (approximately 280,000 cases annually) and despite massive public

DOMESTIC & EXOTIC PETS

HYGIENE AND CAUTIONS

IMPORTANT: Hygiene measures, such as hand-washing, when performed thoroughly and with correct chemicals, can significantly reduce the amount of germs on your hands but *does not* guarantee protection against becoming sick or remove the possibility of passing germs directly or indirectly to others.

Advice included here can help to *reduce* but not *eliminate* the risk of contracting illness from pets, especially exotic pets.

Ownership of exotic as pets such as fishes, amphibians, reptiles, birds, and mammals such as raccoons and primates involve special risks to the health of animal keepers and to the health of those around them. *It is not advisable to keep exotic animals as pets.* Many people, however, already have exotic pets, and this most likely causes thousands of cases of human illness annually and occasional deaths.

It is important to note that because exotic pets occupy the home, and that germs are easily spread around surfaces, walls, door-handles, clothes and other items, even thoroughly cleaned hands can quickly become contaminated again by simple contact with any of these items. Pet stores and the people who work there should also be regarded as sources of contamination. Thorough cleaning of exotic pet-related germs from the home may be practically impossible.

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- Thoroughly cleaning hands is particularly important before touching or feeding a baby or young child. Not to do so would pose a strong health risk to the infant.
- Local authorities, doctors, vets facility managers should advise their patients and customers of the health risks associated with having an exotic animal as a family pet and should provide appropriate health protection advice.

Figure 2. Avoiding animal-linked disease associated with pets (derived with permission from Warwick *et al.*,² <http://www.cieh.org/jehr/default.aspx?id=41594>).

Guidance to general physicians

Table 3.0

Possible useful standard-setting questions to ascertain source of infection.
(Reproduced from Warwick 2004).

a	recently consumed foods (and their condition)
b	visits to restaurants
c	foreign travel
d	visits to hospital
e	visits to farms
f	visits to zoos and other wildlife centres
g	visits to a pet shop
h	whether the patient household possesses any pets
i	whether the patient has visited a household that possesses pets
j	whether in particular in c-g above, the patient or others in the household may have had direct or indirect contact with persons or inanimate material from these categories

Guidance to pet suppliers

Table 2.
Common zoonoses signs and symptoms.

Zoonosis/condition	Source	Signs and symptoms
Salmonellosis/gastroenteritis	Fish, amphibian, reptile, bird, mammal	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
<i>E. coli</i> infection/gastroenteritis	Amphibian, reptile, bird, mammal	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
Campylobacteriosis/gastroenteritis	Amphibian, reptile, bird, mammal-primate	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
Leptospirosis	Amphibian, reptile, bird, mammal	Flu-like, vomiting, icterus, telangiectasia, uveitis, splenomegaly, meningitis
Psittacosis	Bird, mammal-primate	Flu-like, pneumonia, fever, cough
Vibriosis	Fish, amphibian, reptile, bird	Gastrointestinal, pain, vomiting, fever, otitis
Lyme disease/bartonellosis	Mammal	Flu-like, fever, rash, gastrointestinal
Toxocariasis	Mammal	Eye problems
Giardiasis	Mammal-primate	Gastrointestinal, fever, nausea, fatigue, weight loss
Tuberculosis	Fish, amphibian, reptile, bird, mammal-primate	Respiratory, flu-like, fever, weight loss
Q-fever	Reptile, bird, mammal	Fever, flu-like
Cryptosporidiosis	Fish, amphibian, reptile, bird	Acute gastrointestinal disturbance, nausea, vomiting, pain, fever, flu-like
Macroparasite infestation, e.g. helminths and ectoparasites	Fish, amphibian, reptile, bird, mammal, mammal-primate	Gastrointestinal disturbance, abdominal cramps and pain, weight loss, flu-like
Ringworm	Mammal, mammal-primate	Patchy skin, inflammation, itching
Allergic alveolitis	Bird	Persistent dry cough, chest irritation
Lymphocytic choriomeningitis virus (LCMV)	Mammal	Nausea, vomiting, anorexia, fever, headache, fatigue.

If experiencing these indicators report to a healthcare professional. These are a small sample of relatively common animal-to-human diseases (derived with permission from Warwick *et al.*,⁷ <http://www.cieh.org/jehr/default.aspx?id=41594>). Onset of signs and symptoms of an animal-related disease may occur within hours or not for several weeks or months following exposure to an exotic animal. Most cases of diseases are not serious, but it is important to report any suspicion of having an animal-linked disease because treatment may vary from regular illnesses and early access to medical help can alleviate greater problems as well as assist health workers to provide best advice.

Zoonosis/condition	Source	Signs & symptoms
<i>Salmonellosis/gastroenteritis</i>	Fish, amphibian, reptile, bird, mammal	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
<i>E. coli infection/gastroenteritis</i>	Amphibian, reptile, bird, mammal	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
<i>Campylobacteriosis/gastroenteritis</i>	Amphibian, reptile, bird, mammal-primate	Nausea, vomiting, diarrhoea, abdominal cramps and pain, fever, painful joints, meningitis, flu-like
<i>Leptospirosis</i>	Amphibian, reptile, bird, mammal	Flu-like, vomiting, icterus, telangiectasia, uveitis, splenomegaly, meningitis
<i>Psittacosis</i>	Bird, mammal-primate	Flu-like, pneumonia, fever, cough
<i>Vibriosis</i>	Fish, amphibian, reptile, bird	Gastrointestinal, pain, vomiting, fever, otitis
<i>Lyme disease/bartonellosis</i>	Mammal	Flu-like, fever, rash, gastrointestinal
<i>Toxocariasis</i>	Mammal	Eye problems
<i>Giardiasis</i>	Mammal-primate	Gastrointestinal, fever, nausea, fatigue, weight loss
<i>Tuberculosis</i>	Fish, amphibian, reptile, bird, mammal-primate	Respiratory, flu-like, fever, weight loss
<i>Q-fever</i>	Reptile, bird, mammal	Fever, flu-like
<i>Cryptosporidiosis</i>	Fish, amphibian, reptile, bird	Acute gastrointestinal disturbance, nausea, vomiting, pain, fever, flu-like
<i>Macroparasite infestation</i>	Fish, amphibian, reptile, bird, mammal, mammal-primate	Gastrointestinal disturbance, abdominal cramps and pain, weight loss, flu-like
<i>Ringworm</i>	Mammal, mammal-primate	Patchy skin, inflammation, itching
<i>Allergic alveolitis</i>	Bird	Persistent dry cough, chest irritation

Important: The onset of signs and symptoms of an animal-related disease may occur within hours or not for several weeks or months following exposure to an exotic animal. Most cases of diseases are not serious, but it is important to report any suspicion of having an animal-linked disease because treatment may vary from regular illnesses and early access to medical help can alleviate greater problems as well as assist health workers provide best advice.

Table 2.0
Common zoonoses signs and symptoms. If experiencing these indicators report to a healthcare professional. These are a small sample of relatively common animal-to-human diseases.

Guidance to public

Exotic Pets

Reducing the risk of human infection



Injuries

- Small but important contribution to public health concerns
- Wholly avoidable

Public health policies?

- Update advice to public and healthcare professionals
- Consumer protection, e.g. EMODE, pet labelling
- Positive lists
- Trade bans

Conclusions

- Trade out of control
- Historical attempts at control (negative lists, education etc) - failed
- Public health/zoonoses/allergies - significant issue
- Species over-diversity - major issue
- Antimicrobial resistance - significant issue
- Animal welfare - major issue (goes beyond improved husbandry)
- Species conservation - increasing concern
- Invasive alien species: novel pathogens threat - major issue
- Best advice = “Advisable not to keep exotic pets”