

Zoonoses and the Wildlife Rehabilitator

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ABSTRACT: Zoonoses are diseases that can be transmitted from animals to people. Wildlife rehabilitators care for a wide variety of wildlife species – from birds to reptiles to marsupials. Many these species can potentially harbour diseases that could affect human health. In the daily round, carers are exposed to faeces, respiratory secretions and blood – either their own or the animals! So the potential risk is real and present. Knowledge about the common diseases that can be transmitted to carers, and by what means they are transmitted from animal to human will be covered in this presentation. The tools to reduce the likelihood of contracting a zoonosis are often based on common sense hygiene principles which will be discussed. Preventative steps will also be included in the discussion. Some of the zoonoses covered will include psittacosis, Q fever, Lyssavirus, and the arboviruses.

Introduction

Zoonoses are diseases that can be transmitted to humans from other animal species. There are over 60 diseases in Australia that can be transmitted from animals to humans.

The Commonwealth Department of Health & Aging (so named in 2006) maintains a surveillance system for nationally notifiable diseases, including zoonotic diseases. The zoonoses that are monitored include anthrax, Australian bat lyssavirus, brucellosis, leptospirosis, Ornithosis (Chlamydiosis) and Q fever. These are listed on the website www.health.gov.au and reported on the Animal Health Surveillance quarterly report published by Animal Health Australia. Of these diseases, lyssavirus, leptosporosis, Ornithosis and Q Fever are pertinent to wildlife carers. However, as we enter a time of increased human populations and intense urbanization, it is recognized that the new zoonotic diseases are likely to emerge in the coming years – for example Nipah virus in Indonesia (Field).

However, there are other zoonoses that are not notifiable to the government that also pose potential risks to wildlife rehabilitators – such as bites and sarcoptic mange, and these will be discussed as well.

The importance of zoonoses

All of these diseases sound a little scary! So how likely is someone to contract a disease from an animal? The answer to that is, very unlikely. Each of us is much more likely to have a car accident or die from heart disease than contract one of these illnesses. These diseases are often listed in terms of the number of people affected per 100 000 people in the population and this is shown in Table 1 below. However, there is a growing appreciation that wildlife rehabilitators may represent an unrecognized at-risk population due to their increased exposure to these diseases in wildlife (Daszak). Being aware of possible zoonoses is the first step towards preventing their occurrence.



Table 1: Incidence of Disease per 100 000 people

Disease	1992	1997	2002	2007
Australian bat lyssavirus	NN	NN	0	0
Ornithosis	1	0.4	1.1	0.2
Q fever	3.2	3.0	4.1	0.8
Leptospirosis	1	0.6	1.3	0.3
Ross River fever	NN	35.7	7.4	9.4
Cryptosporidiosis	NN	NN	16.7	7.5
Salmonellosis	26	38.6	40.1	24.5

Table 1 above, shows the number of people affected per 100 000 people throughout Australia for each of the diseases listed in the year tabled. This table has been sourced from the website of the Department of Health & Aging. Other diseases that humans acquire, such as Salmonellosis from contaminated food, are included as an example to illustrate the low frequency that zoonoses occur in comparison to other reportable diseases. The notation, NN, stands for Not Notifiable and shows how some of these Zoonoses represent our growing knowledge of emerging diseases. Although 2 people have died from Australian bat Lyssavirus, the deaths did not occur in the years listed, and thus there appears to be no deaths. These years were simply chosen as examples to illustrate the discussion.

There are a number of issues that surround zoonoses and wildlife carers:

1. Was the cause of the disease due to wildlife in care, or wildlife in the surrounding area?
Many carers live in rural or natural areas and have wildlife on the property. Was it the contact with the dead kangaroo mother's blood while dragging her off the road, or her joey that was the source of the infection, for example?
2. Confirmation of cases tends to lead to underreporting as the case definitions are reasonably strict.
3. Medical practitioners often do not collect a client history that pertains to animal interactions – were you asked about exposure to animals the last time you presented to a doctor with flu-like symptoms? No? Yet flu-like symptoms are a common presentation for several zoonotic diseases.
4. Doctors are not familiar with zoonotic diseases, their transmission and presentation, which may lead to misdiagnosis and incorrect treatment.
5. Most zoonotic diseases present with mild and vague signs and so people may not present for medical attention at all – bites being a good example.
6. Mild zoonotic disease is treated as something else or resolves and is thus unrecognised.
7. Wildlife carers often have other animals capable of transferring zoonotic diseases – such as cattle, sheep, goats and horses – are they the culprit, or the wildlife?
8. Are we missing cases of zoonotic disease in wildlife carers?
9. What recommendations should we as veterinarians, or as care groups be making to wildlife carers to help prevent Zoonoses? There is no value in a scare campaign, but information to assist people preventing disease is required.

There is potentially a role for veterinarians to play in the education of medical practitioners about zoonoses in Australia or as part of the human health care team.

Some zoonoses are potentially very serious. We, as wildlife rehabilitators may be healthy individuals, but we also have a responsibility to those who might assist us with animal care and are at greater risk – children, elderly volunteers for example. Wildlife rehabilitators, by being aware of zoonotic disease can educate members of the public about their level of risk in the event of exposure. However, it is wise to recommend that members of the general public seek medical advice if possible exposure to a zoonotic disease is observed.

The zoonoses that will be discussed in this presentation are tabled below in Table 2 according to their causative agent.

Table 2: Types of Zoonoses

Parasite	Protozoa	Bacteria	Rickettsia	Virus
Sarcoptes mite	Cryptosporidiosis	Leptospirosis	Q fever	Lyssavirus
		Salmonellosis		Ross River virus
		Chlamydiosis		

Scabies

Cause: *Sarcoptes scabiei* an ascarid mite that is transmitted from humans to wombats by direct contact. However, dogs, cats, pigs and horses may also transmit this external parasite to humans.

Transmission: direct contact is usually required. At risk groups are wildlife carers and veterinarians.

Clinical signs: a papular rash on the skin which is very itchy. The itchiness is a reaction to saliva and faeces of the mite. It is commonly seen on arms and legs and abdomen – places where the wombat can come in contact with human skin during handling. Less commonly, immunosuppressed people may develop thicker skin.

Treatment: 5% permethrin cream or 25% benzyl benzoate wash is applied to the affected areas and repeated in 7 days. It is important to wash clothing and bedding on the day of treatment. In contact humans may also need to be treated (Stevenson & Hughes).

Prognosis: good with effective treatment. Reinfestation is possible.

Cryptosporidiosis

Cause: is a coccidian protozoa, *Cryptosporidium*, that is found in water contaminated by faeces. Not all species are infective to humans. Potential sources of this protozoa include reptiles and possibly other animals, such as the Mountain Brushtail possum, the bilby (Warren et al) and the kangaroo. It can cause watery diarrhoea in mammals and gastritis in reptiles.

Transmission: Either directly from animal to person, or by drinking contaminated water. Documented cases involving transmission from wildlife has not occurred, however, the potential remains.

Clinical signs: after 7-10 days, patients develop watery diarrhoea, stomach cramps, bloating, vomiting, or fever. In immunosuppressed people, diarrhoea may continue for up to 4 weeks with weight loss due to malabsorption.

Diagnosis: detection of oocysts in faeces, PCR

Treatment: there is no treatment to kill the organism. Supportive treatment for diarrhoea with fluid and electrolyte replacement is recommended.

Prognosis: It is usually a mild disease, unless the individual is immunosuppressed. It is of concern as up to 50% of immunosuppressed people die and the organism is very resistant to disinfection.

Prevention: wash your hands! Avoid contact with diarrhoea.

Animal bites and scratches

Cause: well, they are called wild animals for a reason!

Clinical signs: punctures, bite or tearing wounds often on the arms and legs of the handler. Signs of ascending infection include swelling, redness, inability to move the digit, pain, fever and inflammation of the lymph tract causing a red line under the skin to a swollen regional lymph gland.

Treatment: promptly wash all wounds in hot water and soap for at least 30 seconds. Cover the area to prevent further contamination or injury. Seek medical attention promptly, particularly if the area is not improving within 24 hours, as antibiotics may be indicated.

Prevention: plan all animal captures with sufficient people and resources to reduce the incidence of bites. Use towels and pillowcases to restrain the animal and prevent bites and scratches. Use sedation and anaesthesia, where appropriate, under veterinary supervision.

Leptospirosis

Cause: a bacteria, *Leptospira* which is divided into several species. It has been seen in platypus and Brushtail possums but also bush rats and marsupial mice (Stevenson & Hughes).

Leptospira is shed in urine.

Transmission: occurs due to inhalation or by urine containing the organism which penetrates open wounds and scratches. The most common animal involved in transmission is the dairy cow and rats in cane fields.

Clinical signs: a mild, vague, non-jaundiced form of the disease is common. Fever for 1 – 3 days, headache due to meningitis, vomiting, and abdominal pain may be seen. More severe forms are associated with jaundice, fever, headache, muscle pains, liver disease and renal failure. Fortunately, the fatality rate is less than 1% (Stevenson & Hughes).

Treatment: involves antibiotics and has a good prognosis with early intervention.

Prevention: use gloves and protective clothing when cleaning cages where access to urine occurs. Cover scratches to prevent contamination. Controlling rodents around feed areas is also recommended.

Salmonellosis

Cause: a gram negative bacterium, *Salmonella*, which lives in the gut. There are several species – *typhimurium* is the most common. In kangaroos, this bacteria is considered normal gut flora. In birds, it can be associated with deaths. In reptiles in the United States, a strong link with *Salmonella arizonae* has been established. This has not been reported to a similar degree in Australia, but caution is advised – particularly with children handling wild reptiles (Woodward, et al). Wildlife carers may also handle raw meat or whole foods that could also carry the bacteria.

Transmission: by ingestion. Salmonella is most commonly implicated in human food poisoning.

Clinical signs: headache, nausea, vomiting and diarrhoea,

Complications: septicaemia, dehydration, endocarditis and death

Treatment: depends on severity – it can be self-limiting, or may require hospitalization and intravenous antibiotics (Stevenson & Hughes).

Prevention: wash hands – after handling raw meats, faeces, necropsies, reptiles.

Ornithosis

This is not the same disease as the genital chlamydiosis seen in humans. Ornithosis can be also be known as Parrot fever, psittacosis or chlamydiosis.

Cause: an intracellular bacteria, *Chlamydiophila psittaci*. This bacteria is present in wild parrots (lorikeets, cockatoos), waterfowl, pigeons, doves and lyrebirds. The bird may present unwell or may be a carrier that does not show signs of disease. Koalas also carry other strains of *Chlamydiophila (pecorum and pneumoniae)* which have not yet been documented to cause transmission to humans.

Transmission: inhalation of organisms present in faeces or discharges from the nose.

Clinical signs: fever, headache, anorexia, muscle pain, photophobia and coughing.

Complications: pneumonia, myocarditis, secondary bacteria infections.

Treatment: doxycycline or arithromycin

Prognosis: good with early intervention

Prevention: prevent aerosolisation of bird faeces when cleaning cages– change daily, dampen the paper, roll the paper to reduce particles lifting into the air. If performing a necropsy on a dead bird, wet the feathers first and wear a face mask as a minimum measure (McManus).

Q fever

Cause: a bacterium, *Coxiella burnetti*, in a particular family of bacteria called the rickettsia. Infections in wild animals are maintained by ticks. Bandicoots and kangaroos have been documented to carry the bacteria in their blood without evidence of clinical infection.

Transmission: highly infective – only a few bacteria can begin an infection. It can be present in faeces, urine, blood and birth fluids. It is able to persist in the environment for a long period of time. Humans are most commonly affected working in abattoirs or by contact with infected wool, hides or placenta of domestic ruminants (cattle and sheep).

Clinical signs: after an incubation period of 1 – 4 weeks humans develop fever, rashes, headache, muscle pains, cough and fatigue which lasts 2 weeks. 10 -15% of affected people develop a chronic fatigue syndrome

Complications: pneumonia or hepatitis and less than 1% of affected people may die.

Treatment: doxycycline and other antibiotics

Prevention: a Q fever vaccine is available and significantly reduces the number of people affected. Wear a face mask and gloves while performing necropsies. Wear gloves when cleaning cages of faeces and urine.

Ross River virus

Cause: this is an **arbovirus** – a virus that is spread by mosquito bites. Other arboviruses present in Australia include

- Barmah Forest virus;
- Australian encephalitis (Murray Valley encephalitis) and;
- Kunjin virus.

Reservoir: eastern grey kangaroos and wallabies may represent the host species that maintain the virus. These animals do not suffer clinical signs associated with viral infection.

Transmission: The *Aedes vigilax* (salt water) and *Culex annulirostris* (fresh water) mosquitoes transfer the virus between hosts.

Clinical signs in man: after an incubation of 3 – 21 days, a rash on the trunk and limbs, chills, fever, headache, lethargy, muscle tenderness. Arthritis of the wrists, ankles, fingers, knees and toes may occur. Recovery occurs within 2 weeks to months. 10% of cases develop a chronic fatigue syndrome.

Prevention: avoid being bitten by mosquitoes. Wear light coloured clothing and appropriate insect repellants.

Lyssavirus

Cause: Lyssavirus is a virus related to rabies virus. It is endemic in bat populations in Australia. Lyssavirus has been found in several species of flying foxes, with a high incidence in Little Red Flying foxes; and microbats (the Yellow-bellied Sheath-tailed bat, and Lesser Long-eared bats in particular).

Transmission: by biting or contamination of open cuts.

Clinical signs: related to encephalitis – paralysis, coma, death

Treatment: wash the wound immediately in hot soapy water for 30 seconds. Then apply a disinfectant – such as methylated spirits or iodine to the area. Post-exposure vaccinations are recommended.

Prognosis: poor - two deaths in humans have been reported

Prevention: do not recommend that the general public picks up sick or injured bats – get a vaccinated carer to rescue the bat. A rabies vaccine protects against infection with ABLV. Have your titres checked annually prior to the onset of the orphan bat season.

It is strongly recommended that you read the PDF documents about ABLV on the Department of Health & Aging website.

www.health.gov.au/internet/wcms/publishing.nsf/Content/cda-pubs-other-bat_lyssa.htm

Other viruses that affect flying foxes and can cause disease in humans include

- Hendra virus (equine morbillivirus) which has been responsible for the infection of two, and death of one human. Wildlife surveillance identified *P alecto*, *P poliocephalus*, *P scapulatus* and *P conspicillatus* are natural hosts but mode of transmission from flying fox to horse is unknown (Field).
- Nipah virus was found in Malaysia in 1999 affecting pigs and in-contact humans.



Preventative measures that wildlife carers can take against zoonotic diseases:

- Tetanus vaccinations performed every 10 years, or as suggested by your medical practitioner.
- Lyssavirus vaccinations are recommended if the carer expects to be handling flying foxes or microbats. Check titre levels annually.
- Seek prompt medical attention for infected wounds and illnesses.
- Inform your doctor that you handle wildlife.
- Do not smoke or eat while cleaning cages and preparing food.
- WASH YOUR HANDS – use the 20/20/20 rule: wash for 20 seconds with soap, rinse your hands for 20 seconds and dry your hands for 20 seconds.
- If you feel that the animal in your care may be carrying a zoonotic disease, such as Chlamydiosis, take the animal to your veterinarian for assessment.

Recommendations for cleaning enclosures:

- Work from young to adult, and healthy to diseased animals that are in care.
- Wear gloves to minimize contact with urine and faeces while cleaning cages.
- Remove the animal from the enclosure to a holding cage while cleaning the cage itself.
- Roll paper linings to contain faeces and uneaten food to minimize aerosolization.
- Remove faeces, pieces of shed skin, uneaten food from the enclosure daily.
- Wipe the enclosure with soapy water initially.
- Then wipe the enclosure with a disinfectant suitable against bacteria and viruses – e.g.: F10, bleach, or Virkon/Halamid.

Recommendations if performing or assisting necropsies

Some carers may be either performing necropsies themselves, or assisting veterinarians.

- Wear gloves, face mask and long-sleeved shirts and trousers.
 - Wet the animal's coat with soapy water before opening the body cavity.
 - Do not eat, drink or smoke while the necropsy is in progress.
 - Dispose of the body appropriately.
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Conclusion

As wildlife carers, we are often encouraged to use measures to protect our own health. Hopefully, this presentation will have outlined some of the more common diseases that can be transmitted from wildlife to humans. However, the key message remains that practicing good hygiene – washing hands, using gloves and cleaning cages daily is not only good for the health of the animal, but good for our health too.

Glossary

Aerosol	an infective agent that has been lifted into the air
Arbovirus	virus that is transmitted by mosquitos
Disinfectant	agent able to kill bacteria, fungi and viruses on contact.
Encephalitis	inflammation of the brain
Endocarditis	inflammation of the heart valves
Inhalation	act of breathing air into lungs
Lethargy	tiredness, weakness
Meningitis	inflammation of the meninges, the lining of the brain
Myocarditis	inflammation of the heart muscle
Oocyst	infective stage of the coccidia parasite found in faeces
Papularred	circular lesion on skin

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