Exotic Animal Care and Management 2nd edition Judah Solutions Manual

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Chapter 2: Zoonotic Diseases

Learning Domain - Cognitive

Level of Learning – Comprehension

Time Allocation – Approximately 30 minutes

Learning Objectives:

- Define zoonotic disease.
- Understand how zoonotic diseases are contracted and spread.
- Know how to incorporate safety procedures in handling and housing exotics.
- Identify exotic pets that have a higher risk of transmitting zoonotic diseases.

Vocabulary Introduced:

- zoonotic
- bacterial
- viral
- fungal
- protozoal
- parasitic
- Salmonella
- tularemia
- *Francisella tularensis*
- pathogens
- septicemia
- Centers for Disease Control (CDC)
- United States Department of Agriculture (USDA)
- superinfections
- monkey pox
- orthopox
- variola
- Food and Drug Administration (FDA)
- lymphocytic choriomeningitis (LCM)
- Campylobacter
- pandemic diseases
- bubonic plague

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- *Yersinia pestis*
- pneumonic
- ectoparasite
- scabies
- Cheyletiella

Needed Equipment/Materials:

Instructor: PowerPoint presentation equipment
Student: paper, pencil

References: *Exotic Animal Care and Management,* Second Edition

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I. Introduction

[Time Allocation: 5 min.]

A. Zoonotic diseases are transmitted directly from animals to humans
B. Methods of transmission can be as variable as each disease-causing organism
C. Children and the elderly have higher risk factors because their immune systems are less able to ward off disease
D. Species commonly available all have the potential to transmit disease
E. One of the biggest concerns is new and emerging unknown diseases

Reference: *Exotic Animal Care and Management,* p. 6
Slides: 2-3 and 2-4

II. Pathogens

[Time Allocation: 20 min.]

A. Adapting to change
    1. Pathogens, like other life forms, are continually adapting and responding to environmental changes
    2. Many are opportunistic
        a. They invade convenient hosts
        b. These may not be considered the *normal* reservoir
    3. Viruses mutate regularly with different strains emerging annually
    4. Bacteria are becoming drug resistant
        a. Producing superinfections
        b. Causing deadly consequences to humans
B. Vaccines
    1. Few vaccines have been developed to protect against zoonotic diseases
    2. The human rabies vaccine is one exception
        a. It is readily available, yet few people choose to be inoculated
        b. People with a high risk of exposure to rabies include:
            i. Veterinarians
            ii. Veterinary technicians and assistants
            iii. Wildlife personnel
            iv. Diagnostic laboratory workers
C. Housing species collectively
    1. Housing different species collectively increases the opportunity for pathogens to invade other organisms
        a. There may be a direct leap to a new host
        b. Pathogens can also reach a new host through links and bridges

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i. These are formed from one host to the next
ii. Multiple species are infected
iii. Ultimately it is transmitted to a human host

2. The monkey pox outbreak demonstrates how easily this can occur
   a. Monkey pox is caused by an orthopox virus
      i. It is closely related to the human smallpox virus, variola
   b. In June 2003, monkey pox was diagnosed in several people in the United States
      i. All of the victims had close contact with wild-caught prairie dogs that were offered for sale as pets
      ii. The prairie dogs were exposed in a distributor's facility housing animals destined for the pet market
      iii. The prairie dogs were in close proximity to Gambian giant rats and other mammals imported from Africa
   c. The CDC and the Food and Drug Administration (FDA) issued an order in response:
      i. Prohibits the importation of all African rodents
      ii. Stops movement, sale, or release of prairie dogs
      iii. Includes six genera of African rodents known to be already in the United States

D. Common zoonotic diseases
   1. Lymphocytic choriomeningitis (LCM)
      a. The following are known reservoirs of the virus responsible for causing lymphocytic choriomeningitis (LCM):
         i. Hamsters
         ii. Mice
         iii. Rats
         iv. Guinea pigs
      b. The disease is transmissible to humans
         i. Three recipients of organ transplants died from LCM
         ii. The organ donor carried the virus but was asymptomatic at the time of his death
         iii. He was infected by a pet hamster
      c. The common house mouse, *Mus musculus*, is a reservoir carrier of the LCM virus
         i. The virus is shed in droppings, urine, and saliva
         ii. It is also transmitted from infected animals to their offspring in utero
         iii. Once infected, animals shed the virus throughout their lives
         iv. It is not fatal in mice and there may be no signs that they are infected
   2. Salmonella bacteria
      a. This bacteria is known to cause septicemia, systemic blood infections

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b. It causes death in rodents, rabbits, guinea pigs, and humans
c. The bacteria is considered normal flora in reptiles but is pathogenic in other species
d. Cases of humans contracting the disease from vacuum-packed feeder mice have been documented
e. In 2011, there was an increase in the number of incidents of Salmonella in humans who had been exposed to pet hedgehogs

3. Campylobacter bacteria
   a. This has been isolated in hamsters and ferrets
   b. Reported incidents of human Campylobacter cases have been directly linked to pet exposure.
      i. Companion animals, however exotic, are brought into homes and are given family member status
      ii. People develop strong attachments and spend much time caring for and interacting with them
      iii. It is human nature to want to hold, hug, kiss, and share

E. Pandemic diseases
   1. Overview
      a. There are more than 200 known zoonoses
         i. Source animals have been identified
         ii. Methods of transmission are known
         iii. Specific symptoms are recognized and treated in humans
      b. Most zoonoses are confined to people with direct contact with a host and are not transmitted from person to person
         i. However, throughout human history, there have been pandemic diseases that have killed millions
         ii. Pandemic outbreaks of a disease involve multiple countries and continents
   2. Black Death, bubonic plague
      a. This disease swept through Europe from 1347 to 1350
         i. It killed approximately one-third of the population
         ii. The source was a bacterium, *Yersinia pestis*
         iii. It is found in the gut of fleas and thrives in the blood of rats
      b. Infected rats spread the disease to people
         i. Infected people spread the plague to family members and entire villages
         ii. People who fled in an attempt to escape the disease spread it even further
      c. Forms of the plague
         i. People infected from direct contact were infected with two types of the plague: septicemic and bubonic
         ii. Pneumonic, was transmitted by airborne droplets, through the coughing and sneezing of infected people
      d. Outbreaks in modern times

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i. The Natural Bridges National Park was temporarily closed in 2006 because the wild rodent population was infected with the plague
ii. In 2006, a cat in Arizona was diagnosed with bubonic plague due to probable close contact with wild rodents
iii. Even today there are sporadic outbreaks in wild rodent colonies, such as prairie dogs and chipmunks
iv. These outbreaks are quickly identified and warning signs are posted in affected state and national parks
v. The concern is resolved by humane extermination of infected colonies or through natural population demise

F. Other zoonotic concerns
1. Ectoparasite infestations
a. Scabies
i. Caused by a burrowing mite (Sarcoptes)
ii. Can be found in most animal species
b. *Trixacarus caviae*
i. Another type of mange mite specific to guinea pigs
ii. Has shown to be zoonotic
c. Cheyletiella
iii. Also called walking dandruff mite
iv. A common mite found in rabbits
2. Allergic alveolitis
a. Also called hypersensitization
i. Inflammation of the alveoli in the lung
ii. Decreases lung capacity
iii. Makes it difficult to move air through the lungs when breathing
b. People become hypersensitive to inhaled dusts
i. Most commonly seen with exposure to avian species

G. Acquiring zoonotic diseases
1. Most zoonotic diseases are acquired through:
a. Casualness
b. Carelessness
c. Lack of education
2. Zoonoses from companion animals are real and the potential is known
a. Responsible ownership includes:
i. Knowledge of what disease potential
ii. Understanding of how to prevent possible infections
b. It is everyone's responsibility to inform and educate
i. Pet stores
ii. Animal handlers
iii. Veterinarians
iv. Veterinary staff

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Reference: *Exotic Animal Care and Management,* pp. 7-9
Slides: 2-5 through 2-14

III. Summary

[Time Allocation: 5 min.]

- Causative agents may be bacterial, viral, fungal, protozoal, or parasitic
- All species of animals have the potential to transmit a zoonotic disease
- Most zoonotic diseases are acquired through casualness, carelessness, and lack of education
- Responsible ownership includes knowledge of what disease potential there is and the best practices to prevent possible infections

Reference: *Exotic Animal Care and Management*, p. 9
Slides: 2-15 and 2-16

IV. Assignment – Read Chapter 3 in *Exotic Animal Care and Management*

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Quiz Answers
Chapter 2

1. **B**, p. 6
2. **C**, p. 7
3. **A**, p. 7
4. **B**, p. 7
5. **D**, p. 8
6. **C**, p. 8
7. **B**, p. 8
8. **A**, p. 9
9. **A**, p. 9
10. **D**, p. 9

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Chapter 2

Zoonotic Diseases

Multiple Choice

Choose the best answer. Write the corresponding letter on the blank.

_____ 1. Which of the following terms means *disease-causing agent*?
a. Zoonotic
b. Pathogen
c. Pandemic
d. Yersinia

_____ 2. Which of the following vaccines was developed specifically for a zoonotic disease?
a. Variola
b. Polio
c. Rabies
d. MMR

_____ 3. What species of mammals should be considered susceptible to the orthopox virus?
a. All mammals
b. Only gerbils and hamsters
c. Just Prairie dogs and Gambian giant rats
d. None

_____ 4. Which of the following species is a known reservoir of the virus responsible for causing lymphocytic choriomeningitis?
a. Degus
b. Guinea pigs
c. Sugar gliders
d. Bearded dragons

_____ 5. The _____ is a reservoir carrier of the LCM virus.
a. chinchilla
b. African rock python
c. passerines bird group
d. common house mouse

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_____ 6. There are _____ known zoonoses.
a. up to 175
b. roughly 125
c. more than 200
d. approximately 150

_____ 7. The bubonic plague was caused by a bacterium that is found _____.
a. in soil
b. in the gut of fleas
c. on the surface of fruit
d. in the feces of rodents

_____ 8. Scabies is caused by _____.
a. a burrowing mite
b. an allergic reaction
c. pinworms
d. flea infestations

_____ 9. *Trixacarus caviae* is a(n) _____ specific to guinea pigs.
a. mange mite
b. bacteria
c. virus
d. internal parasite

_____ 10. The _____ is commonly found in rabbits.
a. virus responsible for LCM
b. Campylobacter bacterium
c. bacteria that causes bubonic plague
d. walking dandruff mite

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Chapter 2

Zoonotic Disease

Answers to Review Questions

1. Define zoonotic disease.
   A zoonotic disease is transmitted directly from animals to humans.

2. What are the common routes of transmission for zoonotic disease?
   Common routes of transmission include inhalation, direct contact, exposure to urine and fecal material, contaminated bedding, and food/water bowl (fomites).

3. List eight safety practices that will reduce the potential for contracting a zoonotic disease.
   1. **Do not allow exotics to roam freely.**
   2. **Use dedicated equipment (tubs, etc.) For soaking and cleaning.**
   3. **Never keep an animal near food preparation areas.**
   4. **Never exchange food from your mouth to the animal's mouth.**
   5. **Don't exchange food/water bowls with different species.**
   6. **Use latex gloves when cleaning the cage and exposing yourself to the bedding.**
   7. **Always wash your hands after handling any animal.**
   8. **Remove the latex gloves inside out so as not to touch your hand with the outside of the glove.**
   9. **Wear a mask when cleaning some cages.**
   10. **Wear eye protection with diseased exotics.**

4. Hamsters are known carriers of a disease called LCM. What is it and how is contracted?
   LCM stands for Lymphocytic Choriomeningitis. The natural reservoir of this virus is a mouse. The virus can be transmitted to hamsters through mouse droppings and urine. It is also transmitted through contaminated bedding, saliva, or in-utero.

5. Which government agency tracks and provides information on zoonotic diseases?
   CDC (Center for Disease Control).

6. Discuss the reasons that close contact with exotic animals could potentially cause disease in humans.
   Contact with exotics can potentially cause disease in humans if food

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preparation areas come in close contact with day to day activities of people. It is natural for people to want to share their food with their pets and to hug and kiss them.

7. Which population groups have a greater risk of developing severe complications from zoonotic disease?
   People who work with exotic animals are at a higher risk of zoonotic exposure. Children and the elderly are also at a higher risk because their immune systems are weak.

8. Explain why mixed species of animals should not be housed together. Give one example of what could happen.
   Because of the increased potential of a zoonotic agent moving into a new host and multiple species. Monkey pox is an example.

9. List five different groups of pathogens that have zoonotic potential.
   Bacteria, viral, yeast, fungal, protozoan.

10. Access the website of the Centers for Disease Control (CDC).
    a) Determine the incidence of zoonotic diseases. How frequently are they reported?
       Zoonotic diseases are required by law to be reported to the CDC. Both human medical providers and veterinary services report diagnosed or suspected cases of zoonoses. The frequency and numbers of reported cases will be shown by the data you collect.

    b) Determine which species of animals are most commonly implicated.
       It will change every year.

Learning Activities

1. Prepare a written report on one of the common zoonotic diseases. Provide details about what the disease is, how is it spread, and how it can be controlled or prevented. Be prepared to give an oral report to the class.
2. Contact the CDC and put together a booklet of facts concerning zoonotic diseases and warnings.
3. Create client education sheets concerning the risks and safety precautions that can be taken to help prevent or reduce the zoonotic disease potential.

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