Knowledge of Zoonotic Diseases and Common Diagnoses

Course 101
Module 3
The following diseases and infections are either zoonotic or are fairly common diagnoses made in an animal clinic. Zoonotic diseases are any infection, whether produced by bacteria, viruses, or parasites, that are contagious to humans. There are some basic ideas that you need to know about these diseases. The incubation period is how long it takes for an animal or human to actually become symptomatic with the disease once it has been exposed to an infected animal. If an animal has been vaccinated for a particular disease, it is less likely to develop the disease. What you must understand is that a vaccination is never 100 percent effective. If an animal is unhealthy, its immune system may not work properly. For an animal to develop immunity to a disease, it must have a well functioning immune system. Even if the animal has been regularly vaccinated, it is a good idea to monitor it closely for a period of time after the average incubation if it has been exposed to an infected animal. If any symptoms of the disease do appear, the owner needs to bring the animal to a clinic immediately so that a licensed veterinarian can examine the animal and decide the next course of action. Never answer questions an owner asks if you are not positive that the information you are giving is correct. It is much smarter to tell them you will find out the answer than it is to tell them information that is not completely true. Animals are at a higher risk for becoming infected if they are in multiple animal households or if they are allowed to roam free.
Zoonoses
Zoonotic Part 1
Rabies

Rabies is an RNA virus known as a rhabdovirus. It is a viral encephalitis, which means it is a virus that causes inflammation of the brain. It is transmitted through the saliva of an infected animal. It is commonly spread by an infected animal biting another warm-blooded animal, although evidence has shown that it may be capable of being spread by inhalation when the infected animal is a bat. It can also occur if saliva or brain tissue comes in contact with broken skin or mucous membranes of a person or other animal. This is one of the most well-known of zoonotic diseases because of its high fatality rate (almost 100 percent) among all warm-blooded animals, including humans.

The most common carriers of rabies in Texas are skunks, raccoons, coyotes, foxes and bats. Texas was under rabies quarantine by the Texas Department of Health for several years due to two simultaneous rabies outbreaks, one in gray foxes and one in coyotes. During the quarantine, Texas had strict rules on moving animals in and out of the state. If a client is planning on taking their pet over state lines, they must have a current health certificate issued by the veterinarian and the animal must have been vaccinated for rabies within the last 12 months.

The average incubation period is two to eight weeks, although this can vary. In humans, it can take up to a year after exposure before the symptoms appear. The length of incubation tends to depend on how severe the bite was, how much virus was actually transmitted, and the location of the bite. If a person is exposed to the rabies virus and receives the proper medical attention within 24-48 hours, the treatment is very effective. Fatalities occur when the treatment is postponed for a longer period of time or not given at all. The first symptoms that may appear in humans can often resemble the flu—lethargy, fever, or a headache. Once clinical signs have been observed, it is almost always fatal.
There are two forms of rabies. The furious form is the one most people imagine when they think about the disease. The furious form is the form where aggression occurs. A change in voice can occur and there may be uncoordination or paralysis. This form is commonly seen in carnivores. The second form is the dumb form. The dumb form is seen more often in livestock. They may become anorexic and lethargic.

If a pet bites a human, the requirement for rabies quarantine is 10 days. If it develops any other symptoms of the disease during that period, it must be evaluated by a veterinarian. If the veterinarian determines that the signs are suggestive of rabies, the animal must be humanely destroyed and the head must be shipped at 32-45°F to a qualified laboratory. If a person is bitten by a stray animal, its head should be shipped immediately for rabies examination. If there is an exposure to a bat and a bite cannot be completely ruled out, it must be considered a possible exposure. Diagnosis of the virus is made either by a Fluorescent Antibody Test or by Negri Body Demonstration.

In Texas, vaccinations for rabies must be given by a licensed veterinarian. Puppies and kittens are required by law to be vaccinated by the age of four months.
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Handling of a Suspected Rabies Case

• Always be careful with quarantined animals
• A quarantined animal should be placed in a cage with solid walls
• Only a qualified person should separate the head from the body for testing

Handling of a Suspected Rabies Case

When you have an animal in the clinic that is being quarantined, you should always be extremely careful. An animal that is being quarantined in your clinic should be placed in a cage with solid walls so that it has no direct contact with other patients. The cage should have a secure latch, as you definitely do not want this patient escaping and running around the clinic. If removing the animal to clean its cage, feed it, etc., be extremely careful. Contact should be limited as much as possible. It is not necessary for you to walk a rabies quarantine animal. That is putting you and everyone else in the clinic at unnecessary risk.

For those cases where testing is to be performed, only a qualified person should separate the head from the rest of the body and, if at all possible, the brain should not be damaged. The head of the animal should be submitted. If it is a bat, submit the whole body. If the brain is being submitted instead of the entire head, parts of the cerebellum, hippocampus, and brain stem must be included.
1. The head, or brain, must be chilled immediately, but not frozen.
2. Ship specimen in a container that will insulate it so that it stays between 32º and 45º F. This container would be the first of two layers.
3. The head should be placed in a plastic bag and then into the insulating container.
4. You need to attach an identification number or name to this inner container, particularly if you are placing several containers into one larger one.
5. Place a completed Texas Department of Health Form No. G-9, Rabies Submission Form, in a Ziplock bag.
6. The outer container should be of adequate strength for shipping.

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will not deliver to the laboratory over the weekend. Obtain a shipment receipt and keep it in a safe place. At the time of shipment, notify the laboratory that the shipment is coming. If you have any questions about this procedure, contact the Texas department of Health.
Mange

Mange is caused by microscopic parasites known as mites. There are numerous species of mites in the world, but only a few cause what we in the veterinary field call mange. Mange mites are unable to live off the skin and hair for very long. Transmission is typically through direct contact with an infected animal or through the immediate environment. A dog diagnosed with mange has either demodectic mange or sarcotic mange.
Demodectic mange has also been called “red mange.” Demodex is not a zoonotic disease. It only causes symptoms in dogs with reduced immunity. Typically puppies are the number one target. Young animals have immune systems that aren’t mature. You can also see it occur in an animal that has been ill or in an older animal due to the fact that, in both cases, the immune system may be either temporarily or permanently compromised. You don't see much itching with demodectic mange unless it has progressed to the point where a secondary bacterial infection has occurred. The common sign for this infection is alopecia and it begins on the muzzle.
Sarcoptic mange has also been called “itch mange” or “scabies.” This mange is contagious to other dogs and to humans. It is caused by a mite known as *Sarcoptes scabiei*. It causes alopecia like demodex, but the hair loss is typically seen on the edges of the ears in the beginning. It is spread to other animals and humans by direct contact. The mites can survive for only a short period of time when not on the skin. As the name suggests, it causes an extreme pruritis (intense itching of the skin without eruption). It can affect a dog at any age and has nothing to do with how healthy or unhealthy the animal is. If it affects humans, they can see small red bumps on their skin and will scratch constantly. If a human is exposed, it can take up to six weeks for symptoms to appear if it is the first time the person has had scabies. If they have been infected previously, the symptoms may appear much sooner. Always wash well after handling an animal that may have sarcoptic mange. Cats also can be infected by sarcoptic mange, but the mite that affects the feline is *Notoedres cati.*
Hookworms

The condition of being infected with hookworms is also known as ancylostomiasis. There are three different species that can affect canines. The most common is *Ancylostoma caninum*. The other two forms are known as *Ancylostoma braziliense* and *Uncinaria stenocephala*. The hookworm that commonly affects the felines is *Ancylostoma tubaeforme*. Hookworms can infect animals and humans in several ways. The most common methods of transmission include:

1) skin penetration,
2) transmammary transfer,
3) in utero, or
4) by ingestion of the eggs.

The major concern of hookworm infestation in animals is that the worms can cause a fatal anemia. Owners should be told to remove all feces from their yard immediately and continue to do so. Even if the animal is treated, it can become re-infected if it continues ingesting eggs that are in its environment.

When humans are infected, the disease is known as cutaneous larval migrans. Typically, lesions appear in the skin where the worms have migrated and they are extremely pruritic. *Ancylostoma caninum* has been known to migrate into the deeper tissues. If this occurs, the symptoms will be dependent on where in the body the worms have moved to. Human cases of hookworms are more common in southeastern and Gulf states. The reason we have always been told that going barefoot in the dirt could be harmful is because these and other parasites may be living in the dirt. Since these
worms can live in soil and infect by skin penetration, it is a good idea to make sure that owners who have pets being treated for hookworms be aware that the eggs and the worms may be living in their backyard. If they have young children, they need to keep a good eye on them so that the children are not putting their hands in their mouth after playing in the dirt or walking around without shoes. Counseling clients on the possible chance of infections in their family is an important part of everyone’s job who works in a clinic.
Roundworms

The term for roundworm infection is ascariasis. *Toxocara canis* is the common ascarid that affects canines and *Toxocara cati* affects the felines. Roundworms can be seen passing in the stool. They are white and usually around five inches long and 1/4 cm in diameter. Feline roundworms will be slightly smaller than the canine variety. Ascariasis is commonly transmitted by ingestion of the eggs or in utero. In puppies and kittens that have heavy worm burdens, distention of the abdomen can commonly be seen. The animal will typically have the appearance of being unhealthy. The coat can be dull and in animals with large numbers of worms, vomiting can occur and there may even be worms vomited or passed in the stool. If an owner says they are seeing worms that look like spaghetti, the animal should be checked by a veterinarian and proper treatment begun.

There are two forms of ascariasis that can occur in humans. Ocular larval migrans is a term used when ingested eggs have hatched and the worms migrate to the eye. If this occurs, loss of vision can be a result. The second form is known as visceral larval migrans. This typically occurs when the infestation is heavy or the person has been infected with the worms before. Inflammation of body organs or the central nervous system can occur. Some symptoms may include coughing, pneumonia, or fever. As with hookworm disease, owners must be informed about the danger of children eating dirt.
Toxoplasmosis

Toxoplasmosis is a disease caused by a single-celled parasite known as *Toxoplasma gondii*. Felines can be exposed to it by coming in contact with the feces of an infected cat or eating raw or partially cooked meat. The infected cat is typically asymptomatic, so the owner has no idea the animal has been exposed. It is only infectious in the cat feces for a few weeks after the infection occurs and the parasite must live in the passed feces for several days before it is infective. Because of this, it is not a common problem in humans. Typically, litter boxes are changed frequently so the feces has not sat long enough for the parasite to be in the infectious stage. People who garden should always wear gloves since they do not know what stray cats have been using the garden as their personal litter box. If a human is exposed, the risk is minimal unless they have a weakened immune system. This is especially true for pregnant women. Anyone who is planning on becoming pregnant should not eat raw or undercooked meat and should have someone else clean the litter box. There is no reliable test to see if a cat has been exposed or not. There is a blood test that can be done on humans to see if they have been exposed. If the test is negative, every precaution should be taken so that an exposure does not occur within several months of becoming pregnant or during the pregnancy. If the exposure occurred more than six months prior to the pregnancy, there is little chance of the parasite being passed to the baby. Infants infected in-utero may be retarded or have other serious problems.
Anthrax

Anthrax is in the news occasionally because it can infect humans and there is the possibility that it can be used as a biological weapon. It is caused by a bacteria called *Bacillus anthracis*. The spore form can live in the dirt for extended periods of time. It is common in Central and South America, South and East Europe, the Middle East, Africa and Asia and can be found in warm-blooded animals. It is not common in the United States, but it has been reported in a few states including Texas, Oklahoma and Louisiana.

This disease is typically transmitted either through the skin, ingestion or inhalation and the incubation period is approximately one week. The symptoms seem to be related to the route of exposure. If it is contracted through a cut in the skin, a swelling occurs that initially looks like an insect bite but then changes to an ulcer and necrosing of the tissue in the center occurs. According to the Center for Disease Control, about 20 percent of these exposures result in death if not treated. If the exposure is through ingestion, the intestinal tract becomes inflamed. Symptoms can include vomiting blood and severe diarrhea. The CDC says that death can occur in 25-60 percent of these cases. If the disease is transmitted by inhalation, the onset of the symptoms mimic those of a cold. They become more severe within a few days until the breathing becomes extremely labored and the patient goes into shock. Death typically occurs within a couple of days of the symptoms appearing.

There are antibiotics that can be used to treat cases of anthrax, but the treatment must be instituted quickly. There is also a vaccine available and the Advisory Committee for Immunizations Practices
does recommend that it be used in individuals at risk for exposure such as workers whose duties bring them in contact with imported hides, wool, and goat hair or who work directly with the spores in laboratory settings. The Department of Defense is going to begin vaccinating all U.S. military personnel due to the biological warfare risk.
Brucellosis

There are several different strains of brucellosis, *Brucella abortus* being the most common in this country. It commonly causes abortions in female cows. It is a zoonotic disease, which is why you should always wear personal protective equipment, including gloves, when aiding in the birth of any type of animal. In humans, the disease is called “undulant fever.” Due to the fact that it is a major concern with cattle, we should be aware that, not only is it passed in discharge from the uterus, but it is also passed through the milk. Thus, you must be careful when ingesting raw milk and other dairy items made with raw milk. *Brucella sp.* does not live in the environment very long if it is in direct sunlight, but can live in manure in cooler climates for more than two months. Infection can occur when the bacteria comes in contact with mucous membranes, wounds, or even intact skin. The number of infected cattle has decreased significantly since 1956, but there is always a chance the numbers may again rise since bison and elk can be reservoirs.