Biological Risk Management for Veterinary Clinics – Key Points

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Introduction

In order to provide the best care for our animal patients, it is the responsibility of veterinary practices to minimize the risks associated with the introduction and spread of infectious and zoonotic diseases.

This document is intended to increase your awareness of the biological risks associated with a veterinary hospital as well as the potential consequences of disease introduction.

A well designed BRM plan will help you:

- Optimize patient care by reducing the threat of infectious and nosocomial disease.
- Help reduce the risk and spread of zoonotic disease. This is especially relevant to high risk groups (i.e. immunocompromised, pregnant, children, elderly).
- Promote public health and develop skills and knowledge of infectious disease control among staff members.
- Reduce the risk of liability and financial loss due to disease outbreaks.
- Prepare for foreign animal diseases and the emergence of novel pathogens.
- Reduce the risk of antimicrobial resistance.

Risk Perception

Risk perception is what individuals believe about real and potential risks of infectious disease entry and spread within their clinic. Perceptions on the likelihood of risks and consequences, may pose the greatest obstacle to improvement in biological risk management.

Hazard Identification

An important step in the process of BRM is the identification of the infectious diseases most likely to affect a veterinary hospital. Emerging diseases, foreign animal diseases and bioterrorism or agroterrorism agents should also be considered. The enormous impact of West Nile Virus (WNV) on the equine and human population is a potent example of an emerging infectious disease that has now become established in the United States.

Risk Assessment

Assessing risk is evaluating the likelihood of disease introduction within a veterinary practice and an estimation of its potential consequences.

- Risk assessment must be a non-biased evaluation of a veterinary practice to evaluate its strengths and weaknesses.

- Each veterinarian should perform a thorough assessment to identify opportunities for improvement in that particular clinic.
- Management recommendations, or suggestions for improvement should be considered as to which ones are most practical, applicable, and economically viable.

Consequences of Disease Spread in Veterinary Clinics

Disease or death in animals

Facts regarding disease outbreak or spread from individual veterinary practices and figures on their consequences have been increasing in recent years.

- 2002 outbreak of highly virulent feline calicivirus (FCV) in southern California
- Veterinary Teaching Hospitals – outbreaks of *Salmonella* at Colorado State University in 1996 and the University of Pennsylvania's New Bolton Center in May 2004.
- A 2001 Swiss study claims nosocomial infections similar to those seen in human hospitals are present and emerging in veterinary medicine.
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Disease or death in humans

Outbreaks of zoonotic disease, and/or their reporting, appear to be on the rise in veterinary practices.

- The 2003 outbreak of monkeypox infected 71 people, 25% of the cases were in veterinarians or their staff.
- Outbreaks of multidrug-resistant *Salmonella* have occurred in employees and clients of small animal veterinary clinics and animal shelters.
- Immune compromised clients and staff may be more at risk of contracting zoonotic disease. Informing clients and staff of zoonotic disease risks is more important than ever.
- Over a three year period in the 1990's there were 246 zoonotic disease related worker's compensation claims filed with AVMA PLIT amounting to approximately $500,000,with an average insurance claim of $2,000.
- Indirect costs incurred when an employee is out of work, such as decreased productivity also need to be considered.

Lost revenue

- The economic costs of closing down business to decontaminate will vary, will be difficult to recover and may include legal or malpractice claims.

Intangible losses

- Social and psychological effects on veterinarians, staff and community members when disease outbreaks occur include loss of confidence, morale and public image.

Risk Management

- Risk management is the process of identifying, selecting and implementing measures that can be applied to reduce the level of risk.
- Risk management plans can include three areas: general practices to improve hygiene, general practices to improve hospital infection control and management changes aimed at the routes of transmission identified in the assessment.

General practices to improve hygiene

- Most veterinary practices will benefit from improved and updated general hygiene practices.
- Adherence to basic Standard Precautions are the foundation of infectious disease prevention and will help reduce transmission of most infectious or zoonotic diseases. Standard Precautions cover the following topics:
  - Hand washing
  - Barrier protection (personal protective equipment or PPE).
  - Limiting the number of individuals that come into contact with potentially infectious animals
  - Disposal of infectious waste
  - Proper cleaning and disinfecting of contaminated environments.

Zoonotic Disease

- Studies show that veterinarians are the most knowledgeable and are the expected providers of information on zoonotic disease
- With over 250 potential zoonoses, educating clients and staff on practices that protect from zoonotic disease is an important professional task.
- Some individuals may be at a greater risk of contracting a zoonotic disease including children less than 5 years of age, the elderly, pregnant women and individuals with chronic diseases.
- There are several excellent sources of information on zoonotic disease and recommendations for immune compromised individuals. These guidelines and information should be printed, copied and kept for distribution to staff and clients for education on zoonoses.
  - http://www.cdc.gov/healthypets, www.cdc.gov/pubs/brochure/oi_pets, www.pawssf.org, Pet Scription CDC handout, Safe Pet Guidelines PAWS handout.

General Practices to Improve Hospital Infection Control

There is no "one size fits all" for biological risk management plans. Individual practices will have unique issues that cannot be generalized. Thoughtful input, common sense and creative ideas will be necessary to address the unusual situations within individual practices.

- General practices to improve hospital infection control include the following topics:
  - **Hospital layout/organization and flow.** How patients move through the hospital is an important consideration with regards to tracking and monitoring potential disease spread.
  - **Client education:** who gives it, what it includes, how it is delivered and documentation in the patient medical record. Use of client consent forms should be considered.
  - **Staff training** is essential, as is a written hospital infection control policy that can be referred to by staff at any time. Preparation of written infection control policies will serve as a resource for staff and new employees.

Management Aimed at Routes of Transmission

These include general recommendations for managing disease spread at the route of transmission level.

- All disease transmission will be decreased by prompt diagnosis, proper handling or isolation of infected animals and cleaning and disinfecting contaminated areas.
- Specialized management steps may be needed for specific disease control.

Aerosol Transmission

- The greater the distance between animals, the less likely transmission will occur.
- Temperature, relative humidity and ventilation play important roles in aerosol transmission of pathogens.
- Aerosol transmission may be the most challenging route of transmission to control.
- Prompt handling and isolation of coughing/sneezing patients will help control disease spread.
- Crowded reception areas with animals in close proximity will lead to greater exposure. Scheduling of clients with disease transmission in mind may decrease potential exposures.
- Cage placement may help or hinder the spread of aerosolized agents.
- The optimum situation is to have separate facilities or separate air spaces for different groups of animals to allow for segregation based on disease status.
- Leaving a cage or pen between animal patients may help decrease aerosol transmission of disease.

- Density of animals is very important in determining pathogen spread within a veterinary hospital. Recommendations on appropriate density of animals in a clinic will depend on a number of factors including square footage, cage space, whether there is a haul-in facility on premises for mixed and large animal practices, and the type of ventilation system.
- Density should be kept at the minimum acceptable level, situations that lead to congregation should be limited, and stress and excitement should be minimized.
- Appropriate ventilation is extremely important in reducing airborne disease transmission. Holding facilities for large animals brought to the clinic need to be designed to reduce aerosol spread of disease.
- Proper ventilation should ensure that the animal enclosures have as little moisture, dust and irritating gasses (e.g. ammonia) as possible.
- Properly operating ventilation systems with adequate air exchanges are important, especially in crowded environments. For example, 6-10 air exchanges per hour have been shown to be effective in reducing the number of air-borne microorganisms in animal-holding facilities. Ventilation systems need to be inspected regularly and updated as needed.
- Ventilation systems with air inlets near the ceiling and air outlets closer to the floor are best as air travels down toward the more heavily contaminated floor region.
- Following the proper guidelines for sanitizer and disinfectants and contact time is important, as is allowing cages, pens and stalls to dry completely before returning animals.
- Adequate ventilation following application of disinfectants will reduce residual chemical fumes which may injure delicate sinuses and mucous membranes impairing the animal's ability to clear potential infectious organisms.
- Hospital floors should not be dry mopped or swept with brooms as this may increase aerosolization of particles.
- Impervious floor coverings and using wet mops or filtered vacuums can reduce spread of aerosolized agents.
- Pressure washing of cages, stalls or pens may aerosolize pathogens, increasing disease transmission risk.
- Care must be taken to protect staff and other animals during cleaning.
- Air conditioning systems should reduce turbulent airflow and be electronically filtered.

Oral Transmission

- Oral transmission of disease can occur through contaminated feed, water or licking chewing on contaminated environmental objects. This may involve eating, drinking, licking of cages or stalls, or contact with contaminated material followed by licking the pathogen from feet or fur.
- Oral transmission can occur through a single incident or as a common source transmission in which a number of individuals are exposed.

- Oral transmission of diseases between animals, such as parvovirus, salmonellosis, Johne's disease and leptospirosis may occur by the oral route with improper or untimely clean up of feces, urine or bodily fluids and/or inadequate disinfection.
- Parking lot areas as well as outdoor patient exercise areas must be cleaned up on a regular basis, with separate exercise areas used for patients with suspected or diagnosed infectious disease. Prompt handling/isolation of patients with diarrhea will help control the spread of potentially infective organisms in feces.
- Proper cleaning and disinfection of food and water dishes after each use will decrease the risk of oral transmission between animals.
- Animal feed can become a potential threat if not handled and stored correctly.
- Preventing access and contamination by pests including insects (i.e. flies, cockroaches) as well as wildlife, feral cats, birds, and vermin which may urinate, defecate or otherwise introduce disease is an important safeguard.
- Feed storage rooms at veterinary clinics should be kept clean and free from rodents; any spilled feeds should be immediately cleaned up and disposed of.
- Stored animal food must be properly rotated on a first in, first out basis and new feed should not be added to, or poured on top of. older feed.

Direct Contact Transmission

Direct contact transmission requires the presence of an agent or organism in the environment or within an infected animal. A susceptible animal becomes exposed when the agent directly touches open wounds, mucous membranes, or the skin through blood, saliva, nose to nose contact, rubbing, or biting.

- Direct transmission can generally be more easily controlled than diseases caused by other routes of transmission.
- The most important effort to reduce transmission via direct contact is the isolation of affected animals and limiting the number of individuals and animals who come into contact with infectious animals.
- Since not all infected animals show signs of illness, generalized efforts to decrease the likelihood of direct contact are warranted.
- Direct transmission may occur in parking areas or in the waiting room between animals, in the exam room between patient and doctor, in close contact between animals as they move through the hospital, or in livestock pens or chutes in mixed/large animal facilities.
- A build up of clients in the waiting areas may increase the potential for direct contact. Scheduling of appointments to reduce overlap or placement of clients into to exam rooms may help reduce direct contact.

Fomite Transmission

- Fomite transmission requires an inanimate object to carry a pathogen from one susceptible animal to another. Fomite transmission often involves a secondary route of transmission such as oral or direct contact for the pathogen to enter the host.

- Numerous diseases can be spread by fomites: common examples include ringworm (e.g. brushes, bedding), brucellosis (e.g. artificial insemination instruments), and *Streptococcus equi* (e.g. water buckets, halters, fences).
- Canine parvovirus and feline panleukopenia are often spread through fomites (e.g. food bowls, litter pans, bedding in cages) because of their hardiness in the environment.
- All hospital areas from the parking lot to waiting room, exam rooms, treatment areas and hospital wards contain potential fomites.
- Virtually any object can serve as a fomite and includes anything contaminated with body fluids of infective animals (i.e., blood, saliva, nasal secretions, urine, feces) or those in direct contact with infected skin or tissues.
- Fomite examples for a small animal practice could include: waiting and exam room surfaces, needles, syringes, rushes, stethoscopes, thermometers, muzzles, food dishes, surgical equipment and cages.
- Additional examples of objects in a mixed and large animal practice would include implant needles, tattoo and dehorning equipment, halters, grooming supplies, feed and water buckets, oral speculums, balling guns, chutes, corral fencing and many others.
- Proper cleaning and disinfecting of cages, stalls and pens is of primary importance.
- Often humans play a principle role in facilitating fomite exposure.
- In veterinary practice, human hands are the most common indirect form of disease transmission. Other culprits are clothing, coveralls, exam smocks, scrubs, boots, shoes, and other objects that are used or worn when working with animals.
- For this reason, it is imperative that people follow proper hygiene, such as frequent hand washing, removal of dirty clothing and cleaning of boots/shoes.
- Boot baths should be considered for clients in large animal facilities, since individuals from different farms tend to congregate in these areas.
- Clients may also be a source of fomite transmission by their shoes, hands, and clothing and should be encouraged to follow clinic protocols for hand and footwear hygiene.
- The most important means of controlling transmission by fomite is through proper cleaning and disinfection.
- What is also important is appropriate recognition and separation of diseased animals. Consequently, all ill animals should be handled and treated only after all healthy animals have been handled.
- Small animal hospitals with boarding facilities should tend to boarded animals first, before hospitalized patients.
- Large animal haul-in facilities should be managed so that healthy animals are seen at the beginning of the day and sick animals brought in later.
- The preferred option would be to have dedicated equipment, facilities and devices for treatment. This may not be feasible in some circumstances, and careful disinfection can accomplish many of the same results. In other situations, items may need to be disposed of properly rather than re-used.

Vector Transmission

- Vectors are living pathogen carriers (usually an arthropod/insect), that transfer an infective agent from one animal host to another.
- Vectors may include, but are not limited to mosquitoes, ticks, fleas and various fly species.
- Diseases can be transmitted by vectors either mechanically or biologically.
- Mechanical transmission means that the disease agent does not replicate or develop in/on the vector; it is simply transported by the vector from one animal to another (flies). The vector may obtain the disease agent from an animal (nasal and ocular secretions, for example), or from the environment (contaminated feces, feed, etc.). *Moraxella bovis*, or pink eye in cattle, can be transmitted mechanically by flies.
- Biological transmission occurs when the vector uptakes the agent, usually through a blood meal from an infected animal, replicates and/or develops it, and then regurgitates the pathogen onto or injects it into a susceptible animal. Fleas, ticks, and mosquitoes are common biological vectors of disease.
- Heartworm disease and West Nile virus (WNV) are transmitted biologically by mosquitoes.
- Infected fleas may transmit bartonellosis to susceptible cats and to humans.
- Plague can also be transmitted by fleas from cats or wildlife to humans and other animals.
- Ticks can transmit anaplasmosis and babesiosis to susceptible cattle, Q fever to dogs, cats, livestock and humans, and tularemia to wildlife and humans. While humans will not acquire Lyme disease, Rocky Mountain spotted fever or ehrlichiosis directly from an infected dog, exposure to the same tick species has the potential to cause human disease.
- Regardless of whether vector transmission is mechanical or biological, the most effective means to prevent transmission is the elimination or reduction of the insect vector, or at a minimum, separation of the vector from the host.
- Hospital insect control should be maintained to the highest level possible.
- Large animal holding and treating areas may require pest strips or timed pesticide misters that are labeled for use in food producing animals.
- For small animals, flea and tick control, as well as treating their environment, is important to break the cycle.
- Clients should be encouraged to use flea and tick prevention and to treat their home environments and animals, especially in areas where plague and tick borne diseases are present.
- Anything that can be a breeding ground for insects, such as old bedding or standing water should be removed or changed often.
- An integrated approach is best, where efforts are directed at eliminating the vectors and reducing their presence in the animals' environment through insecticide use, cleaning and disinfection.

Zoonotic Transmission

- Zoonotic transmission occurs when diseases are transmitted from animals to humans.
- Sweeping and high pressure washing of cages, stalls or pens during cleaning of infected premises may expose humans to disease pathogens transmitted by the aerosol route.
- Density of animals, ventilation, levels of moisture, dust and irritating gasses will greatly affect potential aerosol disease transmission to humans.
- Oral transmission of zoonotic diseases may occur due to lack of, or inappropriate, hand washing techniques.
- Rules should be implemented on appropriate areas for staff eating and drinking; and on the use of separate refrigerators for human food.
- Limiting food and drink access to non-animal contact areas only will help minimize the potential for oral transmission of zoonotic disease.
- Oral transmission can also occur when infective body fluids are splashed into the mouth or mucous membranes, or when needle caps are pulled off by mouth.
- These types of transmission can be minimized by the use of masks and eye protection when handling potentially infective materials and only using hands to remove needle caps.
- Direct contact may be the most common way for humans to become infected with zoonotic disease.
- When contact with animals infected with zoonotic disease is necessary, barrier protection is the simplest means of protection.
- Proper use of restraint, heavy gloves or sedation when handling fractious animals can also decrease incidence of direct transmission to humans.
- For certain zoonotic diseases, humans can actually be infected with the organism, and shed it into the environment. These facts require that people follow proper hygiene and avoid animal contact when infected with certain diseases.

Risk Communication

- The BRM plan must be understood and supported by everyone in order to be effectively implemented.
- The plan should present the information in more than one way to appeal to different learning styles.
- Keep each session focused to a few concise points and to a reasonable length of time.
- Offer the opportunity for participants to discuss, share information and provide input
- Educational programs can take many forms and may include:
  - Face to face/group meetings
  - Newsletter or bulletin

- Videos, CD's or web-based instruction
- Posted signs or information panels placed around the workplace – standard precautions handout, hand washing signs, etc.
- Employee questions and suggestions- question/answer board, suggestion box, question period during meetings, etc.
- Mentoring of new employees by experienced employees
- Knowledge testing
- Recognition program - any type of incentive program that rewards employees for reaching BRM goals.

Summary

- Biological risk management is an essential component of keeping any veterinary facility as clean and secure as possible.
- Risks of disease transmission cannot be completely eliminated, but by employing some basic hygiene and biological risk management principles, these risks can be effectively managed and significantly reduced.