

**COMPENDIUM OF
VETERINARY STANDARD PRECAUTIONS:
ZOOBOTIC DISEASE PREVENTION IN VETERINARY
PERSONNEL**

**National Association of State Public Health Veterinarians
Veterinary Infection Control Committee
2008**

Compendium of Veterinary Standard Precautions: Zoonotic Disease Prevention in Veterinary Personnel

National Association of State Public Health Veterinarians (NASPHV)
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SUMMARY

Veterinary practices are unique environments that bring humans into close contact with many different species of animals. Whether in a clinic or “in the field,” veterinary personnel are exposed to recognized and unrecognized infectious pathogens, many of which are zoonotic (transmitted from animals to humans). Some of the zoonotic infections documented in veterinary personnel include: multi drug-resistant *Salmonella* Typhimurium infection, cryptosporidiosis, cat-associated plague, sporotrichosis, methicillin-resistant *Staphylococcus aureus* (MRSA) infection, psittacosis, and dermatophytosis. Infection control measures vary from practice to practice and are often insufficient to prevent zoonotic disease transmission.

The Veterinary Standard Precautions (VSP) outlined in this Compendium are designed to prevent transmission of zoonotic pathogens from animal patients to veterinary personnel in private practice. The Compendium is a document from veterinarians, for veterinarians. It is based on current scientific evidence and the Veterinary Infection Control Committee (VICC) members’ collective experience and knowledge of the veterinary profession.

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I. INTRODUCTION

A. Background and Objectives

Zoonotic diseases are an occupational hazard faced by veterinary personnel on a daily basis.¹ While the scope of zoonotic disease risk has been documented, guidance for infection control in general veterinary practice has been limited. Currently, infection control measures vary tremendously among veterinary facilities and are often insufficient to prevent zoonotic disease transmission.^{2,3}

Infection control in human medicine evolved significantly with the recognition of HIV and hepatitis B and C virus transmission to healthcare workers. Now the cornerstone of human infection control is the consistent use of “Standard Precautions”.⁴ Similarly, the 2003 U.S. outbreak of monkeypox in six states, in which 25% of 71 human infections occurred among veterinary personnel, served to highlight the need for infection control precautions in veterinary medicine.^{5,6}

Veterinary Standard Precautions (VSP) are infection control guidelines intended to minimize the risk of occupational zoonotic infections from recognized and unrecognized sources. These precautions should be used regardless of the patient’s diagnosis, whenever personnel may be exposed to potentially infectious materials including feces, blood, body fluids, exudates, and non-intact skin.

New infectious diseases are continually emerging.⁷ About 60% of all human pathogens are zoonotic, and approximately 75% of recently emerging infectious diseases affecting humans derive from animals.⁸ Global commerce, trade and travel continue to increase the potential for exposure to zoonotic pathogens.

Although exotic infections in veterinary personnel dramatically demonstrate the need for routine infection control precautions, use of VSP would minimize exposure to many zoonotic pathogens encountered more frequently. Documented occupationally acquired zoonotic infections include:

- Multidrug-resistant *Salmonella* Typhimurium outbreaks with zoonotic transmission to veterinary staff and students⁸⁻¹¹
- Cryptosporidiosis among veterinary students¹²⁻¹⁶
- Cat-associated plague in veterinary personnel¹⁷
- Cat-associated sporotrichosis in veterinary personnel¹⁸⁻²²

- Methicillin-resistant *Staphylococcus aureus* (MRSA) transmission among veterinary personnel and equine, bovine, porcine, canine and feline patients^{11,23-33}
- Psittacosis³⁴⁻³⁷
- Dermatophytosis (ringworm)³⁸

VSP also includes strategies to reduce the potential for bites and other trauma that may result in exposure to zoonotic pathogens. During their careers, two-thirds of veterinary personnel are hospitalized or lose significant work time as a result of animal-related injury.^{1,39-42} Dog and cat bites, kicks, cat scratches and crush injuries account for most occupational injuries among veterinary personnel.^{1,39-42} Approximately 3% to 18% of dog bites and 28% to 80% of cat bites become infected.⁴³ Most infected dog and cat bite wounds are mixed aerobic and anaerobic bacterial infections. The most commonly isolated aerobes are *Pasteurella multocida* (cats), *Pasteurella canis* (dogs), streptococci, staphylococci, *Moraxella*, and *Neisseria weaveri*; the most commonly isolated anaerobes include *Fusobacterium*, *Bacteroides*, *Porphyromonas*, and *Prevotella*.⁴³ In addition, rare but serious systemic infections with invasive pathogens including *Capnocytophaga canimorsus*, *Bergeyella zoohelcum*, *Bartonella henselae*, and CDC Group NO-1 may occur following bites or scratches.⁴³⁻⁴⁷

Needlestick injuries are also among the most prevalent accidents in the veterinary workplace.^{48,49} The most common needlestick injury is inadvertent injection of a vaccine.^{1,50,51} In a 1995 survey of veterinarians, 27% of respondents had accidentally self-inoculated rabies vaccine and 7% (23% of large animal veterinarians) live *Brucella* vaccine.¹ Needle punctures sustained during procedures such as fine-needle aspiration are potential sources of zoonotic pathogens.⁵²

Based on the need for infection control guidelines specific to veterinary medicine, the VICC set the following objectives for the creation of the Compendium:

- Raise awareness of the scope of zoonotic disease risk in veterinary medicine
- Address issues specific to the veterinary profession
- Provide practical, science-based veterinary infection control guidance
- Provide a model infection control plan for use in individual veterinary facilities

B. Considerations

Limited data are available on the efficacy of infection control in veterinary medicine and gaps still exist in the knowledge of the epidemiology of some diseases. However, available scientific evidence has been reviewed, and this is a rapidly growing area of endeavor. The VICC will update the Compendium annually to keep it current and relevant.

Although eliminating all risk from zoonotic pathogens is not possible, this Compendium provides reasonable guidance for minimizing disease and injury in veterinary personnel in clinical settings. It may also be useful for preventing infectious agent transmission in facilities other than veterinary clinics and hospitals (such as farms, kennels and shelters).

The guidelines are intended to be adapted to individual needs and circumstances, but practices must first comply with federal, state, and local regulations. Modifications should adhere to the basic principles of infection control necessary to prevent spread of occupational zoonotic pathogens by all routes of transmission.

This compendium advocates a multi-faceted approach to infection control, incorporating personal protective activities with appropriate administrative and environmental engineering controls. These measures are most effective when they are integrated and used routinely in veterinary settings.

Employers should promote safe work habits. The cost of implementing these guidelines should be compared to the potential consequences of inadequate infection control, including sick leave or hospitalization of personnel, loss of credibility, and litigation.⁵³⁻⁵⁵

Training is an essential part of implementing the VSP. This will be most effective if each employee understands the relevance of these guidelines to his or her health and the health of others. Client education that addresses issues such as the importance of rabies vaccination, comprehensive internal and external parasite control, and bite prevention will also help protect veterinary staff from zoonotic diseases. Veterinarians are accessible sources of expert information on zoonotic diseases and should inform clients of risks specific to their community. Written educational information should be made available in clinic waiting areas and on websites.

II. ZOONOTIC DISEASE TRANSMISSION

Transmission of pathogens requires three elements: a source, a susceptible host, and a means of transmission between them.⁴ Infection control involves elimination or isolation of the source, reducing host susceptibility and/or interrupting transmission.

A. Source

Animal sources of infection include animals that harbor endogenous flora that are pathogenic to humans, asymptomatic carriers of an infectious agent, and those that are clinically ill. Environmental sources of infection include contaminated walls, floors, counters, cages, bedding, equipment, supplies, feed, soil and water.

B. Host Susceptibility

Human susceptibility to infection varies greatly. Factors influencing susceptibility include immunization status, age, underlying diseases, immunosuppression, pregnancy, and breaks in body defense mechanisms (intact skin, cough reflex, stomach acid). Individuals may be immune or able to resist colonization by an infectious agent, become asymptomatic carriers, or develop illness.

C. Routes of Transmission

Pathogens are transmitted through three main routes: contact, aerosol, and vector-borne. Some agents may be transmitted by more than one route.⁴

1. Contact Transmission

Contact transmission occurs when pathogens from animals or their environments enter the human host through three mechanisms: ingestion, cutaneous/percutaneous and mucous membrane exposure. Direct transmission may occur while examining, medicating, bathing, and handling animals. Indirect transmission involves contact with a contaminated intermediate object, such as while cleaning cages and equipment or handling soiled laundry.⁴

2. Aerosol Transmission

Aerosol transmission occurs when pathogens travel through the air to enter the host. Aerosols may be large droplets deposited on the mucous membranes or smaller particles that are inhaled. For most pathogens transmitted by this route, specific data defining risk of infection are limited; in general, risk of aerosol transmission increases with proximity to the source and the duration of exposure.

Large droplets are created by coughing, sneezing, vocalizing, and by procedures such as lancing abscesses and dentistry. Inhalable particles may be generated by procedures such as suctioning, bronchoscopy, sweeping, vacuuming and high pressure spraying. Certain aerosolized pathogens may remain infective over long distances depending on particle size, the nature of the pathogen, and environmental factors.^{4,56} Two zoonotic pathogens known to be transmitted over long distances include *Coxiella burnetii*⁵⁷⁻⁵⁹ and *Mycobacterium bovis*.⁶⁰

3. Vector-borne Transmission

Vector-borne transmission occurs when vectors such as mosquitoes, fleas, and ticks transmit pathogens. Animals may bring flea and tick vectors into contact with veterinary personnel. Working in outdoor settings may increase risk of exposure to arthropods and other biological vectors.

III. VETERINARY STANDARD PRECAUTIONS

A. Personal Protective Actions and Equipment

1. Hand Hygiene

Consistent, thorough hand hygiene is the single most important measure one can take to reduce the risk of disease transmission.^{4,61,62} Handwashing is preferred in veterinary settings over the use of hand rubs because hands are routinely contaminated with organic material in veterinary practice.

Handwashing with plain soap and running water mechanically removes organic material and reduces the number of transient organisms on the skin, whereas antimicrobial soap kills or inhibits growth of both transient and resident flora.^{63,64} Plain or antibacterial products are appropriate for routine use. Liquid or foam soap products should be selected

over bar soaps to reduce the opportunity for cross-contamination. Liquid soap dispensers should not be topped off. Refillable dispensers should be completely emptied, cleaned and then refilled to prevent creation of a bacterial reservoir. Moisturizing soaps can preserve skin integrity and encourage compliance. Dry, cracked skin is painful and indicates skin barrier disruption.

Hands should be washed between animal contacts and after contact with feces, blood, body fluids, exudates, and equipment or articles contaminated by them. Staff with animal contact should not wear artificial nails and should keep fingernails short.^{61,65} Based on human healthcare experience, wearing rings may reduce the effectiveness of hand hygiene.⁶¹ Handwashing should focus on thorough cleaning of all hand surfaces.

Correct technique:⁶⁶

- Wet hands with running water
- Place soap in palms
- Rub hands together to make a lather
- Scrub hands vigorously for 20 seconds
- Rinse soap off hands
- Dry hands with a disposable towel
- Turn off faucet by using the disposable towel

Alcohol-based hand rubs are highly effective against bacteria and enveloped viruses and may be used if hands are not visibly soiled.^{61,67,68} They are less effective against some non-enveloped viruses (e.g., norovirus, rotavirus, parvovirus), bacterial spores (e.g., anthrax, *Clostridium difficile*), or protozoal parasites (e.g., cryptosporidia).^{61,68,69} Correct technique:

- Apply alcohol-based hand rub to palm of one hand
- Cover all surfaces of hands and fingers
- Continue to rub hands together until dry⁶¹

When running water is not available, moist wipes followed by alcohol-based hand rubs may be used. The mechanical action of the wipe may enhance the effectiveness of alcohol-based hand rubs when hands are visibly soiled. Used alone, wipes are not as effective as alcohol-based hand rubs or washing hands with soap and running water.⁶¹

2. Use of Gloves and Sleeves

Gloves are not necessary when examining or handling normal, healthy animals.

Gloves reduce the risk of pathogen transmission by providing barrier protection. However, wearing gloves (including sleeves) does not replace handwashing.^{70,71} They should be worn when the animal has evidence of disease or the medical history is unknown, and worn routinely when touching feces, blood, body fluids, secretions, excretions, exudates and non-intact skin. Gloves should also be worn when cleaning cages, litter boxes and environmental surfaces.

Gloves should be changed between examinations of individual animals or animal groups (e.g., litter of puppies/kittens, group of cattle), between dirty and clean procedures on a

single patient, and whenever torn. Changing gloves between patients reduces the likelihood of spreading microorganisms from an animal or fomite to another animal or person. Gloves should be removed promptly after use, avoiding contact between skin and the outer glove surface. Disposable gloves should not be washed and reused.^{72,73} Wash hands immediately after glove removal because gloves can have unrecognized perforations and hands may be contaminated during glove removal.

Gloves come in a variety of materials. Choice of gloves depends on their intended use. If latex allergies are a concern, acceptable alternatives include nitrile or vinyl gloves. For more information on preventing allergic reactions to natural rubber in the workplace, refer to the National Institute of Occupational Safety and Health (NIOSH) website.⁷⁴

3. Facial Protection

Facial protection prevents exposure of mucous membranes of the eyes, nose and mouth to infectious materials. Facial protection should be used whenever exposures to splashes or sprays are likely to occur.^{4,53,75} These include lancing abscesses, flushing wounds, dentistry, nebulization, suctioning, lavage, and necropsy.

Facial protection includes a surgical mask worn with goggles, or a face shield. Surgical masks provide adequate protection during most veterinary procedures that generate potentially infectious large droplets.

4. Respiratory Protection

Respiratory protection is designed to protect the respiratory tract of the wearer from infectious diseases transmitted by inhalation of small particles. Although the need for this type of protection is limited in veterinary medicine, it may be appropriate in certain situations, such as when investigating abortion storms in small ruminants (Q fever), significant poultry mortality (avian influenza), respiratory disease in a TB positive herd (bovine TB) and ill psittacines (avian chlamydiosis).

Disposable particulate respirators often resemble surgical or dust masks, but fit closely to the wearer's face and are designed to filter smaller particles. (Surgical masks are not designed to prevent inhalation of small particles.) A variety of inexpensive respirators, such as the commonly used NIOSH-certified N95, are readily available.⁷⁶ Fit testing is necessary to ensure an effective seal between a respirator and the face. For additional information about respirators, fit-testing, or the OSHA Respiratory Protection Standard, please visit the NIOSH and OSHA websites available at:

<http://www.cdc.gov/niosh/nppt/topics/respirators> (Accessed Feb 1, 2008)

<http://www.osha.gov/SLTC/respiratoryprotection/standards.html> (Accessed Feb 1, 2008)

5. Protective Outerwear

a. Laboratory Coats, Smocks, and Coveralls

Laboratory coats, smocks, and coveralls are designed to protect street clothes or scrubs from contamination. They are generally not fluid resistant, so they should not be used in situations where splashing or soaking with potentially infectious liquids is anticipated. Garments should be changed promptly whenever visibly soiled or contaminated with

feces or body fluids. For most personnel, outerwear should be changed and laundered daily. These garments should not be worn outside of the work environment.^{4,77,78}

b. Non-Sterile Gowns

Gowns provide better barrier protection than laboratory coats. Permeable gowns can be used for general care of patients in isolation. Impermeable gowns should be used when splashes or large quantities of body fluids are present or anticipated. Disposable gowns should not be reused. Reusable fabric gowns may be used repeatedly to care for the same patient in isolation, but should be laundered between patients or whenever soiled. Gloves are indicated whenever gowns are worn. Gowns and gloves should be removed and placed in the laundry bin or trash before leaving the animal's environment. Hands should be washed immediately afterwards.⁵³

Proper removal of gowns is important to avoid cross-contamination. The outer (contaminated) surface of a gown should only be touched with gloved hands.

- After unfastening ties, peel the gown from the shoulders and arms by pulling on the chest surface with gloved hands.
- Remove the gown, avoiding contact between the outer surface and clean surfaces.
- Ball the gown up for disposal while keeping the contaminated surface on the inside.
- Remove gloves and wash hands.
- If body fluids have soaked through the gown, promptly remove the contaminated clothing and wash the skin.

c. Footwear

Footwear should be suitable for the specific working conditions (e.g., rubber boots for farm work) and should protect personnel from exposure to infectious material as well as trauma. Recommendations include shoes or boots with thick soles and closed-toe construction that are impermeable to liquid and easily cleaned. Footwear should be cleaned to prevent transfer of infectious material from one environment to another such as between farm visits and before returning home or to veterinary facilities. Disposable shoe covers or booties add an extra level of protection when heavy quantities of infectious materials are present or expected.

d. Headcovers

Disposable headcovers provide a barrier when gross contamination of the hair and scalp is expected. Disposable headcovers should not be reused.

6. Bite and Other Animal-Related Injury Prevention

Veterinary personnel should take all necessary precautions to prevent animal-related injuries. Preventive measures include use of physical restraints, bite-resistant gloves, muzzles, sedation or anesthesia, and relying on experienced veterinary personnel rather than owners to restrain animals.⁷⁹ Request that owners notify veterinary personnel if the animal is aggressive. Aggressive tendencies and bite history should be noted and communicated to personnel. Practitioners should remain alert for changes in their

patients' behavior. Veterinary personnel attending large animals should have an escape route in mind at all times.^{1,42}

B. Protective Actions During Veterinary Procedures

1. Intake

Waiting rooms should be a safe environment for clients, animals and employees. Aggressive animals and those that are potentially infectious should be placed directly into an exam room. Animals with respiratory or gastrointestinal signs, or a history of exposure to a known infectious disease should be brought through an alternative entrance.⁸⁰ If possible, an exam room should be designated for potentially infectious animals.

2. Examination of Animals

All veterinary personnel must wash their hands between examinations of individual animals or animal groups (e.g., litter of puppies/kittens, herd of cattle). Hand hygiene is the most important measure to prevent transmission of zoonotic diseases. Every exam room should have running water, a soap dispenser, and paper towels. Alcohol-based hand rubs may be provided for use in conjunction with handwashing.

Veterinary personnel should wear protective outerwear, and use gloves and other protective equipment appropriate for the situation. Potentially infectious animals should be examined in a dedicated exam room and should remain there until initial diagnostic procedures and treatments have been performed.

3. Injections, Venipuncture, and Aspirations

a. Needlestick Injury Prevention

Needlestick injuries are of concern in veterinary medicine because they can result in the inoculation of live vaccines or infectious aspirates. Additionally, skin breaks from needlesticks can serve as a portal of entry for environmental pathogens. The risk of exposure to bloodborne pathogens from needlestick injuries is inherently different in veterinary medicine than in human medicine. Contact with animal blood (except primate blood) has not been a recognized source of occupational infection; nevertheless percutaneous and mucosal exposure to blood and blood products should be avoided.

When injecting live vaccines or aspirating body fluids or tissue, the used syringe with the needle attached should be placed in a sharps container. Although not ideal, following most other veterinary procedures, the needle and syringe may be separated for disposal of the needle in the sharps container. This can be most safely accomplished by using the needle removal device on the sharps container, which allows the needle to drop directly into the container. Alternatively, the needle may be removed from the syringe using a forceps. Uncapped needles should never be removed from the syringe by hand. In addition, needle caps should not be removed by mouth.

Puncture and leak proof sharps containers should be located in every area where animal care occurs.⁸¹⁻⁸³ Sharps should not be transferred from one container to another. Devices

that cut needles prior to disposal should not be used because they increase the potential for aerosolization of the contents.⁸¹

When it is absolutely necessary to recap needles as part of a medical procedure or protocol, a forceps can be used to replace the cap on the needle or the one-handed "scoop" technique may be employed:⁸⁴

- Place the cap on a horizontal surface
- Hold the syringe with attached needle in one hand
- Use the needle to scoop up the cap without using the other hand
- Tighten the cap by pushing it against a hard surface

b. Barrier Protection

Gloves should be worn during venipuncture on animals suspected of having an infectious disease and when performing soft tissue aspirations. Currently, there is no data indicating that venipuncture on healthy animals carries a significant risk of exposure to pathogens.

4. Dental Procedures

Dental procedures create splashes or sprays of saliva and blood that are potentially infectious. There is also the potential for cuts and abrasions from dental equipment and teeth. Veterinary personnel performing the dental procedure and anyone in range of direct splashes or sprays should wear protective outerwear, gloves, and facial protection.⁸⁵ In one study, irrigating the oral cavity with a 0.12% chlorhexadine solution significantly decreased bacterial aerosolization.⁸⁶

5. Resuscitations

The urgent nature of resuscitation increases the likelihood that breaches in infection control will occur. Barrier precautions such as gloves and facial protection should be worn to prevent exposure to unrecognized/undiagnosed zoonotic infectious agents. Never blow into the nose/mouth of an animal or into an endotracheal tube to resuscitate an animal; rather intubate the animal and use an ambubag or an anesthesia machine/ventilator.

6. Obstetrics

Common zoonotic agents, including *Brucella*, *Coxiella burnetii*, and *Listeria monocytogenes* may be found in high concentrations in the birthing fluids of aborting or parturient animals, stillborn fetuses, and neonates.⁸⁷ Gloves, sleeves, facial protection, and impermeable protective outerwear should be employed as needed to prevent exposures to potentially infectious materials. During resuscitation, do not blow into the nose or mouth of a non-respiring neonate.

7. Necropsy

Necropsy is a high risk procedure due to contact with infectious body fluids, aerosols, and contaminated sharps.⁷⁵ Non-essential persons should not be present. Veterinary personnel should wear gloves, facial protection and impermeable protective outerwear as needed. In addition, cut-proof gloves should be used to prevent sharps injuries. Respiratory protection and environmental controls should be employed when band saws or other power equipment are used.

8. Diagnostic Specimen Handling

Feces, urine, aspirates, and swabs should be presumed infectious. Protective outerwear and disposable gloves should be worn when handling these specimens. Discard gloves and wash hands before touching clean items (e.g. medical records, telephones). Eating and drinking must not be allowed in the laboratory.

C. Environmental Infection Control

1. Isolation of Infectious Animals

A single-purpose isolation room is recommended for the care and housing of contagious patients.⁸⁸ A designated exam room that can be easily emptied of non-essential equipment and cleaned and disinfected can be transformed into an isolation room. A cage may be brought in for the infectious animal. If an isolation room has negative pressure air handling, the air should be exhausted outside of the building away from animal and public access areas, employee break areas, and air intake vents.^{4,88,89} Air pressures should be monitored daily while in use.

The isolation room should have signage indicating the animal may be infectious and delineating what precautions should be taken.^{53,88} Access to the room should be limited and a sign-in sheet kept of all people entering the isolation area.^{88,90}

Only the equipment and materials needed for the care and treatment of the patient should be kept in the isolation room. Items intended for use in the isolation room should remain there and replacements purchased for use elsewhere in the hospital. Items removed from the isolation area should be disassembled, cleaned, and disinfected prior to removal. Disposable articles minimize exposure of personnel to potentially infectious materials. Potentially contaminated materials should be bagged before transport within the practice and disinfected or disposed of according to their level of hazard.^{53,83,88}

Limited data are available on the efficacy of shoe covers and footbaths for infection control in veterinary settings. When shoe or boot coverings are used, personnel should be trained to use, remove, and dispose of them properly because improper use may increase the risk of exposure to pathogens. When disinfectant footbaths are used, they should be placed just inside the door of the isolation area and used before departing the room.^{88,91} Footbath disinfectant should be changed daily or when visibly dirty.

2. Cleaning and Disinfection of Equipment and Environmental Surfaces

Environmental surfaces and equipment should be cleaned and disinfected between uses or whenever visibly soiled. Surfaces where animals are housed, examined, or treated should be made of non-porous, easily cleanable materials. When cleaning, ensure adequate ventilation and avoid generating dust that may contain pathogens by using central vacuum units, wet mopping, dust mopping, or electrostatic sweeping (e.g., Swiffer[®]). Exposure to aerosols generated by brushing during cleaning can be minimized by wearing facial protection and containing splatter. Surfaces may be lightly sprayed with

water prior to mopping or sweeping. High pressure sprayers may aerosolize and disseminate infectious small particles, and their use should be limited.

Gross contamination must be removed before disinfection because organic material decreases the effectiveness of most disinfectants.⁹² To maximize effectiveness, disinfectants should be used according to manufacturers' instructions; check label for proper dilution and contact time. Personnel engaged in cleaning and disinfection should be trained in safe practices and provided necessary safety equipment according to the product's Material Safety Data Sheet (MSDS). See Appendix B for a list of selected disinfectants.

Normal dishwashing of food and water bowls is adequate for hospitalized patients with infectious diseases,⁴ although disposable dishes should be considered for animals in isolation. Toys, litter boxes and other miscellaneous items should be discarded, or cleaned and disinfected between patients. Litter boxes should be cleaned or disposed of at least daily by a non-pregnant staff member. Clean items should be kept separate from dirty items.

3. Handling of Laundry

Although soiled laundry may be contaminated with pathogens, the risk of disease transmission is negligible if handled correctly. Personnel should check for sharps before sending items to be laundered. Gloves and protective outerwear should be worn when handling soiled laundry. Bedding and other laundry should be machine washed with standard laundry detergent and machine dried. To prevent cross-contamination, separate storage and transport bins should be used for clean and dirty laundry. If soiled clothing is laundered at home, it should be transported in a sealed plastic bag and put directly into the washing machine.

4. Decontamination and Spill Response

Spills and splashes of blood, body fluids, or infectious substances should be immediately sprayed with disinfectant and contained by dropping absorbent material (e.g., paper towels, sawdust, cat litter) on them. Personnel should wear gloves and other appropriate protective equipment before beginning the clean-up. The spilled material should be picked up and sealed in a leak-proof plastic bag, and the area should be cleaned and disinfected. Animals, and people not involved in the clean-up should be kept away from the area until disinfection is completed.⁸⁹

5. Veterinary Medical Waste

Medical waste is defined and regulated at the state level by multiple agencies, but may include sharps, tissues, contaminated materials, and dead animals.^{83,93} AVMA recommends voluntary compliance with the OSHA Bloodborne Pathogen Standard⁹⁴ regarding medical waste. It is beyond the scope of this Compendium to describe veterinary medical waste management in detail. Consult with local and/or state health departments and municipal governments for guidance. Additional information and links to state regulating agencies can be found on the Environmental Protection Agency website: www.epa.gov/epaoswer/other/medical (accessed Feb 1, 2008).

6. Rodent and Vector Control

Many important zoonotic pathogens are transmitted by insect vectors or rodents. Integrated pest management (IPM) is a comprehensive approach used to prevent and control pests^{95,96} IPM measures include the following:

- Seal entry and exit points into buildings; common methods include the use of caulk, steel wool or lath metal under doors and around pipes
- Store food and garbage in metal or thick plastic containers with tight lids
- Dispose of food-waste promptly
- Eliminate potential rodent nesting sites (e.g., clutter, hay and food storage)
- Maintain rodent traps in the facility and check daily
- Remove sources of standing water (empty buckets, tires, clogged gutters) from around the building to reduce potential mosquito breeding sites
- Install and maintain window screens to prevent entry of insects and rodents into buildings

Additional measures may be warranted for control of specific pests. For example, bats should be excluded from hospital barns and veterinary facilities. Veterinary facility managers may wish to contact a pest control company for additional guidance.

7. Other Environmental Controls

Designate staff areas for eating, drinking, or smoking that are separate from patient care areas. Separate refrigerators should be used for human food, animal food, and biologics and labeled accordingly. Dishes for human use should be cleaned and stored away from patient care areas.

IV. EMPLOYEE HEALTH

A. General

Veterinary practice managers should promote infection control as part of a comprehensive employee health program. Senior management support is essential for staff compliance with policies and procedures.^{97,98}

Veterinary practices should maintain staff records for immunizations, rabies titers, exposures and emergency contact information to expedite care following occupational health incidents, such as rabies exposures.^{99,100} Employee health records should be collected on a voluntary basis, with a clear understanding that confidentiality will be maintained. Health-related issues that may influence employees' work duties should be documented in personnel files. Employees should inform their supervisor of changes in health status, such as pregnancy, that may affect work duties. Veterinary personnel should inform their healthcare provider that their work duties involve animal contact.

1. Employee Immunization Policies and Record Keeping

a. Rabies

Veterinary personnel who have contact with animals should be offered rabies vaccination in accordance with recommendations of the Advisory Committee on Immunization Practices (ACIP).¹⁰¹ Pre-exposure rabies vaccination consists of three doses of a licensed human rabies vaccine administered on days 0, 7, and 21 or 28. Following pre-exposure rabies vaccination, the ACIP guidelines recommend that a rabies antibody titer be checked every two years for those in the frequent risk category, which includes most U.S. veterinarians. Pre-exposure vaccination for rabies does not eliminate the need for appropriate treatment following a known rabies exposure, but it does simplify the post-exposure treatment regimen (2 doses of vaccine without rabies immune globulin for pre-exposure vaccinated individuals versus 5 doses of vaccine plus rabies immune globulin for those not pre-exposure vaccinated). In addition, pre-exposure vaccination may protect against unrecognized rabies exposures or when post-exposure treatment is delayed.¹⁰¹

b. Tetanus

Veterinary personnel should receive a tetanus booster every 10 years in accordance with ACIP recommendations.¹⁰²

c. Seasonal Influenza

Veterinary personnel, especially those working with poultry or swine, are encouraged to receive the current seasonal influenza vaccine. This is intended to minimize the small possibility that dual infection of an individual with human and avian or swine influenza virus could result in a new strain of the virus.¹⁰³⁻¹⁰⁶

2. Managing and Documenting Exposure Incidents

Display incident response procedures prominently. First aid should be readily available and personnel trained to recognize and respond to emergency situations. Following the administration of first aid, encourage affected personnel to contact an appropriate healthcare provider.

Injuries or potential exposures to zoonotic pathogens should be reported, investigated and documented. Practice managers should develop policies that encourage reporting.¹⁰⁰ An incident report form, such as OSHA form 300, should include:

- Date, time and location of the incident
- Person(s) injured or exposed
- Other persons present
- Description of the incident
- Whether or not a healthcare provider was consulted
- Status of the animal involved (vaccination status, clinical condition, any diagnostic test results or tests pending)
- Plans for follow up (evaluation by a healthcare provider, reporting to public health)

Practice managers should contact their local or state health department to inquire about mandatory reporting of bite incidents and zoonotic disease exposures.

3. Staff Training and Education

Staff training at the beginning of employment and at least annually is an essential component of an effective employee health program. Training should emphasize infection control practices, the potential for zoonotic disease exposure, hazards associated with work duties, and injury prevention. It should also include instruction in animal handling, restraint, and behavioral cue recognition. Additional in-service training should be provided as recommendations change or as problems with infection control policies are identified. Staff participation in training should be documented.

B. Immunocompromised Personnel

Immunocompromised personnel are more susceptible to zoonotic infections and more likely to develop serious complications from zoonotic infections. Immunity may be suppressed by conditions including HIV/AIDS, diabetes mellitus, asplenia, pregnancy, certain malignancies or congenital abnormalities. Therapies such as corticosteroids, chemotherapeutic and immunosuppressive agents, and radiation treatment may also suppress immunity. Potentially immunocompromised personnel and their supervisors should be aware that the following workplace activities carry a higher risk of exposure to zoonotic pathogens:

- Processing laboratory samples
- Direct patient care, especially with the following high risk animals:⁶⁶
 - Young animals
 - Animals with diarrhea
 - Parturient animals
 - Stray or feral animals
 - Wildlife
 - Animals fed raw meat diets
 - Reptiles and amphibians
 - Exotic or non-native species
 - Animals housed in crowded conditions (e.g., shelters)
 - Unvaccinated animals or those with internal or external parasites.

While data are limited specifically regarding the risks of zoonotic infection for HIV-infected persons employed in veterinary settings, none exist to justify their exclusion.¹⁰⁷ The risk of exposure to zoonotic pathogens in the workplace can be mitigated with appropriate infection control measures.¹⁰⁷

During pregnancy, women experience physiologic suppression of cell-mediated immunity, increasing their susceptibility to certain infections. These include toxoplasmosis, lymphocytic choriomeningitis virus infection (LCMV), brucellosis, listeriosis and *Chlamydomphila psittaci*.¹⁰⁸ Vertical transmission of certain zoonoses may result in abortion, stillbirth, prematurity or congenital anomalies.

Employees with immune dysfunction should discuss their health status with the practice manager so appropriate workplace accommodations can be made. It may be advisable to consult the employee's healthcare provider or an infection control, public health or occupational health specialist.¹⁰⁹ Employers must abide by state and federal laws that

protect pregnant women and persons with disabilities. Employees must be assured that confidential information will not be disclosed to others.

V. CREATING A WRITTEN INFECTION CONTROL PLAN

All veterinary practices should have a written infection control plan that is reviewed and updated at least annually. Appendix C provides a model plan that can be tailored to individual practice needs. A modifiable electronic version is available on the NASPHV website at: www.nasphv.org.

Effective infection control plans should:

- Reflect the principles of infection control outlined in this Compendium
- Be specific to the facility and practice type
- Be flexible to easily address new issues and incorporate new knowledge
- Provide explicit and well organized guidance
- Clearly describe the infection control responsibilities of staff members
- Include a process for the evaluation of infection control practices
- Provide contact information, resources, and references (e.g., reportable disease list, public health contacts, local rabies codes and environmental health regulations, OSHA requirements, websites of interest, client education materials)

A. Infection Control Personnel

Designated staff members should be responsible for developing and implementing infection control policies, monitoring compliance, keeping records and managing workplace exposure and injury incidents. Additional personnel should be assigned responsibility for completing infection control activities in support of the plan.

B. Communicating and Updating the Infection Control Plan

1. Availability

Keep copies of the infection control plan and resource documents at locations readily accessible to all staff including reception, administrative, animal care, housekeeping and veterinary personnel.

2. Leadership

Senior and managerial personnel should set the standard for infection control practices, emphasize its importance to other staff, and reference the infection control plan in daily activities.

3. New Staff

New staff should be given a copy of the infection control plan. Detailed training should be provided on the practice's infection control policies and procedures, employee vaccination recommendations, and incident reporting. Receipt of the plan and training should be documented for each employee.

4. Continuing Education

Infection control procedures should be reviewed at least annually at staff meetings, and continuing education on zoonotic diseases encouraged.

5. Review and Revision

A designated staff person should review and revise the infection control plan when new information becomes available or clinical practices change. Revisions should be shared with all staff members and all copies of the plan updated.

6. Compliance

A designated staff person should ensure that infection control policies and protocols are carried out consistently and correctly, and that corrective measures and employee retraining are instituted when deficiencies are identified.

VI. REFERENCES

1. Langley RL, Pryor WH, O'Brien KF. Health hazards among veterinarians: a survey and review of the literature. *J Agromedicine* 1995;2:23-52.
2. Snow J, Rice J. Infection control in veterinary clinics. *Northwest Public Health* 2005; Fall/Winter:22-23.
3. Wright JJ, Jung S, Holman R, et al. Infection control practices and zoonotic disease risks among veterinarians in the United States, 2005. *J Am Vet Med Assoc* 2007; Accepted for publication Dec 26, 2007.
4. Siegel JD, Rhinehart E, Jackson M, et al. 2007 Guideline for isolation precautions: Preventing transmission of infectious agents in healthcare settings, June 2007. Available at: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/Isolation2007.pdf>. Accessed Feb 1, 2008.
5. CDC. Update: multistate outbreak of monkeypox - Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin, 2003. *Morb Mortal Wkly Rep* 2003;52:642-646.
6. Croft DR, Sotir MJ, Williams CJ, et al. Occupational risks during a monkeypox outbreak, Wisconsin, 2003. *Emerg Infect Dis* 2007;13:1150-1157.
7. Marano N, Pappaioanou M. Historical, new, and reemerging links between human and animal health. *Emerg Infect Dis* 2004;10:2065-2066.
8. Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. *Philos Trans R Soc Lond B Biol Sci* 2001;356:983-989.
9. Wright, JG, Tengelsen LA, Smith KE, et al. Multi-drug resistant *Salmonella* Typhimurium in four animal facilities. *Emerg Infect Dis* 2005;11:1235-1241.
10. Cherry B, Burns A, Johnson GS, et al. *Salmonella* Typhimurium outbreak associated with veterinary clinic. *Emerg Infect Dis* 2004;10:2249-2251.
11. Bender JB, Tsukayama DT. Horses and the risk of zoonotic infections. *Vet Clin North Am Equine Pract* 2004;20:643-653.
12. Levine JF, Levy MG, Walker RL, et al. Cryptosporidiosis in veterinary students. *J Am Vet Med Assoc* 1988;193:1413-1414.
13. Anderson BC, Donndelinger T, Wilkins RM, et al. Cryptosporidiosis in a veterinary student. *J Am Vet Med Assoc* 1982;180:408-409.
14. Reif JS, Wimmer L, Smith JA, et al. Human cryptosporidiosis associated with an epizootic in calves. *Am J Public Health* 1989;79:1528-1530.
15. Pohjola S, Oksanen H, Jokipii L, et al. Outbreak of cryptosporidiosis among veterinary students. *Scand J Infect Dis* 1986;18:173-178.
16. Preiser G, Preiser L, Madeo L. An outbreak of cryptosporidiosis among veterinary science students who work with calves. *J Am Coll Health* 2003;51:213-215.
17. Gage KL, Dennis DT, Orloski KA, et al. Cases of cat-associated human plague in the Western US, 1977-1998. *Clin Infect Dis* 2000;30:893-900.
18. Dunstan RW, Reimann KA, Langham RF. Feline sporotrichosis. In: *Zoonosis Updates from the Journal of the American Veterinary Medical Association*. 2nd ed. Schaumburg: American Veterinary Medical Association, 1995;79-82.
19. Dunstan RW, Langham RF, Reimann KA, et al. Feline sporotrichosis: a report of five cases with transmission to humans. *J Am Acad Dermatol* 1986;15:37-45.
20. Nusbaum BP, Gulbas N, Horwitz SN. Sporotrichosis acquired from a cat. *J Am Acad Dermatol* 1983;8:386-391.
21. Reed KD, Moore FM, Geiger GE, et al. Zoonotic transmission of sporotrichosis: case report and review. *Clin Infect Dis* 1993;16:384-387.
22. Clinkenbeard KD. Diagnostic cytology: sporotrichosis. *Compend Contin Educ Pract Vet* 1991;13:207-211.
23. Baptiste KE, Williams K, Williams NJ, et al. Methicillin-resistant staphylococci in companion animals. *Emerg Infect Dis* 2005; 11:1942-1944.
24. Bender JB, Torres SMF, Gilbert SM, et al. Isolation of methicillin-resistant *Staphylococcus aureus* from a non-healing abscess in a cat. *Vet Rec* 2005;157:388-389.
25. Weese JS, Dick H, Willey BM, et al. Suspected transmission of methicillin-resistant *Staphylococcus aureus* between domestic pets and humans in veterinary clinics and in the household. *Vet Microbiol* 2006;115:148-155.
26. O'Mahony R, Abbott Y, Leonard FC, et al. Methicillin-resistant *Staphylococcus aureus* (MRSA) isolated from animals and veterinary personnel in Ireland. *Vet Microbiol* 2005;109:285-296.

27. Hanselman BA, Kruth SA, Rousseau J, et al. Methicillin-resistant *Staphylococcus aureus* colonization in veterinary personnel. *Emerg Infect Dis* 2006;12:1933-1938.
28. Wulf M, Van Nes, A, Eikelenboom-Boskamp A, et al. Methicillin-resistant *Staphylococcus aureus* in veterinary doctors and students, the Netherlands. *Emerg Infect Dis* 2006;12:1939-1941.
29. Weese JS, Rousseau J, Traub-Dargatz JL, et al. Community-associated methicillin-resistant *Staphylococcus aureus* in horses and humans who work with horses. *J Am Vet Med Assoc* 2005;4:580-583.
30. Weese JS, Caldwell F, Willey BM, et al. An outbreak of methicillin-resistant *Staphylococcus aureus* skin infections resulting from horse to human transmission in a veterinary hospital. *Vet Microbiol* 2006;160-164.
31. Leonard FC, Abbott y, Rossney A, et al. Methicillin-resistant *Staphylococcus aureus* isolated from a veterinary surgeon and five dogs in one practice. *Vet Rec* 2006; 158:155-159.
32. Voss A, Loeffen F, Bakker J, et al. Methicillin-resistant *Staphylococcus aureus* in pig farming. *Emerg Infect Dis* 2005;11:1965-1966.
33. Juhasz-Kaszanyitzky E, Janosi S, Somogyi P, et al. MRSA transmission between cows and humans. *Emerg Infect Dis* 2007;13:630-631.
34. Andrews BE, Major R. A common-source outbreak of ornithosis in veterinary surgeons. *Lancet* 1981:798-799.
35. Heddema ER, Van hannen EJ, Duim B, et al. An outbreak of psittacosis due to *Chlamydophila psittaci* genotype A in a veterinary teaching hospital. *J Med Microbiol* 2006;55:1571-1575.
36. Vanrompay D, Harkinezhad T, Van de Walle M, et al. *Chlamydophila psittaci* transmission from pet birds to humans. *Emerg Infect Dis* 2007;13:1108-1110.
37. Gosbell IB, Ross AD, Turner IB. *Chlamydia psittaci* infection and reinfection in a veterinarian. *Aust Vet J* 1999;775:11-513.
38. Constable PJ, Harrington JM. Risks of zoonoses in a veterinary service. *BMJ* 1982; 284:246-248.
39. Landercasper J, Cogbill TH, Strutt PJ, et al. Trauma and the veterinarian. *J Trauma* 1988;28:1255-1259.
40. Gabel CL, Gerberich SG. Risk factors for injury among veterinarians. *Epidemiology* 2002;13:80-86.
41. Jeyaretnam J, Jones H, Phillips M. Disease and injury among veterinarians. *Aust Vet J* 2000;78:625-629.
42. Nienhaus A, Skudlik C, Seidler A. Work-related accidents and occupational diseases in veterinarians and their staff. *Int Arch Occup Environ Health* 2005;78:230-238.
43. Talan DA, Citron DM, Abrahamian FM, et al. Bacteriologic analysis of infected dog and cat bites. *N Engl J Med* 1999;340:85-92.
44. Le Moal G, Landron C, Grollier G, et al. Meningitis due to *Capnocytophaga canimorsus* after receipt of a dog bite: case report and review of the literature. *Clin Infect Dis* 2003;36:e42-e46.
45. Shukla SK, Paustian DL, Stockwell PJ, et al. Isolation of a fastidious *Bergeyella* species associated with cellulitis after a cat bite and a phylogenetic comparison with *Bergeyella zoohelcum* strains. *J Clin Microbiol* 2004;42:290-293.
46. Kaiser RM, Garman RL, Bruce MG, et al. Clinical significance and epidemiology of NO-1, an unusual bacterium associated with dog and cat bites. *Emerg Infect Dis* 2002;8:171-174.
47. Hara H, Ochiai T, Morishima T, et al. *Pasteurella canis* osteomyelitis and cutaneous abscess after a domestic dog bite. *J Am Acad Dermatol* 2002;s151-s152.
48. Poole AG, Shane SM, Kearney MT, et al. Survey of occupational hazards in companion animal practices. *J Am Vet Med Assoc* 1998;212:1386-1388.
49. Poole AG, Shane SM, Kearney MT, et al. Survey of occupational hazards in large animal practices. *J Am Vet Med Assoc* 1999;215:1433-1435.
50. Hafer AL, Langley RL, Morrow WEM, et al. Occupational hazards reported by swine veterinarians in the United States. *J Swine Health Prod* 1996;4:128-141.
51. Wilkins JR, Bowman ME. Needlestick injuries among female veterinarians: frequency, syringe contents and side-effects. *Occup Med* 1997;47:451-457.
52. Ramsey DT. Blastomycosis in a veterinarian. *J Am Vet Med Assoc* 1994;205:968.
53. Weese JS. Barrier precautions, isolation protocols, and personal hygiene in veterinary hospitals. *Vet Clin North Amer Equine Pract* 2004;20:543-559.
54. Hannah HW. A veterinarian's liability to employees. *J Am Vet Med Assoc* 1994;204:361-362.
55. Smith R, Stiltz P. Controlling workers' compensation losses. *J Am Vet Med Assoc* 1996;209:526.
56. Lenhart SW, Seitz T, Trout D, et al. Issues affecting respirator selection for workers exposed to infectious aerosols: emphasis on healthcare settings. *Appl Biosafety* 2004;9:20-36.

57. Acha PN, Szyfres B. Q fever. In: *Zoonoses and Communicable Diseases Common to Man and Animals. Vol 2: Chlamydioses, Rickettsioses, and Viroses.* 3rd ed. Washington D.C.: Pan American Health Organization, 2003;16-27.
58. Tissot-Dupont H, Amadei MA, Nezri M, et al. Wind in November, Q Fever in December. *Emerg Infect Dis* 2004;10:1264-1269.
59. McQuiston JH, Childs JE. Q fever in humans and animals in the United States. *Vector Borne Zoonotic Dis* 2002;2:179-191.
60. Nation PN, Fanning EA, Hopf HB, et al. Observations on animal and human health during the outbreak of *Mycobacterium bovis* in game farm wapiti in Alberta. *Can Vet J* 1999;40:113-117.
61. Boyce JM, Pittet D. Guideline for hand hygiene in health-care settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Morb Mortal Wkly Rep Recomm Rep* 2002;51:1-48.
62. Larson EL. APIC guideline for handwashing and hand antisepsis in health care settings. *Am J Infect Control* 1995;23:251-269.
63. Ayliffe, GA, Babb JR, Quoraishi AH. A test for hygienic hand disinfection. *J Clin Pathol* 1978;31:923-928.
64. Steere AC, Mallison GF. Handwashing practices for the prevention of nosocomial infections. *Ann Intern Med* 1975;83:683-690.
65. Lin CM, Wu FM, Kim HK, et al. A comparison of hand washing techniques to remove *Escherichia coli* and caliciviruses under natural or artificial nails. *J Food Protect* 2003;66:2296-2301.
66. National Association of State Public Health Veterinarians. Compendium of measures to prevent disease associated with animals in public settings, 2007. Available at: <http://www.nasphv.org/Documents/AnimalsInPublicSettings.pdf>. Accessed Feb 1, 2008.
67. Widmer AF, Dangel M. Alcohol-based handrub: evaluation of technique and microbiological efficacy with international infection control professionals. *Infect Control Hosp Epidemiol* 2004;25:207-209.
68. Sickbert-Bennett EE, Weber DJ, Gergen-Teague MF, et al. Comparative efficacy of hand hygiene agents in the reduction of bacteria and viruses. *Am J Infect Control* 2005;33:67-77.
69. Gehrke C, Steinmann J, Goroncy-Bermes P. Inactivation of feline calicivirus, a surrogate of norovirus (formerly Norwalk-like viruses), by different types of alcohol in vitro and in vivo. *J Hosp Inf* 2004; 56:49-55.
70. Goldmann DA. The role of barrier precautions in infection control. *J Hosp Infect* 1991;18:515-523.
71. Olsen RJ, Lynch P, Coyle MB, et al. Examination gloves as barriers to hand contamination in clinical practice. *J Amer Med Assoc* 1993;2:350-353.
72. Doebbeling BN, Pfaller MA, Houston AK, et al. Removal of nosocomial pathogens from the contaminated glove: implications for glove reuse and handwashing. *Ann Intern Med* 1988;109:394-398.
73. Patterson JE, Vecchio J, Pantelick EL, et al. Association of contaminated gloves with transmission of *Acinetobacter calcoaceticus* var. *anitratus* in an intensive care unit. *Am J Med* 1991;91:479-483.
74. National Institute for Occupational Safety and Health (NIOSH). Preventing allergic reactions to natural rubber latex in the workplace. DHHS (NIOSH) Publication No. 97-135. Available at: www.cdc.gov/niosh/latexalt.html. Accessed Feb 1, 2008.
75. Bemis DA, Craig LE, Dunn JR. *Salmonella* transmission through splash exposure during a bovine necropsy. *Foodborne Pathog Dis* 2007;4:387-390.
76. National Institute for Occupational Safety and Health Web site. NIOSH-approved disposable particulate respirators (filtering facepieces). Available at: http://www.cdc.gov/niosh/nppt/topics/respirators/disp_part/. Accessed Feb 1, 2008.
77. Belkin NL. Use of scrubs and related apparel in health care facilities. *Am J Infect Control* 1997;5:401-404.
78. Belkin NL. Home laundering of soiled surgical scrubs: surgical site infections and the home environment. *Am J Infect Control* 2001;29:58-64.
79. Sheldon CC, Sonsthagen T, Topel JA. Restraint Principles. In: *Animal Restraint for Veterinary Professionals*. St. Louis: Mosby Elsevier, 2006;1-6.
80. CDC. Guidelines and resources, Monkeypox infections in animals: updated interim guidance for veterinarians. Available at: www.cdc.gov/ncidod/monkeypox/animalguidance.htm. Accessed Feb 1, 2008.
81. Seibert PJ. Hazards in the hospital. *J Am Vet Med Assoc* 1994;204:352-360.
82. Grizzle WE, Fredenburgh J. Avoiding biohazards in medical, veterinary, and research laboratories. *Biotech Histochem* 2001;76:183-206.
83. Brody MD. Safety in the veterinary medical workplace environment. *Vet Clin North Am Small Anim Pract* 1993;23:1071-1084.

84. Cornell Center for Animal Resources and Education. CARE711.01 Sharps precautions. Available at: www.research.cornell.edu/care/CARE711.pdf. Accessed Feb 1, 2008.
85. Holmstrom SE, Bellows J, Colmery B, et al. AAHA dental care guidelines for dogs and cats. *J Am Anim Hosp Assoc* 2005;41:277-283.
86. Logothetis DD, Martinez-Welles JM. Reducing bacterial aerosol contamination with a chlorhexidine gluconate pre-rinse. *J Am Dent Assoc* 1995;126:1634-1639.
87. Heymann DL. Brucellosis, Q fever, Listeriosis. In: Heymann DL, ed. *Control of Communicable Diseases Manual*. 18th ed. Washington D.C.: American Public Health Association, 2004;75-78,434-438,309-312.
88. American Animal Hospital Association. Contagious disease standards – effective containment. Available only to AAHA members. 2005.
89. CDC. Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *Morb Mortal Wkly Rep Recomm Rep* 2003;52:1-42.
90. Virginia-Maryland Regional College of Veterinary Medicine. Policy Number 9210 – Isolation and infection control policy and procedures. Password protected at: www.vth.vt.edu/policies/showpnp.asp?id=62. Accessed Aug 22, 2006.
91. Morley PS, Morris SN, Hyatt DR, et al. Evaluation of the efficacy of disinfectant footbaths as used in veterinary hospitals. *J Am Vet Med Assoc* 2005;226:2053-2058.
92. Dwyer RM. Environmental disinfection to control equine infectious diseases. *Vet Clin North Amer Equine Pract* 2004;20:531-542.
93. Brody MD. AVMA guide for veterinary medical waste management. *J Am Vet Med Assoc* 1989;195:440-452.
94. U.S. Department of Labor Occupational Safety and Health Administration. Occupational safety and health standards: toxic and hazardous substances. 1910.1030: Bloodborne pathogens. Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051. Accessed Feb 1, 2008.
95. Kogan M. Integrated pest management: historical perspectives and contemporary developments. *Annu Rev Entomol* 1998;43:243-270.
96. Peter RJ, Van den Bossche P, Penzhorn BL, et al. Tick, fly, and mosquito control—lessons from the past, solutions for the future. *Vet Parasitol* 2005;132:205-215.
97. Gershon RRM, Karkashian CD, Grosch JW, et al. Hospital safety climate and its relationship with safe work practices and workplace exposure incidents. *Am J Infect Control* 2000;28:211-221.
98. Institute for Healthcare Improvement. How-to guide: Improving hand hygiene, a guide for improving practices among health care workers. Available at: www.IHI.org. Accessed Feb 1, 2008.
99. Bolyard EA, Tablan OC, Williams WW, et al. Guideline for infection control in health care personnel, 1998. *Am J Infect Control* 1998;26:289-354.
100. Herwaldt LA, Pottinger JM, Carter CD, et al. Exposure workups. *Infect Control Hosp Epidemiol* 1997;18:850-871.
101. CDC. Human rabies prevention — United States, 1999: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *Morb Mortal Wkly Rep Recomm Rep* 1999;48:1-21.
102. CDC. Immunization of health-care workers: Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *Morb Mortal Wkly Rep Recomm Rep* 1997;46:1-44.
103. CDC. Interim guidance for protection of persons involved in U.S. avian influenza outbreak disease control and eradication activities, 2006. Available at: www.cdc.gov/flu/avian/professional/protect-guid.htm. Accessed Feb 1, 2008.
104. Gray GC, Trampel DW, Roth JA. Pandemic influenza planning: Shouldn't swine and poultry workers be included? *Vaccine* 2007;25:4376-4381.
105. Myers KP, Setterquist SF, Capuano AW, et al. Infection due to 3 avian influenza subtypes in United States veterinarians. *Clin Infect Dis* 2007;45:4-9.
106. Myers KP, Olsen CW, Setterquist SF, et al. Are swine workers in the United States at increased risk of infection with zoonotic influenza virus? *Clin Infect Dis* 2006;42:14-20.
107. CDC. Guidelines for preventing opportunistic infections among HIV-infected persons—2002: Recommendations of the U.S. Public Health Service and the Infectious Diseases Society of America. *Morb Mortal Wkly Rep Recomm Rep* 2002;51:1-52.

108. Moore RM, Davis YM, Kaczmarek RG. An overview of occupational hazards among veterinarians, with particular reference to pregnant women. *Am Ind Hyg Assoc J* 1993;54:113-120.
109. Grant S, Olsen CW. Preventing zoonotic diseases in immunocompromised persons: the role of physicians and veterinarians. *Emerg Infect Dis* 1999;5:159-163.

APPENDIX A

Zoonotic Diseases of Importance in the United States, 2008

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans	Nationally notifiable for humans (H) or animals (A)	Severe or prolonged infection associated with immunosuppression	Fatalities reported in humans
Acariasis (Mange)	<i>Sarcoptes scabiei</i> , <i>Notoedres cati</i> and other species of mites	contact	dogs, cats, horses, goats, sheep, swine, birds			No
Anthrax	<i>Bacillus anthracis</i>	contact, aerosol, vector	cattle, sheep, goats, horses	H, A		Yes
Avian influenza	Highly pathogenic AI viruses	contact, aerosol	poultry, pet birds	H,A		Yes
Babesiosis	<i>Babesia microti</i> and other species	vector	cattle, rodents	A	✓	Yes
Baylisascariasis	<i>Baylisascaris procyonis</i>	contact	raccoons			Yes
<i>Bordetella bronchiseptica</i> infection	<i>Bordetella bronchiseptica</i>	aerosol	dogs, pigs, rabbits, guinea pigs		✓	No
Brucellosis	<i>Brucella melitensis</i> , <i>B. abortus</i> , <i>B. suis</i> , <i>B. canis</i>	contact, aerosol	goats, cattle, swine, dogs, horses	H, A		Yes
Campylobacteriosis	<i>Campylobacter jejuni</i> , <i>C. fetus</i> , <i>C. coli</i>	contact	cattle, sheep, goats, pigs, dogs, cats, birds, mink, ferrets, hamsters			Rare
<i>Capnocytophaga canimorsus</i> infection	<i>Capnocytophaga canimorsus</i> , <i>C. cynodegmi</i>	contact	dog, cat		✓	Yes
Cat scratch disease	<i>Bartonella henselae</i>	contact	cats		✓	Rare
Chlamydiosis (mammalian)	<i>Chlamydia abortus</i> , <i>C. felis</i>	aerosol, contact	sheep, goats, llamas, cats, cattle			Yes
Contagious pustular dermatitis (orf, contagious ecthyma)	Parapoxvirus	contact	sheep, goats			No
Cryptococcosis	<i>Cryptococcus neoformans</i>	aerosol	pigeons, other birds		✓	Yes
Cryptosporidiosis	<i>Cryptosporidium parvum</i>	contact	cattle, typically calves	H	✓	Yes
Dermatophilosis	<i>Dermatophilus congolensis</i>	contact, vector	goats, sheep, cattle, horses			No
Dermatophytosis (Ringworm)	<i>Microsporium</i> species, <i>Trichophyton</i> species, <i>Epidermophyton</i> species	contact	cats, dogs, cattle, goats, sheep, horses, lagomorphs, rodents		✓	No
<i>Dipylidium</i> infection (Tapeworms)	<i>Dipylidium caninum</i>	vector	dog, cat			No
<i>E. coli</i> O157:H7 infection	<i>Escherichia coli</i> O157:H7	contact	cattle, goats, sheep, deer			Yes

Zoonotic Diseases of Importance in the United States, 2008

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans	Nationally notifiable for humans (H) or animals (A)	Severe or prolonged infection associated with immunosuppression	Fatalities reported in humans
Echinococcosis	<i>Echinococcus granulosus</i> , <i>E. multilocularis</i>	contact	dogs, cats, wild canids	A		Yes
Ehrlichiosis/ Anaplasmosis	<i>Ehrlichia</i> and <i>Anaplasma</i> species	vector	deer, rodents, horses, dogs	H	✓	Yes
Equine encephalomyelitis (WEE, VEE, EEE)	Togaviridae	vector	birds, horses	H, A		Yes
Erysipeloid	<i>Erysipelothrix rhusiopathiae</i>	contact	pigs, fish, crustaceans, and mollusks			Yes
Giardiasis	<i>Giardia intestinalis</i> (<i>G. lamblia</i>)	contact	Thought to be highly species-specific and rarely transmitted from animals to humans	H	✓	No
Hantaviral diseases	Hantaviruses	aerosol	rodents	H		Yes
Herpes B virus infection	Cercopithecine herpesvirus 1	contact	macaque monkeys			Yes
Influenza A	Influenza A virus	contact, aerosol	poultry, swine	H, A		Yes
Larval migrans: cutaneous (hookworm)	<i>Ancylostoma</i> species	contact	dogs, cats			Rare
Larval migrans: visceral, ocular, neuro (roundworm)	<i>Toxocara canis</i> , <i>T. cati</i>	contact	dogs, cats			Rare
Leishmaniasis	<i>Leishmania</i> species	vector	dogs, wild canids	A		Yes
Leptospirosis	<i>Leptospira</i> species	contact, aerosol	rodents, pigs, cattle, sheep, goats, horses, dogs	A		Yes
Listeriosis	<i>Listeria monocytogenes</i>	contact	cattle, sheep, goats, pigs, birds, dogs, cats	H	✓	Yes
Lyme disease	<i>Borrelia burgdorferi</i>	vector	small rodents, wild mammals	H		No
Lymphocytic choriomeningitis	Arenavirus (LCMV)	contact aerosol	mice, hamsters, guinea pigs		✓	Yes
Monkeypox	Orthopoxvirus	contact, aerosol	non-human primates, rodents	A		Yes
Mycobacteria, non- tuberculous	<i>Mycobacterium avium</i> complex, <i>Mycobacterium marinum</i>	aerosol, contact	poultry, birds, aquarium fish, reptiles		✓	Yes
Pasteurellosis	<i>Pasteurella multocida</i> and other species	contact	dogs, cats, rabbits, rodents		✓	No

Zoonotic Diseases of Importance in the United States, 2008

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans	Nationally notifiable for humans (H) or animals (A)	Severe or prolonged infection associated with immunosuppression	Fatalities reported in humans
Plague	<i>Yersinia pestis</i>	vector, contact, aerosol	rodents, cats, lagomorphs	H, A		Yes
Psittacosis/Chlamydiosis	<i>Chlamydoiphila psittaci</i>	aerosol, contact	pet birds, poultry	H	✓	Yes
Q Fever	<i>Coxiella burnetii</i>	contact, aerosol, vector	goats, sheep, cattle, rodents, lagomorphs, dogs, cats	H, A		Yes
Rabies	Lyssavirus	contact	cats, dogs, cattle and other domestic animals, wild carnivores, raccoons, bats, skunks, foxes	H, A		Yes
Rat bite fever	<i>Streptobacillus moniliformis</i> , <i>Spirillum minus</i>	contact	rodents		✓	Yes
Rhodococcus equi infection	<i>Rhodococcus equi</i>	aerosol, contact	horses		✓	Yes
Rocky Mountain spotted fever	<i>Rickettsia rickettsii</i>	vector	dogs, rabbits, rodents	H		Yes
Salmonellosis	<i>Salmonella</i> species	contact	reptiles, amphibians, poultry, horses, swine, cattle, pocket pets, many species of mammals and birds	H	✓	Yes
Sporotrichosis	<i>Sporothrix schenckii</i>	contact	cats, dogs, horses		✓	Rare
Staphylococcosis	<i>Staphylococcus</i> species	contact	dogs, cats, horses	H (VRSA, VISA)	✓	Yes (some forms)
Streptococcosis	<i>Streptococcus</i> species	contact, aerosol	swine, fish, other mammals	some forms H		Yes (some forms)
Toxoplasmosis	<i>Toxoplasma gondii</i>	contact	cats		✓	Yes
Trichuriasis (whipworm infection)	<i>Trichuris suis</i> , <i>T. trichiura</i> , <i>T. vulpis</i>	contact	dogs, swine			Rare
Tuberculosis, bovine	<i>Mycobacterium bovis</i>	aerosol, contact	cattle, swine, sheep, goats	H, A		Yes
Tularemia	<i>Francisella tularensis</i>	vector, contact, aerosol	lagomorphs, pocket pets, wild aquatic rodents, sheep, cats, horses, dogs	H, A		Yes
Vesicular stomatitis	Vesicular stomatitis virus	vector, contact, aerosol	horses, cattle, swine, sheep, goats	A		No
West Nile fever	West Nile virus	vector	wild birds	H, A		Yes
Yersiniosis	<i>Yersinia enterocolitica</i>	contact	swine, many species of mammals and birds			No

Note:

-- Nationally reportable diseases were taken from the Centers for Disease Control and Prevention (CDC) nationally notifiable infectious diseases list, the World Organization for Animal Health (OIE) notifiable animal diseases list, the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) reportable diseases list, and the USDA high consequence livestock pathogens list. Cases may also be notifiable at the state level. Check with your State Veterinarian or State Public Health Veterinarian for a current listing of reportable diseases in your area.

References:

Acha PN, Szyfres B. Zoonoses and Communicable Diseases Common to Man and Animals. Volume I. Bacterioses and Mycoses; Volume II. Chlamydioses, Rickettsioses, and Viroses; and Volume III. Parasitoses. Pan American Health Organization: Washington DC 2003.

CDC. Healthy Pets Healthy People website. Updated 09/27/06. Available at: www.cdc.gov/healthypets/browse_by_diseases.htm. Accessed Feb 6, 2008.

CDC. Nationally Notifiable Infectious Diseases. United States 2007, Revised. Updated 01/09/08. Available at: <http://www.cdc.gov/epo/dphsi/phs/infdis2007r.htm>. Accessed Feb 6, 2008.

Public Health Agency of Canada. Material Safety Data Sheets – Infectious Substances. Updated 08/01/06. Available at: www.phac-aspc.gc.ca/msds-ftss/index.html. Accessed Feb 6, 2008.

The Merck Veterinary Manual. 9th Edition. Kahn CM, Line SL ed. Merck and Company: Whitehouse Station, NJ, 2005.

Trejejo RT, Barr MC, Robinson RA. Important emerging bacterial zoonotic infections affecting the immunocompromised. *Vet Res* 2005;36:493-506.

United States Department of Agriculture. High consequence livestock pathogens list. Available at: www.ars.usda.gov/SP2UserFiles/Place/54000000/Policies/PM03-003.pdf. Accessed Feb 6, 2008.

United States Department of Agriculture Animal and Plant Health Inspection Service. National Animal Health Reporting System – Reportable Diseases. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nahrs/NAHRS_disease_list.htm. Accessed Feb 6, 2008.

World Organization for Animal Health (OIE). Diseases notifiable to the OIE. Updated 03/14/07. Available at: http://www.oie.int/eng/maladies/en_classification2007.htm?e1d7. Accessed Feb 6, 2008.

APPENDIX B

Selected Disinfectants Used in Veterinary Practice

Characteristics of Selected Disinfectants									
Disinfectant Category	Alcohols	Aldehydes	Biguanides	Halogens: Hypochlorites	Halogens: Iodine Compounds	Oxidizing Agents	Phenols	Quaternary Ammonium Compounds (QAC)	
Sample Trade Names	Ethyl alcohol Isopropyl alcohol	Formaldehyde Glutaraldehyde	Chlorhexidine Nolvasan [®] Virosan [®]	Bleach	Betadyne [®] Providone [®]	Hydrogen peroxide Peracetic acid Virkon S [®] Oxy-Sept 333 [®]	One-Stroke Environ [®] Pheno-Tek II [®] Tek-Trol [®]	Roccal [®] DiQuet [®] D-256 [®]	
Mechanism of Action	•Precipitates proteins •Denatures lipids	•Denatures proteins •Alkylates nucleic acids	•Alters membrane permeability	•Denatures proteins	•Denatures proteins	•Denature proteins and lipids	• Denatures proteins • Alters cell wall permeability	• Denatures proteins • Binds phospholipids of cell membrane	
Advantages	•Fast acting •Leaves no residue	•Broad spectrum	•Broad spectrum	•Broad spectrum •Short contact time •Inexpensive	•Stable in storage •Relatively safe	•Broad spectrum	• Good efficacy with organic material • Non-corrosive • Stable in storage	• Stable in storage • Non-irritating to skin • Effective at high temperatures and high pH (9-10)	
Disadvantages	•Rapid evaporation •Flammable	•Carcinogenic •Mucous membranes and tissue irritation •Only use in well ventilated areas	•Only functions in limited pH range (5-7) •Toxic to fish (environmental concern)	•Inactivated by sunlight •Requires frequent application •Corrosive •Stains clothes and treated surfaces	•Inactivated by QACs •Requires frequent application	•Damaging to some metals	• Can cause skin and eye irritation		
Precautions	Flammable	Carcinogenic	Never mix with acids; toxic chlorine gas will be released	Never mix with acids; toxic chlorine gas will be released			May be toxic to animals, especially cats and pigs		
Vegetative Bacteria	Effective	Effective	Effective	Effective	Effective	Effective	Effective	YES—Gram Positive Limited—Gram Negative	
Mycobacteria	Effective	Effective	Variable	Effective	Limited	Effective	Variable	Variable	
Enveloped Viruses	Effective	Effective	Limited	Effective	Effective	Effective	Effective	Variable	
Non-enveloped Viruses	Variable	Effective	Limited	Effective	Limited	Effective	Variable	Not Effective	
Spores	Not Effective	Effective	Not Effective	Variable	Limited	Variable	Not Effective	Not Effective	
Fungi	Effective	Effective	Limited	Effective	Effective	Variable	Variable	Variable	
Efficacy with Organic Matter	Reduced	Reduced	?	Rapidly reduced	Rapidly reduced	Variable	Effective	Inactivated	
Efficacy with Hard Water	?	Reduced	?	Effective	?	?	Effective	Inactivated	
Efficacy with Soap/Detergents	?	Reduced	Inactivated	Inactivated	Effective	?	Effective	Inactivated	

DISCLAIMER: The use of trade names does not in any way signify endorsement of a particular product.

For additional product names, please consult the most recent Compendium of Veterinary Products.

ADAPTED FROM: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine. In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001.

Lippincott, Williams and Wilkins; Philadelphia.

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APPENDIX C

Model Infection Control Plan for Veterinary Practices, 2008

National Association of State Public Health Veterinarians (NASPHV)
Veterinary Infection Control Committee (VICC)

This plan should be adapted to your practice in keeping with local, state and federal regulations. A modifiable electronic version is available on the NASPHV website (www.nasphv.org). Please refer to the full Compendium of Veterinary Standard Precautions for complete information and guidance (also available at www.nasphv.org).

Clinic: _____

Date of Plan Adoption: _____

Date of Next Review: _____

Infection Control Officer: _____

This plan will be followed as part of our practice's routine procedures. The plan will be reviewed at least annually and as part of new employee training.

PERSONAL PROTECTIVE ACTIONS AND EQUIPMENT

Hand Hygiene: Wash hands before and after each patient encounter and after contact with feces, blood, body fluids, secretions, excretions, exudates or articles contaminated by these substances. Wash hands before eating, drinking or smoking, after using the toilet, after cleaning animal cages or animal care areas, and whenever hands are visibly soiled. Alcohol-based rubs may be used if hands are not visibly soiled, but handwashing with soap and running water is preferred. Keep fingernails short. Do not wear artificial nails or hand jewelry when handling animals. Keep handwashing supplies stocked at all times. Staff responsible: _____

Correct handwashing procedure:

- Wet hands with running water
- Place soap in palms
- Rub hands together to make a lather
- Scrub hands vigorously for 20 seconds
- Rinse soap off hands
- Dry hands with disposable towel
- Turn off faucet using the disposable towel

Use of Gloves and Sleeves: Gloves are not necessary when examining or handling normal, healthy animals.

Wear gloves or sleeves when touching feces, blood, body fluids, secretions, excretions, exudates and non-intact skin. Wear gloves for dentistry, resuscitations, necropsies, and obstetrical procedures; when cleaning cages, litter boxes, and contaminated environmental surfaces and equipment; when handling dirty laundry; when handling diagnostic specimens (e.g., urine, feces, aspirates, swabs); and when handling an animal with a suspected infectious disease. Change gloves between examination of individual animals or animal groups (e.g., a litter of puppies) and between dirty and clean procedures on the same patient. Gloves should be removed promptly and disposed of after use. Disposable gloves should not be washed and reused. Hands should be washed immediately after glove removal.

Facial Protection: Wear facial protection whenever exposure to splashes or sprays is likely to occur. Facial protection includes a surgical mask worn with goggles, or a faceshield. Wear facial protection for the following procedures: lancing abscesses, flushing wounds, dentistry, nebulization, suctioning, lavage, obstetrical procedures, and necropsies.

Protective Outerwear: Wear a protective outer garment such as a lab coat, smock, non-sterile gown, or coveralls when attending animals and when conducting cleaning chores. These should be changed whenever soiled, after handling an animal with a known or suspected infectious disease, after working in the isolation room, and after performing a necropsy or other high-risk procedure. Shoes or boots should have thick soles and closed toes, be impermeable to water and easily cleaned. Disposable shoe covers should be worn when heavy quantities of infectious materials are present or expected. Impermeable outwear should be worn during obstetrical procedures and necropsies and whenever substantial splashes or large quantities of body fluids may be encountered. Keep clean outer garments available at all times. Staff responsible: _____

Bite and Other Animal-Related Injury Prevention: Take precautions to prevent bites and other injuries. Identify aggressive animals and alert clinic staff. Use physical restraints, muzzles, bite-resistant gloves, and sedation or anesthesia in accordance with practice policies. Plan an escape route when handling large animals. Do not rely on owners or untrained staff for animal restraint.

- If there is concern for personal safety, notify: _____
- When injuries occur, wash wounds with soap and water, then immediately report incident to: _____ (infection control officer)
- If medical attention is needed contact: _____ (healthcare provider)
- Bite incidents will be reported to: _____ (public health agency) as required by law. Telephone number: _____

PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES

Intake: Avoid bringing aggressive or potentially infectious animals in through the reception area. If they must come through the main entrance, carry the animal or place it on a gurney so that it can be taken directly into a designated exam room.

Examination of Animals: Wear appropriate protective outwear and wash hands before and after examination of individual animals or animal groups (e.g., a litter of puppies). Potentially infectious animals will be examined in a designated exam room and remain there until diagnostic procedures and treatments have been performed.

Injections, Venipuncture, and Aspirations: Wear gloves while performing venipuncture on animals suspected of having an infectious disease and when performing soft tissue aspirations.

Needlestick Injury Prevention: Do not recap needles except in rare instances when required as part of a medical procedure or protocol. Do not remove uncapped needles from the syringe by hand or place needle caps in mouth. Dispose of all sharps in designated containers. When injecting live vaccines or aspirating body fluids, dispose of used syringes with needles attached in the sharps container. Otherwise, remove the needle using a forceps or the needle removal device on the sharps container, and throw the syringe away in the trash. Do not transfer sharps from one container to another. Replace sharps containers before they are completely full.
Staff responsible: _____

Dental Procedures: Wear protective outerwear, gloves, and facial protection when performing dental procedures or when in range of splashes or sprays (such as when monitoring anesthesia).

Resuscitation: Wear gloves and facial protection.

Obstetrics: Wear gloves and/or shoulder-length sleeves, facial protection, and impermeable outerwear.

Necropsy: Wear cut-resistant gloves, facial protection, and impermeable outerwear. Only necessary personnel are allowed in the vicinity of the procedure. Wear a respirator when using a band saw or other power equipment. If an animal is suspected of having a notifiable infectious or a foreign animal disease, consult with the State Veterinarian before proceeding with a necropsy. Contact information for State Veterinarian's office: _____

Diagnostic Specimen Handling: Wear protective outerwear and gloves. Discard gloves and wash hands before touching clean items (e.g., medical records, telephone). Eating and drinking are not allowed in the laboratory.

ENVIRONMENTAL INFECTION CONTROL

Isolation of Infectious Animals: Animals with a contagious or zoonotic disease will be housed in isolation as soon as possible. Clearly mark the room or cage to indicate the patient's status and describe additional precautions. Keep only the equipment needed for the care and treatment of the patient in the isolation room, including dedicated cleaning supplies. Disassemble and thoroughly clean and disinfect any equipment that must be

taken out of the room. Discard gloves after use. Leave other personal protective equipment (e.g., gown, mask) in the isolation room for reuse. Clean and disinfect or discard protective equipment between patients and whenever contaminated by body fluids. Place potentially contaminated materials in a bag before removal from the isolation room. Use a disinfectant footbath before entering and leaving the room. Limit access to the isolation room. Keep a sign-in log of all people (including owners or other non-employees) having contact with a patient in isolation. Monitor air pressure daily while the room is in use.

Staff responsible: _____

Cleaning and Disinfection of Equipment and Environmental Surfaces: Clean surfaces and equipment first to remove organic matter, and then use a disinfectant according to manufacturer's instructions. Minimize dust and aerosols when cleaning by first misting the area with water or disinfectant. Clean and disinfect animal cages, toys, and food and water bowls between animals and whenever visibly soiled. Clean litter boxes once a day. Wear gloves when cleaning and wash hands afterwards. There is a written checklist for each area of the facility (e.g., waiting room, exam rooms, treatment area, kennels) specifying the frequency of cleaning, disinfection procedures, products to be used, and staff responsible.

Handling Laundry: Wear gloves when handling soiled laundry. Wash animal bedding and other laundry with standard laundry detergent and machine dry. Use separate storage and transport bins for clean and dirty laundry.

Decontamination and Spill Response: Immediately spray a spill or splash of blood, feces, or other potentially infectious substance with disinfectant and contain it with absorbent material (e.g., paper towels, sawdust, cat litter). Put on gloves, mask, and protective clothing (including shoe covers if the spill is large and may be stepped in) before beginning the clean-up. Pick up the material, seal it in a leak-proof plastic bag and clean and disinfect the area. Keep clients, patients and employees away from the spill area until disinfection is completed.

Veterinary Medical Waste: *Insert here your local and state ordinances regulating disposal of animal waste, pathology waste, animal carcasses, bedding, sharps and biologics. See the U.S. Environmental Protection Agency website for guidance:*
www.epa.gov/epaoswer/other/medical

Rodent and Vector Control: Seal entry portals, eliminate clutter and sources of standing water, keep animal food in closed metal or thick plastic containers, and dispose of food waste properly to keep the facility free of wild rodents, mosquitoes and other arthropods.

Other Environmental Controls: There are designated areas for eating, drinking, smoking, applying make-up and similar activities. These activities should never occur in animal care areas or in the laboratory area. Do not keep human food or drink in the same

refrigerator as animal food, biologics, or laboratory specimens. Dishes for human use should be cleaned and stored away from animal care and animal food preparation areas.

EMPLOYEE HEALTH

The following personnel are responsible for developing and maintaining the practice's infection control policies, keeping records, and managing workplace exposure and injury incidents.

Staff Responsible:

Employee Immunization Policies and Record Keeping:

Record Keeping: Current emergency contact information will be maintained for each employee. Records will be maintained on immunizations, rabies titers, and exposure and injury incidents. Report and record changes in health status (e.g. pregnancy) that may affect work duties.

Rabies Preexposure Vaccination: All staff with animal contact must be vaccinated against rabies, followed by periodic titer checks and rabies boosters, in accordance with the recommendations of the Advisory Committee on Immunization Practices (CDC, 1999).

Tetanus Vaccination: Tetanus immunizations must be up to date. Report and record puncture wounds and other possible exposures to tetanus. Consult a health care provider regarding the need for a tetanus booster.

Seasonal Influenza Vaccination: Unless contraindicated, veterinary personnel are encouraged to receive the current seasonal influenza vaccine. *See the Centers for Disease Control and Prevention website for guidance: www.cdc.gov.*

Staff Training and Education: Infection control training and education will be documented in the employee health record.

Documenting and Reporting Exposure Incidents: Report incidents that result in injury or potential exposure to an infectious agent to: _____

The following information will be collected for each exposure incident: date, time, location, person(s) injured or exposed, other persons present, description of the incident, whether or not a healthcare provider was consulted, the status of any animals involved (e.g., vaccination history, clinical condition, diagnostic information), and plans for follow-up.

Pregnant and Immunocompromised Personnel: Pregnant and immunocompromised employees are at increased risk from zoonotic diseases. Inform: _____

if you are concerned about your work responsibilities, so that accommodations may be made. Consultation between the supervising veterinarian and a health care provider may be needed.

The following information is attached to the Infection Control Plan:

- Emergency services telephone numbers – fire, police, sheriff, animal control, poison control, etc
- Reportable/notifiable veterinary diseases and where to report
- State Department of Agriculture or Board of Animal Health contact information and regulations
- State and local public health contacts for consultation on zoonotic diseases
- Public Health Laboratory services and contact information
- EPA-registered disinfectants
- OSHA regulations
- Animal waste disposal and biohazard regulations
- Rabies regulations
- Animal control and exotic animal regulations and contacts
- Other useful resources