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

National Association of State Public Health Veterinarians

Veterinary Infection Control Committee
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The NASPHV VICC

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Preface

Veterinary practices are unique environments that bring humans into close contact with many species of animals. Whether in a clinic or in field settings, veterinary personnel are routinely exposed to infectious pathogens, many of which are zoonotic (transmitted from animals to humans). Some reported zoonoses in veterinary personnel include multidrug-resistant salmonellosis, cryptosporidiosis, cat-associated plague, sporotrichosis, methicillin-resistant *Staphylococcus aureus* 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 outlined in this Compendium are designed to minimize transmission of zoonotic pathogens from animals to veterinary personnel in private practice. The Compendium is based on current scientific evidence and the VICC members' collective experience and knowledge of the veterinary profession.

Abbreviations

ACIP	Advisory Committee on Immunization Practices
NASPHV	National Association of State Public Health Veterinarians
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
VICC	Veterinary Infection Control Committee
VSP	Veterinary Standard Precautions

I. INTRODUCTION

A. BACKGROUND AND OBJECTIVES:

Zoonotic diseases are occupational hazards faced by veterinary personnel on a daily basis.[1] Although 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] In human medicine, infection control evolved substantially with the recognition of transmission of HIV and hepatitis B and C viruses to health-care workers; currently, the cornerstone of infection control in human health-care settings is the consistent use of Standard Precautions.[4] Similarly, the 2003 US outbreak of monkeypox virus infection among humans in 6 states, in which 18 of 71 (25%) affected individuals were veterinary personnel, highlighted the need for infection control precautions in veterinary medicine.[5,6]

Veterinary Standard Precautions are infection control guidelines intended to minimize the risk of occupational zoonotic infections from recognized and as yet unrecognized sources. Regardless of the diagnosis made for a particular animal, these precautions should be used whenever personnel may be exposed to potentially infectious materials, including feces, blood, body fluids, exudates, and nonintact skin.

New infectious diseases are continually emerging.[7] Approximately 868 of 1,415 (61%) known human pathogens are zoonotic, and approximately 132 of 175 (75%) emerging diseases that affect humans are zoonotic.[8] Global commerce, trade, and travel continue to increase the potential for exposure to zoonotic pathogens.

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

- Multidrug-resistant salmonellosis outbreaks with zoonotic transmission to veterinary staff and students.[9–11]
- Cryptosporidiosis among veterinary students.[12–16]
- Cat-associated plague (*Yersinia pestis* infection) in veterinary personnel.[17]
- Cat-associated sporotrichosis in veterinary personnel.[18–22]
- Transmission of methicillin-resistant *S aureus* infections among veterinary personnel and equine, bovine, porcine, canine, and feline patients.[11,23–33]
- Psittacosis.[34–37]
- Dermatophytosis (ringworm).[38]

Veterinary Standard Precautions include strategies to reduce the potential for bites and other trauma that may result in exposure to zoonotic pathogens. During their careers, approximately two thirds of veterinary medical personnel are hospitalized or unable to work for considerable periods of time as a result of animal-related injury.[1,39–42] Dog and cat bites, kicks, scratches from cats, and crush injuries account for most occupational injuries among veterinary personnel.[1,39–42] According to 1 report,[43] approximately 3% to 18% of dog bites and 28% to 80% of cat bites become infected. Most infected dog- and cat-bite wounds contain mixed aerobic and anaerobic bacteria. The most commonly isolated aerobes are *Pasteurella multocida* (cats), *Pasteurella canis* (dogs), streptococci, staphylococci, *Moraxella* spp, and *Neisseria weaveri*; the most commonly isolated anaerobes are various species of *Fusobacterium*, *Bacteroides*, *Porphyromonas*, and *Prevotella*.[43] In addition, rare but serious systemic infections with invasive pathogens such as *Capnocytophaga canimorsus*, *Bergeyella zoohelcum*, *Bartonella henselae*, and CDC Group NO-1 may develop following bites or scratches.[43–47]

Needlestick injuries are also among the most frequent 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 701 veterinarians, accidental self-injection of rabies virus vaccine was reported by 27% of respondents; among large-animal practice respondents, 23% had accidentally self-injected vaccines containing live *Brucella* organisms.[1] Additionally, nee-

dle punctures sustained during procedures such as fine-needle aspiration are potential sources of zoonotic pathogens.[52]

Based on the need for infection control guidelines that were specific to veterinary medicine, the VICC set the following objectives for the creation of the Compendium: to raise awareness of the scope of zoonotic disease risk in veterinary medicine; address issues specific to the veterinary profession; establish practical, science-based veterinary infection control guidance; and provide a model infection control plan for use in individual veterinary facilities.

B. CONSIDERATIONS:

Although elimination of all risks associated with zoonotic pathogens is not possible, the purpose of this Compendium is to provide reasonable guidance for minimizing disease and injury among veterinary personnel in clinical settings. The guidelines are intended to be adapted to individual needs and circumstances, but veterinary practices must first comply with federal, state, and local authority regulations, and modifications should adhere to the basic principles of infection control that are necessary to prevent spread of occupational zoonotic pathogens by all routes of transmission. The authors of this Compendium advocate a multifaceted approach to infection control, incorporating personal protective activities with appropriate administrative and environmental engineering control measures.

Employers should promote safe work habits. The cost of implementing these guidelines should be compared with 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 VSP implementation that is 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 of animals, comprehensive internal and external parasite control, and bite prevention will also help protect veterinary staff from zoonotic diseases. Veterinarians are accessible and expert sources of information regarding zoonotic diseases and should be prepared to inform clients of risks specific to their community. Written educational information should be made available in hospital and clinic waiting areas and on practice Web sites.

II. ZOONOTIC DISEASE TRANSMISSION

Transmission of pathogens requires 3 elements: a source of the organism, a susceptible host, and a means of transmission between them.[4] Infection control involves eliminating or isolating the source, reducing host susceptibility, or interrupting transmission of the agent.

A. SOURCE:

Animal sources of infection include animals that harbor endogenous microflora that are pathogenic to humans, apparently healthy animals that are carriers of an infectious agent, and animals 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 vaccination status, age, underlying diseases, immunosuppression, pregnancy, and deficiencies in the body's primary defense mechanisms (eg, damage to intact skin, loss of cough reflex, or reduced production of stomach acid). Humans may be immune to or able to resist colonization by an infectious agent, become asymptomatic carriers, or develop illness.

C. ROUTES OF TRANSMISSION:

Pathogens are transmitted via 3 main routes: contact, aerosol, and vector-borne transmission. Some agents may be transmitted by more than 1 route.[4]

1. CONTACT TRANSMISSION

Contact transmission occurs when pathogens from animals or their environments enter the human host through 3 mechanisms: ingestion, cutaneous or percutaneous exposure, or mucous membrane exposure. Direct transmission may occur during examination, bathing, and general handling of animals or during administration of treatments. Indirect transmission involves contact with a contaminated intermediate object, such as during cleaning of cages and equipment or during handling of soiled laundry.[4]

2. AEROSOL TRANSMISSION

Aerosol transmission occurs when pathogens travel through the air to enter the host. Aerosols may be large droplets that are 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 duration of exposure.

Large droplets are created by coughing, sneezing, and vocalization and by procedures such as lancing abscesses and dentistry. Particles that can be inhaled may be generated through procedures such as suction, 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 are *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 veterinary personnel can take to reduce the risk of disease transmission.[4,61,62] In veterinary practice, hand washing is preferred over the use of hand rubs because hands are routinely contaminated with organic material.

Hand washing with plain (nonantimicrobial) 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 transient and resident flora.[63,64] Plain or antibacterial products are appropriate for routine use. To reduce the opportunity for cross-contamination, liquid or foam soap products should be selected rather than bar soaps. 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 with hand hygiene protocols among veterinary staff. 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, and exudates. Staff members who have animal contact should not wear artificial nails and should keep fingernails short.[61,65] Wearing rings may reduce the effectiveness of hand hygiene.[61] Hand washing should focus on thorough cleaning of all hand surfaces.

The correct technique for hand washing is as follows[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 using the disposable towel as a barrier.

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] However, hand rubs are less effective against some nonenveloped viruses (eg, norovirus, rotavirus, and parvovirus), bacterial spores (eg, *Bacillus anthracis* and *Clostridium difficile*), or protozoal parasites (eg, cryptosporidia).[61,68,69]

The correct technique for use of hand rubs is as follows[61]:

- Apply alcohol-based hand rub to palm of 1 hand.
- Cover all surfaces of hands and fingers.
- Continue to rub hands together until dry.

When running water is not available, the mechanical action of a moist wipe may enhance the effectiveness of an alcohol-based hand rub, especially when hands are visibly soiled. In sole use, moist 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 reduce the risk of pathogen transmission by providing barrier protection. Nevertheless, wearing gloves (including sleeves) is not a substitute for hand washing.[70,71] Wearing gloves is not necessary when examining or handling healthy animals. Gloves should be worn when an animal has evidence of disease or its medical history is unknown and worn routinely when contact with feces, blood, body fluids, secretions, excretions, exudates, and nonintact skin is likely. 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 (eg, litters of puppies or kittens, groups of cattle), between dirty and clean procedures performed on a single patient, and whenever torn. Gloves should be removed promptly after use, and contact between skin and the outer glove surface should be avoided. Disposable gloves should not be washed and reused.[72,73] Immediately after glove removal, hands should be washed because gloves can have undetected perforations or hands may be contaminated unknowingly during glove removal.

Gloves are available in a variety of materials. Choice of gloves depends on their intended use. If allergic reactions to latex are a concern, acceptable alternatives include nitrile or vinyl gloves. Further information regarding prevention of allergic reactions to natural rubber in the workplace is provided by NIOSH.[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] such as those generated during lancing of 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 TRACT PROTECTION

Respiratory tract protection is designed to protect the airways of the wearer from infectious agents that are transmitted via 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 during investigations of abor-

tion storms in small ruminants (Q fever), abnormally high mortality rates among poultry (avian influenza), respiratory disease in an *M bovis*–positive herd (bovine tuberculosis), 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 respirator (designed to filter at least 95% of airborne particles) are readily available.[76] Fit-testing is necessary to ensure an effective seal between a respirator and the wearer's face. Additional information about respirators, fit-testing, and the OSHA Respiratory Protection Standard is provided by NIOSH and OSHA.[76,77]

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 they become 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.[4,78,79]

b. *Nonsterile gowns*

Gowns provide better barrier protection than laboratory coats. Permeable gowns can be used for general care of animals 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 animal in isolation, but should be laundered between contacts with different patients or whenever soiled. Use of gloves is indicated whenever gowns are worn, and the outer (contaminated) surface of a gown should only be touched with gloved hands. Gowns and gloves should be removed and placed in the laundry or refuse bin before leaving the animal's environment. Hands should be washed immediately afterwards.[53]

To avoid cross-contamination, gowns should be removed as follows:

- 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 its outer surface and clean surfaces.
- Wrap the gown into a ball 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 (eg, rubber boots for farm work) and should protect personnel from exposure to infectious material as well as from trauma. Recommendations include shoes or boots with thick soles and closed-toe construction that are impermeable to liquid and easy to clean. Footwear should be cleaned to prevent transfer of infectious material from one environment to another, such as between farm visits and before returning from a field visit to a veterinary facility or home. Disposable shoe covers or booties add an extra level of protection when heavy quantities of infectious materials are present or expected.

d. *Head covers*

Disposable head covers provide a barrier when gross contamination of the hair and scalp is expected. Disposable head covers 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 reliance on experienced veterinary personnel rather than owners to restrain animals.[80] Request that owners notify veterinary personnel before contact is initiated if the animal is aggressive. Aggressive tendencies and bite history should be recorded and communicated to personnel. Practitioners should remain alert for changes in their patients' behavior. Veterinary personnel working with large animals should have an escape route in mind at all times.[1,42]

B. PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES:

1. PATIENT INTAKE

Waiting rooms should be a safe environment for clients, animals, and employees.

Aggressive animals and those that have a potentially communicable disease should be placed directly into an examination room. Animals with respiratory or gastrointestinal signs or that have a history of exposure to a known infectious agent should be brought through an entrance other than the main entrance.[81] If possible, an examination room should be designated for animals with potentially infectious diseases.

2. EXAMINATION OF ANIMALS

All veterinary personnel should wash their hands between examinations of individual ani-

mals or animal groups (eg, litters of puppies or kittens, groups of cattle). Routine hand hygiene is the most effective way to prevent transmission of zoonotic diseases. Every examination room should have a source of running water, a soap dispenser, and paper towels. Alcohol-based hand rubs may be provided for use in conjunction with hand washing.

Veterinary personnel should wear protective outerwear and use gloves and other protective equipment appropriate for the situation. Animals with potentially infectious diseases should be examined in a dedicated examination room and should remain there until initial diagnostic procedures and treatments have been performed.

3. INJECTIONS, VENIPUNCTURE, AND ASPIRATION PROCEDURES

a. *Needlestick injury prevention*

Needlestick injuries are of concern in veterinary medical settings because they can result in the inoculation of live vaccines or infective aspirate materials. Additionally, skin breaks from needlesticks can act as a portal of entry for environmental pathogens. The risk of exposure to blood-borne pathogens from needlestick injuries is inherently different in veterinary medicine than in human medicine. Contact with animal blood (except primate blood) has not been reported as a source of occupationally acquired infection; nevertheless, percutaneous and mucosal exposure to blood and blood products should be avoided.

After injection of vaccines containing live organisms or aspiration of body fluids or tissue, the used syringe with the attached needle should be placed in a sharps container (a container designed for safe collection of medical articles that may cause punctures or cuts to those handling them). 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 use of 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 by use of 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 in which animal care occurs.[82–84] After disposal, 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.[82]

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 a 1-handed scoop technique may be employed as follows[85]:

- Place the cap on a horizontal surface.
- Hold the syringe with attached needle in 1 hand.
- Use the needle to scoop up the cap without use of the other hand.
- Tighten the cap by pushing it against a hard surface.

b. *Barrier protection*

Gloves should be worn during venipuncture of animals suspected of having an infectious disease and when performing soft tissue aspiration procedures. Currently, there are no data indicating that venipuncture of healthy animals constitutes an important 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.[86] In 1 study in humans, irrigation of the oral cavity with a 0.12% chlorhexidine solution significantly decreased bacterial aerosolization.[87]

5. RESUSCITATION

The urgent nature of resuscitation increases the likelihood that breaches in infection control will occur. Barrier precautions, such as use of gloves and facial protection, should be applied to prevent exposure to zoonotic infectious agents that may be present. Never blow into the nose or mouth of an animal or into an endotracheal tube for purposes of resuscitation; instead, intubate the animal and use a manual resuscitator or an anesthesia machine or ventilator.

6. OBSTETRICS

Common zoonotic agents, including *Brucella* spp, *C burnetii*, and *Listeria monocytogenes*, may be found in high concentrations in the birthing fluids of aborting or parturient animals and in stillborn fetuses and neonates.[88] Gloves, sleeves, facial protection, and impermeable protective outerwear should be used as needed to prevent exposures to potentially infective materials. Never attempt to resuscitate a nonrespiring neonate by blowing directly into its nose or mouth.

7. NECROPSY

Necropsy is a high-risk procedure because of potential contact with infectious agents in body fluids and aerosols and on contaminated sharps.[75] Nonessential persons should not be present during necropsy procedures. Veterinary personnel should wear gloves, facial protection, and impermeable protective outerwear as needed. In addition, cut-proof gloves should be used to prevent sharps-associated injuries. Respirato-

ry tract 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 handled as though they contained infectious organisms. Protective outerwear and disposable gloves should be worn when handling these specimens. Discard gloves and wash hands before touching clean items (eg, medical records or telephones). Eating and drinking must not be allowed in the laboratory.

C. ENVIRONMENTAL INFECTION CONTROL:

1. ISOLATION OF ANIMALS WITH INFECTIOUS DISEASES

A single-purpose isolation room is recommended for the care and housing of animals with potentially communicable diseases. A designated examination room that can be easily emptied of nonessential equipment and cleaned and disinfected can be transformed into an isolation room. A cage may be brought in for the animal. If an isolation room has a negative pressure air-handling system, the air should be exhausted outside of the building away from animal and public access areas, employee break areas, and air-intake vents.[4,89] Air pressures should be monitored daily while in use.

The isolation room should have signage indicating that the animal may have an infectious disease and detailing what precautions should be taken.[53] Access to the room should be limited, and a sign-in sheet should be used to monitor all people entering the isolation area.

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; if necessary, replacement items should be procured for use elsewhere in the hospital. Items in the isolation area should be disassembled, cleaned, and disinfected prior to removal. Use of disposable articles minimizes exposure of personnel to potentially infective materials. Potentially contaminated materials should be bagged before transport within the practice and disinfected or disposed of according to their level of hazard.[53,84]

Limited data are available regarding 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 or disposal may increase the risk of exposure to pathogens. When a disinfectant footbath is in use, it should be placed just inside the door of the isolation area so that personnel step through it before departing the room.[90] 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 in areas where animals are housed, examined, or treated should be made of nonporous, easily cleaned materials. During cleaning, adequate ventilation should be provided; generation of dust that may contain pathogens can be minimized by use of central vacuum units, wet mopping, dust mopping, or electrostatic sweeping. Surfaces may be lightly sprayed with water prior to mopping or sweeping. Facial protection and control of splatter can minimize exposure to aerosols generated by brushing during cleaning activities. 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.[91] 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.

Routine dish washing of food and water bowls is adequate for hospitalized patients with infectious diseases,[4] although use of disposable dishes should be considered for animals in isolation. Toys, litter boxes, and other miscellaneous items should be discarded or cleaned and disinfected between patient uses. Litter boxes should be cleaned or disposed of at least daily by a nonpregnant 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 items are 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 a washing machine.

4. DECONTAMINATION AND SPILL RESPONSE

Spills and splashes of blood, body fluids, or potentially infective substances should be immediately sprayed with disinfectant and contained with absorbent material (eg, paper towels, sawdust, or cat litter). Personnel should wear gloves and other appropriate protective equipment before beginning the cleanup. The spilled fluids and absorbent material should be picked up and sealed in a leak-proof plastic bag, and the area should be cleaned and disinfected. Animals and people who are not involved in the cleanup 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.[84,92] The AVMA recommends voluntary compliance with the OSHA Bloodborne Pathogen Standard[93] regarding medical waste. It is beyond the scope of this Compendium to describe veterinary medical waste management in detail; for guidance, local or state health departments and municipal governments should be consulted. Additional information regarding state regulating agencies is available from the Environmental Protection Agency.[94]

6. RODENT AND VECTOR CONTROL

Many important zoonotic pathogens are transmitted by insect vectors or rodents. Integrated pest management is a comprehensive approach used to prevent and control pests.[95,96] Measures included in integrated pest management are as follows:

- Seal potential entry and exit points into buildings; common methods include the use of caulk, steel wool, or metal lath 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 (eg, clutter or hay and food storage).
- Maintain rodent traps in the facility and check daily.
- Remove sources of standing water (eg, empty buckets, tires, and 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

It is important to designate staff areas for eating, drinking, or smoking that are separate from patient care areas. Separate and appropriately labeled refrigerators should be used for food for humans, food for animals, and biologics. Dishware for human use should be cleaned and stored away from animal-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]

In addition to maintaining up-to-date emergency contact information, veterinary practices should maintain staff records including details of vaccinations, rabies virus antibody titers, and exposures to infectious organisms to expedite care following occupational health incidents.[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 health-care provider that their work duties involve animal contact.

1. EMPLOYEE VACCINATION POLICIES AND RECORD KEEPING

a. *Rabies*

Veterinary personnel who have contact with animals should be offered preexposure vaccination in accordance with recommendations of the ACIP.[101] Preexposure vaccination consists of 3 doses of a human rabies vaccine; after the first dose (given on day 0), subsequent doses are administered on day 7 and day 21 or 28. Following preexposure vaccination, the ACIP guidelines recommend that rabies virus antibody titers be checked every 2 years for individuals in the frequent risk category, which includes most veterinary personnel in the United States. Preexposure vaccination against rabies does not eliminate the need for appropriate treatment following a known rabies virus exposure, but it does simplify the postexposure treatment regimen (2 doses of vaccine without administration of human rabies immune globulin for preexposure-vaccinated individuals vs 5 doses of vaccine with administration of human rabies immune globulin for individuals who were not previously vaccinated). In addition, preexposure vaccination may protect against unrecognized rabies exposures or when postexposure treatment is delayed.[101]

b. *Tetanus*

Veterinary personnel should be vaccinated against tetanus every 10 years in accordance with ACIP recommendations.[102]

c. *Influenza*

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

2. MANAGEMENT AND DOCUMENTATION OF EXPOSURE INCIDENTS

Display incident response procedures prominently. First aid should be readily available, and personnel should be trained to recognize

and respond to emergency situations. Following the administration of first aid, strongly encourage affected persons to contact an appropriate health-care 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 details as follow:

- Date, time, and location of the incident.
- Name of person injured or exposed.
- Names of other persons present.
- Description of the incident.
- Whether or not a health-care provider was consulted.
- Status of the animal involved (vaccination status, clinical condition, and any diagnostic test results [or tests pending]).
- Documentation of any report to public health authority.
- Plans for follow-up.

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 infection with zoonotic agents and more likely to develop serious complications from zoonotic infections.[107] Immune responses may be suppressed by conditions, including HIV/AIDS, diabetes mellitus, asplenia, pregnancy, certain malignancies, or congenital abnormalities. Certain treatments (eg, administration of corticosteroids, chemotherapeutic agents, and immunosuppressive drugs) and radiation therapy may also suppress immunity. Potentially immunocompromised personnel and their supervisors should be aware that workplace activities with a higher risk of exposure to zoonotic pathogens include processing of laboratory samples and direct patient care, especially care of high-risk animals.[66] These include animals that are young, parturient, unvaccinated, stray or feral, fed raw meat diets, or housed in crowded conditions (eg, shelters); animals with internal or external parasites; wildlife; reptiles and amphibians; and exotic or nonnative species.[66]

Although data regarding the risks of zoonotic infection for HIV-infected persons employed in veterinary settings are limited, there are none that justify their exclusion from the veterinary workplace.[108] Risk of exposure to zoonotic pathogens in the workplace can be mitigated with appropriate infection control measures.[108]

During pregnancy, physiologic suppression of cell-mediated immunity occurs, which increases a woman's susceptibility to certain infectious diseases, such as toxoplasmosis, lymphocytic choriomeningitis, brucellosis, listeriosis, and psittacosis.[109] Vertical transmission of certain zoonotic agents may result in spontaneous abortion, stillbirth, premature birth, 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 health-care provider or an infection control, public health, or occupational health specialist.[110] 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. A model infection control plan that can be tailored to individual practice needs is available (Appendix 3).

Effective infection control plans should do the following:

- Reflect the principles of infection control outlined in this Compendium.
- Be specific to the facility and practice type.
- Be flexible so that new issues can be addressed easily and new knowledge incorporated.
- 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 (eg, reportable disease list, public health contacts, local rabies codes and environmental health regulations, OSHA requirements, Web sites of interest, and client education materials).

A. INFECTION CONTROL PERSONNEL:

Designated staff members should be responsible for development and implementation of infection control policies, monitoring compliance, maintenance of records, and management of workplace exposures and injury incidents. Additional personnel should be assigned responsibil-

ity for completion of infection control activities in support of the plan.

B. COMMUNICATING AND UPDATING THE INFECTION CONTROL PLAN:

1. AVAILABILITY

   Copies of the infection control plan and resource documents should be kept at locations that are readily accessible to all staff, including reception, administrative, animal-care, housekeeping, and veterinary medical personnel.

2. LEADERSHIP

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

3. NEW STAFF

   New staff members should be given a copy of the infection control plan. Detailed training on the practice's infection control policies and procedures, employee vaccination recommendations, and incident reporting should be provided. 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 regular continuing education on zoonotic disease topics should be 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 should be 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.

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Continued on next page.

Appendix 1

Zoonotic diseases of importance in the United States, 2008.

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans[111–113]	Nationally notifiable for human (H) or animal (A) cases	Severe or prolonged infection usually associated with immunosuppression	Deaths in humans reported
Acariasis (mange)	*Sarcoptes scabiei, Notoedres cati,* and other species of mites	Contact	Dogs, cats, horses, goats, sheep, swine, birds	No	No	No
Anthrax	*Bacillus anthracis*	Contact, aerosol, vector	Cattle, sheep, goats, horses	H, A	No	Yes
Avian influenza	Highly pathogenic avian influenza viruses	Contact, aerosol	Poultry, pet birds	H, A	No	Yes
Babesiosis	*Babesia microti* and other species	Vector	Cattle, rodents	A	Yes	Yes
Baylisascariasis	*Baylisascaris procyonis*	Contact	Raccoons	No	No	Yes
Bordetella bronchiseptica infection	*Bordetella bronchiseptica*	Aerosol	Dogs, swine, rabbits, guinea pigs	No	Yes	No
Brucellosis	*Brucella melitensis, Brucella abortus, Brucella suis, Brucella canis*	Contact, aerosol	Goats, cattle, swine, dogs, horses	H, A	No	Yes
Campylobacteriosis	*Campylobacter jejuni, Campylobacter fetus, Campylobacter coli*	Contact	Cattle, sheep, goats, swine, dogs, cats, birds, mink, ferrets, hamsters	No	No	Rare
Capnocytophaga canimorsus infection	*Capnocytophaga canimorsus, Capnocytophaga cynodegmi*	Contact	Dogs, cats	No	Yes	Yes
Cat scratch disease	*Bartonella henselae*	Contact	Cats	No	Yes	Rare
Chlamydiosis (mammalian)	*Chlamydophila abortus, Chlamydophila felis*	Aerosol, contact	Sheep, goats, llamas, cats, cattle	No	No	Yes
Contagious pustular dermatitis (orf or contagious ecthyma)	Parapoxvirus	Contact	Sheep, goats	No	No	No
Cryptococcosis	*Cryptococcus neoformans*	Aerosol	Pigeons, other birds	No	Yes	Yes
Cryptosporidiosis	*Cryptosporidium parvum*	Contact	Cattle (typically calves)	H	Yes	Yes
Dermatophilosis	*Dermatophilus congolensis*	Contact, vector	Goats, sheep, cattle, horses	No	No	No
Dermatophytosis (ringworm)	*Microsporum* spp, *Trichophyton* spp, *Epidermophyton* spp	Contact	Cats, dogs, cattle, goats, sheep, horses, lagomorphs, rodents	No	Yes	No
Dipylidium infection (tapeworm)	*Dipylidium caninum*	Vector	Dogs, cats	No	No	No
Escherichia coli O157:H7 infection	*Escherichia coli* O157:H7	Contact	Cattle, goats, sheep, deer	No	No	Yes
Echinococcosis	*Echinococcus granulosus, Echinococcus multilocularis*	Contact	Dogs, cats, wild canids	A	No	Yes
Ehrlichiosis or anaplasmosis	*Ehrlichia* and *Anaplasma* spp	Vector	Deer, rodents, horses, dogs	H	Yes	Yes
Equine encephalomyelitis	Togaviridae (eastern, western, and Venezuelan equine encephalomyelitis viruses)	Vector	Birds, horses	H, A	No	Yes
Erysipeloid	*Erysipelothrix rhusiopathiae*	Contact	Swine, poultry, fish, crustaceans, mollusks	No	No	Yes
Giardiasis	*Giardia intestinalis* (*Giardia lamblia*)	Contact	Thought to be highly species-specific and rarely transmitted from animals to humans	H	Yes	No
Hantaviral diseases	Hantaviruses	Aerosol	Rodents	H	No	Yes
Herpes B virus infection	Cercopithecine herpesvirus 1	Contact	Macaque monkeys	No	No	Yes
Influenza A	Influenza A virus	Contact, aerosol	Poultry, swine	H, A	No	Yes
Larval migrans: cutaneous (hookworm)	*Ancylostoma* spp	Contact	Dogs, cats	No	No	Rare

Appendix 1

Zoonotic diseases of importance in the United States, 2008 (continued).

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans[111–113]	Nationally notifiable for human (H) or animal (A) cases	Severe or prolonged infection usually associated with immunosuppression	Deaths in humans reported
Larval migrans: visceral, ocular, neurologic (roundworm)	*Toxocara canis, Toxocara cati*	Contact	Dogs, cats	No	No	Rare
Leishmaniasis	*Leishmania* spp	Vector	Dogs, wild canids	A	No	Yes
Leptospirosis	*Leptospira* spp	Contact, aerosol	Rodents, swine, cattle, sheep, goats, horses, dogs	A	No	Yes
Listeriosis	*Listeria monocytogenes*	Contact	Cattle, sheep, goats, swine, birds, dogs, cats	H	Yes	Yes
Lyme disease	*Borrelia burgdorferi*	Vector	Small rodents, wild mammals	H	No	No
Lymphocytic choriomeningitis	Arenavirus (lymphocytic choriomeningitis virus)	Contact, aerosol	Mice, hamsters, guinea pigs	No	Yes	Yes
Monkeypox	Orthopoxvirus	Contact, aerosol	Nonhuman primates, rodents	A	No	Yes
Mycobacterial infection (nontuberculous)	*Mycobacterium avium* complex, *Mycobacterium marinum*	Aerosol, contact	Poultry, birds, aquarium fish, reptiles	No	Yes	Yes
Pasteurellosis	*Pasteurella multocida* and other species	Contact	Dogs, cats, rabbits, rodents	No	Yes	No
Plague	*Yersinia pestis*	Vector, contact, aerosol	Rodents, cats, lagomorphs	H, A	No	Yes
Psittacosis or chlamydiosis	*Chlamydophila psittaci*	Aerosol, contact	Pet birds, poultry	H	Yes	Yes
Q fever	*Coxiella burnetii*	Contact, aerosol, vector	Goats, sheep, cattle, rodents, lagomorphs, dogs, cats	H, A	No	Yes
Rabies	Lyssavirus	Contact	Cats, dogs, cattle and other domestic animals, wild carnivores, raccoons, bats, skunks, foxes	H, A	No	Yes
Rat bite fever	*Streptobacillus moniliformis, Spirillum minus*	Contact	Rodents	No	Yes	Yes
Rhodococcus equi infection	*Rhodococcus equi*	Aerosol, contact	Horses	No	Yes	Yes
Rocky Mountain spotted fever	*Rickettsia rickettsii*	Vector	Dogs, rabbits, rodents	H	No	Yes
Salmonellosis	*Salmonella* spp	Contact	Reptiles, amphibians, poultry, horses, swine, cattle, pocket pets, many species of mammals and birds	H	Yes	Yes
Sporotrichosis	*Sporothirix schenckii*	Contact	Cats, dogs, horses	No	Yes	Rare
Staphylococcosis	*Staphylococcus* species	Contact	Dogs, cats, horses	H (VRSA, VISA)	Yes	Yes (some forms)
Streptococcosis	*Streptococcus* species	Contact, aerosol	Swine, fish, other mammals	H (some forms)	No	Yes (some forms)
Toxoplasmosis	*Toxoplasma gondii*	Contact	Cats	No	Yes	Yes
Trichuriasis (whipworm infection)	*Trichuris suis, Trichuris trichiura, Trichuris vulpis*	Contact	Dogs, swine	No	No	Rare
Tuberculosis, bovine	*Mycobacterium bovis*	Aerosol, contact	Cattle, swine, sheep, goats	H, A	No	Yes
Tularemia	*Francisella tularensis*	Vector, contact, aerosol	Lagomorphs, pocket pets, wild aquatic rodents, sheep, cats, horses, dogs	H, A	No	Yes
Vesicular stomatitis	Vesicular stomatitis virus	Vector, contact, aerosol	Horses, cattle, swine, sheep, goats	A	No	No
West Nile fever	West Nile virus	Vector	Wild birds	H, A	No	Yes
Yersiniosis	*Yersinia enterocolitica*	Contact	Swine, many species of mammals and birds	No	No	No

Data regarding nationally reportable diseases were obtained from the CDC's nationally notifiable infectious diseases list, the World Organization for Animal Health (OIE) notifiable animal diseases list, and the USDA Animal and Plant Health Inspection Service reportable diseases list.[114–116] Cases may also be notifiable at the state level; state veterinarians or state public health veterinarians should be consulted for current listings of reportable diseases in specific areas.

Continued on next page.

Appendix 2

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® DiQuat® 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 •Corrodes metals •Mucous membrane and tissue irritation	•Inactivated by QACs •Requires frequent application •Corrosive •Stains clothes and treated surfaces	•Damaging to some metals	• Can cause skin and eye irritation	
Precautions	Flammable	Carcinogenic		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.

? Information not found

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 3

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 Web site (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 hand washing with soap and running water is preferred. Keep fingernails short. Do not wear artificial nails or hand jewelry when handling animals. Keep hand-washing supplies stocked at all times.
Staff responsible:

Correct hand-washing 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 as a barrier

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 (eg, urine, feces, aspirates, or swabs); and when handling an animal with a suspected infectious disease. Change gloves between examination of individual animals or animal groups (eg, a litter of puppies) and between dirty and clean procedures performed 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 face shield. 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 an isolation room, and after performing a necropsy or other high-risk procedure. Shoes or boots should have thick soles and closed toes and 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 obstetric 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: (health-care 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, if possible, carry the animal or place it on a gurney so that it can be taken directly into a designated examination room.

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

Injections, venipuncture, and aspiration procedures: 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 an uncapped needle from the syringe by hand or place a needle cap in the mouth. Dispose of all sharps in designated containers. After injection of live-organism vaccines or aspiration of body fluids, dispose of used syringes with attached needles in a sharps container. Otherwise, remove the needle by use of 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 or shoulder-length sleeves, facial protection, and impermeable outerwear.

Continued on next page.

Appendix 3 (continued)

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 (eg, 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 (eg, 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 an animal in isolation. Monitor air pressure daily while the room is in use.
Staff responsible:

Cleaning and disinfection of equipment and environmental surfaces: First, clean surfaces and equipment 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 uses 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 (eg, waiting room, examination rooms, treatment area, and kennels) that specifies 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 (eg, 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 cleanup. 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. Refer to the US Environmental Protection Agency Web site 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 covered 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, application of make-up, and similar activities. These activities should never occur in animal-care areas or in the laboratory area. Do not keep food or drink for human consumption in the same refrigerator as food for animals, biologics, or laboratory specimens. Dishes for human use should be cleaned and stored away from animal-care and animal food–preparation areas.

EMPLOYEE HEALTH
Infection control and employee health management: The following personnel are responsible for development and maintenance of the practice's infection control policies, record keeping, and management of workplace exposure and injury incidents.
Staff responsible:

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

Preexposure rabies vaccination: All staff with animal contact must be vaccinated against rabies, followed by periodic titer checks and rabies vaccine boosters, in accordance with the recommendations of the Advisory Committee on Immunization Practices (CDC, 2008).

Tetanus vaccination: Tetanus vaccination must be up to date. Report and record puncture wounds and other incidents. Consult a health-care provider regarding the need for a tetanus booster.

Influenza vaccination: Unless contraindicated, veterinary personnel are encouraged to receive the current influenza virus vaccine. Refer to the Centers for Disease Control and Prevention Web site 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 a health-care provider was consulted, the status of any animals involved (eg, vaccination history, clinical condition, and 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 or 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
- Environmental Protection Agency (EPA)-registered disinfectants
- Occupational Safety and Health Administration (OSHA) regulations
- Animal waste–disposal and biohazard regulations
- Rabies regulations
- Animal control and exotic animal regulations and contacts
- Other useful resources