Preface............................................................................................................................................................. 1254
I. INTRODUCTION .................................................................................................................................. 1254
  A. OBJECTIVES .................................................................................................................................. 1254
  B. BACKGROUND .................................................................................................................................. 1254
  C. SCOPE AND LIMITATIONS ........................................................................................................... 1255
  D. CONSIDERATIONS ......................................................................................................................... 1255
II. ZOONOTIC DISEASE TRANSMISSION AND INFECTION PREVENTION .................................................. 1256
  A. CONTRACT TRANSMISSION ......................................................................................................... 1256
  B. AEROSOL: AIRBORNE AND DROPLET TRANSMISSION .................................................................. 1256
  C. VECTOR-BORNE TRANSMISSION .................................................................................................. 1257
III. VETERINARY STANDARD PRECAUTIONS ............................................................................................ 1257
  A. HAND HYGIENE ............................................................................................................................. 1257
  B. PERSONAL PROTECTIVE ACTIONS AND EQUIPMENT ..................................................................... 1258
  1. Gloves ........................................................................................................................................ 1258
  2. Facial Protection ............................................................................................................................. 1258
  3. Respiratory Tract Protection .......................................................................................................... 1259
  4. Protective Outerwear ..................................................................................................................... 1259
     a. Laboratory coats, smocks, aprons, and coveralls ........................................................................ 1259
     b. Nonsterile gowns ....................................................................................................................... 1259
     c. Footwear .................................................................................................................................. 1260
     d. Head covers ............................................................................................................................... 1260
  C. PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES ....................................................... 1260
  1. Patient Intake .................................................................................................................................. 1260
  2. Animal Handling and Injury Prevention ......................................................................................... 1260
  3. Examination of Animals ................................................................................................................ 1260
  4. Injection, Venipuncture, and Aspiration Procedures ........................................................................ 1260
     a. Needlestick injury prevention .................................................................................................... 1260
     b. Barrier protection ....................................................................................................................... 1261
  5. Dentistry ........................................................................................................................................ 1261
  6. Resuscitation ................................................................................................................................. 1261
  7. Obstetrics ....................................................................................................................................... 1261
  8. Necropsy ....................................................................................................................................... 1261
  9. Diagnostic Specimen Handling ..................................................................................................... 1262
  10. Wound Care and Abscess Treatment ............................................................................................ 1262
D. ENVIRONMENTAL INFECTION CONTROL ......................................................................................... 1262
  1. Cleaning and Disinfection of Equipment and Surfaces .................................................................... 1262
  2. Isolation of Animals with Infectious Diseases ................................................................................. 1263
  3. Handling of Laundry ...................................................................................................................... 1263
  4. Spill Response and Decontamination .............................................................................................. 1263
  5. Medical Waste ............................................................................................................................. 1263
  6. Rodent and Vector Control ............................................................................................................. 1263
  7. Other Environmental Controls ...................................................................................................... 1264
IV. OCCUPATIONAL HEALTH .................................................................................................................... 1264
  A. GENERAL ....................................................................................................................................... 1264
     1. Employee Vaccination Policies and Record Keeping ...................................................................... 1264
        a. Overview .................................................................................................................................. 1264
        b. Rabies ...................................................................................................................................... 1264
        c. Tetanus ..................................................................................................................................... 1264
        d. Influenza ................................................................................................................................. 1264
     2. Management and Documentation of Exposure Incidents .............................................................. 1265
     3. Staff Training and Education ....................................................................................................... 1265
  B. IMMUNOCOMPROMISED PERSONNEL ............................................................................................ 1265
  C. PREGNANCY ..................................................................................................................................... 1265
V. CREATING A WRITTEN INFECTION CONTROL PLAN .......................................................... 1266
    A. INFECTION CONTROL PERSONNEL ............................................................................. 1266
    B. IMPLEMENTING THE INFECTION CONTROL PLAN ...................................................... 1266
        1. Leadership .................................................................................................................. 1266
        2. New Staff .................................................................................................................... 1266
        3. Review and Revision ............................................................................................... 1266
        4. Compliance ............................................................................................................... 1266
        5. Availability ............................................................................................................... 1266
VI. REFERENCES .................................................................................................................. 1266

Appendices
1—Selected zoonotic diseases of importance in the United States, 2015 ............................................. 1272
2—Antimicrobial spectrum of hand-hygiene antiseptic agents ............................................................ 1274
3—Selected disinfectants used in veterinary practice ........................................................................... 1275
4—Model infection control plan for veterinary practices, 2013 .............................................................. 1276

The NASPHV VICC
Carl J. Williams (Co-Chair), DVM, DACVP, State Public Health Veterinarian, North Carolina Department of Health and Human Services, Raleigh, NC 27699.

Joni M. Scheftel (Co-Chair), DVM, MPH, DACVP, State Public Health Veterinarian, Minnesota Department of Health, Saint Paul, MN 55155.

Brigid L. Elchos, RN, DVM, Deputy State Veterinarian, Mississippi Board of Animal Health, Jackson, MS 39207.

Sharon G. Hopkins, DVM, MPH, Public Health Veterinarian, Public Health, formerly of Public Health—Seattle & King County, Seattle, WA 98104.

Jay F. Levine, DVM, MPH, Department of Population Health and Pathobiology, College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27606.

Consultants to the Committee
Michael R. Bell, MD; CDC, Atlanta, GA 30333.

Glenda D. Dvorak, DVM, MPH, Center for Food Security and Public Health, Iowa State University, Ames, IA 50011.

Renee H. Funk, DVM, MPH, NIOSH, National Institute for Occupational Safety and Health (NIOSH), Atlanta, GA 30333.


A. Chea Hall, DVM, AVMA, Schaumburg, IL 60173.


Steven J. Just, DVM, MS, DACVP, USDA APHIS Veterinary Services (USDA APHIS VS), Saint Paul, MN 55107.

Oreta M. Samples, CVT, NPH, DHS, National Association of Veterinary Technicians in America (NAVTA), Alexandria, VA 22304.

Michelle Traverse, CVT, MLA, American Animal Hospital Association (AAHA), Lakewood, CO 80228.

This article has not undergone peer review; opinions expressed are not necessarily those of the AVMA.

Address correspondence to Dr. Williams (carl.williams@dhhs.nc.gov).
I. INTRODUCTION
A. OBJECTIVES
Within the context of a comprehensive employee safety and health program, the objectives of the compendium are to address infection prevention and control issues specific to veterinary practice, provide practical, science-based veterinary infection control guidance, and provide a model infection control plan for use in individual veterinary facilities.

Since 2003, employee safety and health in the veterinary workplace, particularly infection prevention, has garnered increasing attention in the United States and other countries.3–5 The 2003 monkeypox outbreak was a clear example of the risk of zoonotic disease transmission in veterinary practice and led to the development of a novel set of infection control guidelines for veterinarians.6,7 A cohort study8 of potentially exposed veterinary personnel working in veterinary practices in which prairie dogs associated with the outbreak were examined as patients identified occupational risk factors for monkeypox transmission and highlighted the importance of infection control practices.
implement a written accident prevention program to identify and address worksite safety and health hazards.66 This law applies to veterinarians and their staff. A general overview of workers’ rights to a safe workplace under the Occupational Safety and Health Act is available.57

The NORA was initiated in 1996 to stimulate innovative research and improved workplace practices. There are 10 NORA Sector Councils to guide research in each sector (including but not limited to construction, manufacturing, and HCSA).58 The HCSA sector includes all aspects of human health care. However, veterinary medicine and animal care were never included in any of the original sectors. Owing to a relative similarity between veterinary and human medicine, and following the one-health concept, veterinary medicine and pet care were rolled into the NORA HCSA sector in 2013.2 The NORA HCSA sector now identifies goals for improving the workplace safety of veterinary medical and animal care workers.

Within the NORA HCSA sector are several goals that apply to both human and veterinary medical providers. These include the following:

- Promote a culture of safety.
- Reduce the incidence of musculoskeletal disorders.
- Reduce or eliminate exposures to and adverse outcomes from hazardous chemicals.
- Reduce injuries related to sharps.

Also within the NORA HCSA sector are several goals that apply specifically to veterinary medical providers. These include the following:

- Minimize or prevent occupational exposure of personnel to zoonotic diseases.
- Reduce the occurrence of animal-inflicted injuries.
- Minimize or prevent occupational exposures to respiratory hazards.
- Reduce potential reproductive hazards.

C. SCOPE AND LIMITATIONS

This edition of the NASPHV Compendium of Veterinary Standard Precautions provides updated infection prevention recommendations, references, and concepts. However, it should be noted that infection prevention is only 1 component of an employee safety and health program. As indicated in the NORA HCSA goals, worker safety and health extends far beyond preventing zoonotic disease transmission. This compendium provides guidance to minimize transmission of zoonotic pathogens between employees and animal patients. It does not address prevention of disease transmission between patients (nosocomial disease transmission); however, many of the same principles apply.

D. CONSIDERATIONS

In general, provision of a safe work environment is accomplished through the assessment of risks in the workplace and application of a hierarchy of controls to manage those risks. A hierarchy of controls is a systematic method of hazard reduction implemented by employers to control (or eliminate) risks posed by workplace hazards, such as zoonotic diseases (Figure 1).

In the context of zoonotic diseases, the aim is to interrupt the disease transmission cycle at 1 or more points. Transmission of disease requires an infectious source (the animal patient), a susceptible host (the veterinary employee), a route of transmission (contact [direct or indirect], aerosol, or vector-borne transmission), and a portal of entry (eg, an open wound or mucous membrane). A successful control measure will reliably interrupt transmission at some point and could be termed infection prevention. Control measures include the following:

- **Elimination or substitution of the hazard**—In general, this is the most effective measure, as it requires no action on the part of the employee. The hazard has been identified and eliminated. An example would be exclusion of exotic pets or native wildlife from a clinic because of the disease risk; such animals would include macaques and skunks that are associated with a risk of herpes B virus or rabies virus transmission.

- **Engineering controls**—A veterinary clinic is designed to facilitate infection prevention best practices. An example would be placement of sinks for handwashing in convenient locations.

- **Administrative controls**—Clinic policies are adopted that mandate appropriate infection prevention practices. Administrative controls are generally not considered as effective as elimination or engineering controls because they require rigorous adherence to the policy by all employees. Examples would be the requirement for handwashing between patient contacts, no recapping of needles, and rabies vaccination of staff.

- **PPE**—This control measure is generally considered the least effective and the last line of defense because it requires the most action from the employee. The use of PPE requires routine adherence to and appropriate use of a variety of equipment and is dependent on employee training. Personal protective equipment is frequently and appropriately used in veterinary practice when engineering and administrative control options are limited. An example would be wearing a mask and face shield while performing dental procedures.

The VSP are derived from standard precautions applicable to human medicine, which are the cornerstone of infection prevention in human health-care settings.59 In addition, the VSP also include strategies to reduce the potential for animal bites and other trauma that may result in exposure to zoonotic pathogens. During their careers, approximately two-thirds of veterinarians report a major animal-related injury that resulted in lost work time or hospitalization.60–62 The most common occupational injuries among veterinary personnel include animal bites and scratches, kick and crush injuries, and needlesticks.63–72
The VSP described in this document should be used consistently by veterinary personnel—regardless of the clinical condition or the presumed diagnosis of animals in their care—whenever personnel may be exposed to potentially infectious materials including feces, blood, body fluids, vomitus, exudates, work surfaces contaminated with these items, and nonintact skin. Although the VSP are intended to be adaptable to individual practice needs and circumstances, any modifications should adhere to basic principles of infection prevention and comply with federal, state, and local regulations.

Although it may not be possible to eliminate all zoonotic disease hazards, employers should conduct a workplace risk assessment and implement appropriate control measures where possible. Adherence to a well-developed employee safety and health program will minimize the risk of injury and illness. This compendium provides reasonable guidance for minimizing 1 type of workplace hazard—zoonotic disease transmission—among veterinary personnel in clinical settings through the application of the VSP.

II. ZOONOTIC DISEASE TRANSMISSION AND INFECTION PREVENTION

Pathogens are transmitted via 3 major routes: contact, aerosol, and vector-borne. Some agents may be transmitted by multiple routes of infection. Infection prevention or control refers to policies and procedures used to minimize the risk of spreading pathogens through any of these routes of transmission.

A. CONTACT TRANSMISSION

Contact transmission occurs when pathogens from animals or their environments enter a human host through ingestion or through cutaneous, percutaneous, or mucous membrane exposure. Many zoonotic pathogens are transmitted from animals to people by hand-to-mouth contact either directly from animals or indirectly through the environment. Direct transmission may occur during examination, treatment, and handling of animals. Indirect transmission involves contact with a contaminated intermediate—objects such as cages, equipment, workplace surfaces, and soiled laundry. The role of the clinic or work environment in transmission of disease can be very important.16,19,73–75

B. AEROSOL: AIRBORNE AND DROPLET TRANSMISSION

Droplet transmission occurs when droplets created by coughing, sneezing, and vocalization
are deposited on the mucous membranes. These droplets are typically large, can generally travel only approximately 1 to 2 m (3 to 6 feet), and do not remain suspended in the air. Procedures such as lancing abscesses or dentistry can also produce droplets. Examples of zoonotic pathogens that are transmitted by droplets include avian influenza virus and *Rhodococcus equi*. Risk of pathogen transmission increases with proximity to the source and duration of exposure.

Airborne transmission occurs when small droplets or particles that are created remain suspended in the air for extended periods and are inhaled. These small droplets or particles can be disseminated by air currents in a room or through a facility. They may be generated through medical procedures such as suction and bronchoscopy and during cleaning, particularly with high-pressure sprays. Certain airborne pathogens may remain infective over long distances depending on particle size, the nature of the pathogen, and environmental factors.59,76 Two zoonotic pathogens transmitted over long distances are *Coxiella burnetii* and *Mycobacterium bovis*.

### C. 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 the risk of exposure to arthropods.

### III. VETERINARY STANDARD PRECAUTIONS

#### A. HAND HYGIENE

Consistent, thorough hand hygiene is the single most important measure veterinary personnel can take to reduce the risk of zoonotic disease transmission. Most common pathogens are transmitted by hand-to-mouth contact either directly from animals or indirectly through the environment.82–84 Hand hygiene includes hand-washing with soap and water, the use of alcohol-based hand rubs, and appropriate use of gloves. Adequate hand hygiene may include washing the forearms when contamination extends beyond the wrist.

Hand hygiene should be performed after contact with feces, body fluids, vomitus, or exudates; after contact with articles contaminated by these substances; after contact with environmental surfaces in animal areas; and after removing gloves. Hand hygiene should be consistently performed between examinations of individual animals or animal groups (eg, litters of puppies or kittens, groups of cattle).

Either plain or antimicrobial soaps are appropriate for routine handwashing, which removes loosely adherent transient flora from the hands.85 Transient flora reside in the uppermost layers of the stratum corneum; are acquired through contact with animals, people, or the environment; and are most frequently associated with infection transmission. Transient flora may be removed by the mechanical friction or detergent properties of soap and water or killed by antiseptic agents. In contrast, resident flora are of low pathogenicity, are permanent residents of the deeper layers of the skin, and are not susceptible to mechanical removal; if the goal is to reduce their numbers, such as when scrubbing for a surgical procedure, an antiseptic agent must be used.86 Several antiseptic products with variable efficacy against different classes of microorganisms are available (Appendix 2).52,84,86

Hand soaps may be susceptible to bacterial overgrowth and have been associated with nosocomial infections.87 To prevent creation of a bacterial reservoir or cross-contamination, no additional soap should be added to liquid soap dispensers before they are empty (ie, they should not be topped off); once completely empty, refillable dispensers should be cleaned and dried, then refilled with liquid soap or sealed soap refills.82 Water temperature has little effect on the removal of microorganisms from hands, but warm (as opposed to cold) water improves compliance.88 Moisturizing soaps and lotions can preserve skin integrity and encourage adherence to hand hygiene protocols among veterinary staff. Dry, cracked skin is painful, indicates compromised skin integrity, and is more likely to be colonized with staphylococci and gram-negative organisms.82 When hand lotions are used, personal containers are recommended over use of shared dispensers to prevent contamination.

Staff members who have animal contact should not wear artificial nails and should keep fingernails short.82,89 Wearing rings and other jewelry reduces the effectiveness of hand hygiene; as a result, the skin underneath rings and other jewelry can become more heavily colonized with organisms.82 Additionally, the use of community or shared towels should be avoided. Disposable towels should be used for the drying of hands.82,90

Alcohol-based hand rubs are fast-acting, broad-spectrum germicides that kill microorganisms by denaturing microbial proteins.85 They lack residual activity, but can be combined with other antiseptic products (eg, chlorhexidine or triclosan) to enhance persistence (Appendix 2). Hand rubs are generally well tolerated owing to the addition of emollients. Hand rubs, when properly applied for 30 seconds to hands that are not visibly soiled, are highly effective against bacteria, many fungi, and enveloped viruses.82,31–41 Hand rubs are less effective against bacterial spores, protozoal parasites, and some nonenveloped viruses.82,104,106 In the field, when running water is not available and hands are visibly soiled, use of a moist wipe to remove organic material prior to application of an alcohol-based hand rub may increase the effectiveness of hand hygiene. Use of moist wipes alone is not recommended.82 The CDC recommends hand rubs...
B. PERSONAL PROTECTIVE ACTIONS

Avoid hand contact.

AND EQUIPMENT

are not feasible or do not provide sufficient protection. Engineering, work practice, and administrative controls are not always available, such as in examination rooms and outdoor stalls. However, it is important to train staff that the visible presence of organic matter (eg, blood or feces) on hands will greatly decrease the efficacy of alcohol-based hand rubs.

The importance of hand hygiene cannot be overemphasized. Personal adherence to hand hygiene protocols can be negatively influenced by several factors including inaccessible hand hygiene supplies, skin irritation, high workload, and insufficient time. Compliance with hand hygiene protocols among veterinary personnel can be improved when adherence is made as simple and convenient as possible, with regular training uniquely tailored to individual workplaces and delivered in innovative ways, and, most importantly, when senior team members consistently display good hand hygiene practices.

Correct handwashing procedure:

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

Correct use of hand rubs:

- Place alcohol-based hand rub in palms.
- Apply to all surfaces of hands.
- Rub hands together until dry.

B. PERSONAL PROTECTIVE ACTIONS

AND EQUIPMENT

The following sections highlight a variety of PPE intended to prevent the transmission of zoonotic infectious agents to veterinary employees. However, the personal protective value of PPE is realized only if there is a collective culture that supports the use of PPE and if the necessary gloves, face shields, respirators, gowns, and other supplies are readily accessible when needed.

Personal protective equipment is equipment worn to minimize exposure to serious workplace injuries and illnesses. As stated by OSHA, “when engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, employers must provide PPE to their workers and ensure its proper use. Employers are also required to train each worker required to use PPE to know:

- When it is necessary
- What kind is necessary
- How to properly put it on, adjust, wear, and take it off
- The limitations of the equipment
- Proper care, maintenance, useful life, and disposal of the equipment.”

1. Gloves

Gloves reduce the risk of pathogen transmission by providing a barrier that can be efficiently removed when soiled. Gloves should be worn routinely when contact with feces, body fluids, vomitus, exudates, and non-intact skin is likely. They should be worn when performing dental or obstetric procedures, resuscitations, and necropsies and when handling diagnostic specimens (eg, urine, feces, aspirates, or swabs). Gloves should also be used when cleaning cages, litter boxes, and contaminated equipment and environmental surfaces in animal areas and when handling dirty laundry. Gloves should also be worn when personnel have wounds or other compromised skin integrity of the hands. Gloves are not necessary when examining, handling, vaccinating, or obtaining a blood sample from most healthy animals, provided good hand hygiene is practiced.

Gloves should be changed between examinations of individual animals or animal groups, between dirty and clean procedures performed on a single patient, and whenever torn. Gloves should never be washed and then reused for another procedure. Gloves should be removed immediately after use and before beginning other activities. During removal, care should be taken to avoid skin contact with the outer glove surface. Wearing gloves (including palpation sleeves) does not preclude the need for hand hygiene. Handwashing should be performed or alcohol-based hand rubs should be used immediately after glove removal because gloves may have undetected microperforations or hands may be contaminated during glove removal.

Gloves are available in a variety of materials, such as latex, nitrile, and vinyl. Choice of gloves depends on their intended use; a range of sizes should be available to encourage use. Some personnel exposed to latex may experience allergic reactions. Further information regarding prevention of allergic reactions to natural rubber latex in the workplace is provided by the National Institute for Occupational Safety and Health.

2. Facial Protection

Facial protection prevents exposure of the mucous membranes of the eyes, nose, and mouth to infectious materials. Facial protection should be used whenever exposure
to splashes or sprays is likely to occur (eg, when lancing abscesses, flushing wounds, or suctioning and when performing dentistry, obstetric procedures, or necropsies). Nonsterile gowns are generally worn when attending a single patient to protect the wearer and prevent movement of infectious material from one location to another. Permeable gowns can be used for general care of animals in isolation. Impermeable gowns should not be worn outside the work environment, and coveralls should be washed between visits to different farm premises, facilities, locations, or herds.

b. Nonsterile gowns

Nonsterile gowns are generally worn when attending a single patient to protect the wearer and prevent movement of infectious material from one location to another. Permeable gowns can be used for general care of animals in isolation. Impermeable gowns should not be worn outside the work environment, and coveralls should be washed between visits to different farm premises, facilities, locations, or herds.

a. Laboratory coats, smocks, aprons, and coveralls

Laboratory coats, smocks, aprons, and coveralls serve as a temporary layer of protection that prevents contamination of the wearer's garments. Protective outerwear should be worn when attending animals and when conducting cleaning chores. In situations where splashing or soaking with potentially infectious liquids is anticipated, impermeable outerwear, such as a disposable plastic apron, should be used.

Garments should be changed and laundered daily and whenever they become visibly soiled or contaminated. Protective outerwear should not be worn outside the work environment, and coveralls should be washed between visits to different farm premises, facilities, locations, or herds.

b. Nonsterile gowns

Nonsterile gowns are generally worn when attending a single patient to protect the wearer and prevent movement of infectious material from one location to another. Permeable gowns can be used for general care of animals in isolation. Impermeable gowns should not be worn outside the work environment, and coveralls should be washed between visits to different farm premises, facilities, locations, or herds.

4. Protective Outerwear

Protective outerwear includes laboratory coats, smocks, aprons, coveralls, nonsterile gowns, foot-
c. Footwear

Footwear should be suitable for the specific working conditions (eg, rubber boots for farm work) and should protect personnel from both trauma and exposure to infectious material. Recommendations include shoes or boots with thick soles and closed-toe construction that are impermeable to liquids 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 known or expected to be present. When leaving contaminated work areas, promptly remove and dispose of shoe covers and booties. Disposable shoe covers should not be worn on slippery surfaces; water-impervious boots that can be disinfected after use should be worn as an alternative.

d. Head covers

Disposable head covers provide a barrier when contamination of the hair and scalp may occur, such as in livestock barns, or in situations involving airborne pathogens. Disposable head covers should not be reused.

C. PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES

1. Patient Intake

Waiting rooms should be a clean and safe environment for clients, animals, and veterinary personnel. Staff training regarding waiting room protocol for reception area personnel should include instruction to pose basic questions to incoming clients about the reason for the visit and to observe every pet for behavioral cues and outward signs of illness. Animals that are fearful, are aggressive, or have a known exposure to an infectious agent should bypass the waiting room and be placed directly into an examination or isolation room, as should those with the following so-called red flag signs: neurologic signs, diarrhea, respiratory tract signs, fever, infected wounds, or chronic infection. Consider providing alcohol-based hand rub dispensers in the waiting room and at the desks where clients check in and out.

2. Animal Handling and Injury Prevention

Proper handling and restraint of animals decrease the possibility of staff receiving bites, scratches, needlesticks, and other animal-related injuries, which are associated with risk for zoonotic infections. Most injuries among veterinary personnel occur during animal handling or treatment. Preventive measures include reliance on experienced veterinary personnel rather than owners to restrain animals and the use of muzzles, bite-resistant gloves, and sedation or anesthesia as necessary. Veterinary personnel should be trained to remain alert for changes in a patient's behavior. Aggressive or fearful tendencies and bite history should be recorded in the patient's record, communicated to personnel, and indicated with signage on cages and enclosures. Those working with large animals are at risk for kick and crush injuries. Proper livestock-handling equipment should be used, and an escape route should be kept in mind at all times. Veterinarians have the right to refuse services if large animal–handling facilities are not available or are not adequate to ensure their safety and the safety of those assisting them. Similarly, veterinarians have the right to refuse to provide services for clients with exotic species or wildlife that cannot be handled safely because of physical infrastructure or clinician or staff training limitations.

Preplanning, adequate equipment, and clear communication with coworkers while working with animals are key to preventing animal-related injuries. First aid supplies, including eyewash, should be readily available, and personnel should know where the supplies are located and how to use them. Incident response procedures should be displayed prominently.

3. Examination of Animals

Animals with potentially infectious diseases should be examined in a dedicated examination or isolation room and should remain there until initial diagnostic procedures and treatments have been performed. Contact with animals suspected of having an infectious disease should be limited to essential personnel who should wear protective outerwear and use gloves and other protective equipment appropriate for the situation.

The examination room used for this purpose should remain out of service until properly cleaned and disinfected. Every examination room should have an easily accessible source of running water, a soap dispenser, and paper towels. In addition, it is recommended that alcohol-based hand rubs be available in the examination room.

4. Injection, Venipuncture, and Aspiration Procedures

a. Needlestick injury prevention

Needlesticks are common in veterinary medicine, can cause serious injury, and may result in a loss of work time. Needlesticks may result in the inoculation of vaccines containing live organisms, harmful chemicals, hormones, chemotherapeutics, or infective materials; in ad-
dition, the wound can serve as a portal of entry for pathogens.\textsuperscript{11} Needlestick injuries are preventable. Following the passage of the Needlestick Safety and Prevention Act in 2000, percutaneous injuries among human hospital employees decreased by 38\% in the first year of implementation and remained low in subsequent years.\textsuperscript{134} To promote a culture of safety and reduce workplace injuries, a NORA HCSA goal of promoting the use of safety devices to prevent needlestick injuries among veterinary personnel employed in all work settings has been set.\textsuperscript{7} Records of needlestick injuries should be kept and analyzed so that interventions specific to the practice may be implemented and protocols corrected as necessary.

Clinic personnel should be educated regarding the serious nature of needlestick injuries. Trained personnel should restrain animals to minimize needlestick injuries resulting from animal movement. Veterinary staff should not bend needles, pass an uncapped needle to another person, or walk around with uncapped needles. Needle caps should never be placed in the mouth. Needles should not be recapped unless the 1-handed scoop method is used:

- 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.
- Secure the cap by pushing it against a hard surface.\textsuperscript{135}

An approved sharps container (puncture- and leak-proof container designed for the safe collection of sharp medical articles for disposal) should be located in every area in which animal care occurs.\textsuperscript{136–138} Following most veterinary procedures, a forceps can be used to remove the uncapped needle from the syringe, and the needle alone can be placed in the sharps container. Uncapped needles should never be removed from a syringe by hand. After aspiration of infectious materials or injection of vaccines containing live organisms, the used syringe with needle attached should be placed in a sharps container. Sharps containers should not be overfilled, and sharps should not be transferred from one container to another. Disposal of sharps and sharp containers must be done in accordance with applicable state and local laws.

b. \textbf{Barrier protection}

Currently, there are no data indicating that venipuncture of healthy animals constitutes an important risk of exposure to pathogens, and contact with animal blood (except primate blood) has not been reported as a source of occupationally acquired infection. Appropriate PPE should be worn when procedures are performed on animals suspected of having an infectious disease that may result in exposure to blood or other potentially infectious materials.

5. \textbf{Dentistry}

Dental procedures can generate splash- es, sprays, and large droplets that are potentially infectious. Veterinary personnel and anyone in range of direct splashes or sprays should wear protective outerwear, a head cover, gloves, and facial protection. Dental procedures should be performed in a dedicated space—ideally a dental suite—with separate, dedicated equipment and appropriate ventilation.\textsuperscript{139} Environmental surfaces can be easily contaminated during dental procedures. These surfaces should be cleaned and disinfected between patients and at the end of daily work activities.\textsuperscript{140}

6. \textbf{Resuscitation}

The urgent nature of resuscitation increases the likelihood that breaches in infection control will occur. Standard emergency protocols and regular staff training regarding resuscitation are very important to minimize risk and reduce exposures. Barrier precautions, such as the use of gloves and facial protection, should be implemented 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; instead, intubate the animal and use a manual resuscitator, anesthesia machine, or ventilator.

7. \textbf{Obstetrics}

Zoonotic agents, including \textit{Brucella} spp, \textit{C. burnetii}, and \textit{Listeria monocytogenes}, may be found in high concentrations in the birthing fluids of aborting or parturient animals and in stillborn fetuses and infected neonates. Gloves or sleeves, facial protection, and impermeable protective outerwear should be used routinely to prevent exposure to potentially infectious materials.\textsuperscript{141} Respiratory tract protection should be used when investigating abortions attributable to \textit{C. burnetii} infection (Q fever) or when other airborne pathogens are known or suspected risks.\textsuperscript{142}

8. \textbf{Necropsy}

Necropsy is a high-risk procedure because of the possibility of injury and potential contact with infectious agents in body tissues, body fluids, and aerosols.\textsuperscript{117,120} Nonessential persons should not be present during necropsy procedures. Veterinary personnel should routinely wear gloves, facial protection, and impermeable protective outerwear. In addition, eye protection
and respiratory tract protection used in the context of a respiratory tract protection program should be employed when hand saws or other power equipment is used or there is a high probability of exposure to a zoonotic pathogen. Cut-proof gloves should be used to prevent sharps-associated injuries.

9. Diagnostic Specimen Handling

Samples of feces, urine, or vomitus; aspirate specimens; and swabs collected from the general population should be handled as though they contain infectious organisms. The sample containers should be clear and detailed labeling and be stored in a designated refrigerator. Protective outerwear and disposable gloves should be worn when these specimens are handled. Discard gloves and wash hands before subsequently touching clean items such as telephones, medical records, or computer keyboards. Specimens shipped for diagnostic testing must be packaged and labeled according to applicable regulations.

10. Wound Care and Abscess Treatment

Many zoonotic pathogens can be associated with wound infections and abscesses. Veterinary personnel should wear protective outerwear and gloves for debridement, treatment, and bandaging of wounds; facial protection should be worn when abscesses are lanced and wounds are lavaged. Hand hygiene should be performed after gloves are discarded and following removal of outerwear. Animals with infected wounds should be prevented from contaminating environmental surfaces, including floors. Used bandage materials and equipment such as bandage scissors and clipper blades should be considered contaminated and handled accordingly. Leftover bandaging material should be sterilized (autoclaved or gas sterilized) prior to storage for reuse because unused bandaging material may become contaminated with methicillin-resistant \textit{S. aureus} and other wound pathogens during wound care.

D. ENVIRONMENTAL INFECTION CONTROL

The veterinary clinic environment can potentially serve as a source of pathogens for staff and patients. Controlling this potential reservoir of infection is increasingly recognized as an important component of infection control and prevention. Surfaces in a clinic can become contaminated with methicillin-resistant \textit{S. aureus}, \textit{Salmonella} spp, and other pathogens; once introduced onto a surface, some pathogens may persist for months in the facility and serve as a source of infection for animals, their owners, and veterinary employees. Additional equipment (eg, stethoscopes) can become contaminated with pathogens following physical examination. Guidelines have been developed for hospital layout and design that address infection control issues and provide for ease of cleaning and disinfection of environmental surfaces.

1. Cleaning and Disinfection of Equipment and Surfaces

Regular cleaning and disinfection of equipment and surfaces is critical for environmental control of pathogens. Equipment and surfaces must be cleaned with water and detergent before they are disinfected because organic material decreases the effectiveness of most disinfectants. An EPA-registered disinfectant should be used according to label instructions, with attention to storage conditions, proper dilution, and contact time. When selecting a disinfectant, ensure that users will be able to accommodate all label requirements, including appropriate contact time. Quaternary ammonium compounds and hypochlorites are the most common disinfectants used on environmental surfaces in veterinary practices; however, hydrogen peroxide–based oxidizing agents are also effective against a wide range of veterinary microbes (Appendix 3).

Equipment and surfaces should be cleaned and disinfected between uses or whenever visibly soiled. Special attention should be paid to surface areas with high contact rates (eg, examination tables, door knobs, cage latches, faucet handles, and sinks). A written checklist should be developed for each area of the facility (eg, waiting room, examination rooms, treatment area, surgery suite, and kennels) that specifies the frequency of cleaning, disinfection procedures, products to be used, and the staff responsible. At a minimum, staff should perform hand hygiene after they have finished cleaning and before beginning other tasks.

Surfaces in areas where animals are housed, examined, or treated should be made of nonporous, easily cleaned materials. Generation of dust that may contain pathogens can be minimized by use of vacuums with high-efficiency particulate air filters, wet mopping, dust mopping, or electrostatic sweeping. Surfaces may be lightly sprayed with water prior to mopping or sweeping to minimize dust generation (wet mopping). Use of high-pressure sprayers and similar devices that can disseminate infectious particles should be avoided. However, if procedures that may generate infectious aerosols are undertaken, appropriate PPE should be worn.

Cleaning products and disinfectants may contain components harmful to human health. It is incumbent on employers to provide appropriate training as required by OSHA. This training must detail all physical, chemical, and biological hazards in the...
workplace, and each cleaning and disinfectant products’ label and safety data sheet should be easily accessible.\textsuperscript{155}

Routine dishwashing is sufficient to clean food and water bowls used for most hospitalized patients. 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.

2. Isolation of Animals with Infectious Diseases

Animals with suspected or confirmed communicable diseases should be identified prior to arrival if possible and be examined, cared for, and housed in designated isolation rooms (small animals) or areas (large animals) to protect other patients and veterinary personnel. Isolation procedures should be prominently posted.\textsuperscript{116} Isolation rooms or areas should be identified with signage, access should be limited, and a sign-in log should be used.

Only the equipment and materials needed for the care and treatment of the patient should be kept in an isolation room or area, and isolation supplies should not be removed for use elsewhere. Whenever possible, use of disposable articles such as bowls, litter pans, and gowns is recommended. Equipment that must be removed from the isolation room or area should be disassembled, cleaned, and disinfected prior to removal to prevent contamination of other areas of the hospital. Potentially contaminated materials should be bagged before transport within the facility and disinfected or disposed of in accordance with state rules governing disposal of medical waste.\textsuperscript{160,166}

Limited data are available regarding the effectiveness of footbaths and foot mats for infection control in private veterinary practices.\textsuperscript{157–159} Footbaths and foot mats are difficult to maintain properly, which limits their efficacy. Disposable, impermeable shoe or boot coverings made of plastic should be considered for use in isolation rooms. All PPE used when attending animals in isolation should be donned immediately prior to and doffed following care for the animal in an effort to limit movement of infectious organisms within the facility.

3. Handling of Laundry

Although soiled laundry may be contaminated with pathogens, the risk of disease transmission is negligible when soiled items are handled correctly.\textsuperscript{160} Personnel should check pockets for sharps before items are removed and laundered. Gloves and protective outerwear should be worn when handling soiled laundry. Bedding and other laundry should be machine washed with any standard laundry detergent and machine dried at the highest temperature suitable for the material.\textsuperscript{161} To prevent cross-contamination, separate storage and transport bins should be used for clean and dirty laundry. When soiled clothing is laundered at home, it should be transported in a sealed plastic bag, kept separate from household laundry, emptied from the bag directly into a washing machine, and thoroughly machine dried after completion of the wash cycle.\textsuperscript{162–164}

4. Spill Response and Decontamination

Spills and splashes of potentially infective substances should be immediately contained with absorbent material (eg, paper towels, sawdust, or cat litter). Personnel should wear PPE sufficient to protect against potentially infective substances in the spill and the cleaning or disinfectant agent selected for use. The safety data sheet for each EPA-registered disinfectant will indicate appropriate PPE for use with the product.\textsuperscript{165} The spilled fluids and absorbent material should be collected and sealed in a leak-proof plastic bag, and the area should be cleaned and disinfected. An EPA-registered disinfectant should be used with attention to storage conditions, label instructions, and contact time. Animals and people who are not involved in the cleanup should be kept away from the area until disinfection is completed. Creating a spill response kit with instructions in advance may expedite cleanup processes and enhance worker safety.

5. Medical Waste

Medical waste is regulated at the state level, and employers should become familiar with the applicable laws in their state.\textsuperscript{166} Medical waste is defined by the EPA as “any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals.”\textsuperscript{167} Sharps and regulated medical waste are generally considered subsets of medical waste, and proper management of them is also based on state medical waste laws.

6. Rodent and Vector Control

Field veterinarians and any accompanying support personnel are likely to have the greatest risk of exposure to arthropod vectors that may transmit zoonotic pathogens. However, the risk of illness for any particular infection is not uniform across the United States.\textsuperscript{168,169} Regardless of the geographic location of the field work, permethrin-treated clothing has been demonstrated to be highly effective at reducing tick bites and would be recommended for those veterinarians and assistants with occupational
exposures. Animals may act as mechanical carriers for ticks, and it is important to check patients as they enter a clinic to limit introduction of arthropod vectors into the indoor work environment.

Integrated pest management is the recommended approach to the control of rodents and vectors in veterinary medical buildings. Integrated pest management is a comprehensive approach to pest control based on an understanding of the life cycle and ecological niche of the pest. Pest populations are controlled largely by creating unfavorable environments; by removing the air, moisture, food, or shelter that pests need to survive; or by blocking access to buildings. Pesticides and rodent traps may be used as part of a comprehensive plan that includes environmental control measures as follows:

- Sealing of potential entry and exit points into buildings with caulk, steel wool, or metal lath.
- Storage of food and garbage in metal or thick-plastic containers with tight lids.
- Disposal of food waste promptly.
- Elimination of potential rodent nesting sites (eg, clutter).
- Removal of sources of standing water (eg, empty buckets, tires, and clogged gutters) to reduce potential mosquito breeding sites.
- Installation and maintenance of window screens to prevent entry of insects and rodents.

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

7. Other Environmental Controls

It is important to provide an employee break room or area for eating and drinking. Such activities should be prohibited in laboratories, treatment rooms, and other patient care and housing areas. Separate, appropriately labeled refrigerators should be used for human food, animal food, biologics, and laboratory diagnostic samples. Dishware for human use should be washed and stored away from animal-care areas.

IV. OCCUPATIONAL HEALTH

A. GENERAL

Veterinary clinic managers should develop a comprehensive employee safety and health program on the basis of their own workplace risk assessment addressing the potential for animal-related and non-animal-related occupational injuries and illnesses. Utilizing control measures that place the least amount of burden on the individual employee will be most effective. Personal protective equipment (while often essential) represents the least effective and least desirable control measure in any workplace environment. Some elements to consider when implementing a safety and health program follow.

1. Employee Vaccination Policies and Record Keeping

a. Overview

Veterinary practices should maintain up-to-date emergency contact information and staff records including vaccinations and rabies virus antibody titers. Employee health information should be collected on a voluntary basis and confidentially maintained. Employees should inform their supervisor of changes in health status, such as pregnancy, that may affect work assignments. New employees should receive training regarding the importance of informing their health-care provider that their work duties involve contact with animals.

b. Rabies

Veterinary personnel should receive pre-exposure rabies vaccination and antibody titer checks in accordance with the ACIP recommendations. Preexposure immunization against rabies consists of 3 IM doses of vaccine administered on days 0, 7, and 21 or 28. Periodic titer checks (generally every 2 years) should be performed, and a single rabies booster should be administered when immunity is defined as less than adequate by the performing laboratory. It should be emphasized that preexposure vaccination against rabies does not eliminate the need for additional rabies vaccinations following a known rabies virus exposure. It does, however, simplify the rabies postexposure treatment, and it may be protective in cases of unrecognized rabies exposure or when postexposure treatment is delayed.

c. Tetanus

Tetanus prophylaxis and prevention recommendations for veterinary personnel are no different than those for the general public. However, because animal bites are tetanus-prone wounds, veterinarians and their staff may be at an elevated risk of exposure. Veterinary staff should receive a routine tetanus vaccination every 10 years in accordance with ACIP recommendations. New personnel should be screened to ensure they are currently vaccinated for tetanus. Additionally, if a person sustains a wound, including a bite wound, and it has been more than 5 years since his or her last tetanus booster, a single dose of Tdap (tetanus, diphtheria, and pertussis) or Td (tetanus and diphtheria) vaccine should be administered. Persons who are not adequately immunized against tetanus may require tetanus immune globulin in addition to vaccine.
d. Influenza
Owing to their extensive contact with animals and the public, veterinary personnel should receive influenza vaccine or vaccines in accordance with ACIP guidelines.181–185

2. Management and Documentation of Exposure Incidents
Workplace injuries and illnesses will still occur despite best efforts to identify and reduce hazards. The management team should review recent work-related injuries and illnesses in the practice to ascertain any patterns or cause. Additional or new administrative or engineering controls may be warranted. Another important step is to conduct refresher training for employees that addresses the cause of the incident and covers new control measures.

Pursuant to OSHAs recordkeeping and reporting requirement (29 CFR 1904), employers must complete the following186:
- Form 301: Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must complete this injury and illness incident report form that is specific to an individual event. This form will contain information about individual employee health and must be used in a manner that protects confidentiality of employees. You must keep this form on file for 5 years following the year to which it pertains.
- Form 300: Each incident, as recorded on Form 301, must be entered on Form 300. This is an injury and illness log that contains summary information for each event recorded on a Form 301. This will help employers identify trends and complete Form 300A. This form will contain information about individual employee health and must be used in a manner that protects confidentiality of employees.
- Form 300A (summary of injuries and illnesses): This report summarizes, for all employees, the number of work-related injuries and illnesses, the number of days away from work, and the total numbers of injury and illness types. This form will not contain confidential information and must be publicly posted for employees to review.
- Employers with 10 or fewer employees throughout the previous calendar year are not required to complete these forms. This exemption applies to employers in states with federal as well as state OSHA plans.197

3. Staff Training and Education
Comprehensive staff training and education are essential components of an effective employee safety and health program. Training should have defined objectives and a means of measuring the effectiveness of the training.188 Furthermore, all training, whether written or oral, must be provided at a level of complexity and in a language that employees can understand.188 Before new staff begin work, they should receive training that emphasizes infection control practices and the clinic infection control plan, the potential for zoonotic disease exposure, hazards associated with work duties, and injury prevention.198,199,200 Training should also include instruction in animal handling, restraint, and behavioral cue recognition. Additional in-service training should be provided at least annually and as recommendations or policies change. Staff participation in infection control and hazard awareness training should be documented.

Although training is critical to reducing the incidence of occupational illness and injury, remember that it is only 1 component of an employee safety and health program. Practice managers and supervisors must ensure that all feasible engineering and administrative controls have been implemented on the basis of a workplace risk assessment.

B. IMMUNOCOMPROMISED PERSONNEL
Personnel with a weakened immune system as a result of disease or medication and pregnant women are more susceptible to infection with zoonotic agents and more likely to develop serious complications from zoonotic infections.194 Employees with immunocompromising conditions should talk to their primary health-care provider to clarify work parameters and obtain guidance.

Occupational activities associated with a higher risk of exposure to zoonotic pathogens include processing laboratory samples, necropsy, and care of certain high-risk animals. High-risk animals include those that are young, parturient, unvaccinated, stray or feral, fed raw-meat diets, or housed in a shelter; animals with internal or external parasites; wildlife; reptiles and amphibians; and exotic or nonnative species.195,196 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.197 Risk of exposure to zoonotic pathogens in the workplace can be mitigated through consistent use of the VSP outlined in this compendium.

C. PREGNANCY
Pregnancy presents a situation in which multiple potential occupational hazards must be addressed. The employer, on the basis of a workplace risk assessment, should provide information about hazards to which the employee and fetus may be exposed. Pregnant employees should consult with their health-care provider about potential hazards including zoonotic disease, chemicals, waste anesthetic gas, radiation, and lifting hazards. Employers must then provide reasonable workplace accommodation for the employee.

The ADA as amended in 2008 states that while pregnancy itself is not a disability, pregnant workers and job applicants are not excluded from the protections of the ADA. Pregnant workers with pregnancy-related impairments may demonstrate that they have
disabilities for which they may be entitled to a rea-
sonable accommodation under the ADA. Also, if an
employee is temporarily unable to perform her job
because of pregnancy, the employer must treat her
the same as any other temporarily disabled employee;
for example, by providing light duty, modified tasks,
alternative assignments, disability leave, or leave
without pay.\textsuperscript{198,199} Employees should notify managers
as soon as they know they are pregnant so that poten-
tially harmful activities may be avoided and necessary
adjustments to workplace activities can be addressed.

Pregnant women are more susceptible to certain
zoonotic infections owing to physiologic suppres-
sion of cell-mediated immunity. Conditions to which
pregnant women are more susceptible include toxo-
plasmosis, lymphohytic choriomeningitis, brucellosis,
listeriosis, and psittacosis.\textsuperscript{200} Vertical transmission of
certain zoonotic agents may result in miscarriage, still-
birth, premature birth, or fetal congenital anomalies.

V. CREATING A WRITTEN INFECTION
CONTROL PLAN
Veterinary practices should have a written infec-
tion control plan.\textsuperscript{1,3} A model infection control plan
that can be tailored to individual practice needs is
available in electronic format from the NASPHV
website (Appendix 4).\textsuperscript{201} Effective infection control
plans should do the following:
• Provide explicit and well-organized guidance spe-
cific to the facility and practice type.
• Be flexible so that new issues can be addressed eas-
ily and new knowledge incorporated.
• Indicate the staff members responsible for each
area, activity, or function.
• Provide contact information, resources, and references.

A. INFECTION CONTROL PERSONNEL
All veterinary personnel are responsible for
supporting and carrying out the activities outlined
in the practice’s infection control plan; however, it is
the practice management team and senior clinicians
who must play a leadership role in establishing the
culture of infection control practice. Staff members
should be designated for development and imple-
mentation of specific infection control policies such
as monitoring compliance, maintenance of records,
and management and documentation of workplace
exposures and injuries. Breaches in infection con-
trol practice should be addressed.

B. IMPLEMENTING THE INFECTION
CONTROL PLAN
1. Leadership
The management team should set the stan-
dard for infection control practices, champion
the importance of infection prevention in daily
activities, and model desired behaviors such as
hand hygiene after every patient contact.

2. New Staff
New staff members should be given their own
copy of the infection control plan. Detailed training
should be provided. Receipt of the plan and training
should be documented for each employee.

3. Review and Revision
Practice management should evaluate inci-
dents as they occur and evaluate processes and
identify deficiencies that may necessitate engineer-
ing or administrative changes. Revisions should be
communicated to all staff members. If deficiencies
in training are identified, the management team
should ensure that corrective measures are taken
and employee retraining is instituted.

4. Compliance
All team members should ensure that in-
fection control policies and protocols are car-
ried out consistently and correctly.

5. Availability
Copies of the infection control plan and re-
source documents should be readily accessible
to all staff, including reception, administration,
animal care, and housekeeping personnel.

\textsuperscript{a}  Bender J, Professor, College of Veterinary Medicine, University of
Minnesota, Saint Paul, Minn: Personal communication, 2015.

VI. REFERENCES
1. Scheftel JM, Elchos BL, Cherry B, et al. Compendium of vet-
inary standard precautions for zoonotic disease prevention
in veterinary personnel. National Association of State Public
Health Veterinarians Veterinary Infection Control Committee
2. CDC. National Occupational Research Agenda: National Healthcare
3. Australian Veterinary Association. Guidelines for veterinary
5. Prescott JF, Weese JS. Infection control and best practice for
6. CDC. Multistate outbreak of monkeypox—Illinois, Indiana, and
7. CDC. Monkeypox infections in animals: updated interim
guidance for veterinarians. Available at: stacks.cdc.gov/view/
ing a monkeypox outbreak, Wisconsin, 2003. Emerg Infect Dis
9. Langley BLPW, O’Brien KF. Health hazards among veterinarians: a
10. Nienhaus A, Skudlik C, Seidler A. Work-related accidents and
occupational diseases in veterinarians and their staff. Int Arch
12. Schnurrenberger PR, Masterson RA, Russell JH. Serologic sur-
veys for selected zoonoses in Ohio veterinarians. J Am Vet Med
Assoc 1964;144:381–383.
13. Taylor LH, Lalham SM, Woodhouse ME. Risk factors for human dis-
2015 national notifiable conditions. Available at: www.cdc.
86. US Department of Labor Occupational Safety and Health Administration. Safety and health topics. Personal protective equipment. Available at: www.osha.gov/SLTC/personalprotectiveequipment/.
106. US Department of Labor Occupational Safety and Health Administration. Safety and health topics. Personal protective equipment. Available at: www.osha.gov/SLTC/personalprotectiveequipment/.


Continued on next page.
### Appendix 1

Selected zoonotic diseases of importance in the United States, 2015.

<table>
<thead>
<tr>
<th>Disease (scabies)</th>
<th>Agent</th>
<th>Means of transmission to humans</th>
<th>Most common species associated with transmission to humans</th>
<th>Nationally notifiable for human (H) or animal (A) cases</th>
<th>Severe or prolonged infection usually associated with immunosuppression</th>
<th>Deaths in humans reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acariasis (scabies)</td>
<td><em>Sarcoptes scabiei</em>, <em>Notoedres cati</em>, and other species of mites</td>
<td>Contact</td>
<td>Dogs, cats, horses, goats, sheep, swine, birds</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Anthrax</td>
<td><em>Bacillus anthracis</em></td>
<td>Contact, aerosol, vector</td>
<td>Cattle, sheep, goats, horses</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Avian influenza</td>
<td>Highly pathogenic avian influenza viruses</td>
<td>Contact, aerosol</td>
<td>Poultry, pet birds</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Babesiosis</td>
<td><em>Babesia microti</em> and other <em>Babesia</em> spp</td>
<td>Vector</td>
<td>Cattle, rodents</td>
<td>A</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bartonellosis</td>
<td><em>Bartonella henselae</em>, other <em>Bartonella</em> spp</td>
<td>Cats, other species possible</td>
<td>No</td>
<td>Yes</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td>Baylisascaris</td>
<td><em>Baylisascaris procyonis</em></td>
<td>Contact</td>
<td>Raccoons</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Bordetella</td>
<td><em>Bordetella bronchiseptica</em></td>
<td>Aerosol</td>
<td>Dogs, cats, swine, rabbits, guinea pigs, horses</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Brucellosis</td>
<td><em>Brucella melitensis</em>, <em>Brucella abortus</em>, <em>Brucella suis</em>, <em>Brucella canis</em></td>
<td>Contact, aerosol</td>
<td>Goats, cattle, swine, feral pigs, dogs, horses</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td><em>Campylobacter jejuni</em>, other <em>Campylobacter</em> spp</td>
<td>Contact</td>
<td>Poultry, cattle, sheep, goats, swine, dogs, cats, mink, ferrets, hamsters, raccoons, other wildlife</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Capnocytophaga</td>
<td><em>Capnocytophaga canimorsus</em>, <em>Capnocytophaga cynodegni</em></td>
<td>Contact</td>
<td>Dogs, cats</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chlamydiosis</td>
<td><em>Chlamydia abortus</em>, <em>Chlamydia felis</em></td>
<td>Aerosol, contact</td>
<td>Sheep, goats, llamas, cats, cattle</td>
<td>No</td>
<td>Yes, pregnant women</td>
<td>Yes</td>
</tr>
<tr>
<td>Contagious pustular dermatitis (orf or contagious ecthyma)</td>
<td><em>Parapoxvirus</em></td>
<td>Contact</td>
<td>Sheep, goats</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cryptococcosis</td>
<td><em>Cryptococcus neoformans</em></td>
<td>Aerosol</td>
<td>Pigeons, other birds</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td><em>Cryptosporidium parvum</em></td>
<td>Contact</td>
<td>Cattle (typically calves)</td>
<td>H</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dermatophiosis</td>
<td><em>Dermatophilus congolensis</em></td>
<td>Contact, vector</td>
<td>Goats, sheep, cattle, horses</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dermatophytosis</td>
<td><em>Trichophyton spp.</em>, <em>Epidermophyton</em> spp</td>
<td>Contact</td>
<td>Cats, dogs, cattle, goats, sheep, horses, rabbits, rodents</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dipylidium infection (tapeworm)</td>
<td><em>Dipylidium caninum</em></td>
<td>Vector</td>
<td>Dogs, cats</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Echinococcosis</td>
<td><em>Echinococcus granulosus</em>, <em>Echinococcus multilocularis</em></td>
<td>Contact</td>
<td>Dogs, cats, wild canids</td>
<td>A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Ehrlichiosis or anaplasmosis</td>
<td><em>Ehrlichia</em> and <em>Anaplasma</em> spp</td>
<td>Vector</td>
<td>Deer, rodents, horses, dogs</td>
<td>H</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Equine encephalomyelitis</td>
<td><em>Togaviridae</em> (eastern, western, and Venezuelan equine encephalomyelitis viruses)</td>
<td>Vector</td>
<td>Birds, horses</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Erysipeloïd</td>
<td><em>Erysipelothrix rhusiopathiae</em> (multiple subtypes, called assemblages, exist, several of which can be transmitted to people)</td>
<td>Contact</td>
<td>Pigs, poultry, lambs, calves, birds, fish, crustaceans, mollusks</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Giardiasis</td>
<td><em>Giardia intestinalis</em> (<em>Giardia lamblia</em>)</td>
<td>Contact</td>
<td>Beavers and other wild rodents, dogs, cats, guinea pigs, ferrets, livestock</td>
<td>H</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Hantaviral diseases</td>
<td><em>Hantavirus</em></td>
<td>Aerosol</td>
<td>Rodents</td>
<td>H</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Herpes B virus infection</td>
<td><em>Macacine herpesvirus</em></td>
<td>Contact</td>
<td>Macaque monkeys</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Histoplasmosis</td>
<td><em>Histoplasma capsulatum</em></td>
<td>Aerosol</td>
<td>Bats, soil enriched with wild bird guano</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Influenza A</td>
<td><em>Influenza A virus</em></td>
<td>Contact, aerosol</td>
<td>Poultry, swine, ferrets</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Continued on next page.*
### Appendix 1
Zoonotic diseases of importance in the United States, 2015 (continued).

<table>
<thead>
<tr>
<th>Disease</th>
<th>Agent</th>
<th>Means of transmission to humans</th>
<th>Most common species associated with transmission to humans</th>
<th>Nationally notifiable for human (H) or animal (A) cases</th>
<th>Severe or prolonged infection usually associated with immunosuppression</th>
<th>Deaths in humans reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larval migrans: cutaneous (hookworm)</td>
<td>Ancylostoma spp</td>
<td>Contact</td>
<td>Dogs, cats</td>
<td>No</td>
<td>No</td>
<td>Rare</td>
</tr>
<tr>
<td>Larval migrans: visceral, ocular, neuro (roundworm)</td>
<td>Toxocara canis, Toxocara cati</td>
<td>Contact</td>
<td>Dogs, cats, raccoons</td>
<td>No</td>
<td>No</td>
<td>Rare</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>Leishmania spp</td>
<td>Vector</td>
<td>Dogs, wild canids</td>
<td>A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Leptospira spp</td>
<td>Contact, aerosol</td>
<td>Rodents, swine, goats, cats, dogs, dogs, cats</td>
<td>A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Listeria monocytogenes</td>
<td>Contact</td>
<td>Cattle, sheep, goats, pigs, birds, dogs, cats</td>
<td>H</td>
<td>Yes, particularly pregnant women</td>
<td>Yes</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>Borrelia burgdorferi</td>
<td>Vector</td>
<td>Small rodents, wild large mammals</td>
<td>H</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lymphocytic choriomeningitis</td>
<td>Arenavirus (lymphocytic choriomeningitis virus)</td>
<td>Contact, aerosol</td>
<td>Mice, hamsters, guinea pigs</td>
<td>No</td>
<td>Yes, particularly pregnant women</td>
<td>Rare</td>
</tr>
<tr>
<td>Monkeypox</td>
<td>Orthopoxvirus</td>
<td>Contact, aerosol</td>
<td>Nonhuman primates, rodents</td>
<td>A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mycobacteriosis (nontuberculous)</td>
<td>Mycobacterium avium complex, Mycobacterium marinum</td>
<td>Aerosol, contact</td>
<td>Poultry, pet birds, aquarium fish, reptiles</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pasteurellosis</td>
<td>Pasteurella multocida and other species</td>
<td>Contact</td>
<td>Dogs, cats, rabbits, rodents</td>
<td>No</td>
<td>Yes</td>
<td>Rare</td>
</tr>
<tr>
<td>Plague</td>
<td>Yersinia pestis</td>
<td>Vector, contact, aerosol</td>
<td>Rodents, cats, rabbits</td>
<td>H, A</td>
<td>Yes</td>
<td>Rare</td>
</tr>
<tr>
<td>Psittacosis (human)</td>
<td>Chlamyphila psittaci</td>
<td>Aerosol, contact</td>
<td>Pet birds, poultry</td>
<td>H, A (poultry)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Q fever</td>
<td>Coxiella burnetii</td>
<td>Contact, aerosol, vector</td>
<td>Goats, sheep, cattle, rodents, rabbits, dogs, cats</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rabies</td>
<td>Lyssavirus</td>
<td>Contact</td>
<td>Cats, dogs, cattle and other domestic animals, wild carnivores, raccoons, bats, skunks, foxes</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rat bite fever</td>
<td>Streptobacillus moniliformis, Spirillum minus</td>
<td>Contact</td>
<td>Pet rats, wild rats</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rhodococcus equi infection</td>
<td>Rhodococcus equi</td>
<td>Aerosol, contact</td>
<td>Horses</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rocky Mountain spotted fever</td>
<td>Rickettsia rickettsii</td>
<td>Vector</td>
<td>Dogs, rabbits, rodents</td>
<td>H</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>Salmonella spp</td>
<td>Contact</td>
<td>Reptiles, amphibians, poultry, horses, swine, cattle, pocket pets, many species of mammals and birds</td>
<td>H</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sporotrichosis</td>
<td>Sporothrix schenckii</td>
<td>Contact</td>
<td>Cats, dogs, horses</td>
<td>No</td>
<td>Yes</td>
<td>Rare</td>
</tr>
<tr>
<td>Staphylococcosis</td>
<td>Staphylococcus spp</td>
<td>Contact</td>
<td>Dogs, cats, horses</td>
<td>H (certain drug-resistant strains of S aureus)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Streptococcus</td>
<td>Streptococcus spp</td>
<td>Contact, aerosol</td>
<td>Swine, fish, other mammals</td>
<td>H (some forms)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Mycobacterium bovis</td>
<td>Contact</td>
<td>Swine, sheep, goats, bison, elk, deer, reindeer</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Tularemia</td>
<td>Francisella tularensis</td>
<td>Vector, contact, aerosol</td>
<td>Rabbids, pocket pets, wild aquatic rodents, sheep, cats, horses, dogs</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Visceral stomatitis</td>
<td>Visceral stomatitis virus</td>
<td>Vector, contact, aerosol</td>
<td>Horses, cattle, swine, sheep, goats</td>
<td>A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>West Nile fever</td>
<td>West Nile virus</td>
<td>Vector</td>
<td>Wild birds</td>
<td>H, A</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Yersiniosis</td>
<td>Yersinia enterocolitica</td>
<td>Contact</td>
<td>Swine, many species of mammals and birds</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

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 APHIS reportable-diseases list.14,15 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.
## Appendix 2

Antimicrobial spectrum of hand-hygiene antiseptic agents

<table>
<thead>
<tr>
<th>Target organism or agent characteristic</th>
<th>Alcohols (ethanol or isopropanol)</th>
<th>Chlorhexidine (2%–4%)</th>
<th>Iodophors*</th>
<th>Triclosan</th>
<th>Quaternary ammonium compounds*&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram-positive bacteria</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Gram-negative bacteria</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Enveloped (lipophilic) viruses</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>±</td>
</tr>
<tr>
<td>Nonenveloped viruses</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>±</td>
<td>–</td>
</tr>
<tr>
<td>Mycobacteria</td>
<td>+++</td>
<td>+</td>
<td>±</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Fungi</td>
<td>+++</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Protozoal oocysts</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Speed of action</th>
<th>Residual activity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>No</td>
<td>Optimum concentration 60%–85% Intermediate Persistent activity; potential allergic reactions No Used in combination with alcohols; activity limited by organic matter and hard water; prone to contamination</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Yes</td>
<td>Yes Tolerance on hands varies; decreases skin hydration and possible irritation</td>
</tr>
<tr>
<td>Slow</td>
<td>No</td>
<td>Slow Less irritating than iodine Used in combination with alcohols; activity limited by organic matter and hard water; prone to contamination</td>
</tr>
</tbody>
</table>

+++ = Excellent. ++ = Good. + = Fair. ± = Variable. – = No or insufficient activity.

*<sup>a</sup>Iodine compounds are usually too irritating for hand hygiene; iodophors are specially formulated iodine compounds that are less irritating.

*<sup>b</sup>Quaternary ammonium compounds are not recommended as a sole antiseptic agent. Efficacy against dermatophytes may be less than indicated.

*<sup>c</sup>Activity against some fungi, but much less against filamentous fungi.

---

Copyright () 2015 American Veterinary Medical Association. All rights reserved.
### Appendix 3

#### Selected disinfectants used in veterinary practice.

<table>
<thead>
<tr>
<th>Disinfectant Category</th>
<th>Alcohols</th>
<th>Alkalis</th>
<th>Aldehydes</th>
<th>Halogens: Chlorine</th>
<th>Halogens: Iodine</th>
<th>Oxidizing Agents</th>
<th>Phenols</th>
<th>Quaternary Ammonium Compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>ExampleActive Ingredients</td>
<td>Ethanol</td>
<td>Isopropanol</td>
<td>Sodium hydroxide</td>
<td>Sodium carbonate</td>
<td>Sodium hypochlorite (household bleach)</td>
<td>Chlorine dioxide</td>
<td>Phenol</td>
<td>Ortho-phenylphenol, ortho-phenxyphenol, chlorophenol</td>
</tr>
<tr>
<td>Mechanism of Action</td>
<td>Precipitates proteins; denatures lipids</td>
<td>Affects pH through hydroxyl ions; fat saponification</td>
<td>Denatures proteins; alkylates mucous acids</td>
<td>Denatures proteins</td>
<td>Denature proteins and lipids</td>
<td>Denature proteins; disrupts cell wall</td>
<td>Denatures proteins; binds phospholipids of cell membrane</td>
<td>Denatures proteins; binds phospholipids of cell membrane</td>
</tr>
<tr>
<td>Characteristics</td>
<td>Fast acting</td>
<td>Rapid evaporation</td>
<td>Leaves no residue</td>
<td>Can swell or harden rubber and plastics</td>
<td>Slow acting</td>
<td>Affects pH</td>
<td>Metabolizes some metals</td>
<td>Mucous membrane irritation</td>
</tr>
</tbody>
</table>
| Precautions | Flammable | Very caustic | Carcinogenic | Toxic gas released if mixed with strong acids or ammonia | May be toxic to animals, especially cats and pigs | Ectopic Necrosis, Inactivation, 
| Gram-positive Bacteria | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Gram-negative Bacteria | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Mycobacteria | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Endospores | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Enveloped Viruses | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Non-enveloped Viruses | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Fungi/Fungal spores | ++ | ++ | ++ | ++ | ++ | ++ | ++ | ++ |
| Efficacy with Organic Matter | Reduced | Variable | Variable | Rapidly reduced | Rapidly reduced | Variable | Effective | Inactivated |
| Efficacy with Hard Water | Reduced | Reduced | Reduced | Effective | ? | ? | Effective | Reduced |
| Efficacy with Detergents | Reduced | Inactivated | ? | Effective | Reduced | Inactivated | Effective | Reduced by soaps and detergents |

++ = highly effective; + = effective; ± = variable or limited activity; = not effective; ? = data not found

Disclaimer: The information provided generalizes data for each class of products; antimicrobial activity may vary with formulation and concentration. Always read and follow the product label. The preparation and application of disinfectant solutions must be in accordance with product label directions. Only EPA-registered products should be used.

Appendix 4

Model Infection Control Plan for Veterinary Practices, 2015

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: Perform hand hygiene between examinations of individual animals or animal groups (eg, litters of puppies or kittens, groups of cattle) and after contact with feces, body fluids, vomitus, exudates, and articles contaminated by these substances. Perform hand hygiene before eating, drinking, or smoking; after using the toilet; after cleaning animal cages; after contact with environmental surfaces in animal areas; after handling laboratory specimens; after removing gloves; and whenever hands are visibly soiled. Keep fingernails short. Do not wear artificial nails or hand jewelry when handling animals. Keep hand-hygiene supplies stocked at all times.

Correct handwashing procedure:
• Wet hands with running water.
• Place soap in palms.
• Rub hands together to make a lather.
• Scrub hands thoroughly for 20 seconds.
• Rinse soap off hands.
• Dry hands with disposable towel.
• Turn off faucet using the disposable towel to avoid hand contact.

Correct use of hand rubs:
• Place alcohol-based hand rub in palms.
• Apply to all surfaces of hands.
• Rub hands together until dry.

Gloves: Gloves are not necessary when examining or handling healthy animals. Wear gloves when touching feces, body fluids, vomitus, exudates, and nonintact skin. Wear gloves for dentistry, resuscitations, necropsies, and obstetric procedures; when cleaning cages, litter boxes, and environmental surfaces and equipment in animal areas; when handling dirty laundry; when handling diagnostic specimens (eg, urine, feces, aspirates, or swabs); and when handling an animal with a suspected infectious disease. Wear gloves if you have wounds or compromised skin integrity of the hands. Change gloves between examination of individual animals or animal groups (eg, a litter of puppies), between dirty and clean procedures performed on the same patient, and when torn. 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: Use a face shield or goggles worn with a surgical mask whenever splashes or sprays are likely to occur. Wear facial protection for the following procedures: lancing abscesses, flushing wounds, dentistry, resuscitation, suctioning, lavage, obstetric procedures, and necropsies.

Respiratory tract protection: Use a molded particulate respirator (N95 or N99) when exposure to airborne pathogens is likely. Use respiratory protection under the supervision of a veterinarian and following OSHA regulations. Training and fit testing are required for their use.

Protective outerwear: Wear a protective outer garment such as a laboratory coat, smock, nonsterile gown, or coveralls when attending animals and when conducting cleaning chores in animal areas. Protective outerwear should be changed after handling an animal with a known or suspected infectious disease, after working in an isolation room, after performing a necropsy or other high-risk procedure, and whenever soiled. Impermeable outerwear should be worn during obstetric procedures and necropsies and whenever substantial splashes or large quantities of body fluids may be encountered. Shoes or boots should have thick soles and closed toes and be impermeable to water and easily cleaned. Disposable shoe covers or washable boots should be worn when heavy quantities of infectious materials are expected. Garments should be changed and laundered daily and whenever they become visibly soiled or contaminated. Coveralls should be changed and boots cleaned between farm premises, facilities, locations, or herds. Protective outerwear should not be worn outside of the work environment. Keep clean outer garments available at all times.

Staff responsible:

PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES

Patient Intake: Place animals that have neurologic signs, diarrhea, respiratory signs, fever, infected wounds, chronic infections, or a known exposure to an infectious agent directly into a designated examination or isolation room. Bring them in a side entrance if possible.

Animal handling and injury prevention: Take precautions to prevent bites and other animal-related injuries. Identify aggressive animals and alert clinic staff. Use physical restraints, muzzles, bite-resistant gloves, and sedation or anesthesia as necessary 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 ______ (infection control officer).
• When injuries occur, wash wounds with soap and water, then immediately report incident to: ______ (health-care provider).
• If medical attention is needed contact: __________________________ (public health agency) as required by law.
• Telephone number: __________

Examination of animals: Wear protective outerwear and perform hand hygiene before and after examination of individual animals or animal groups (eg, a litter of puppies). Use gloves and other protective equipment as appropriate to examine potentially infectious animals. Keep potentially infectious animals in a designated examination room until diagnostic procedures and treatments have been performed.

Continued on next page.
Appendix 4 (continued)

Injections, venipuncture, and aspiration procedures: Wear gloves when performing soft tissue or body fluid aspirations and while performing
venipuncture on animals suspected of having an infectious disease. Trained personnel should restrain animals to minimize needlestick injuries due
to animal movement. Do not bend needles, pass an uncapped needle to another person, or walk around with uncapped needles. Do not remove an
uncapped needle from the syringe by hand or place a needle cap in the mouth. Do not recap needles unless the 1-handed scoop method is used.

1-handed scoop method for recapping needles:
- 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.
- Secure the cap by pushing it against a hard surface.

Dispose of all sharps in designated containers. After injection of live vaccines or aspiration of soft tissue or body fluid, dispose of the used
syringe with needle attached in a sharps container. Otherwise, you may remove the needle with a forceps 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, a head cover, gloves, and facial protection when performing dental procedures or when in
range of splashes or sprays (such as when monitoring anesthetics).

Resuscitation: Wear gloves and facial protection. Use a manual resuscitator, anesthesia machine, or ventilator to resuscitate animals. Do not
blow directly into the mouth, nose, or endotracheal tube of the animal.

Obstetrics: Wear gloves or shoulder-length sleeves, facial protection, and impermeable outerwear. Do not blow directly into the nose or mouth
of a nonrespiring neonate.

Necropsy: Wear cut-resistant gloves, facial protection, and impermeable outerwear. Also wear eye protection and a respirator when using a
bandage or other power equipment. Only necessary personnel are allowed in the vicinity of the procedure. 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. Handle feces, urine, vomitus, aspirates, and swabs as if they were
infectious. Discard gloves and perform hand hygiene before touching clean items (eg, medical records, keyboard, or telephone). Eating and
drinking are not allowed in the laboratory.

Wound care and abscesses: Wear protective outerwear and gloves for debridement, treatment, and bandaging of wounds. Facial protection should also
be used when lancing abscesses or lavaging wounds. Discard used bandages. Handle used scissors, clipper blades, and other equipment as if
contaminated. Autoclave or gas sterilize leftover bandaging material before putting it away. Perform hand hygiene after removing gloves.

ENVIRONMENTAL INFECTION CONTROL

Cleaning and disinfection of equipment and environmental surfaces: Wear gloves when cleaning and disinfecting cages and other surfaces in
animal areas. Perform hand hygiene afterwards. Clean surfaces and equipment to remove organic matter, and then use a disinfectant according
to manufacturer’s instructions. Clean and disinfect animal cages, toys, and food and water bowls between uses and whenever visibly soiled.

Clean litter boxes at least once daily. Keep clean items separate from dirty items.

Isolation of infectious animals: Put animals with an infectious disease in isolation as soon as possible. Clearly mark the room or cage to indicate
the patient’s status and describe additional precautions. Limit access to the isolation room. Keep a sign-in log of all people (including owners or
other nonemployees) having contact with an animal in isolation. Keep only the equipment needed for the care and treatment of the patient in the
isolation room, including dedicated cleaning supplies. Personal protective equipment should be donned immediately prior to care of the animal
in isolation and removed just prior to leaving isolation. Discard gloves after use. Leave reusable PPE (eg, gown, mask) in the isolation room.

Clean and disinfect discard protective equipment between patients and whenever contaminated by body fluids. Disassemble and thoroughly
clean and disinfect any equipment that has been used in the isolation room. Place potentially contaminated materials in a bag before removal
from the isolation room.

Staff responsible:

Handling laundry: Wear gloves and protective outerwear when handling soiled laundry. Check for sharps before items are laundered. Wash
animal bedding and other laundry in the facility with standard laundry detergent, and completely machine dry at the highest temperature
suitable for the material. Use separate storage and transport bins for clean and dirty laundry. Outerwear to be laundered at home should be
transported in a plastic bag, kept separate from household items, washed separately, and then thoroughly machine dried.

Spill response and decontamination: Immediately contain spills and splashes of potentially infective substances with absorbent material (eg,
paper towels, sawdust, or cat litter). Use PPE to protect against potentially infective agents and the cleaning agent or disinfectant to be used.

Consult and follow the label recommendations for the cleaning agent or disinfectant. 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 website (www.epa.gov/epawaste/nhaz/industrial/medical/
programs.htm) and the AVMA website (www.avma.org/PracticeManagement/Administration/Pages/AVMA-Policies-Relevant-to-Waste-
Disposal.aspx) for guidance.

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 rodents, mosquitoes, and other arthropods. Check and treat
animals entering the veterinary facility for vector parasites.

Other environmental controls: Use the employee break room or designated area for eating, drinking, smoking, application of makeup, and
similar activities. These activities should not occur in animal-care areas or in the laboratory. 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 washed and stored away from
animal-care and animal food preparation areas.

OCCUPATIONAL 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–specific antibody titers, and exposure and injury incidents. Changes in health status (eg, pregnancy) that may affect work duties
should be reported to and recorded by the office manager so that accommodations may be made.