COMPENDIUM OF VETERINARY STANDARD PRECAUTIONS:

ZOONOTIC DISEASE PREVENTION IN VETERINARY PERSONNEL

National Association of State Public Health Veterinarians
Veterinary Infection Control Committee
2006

Compendium of Veterinary Standard Precautions:
Zoonotic Disease Prevention in Veterinary Personnel, 2006

National Association of State Public Health Veterinarians (NASPHV)

Veterinary Infection Control Committee (VICC)

SUMMARY

Veterinary practices are unique environments that bring humans into close contact with many different species of ill animals. In the practice environment, whether in a building or "in the field," veterinary personnel are frequently exposed to recognized and unrecognized infectious pathogens, many of which are zoonotic (transmitted from animals). Some of the documented zoonotic infections that have occurred in veterinary personnel include: multi-drug resistant *Salmonella* Typhimurium, cryptosporidiosis, cat-associated plague, cat-associated sporotrichosis, Methicillin-resistant *Staphyloccocus aureus* (MRSA), and dermatophytosis.

Infection control measures vary from practice to practice and are often insufficient to prevent zoonotic disease transmission. The Veterinary Standard Precautions (VSP) in this compendium are designed to prevent transmission of zoonotic pathogens from animal patients to veterinary personnel in private practice. The compendium committee has set the following objectives:

- Raise awareness of the scope of zoonotic disease risk in veterinary practice
- Address issues specific to veterinary practices, such as bites and other trauma from veterinary patients, and housing and monitoring of ill animals in common treatment areas
- Provide practical, science-based guidance that will reduce transmission from recognized and unrecognized sources of infection
- Outline sensible infection control practices
- Provide a model infection control plan for use by individual veterinary practices

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TABLE OF CONTENTS

Compendium of Veterinary Standard Precautions: Zoonotic Disease Prevention in Veterinary Personnel 2006

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I. INTRODUCTION

A. Background and Objectives

Veterinary personnel are at risk of contracting infections from animals (zoonotic diseases) because of their frequent contact with a wide variety of species (1). Yet, the scope of zoonotic disease risk has not been well recognized, and uniform guidance for infection control in general veterinary practice has been limited. Infection control practices vary tremendously from one veterinary practice to another and often are not sufficient to prevent zoonotic disease transmission (2, 3, J. McQuiston personal communication, Aug 22, 2006, J.Wright personal communication, Aug 22, 2006).

The Veterinary Standard Precautions (VSP) outlined in this compendium are designed to reduce the risk of zoonotic infections among personnel in private veterinary clinics and hospitals from both recognized and unrecognized sources of infection. They are to be used with all patients, regardless of their diagnosis, when contacting blood, all body fluids, feces, exudates, non-intact skin, or mucous membranes. In addition, VSP include practices to prevent bites and other trauma induced by veterinary patients that may result in exposure to zoonotic pathogens.

Infection control in human medicine has evolved considerably in the past 30 years with the recognition of HIV and hepatitis B and C viruses. Currently, the cornerstone of human infection control is the use of "Standard Precautions" (4), which provide a basis for the principles of VSP. It would be prudent for veterinary practices to apply standard infection control procedures now, rather than as a response to a serious or fatal zoonotic disease outbreak in veterinary personnel.

New infectious diseases are continually emerging (5). A recent report cataloging human disease agents found that of 1,415 agents causing disease in humans, 868 (61%) are zoonotic. Also, of the 175 pathogens defined as emerging infections, 75% are zoonotic (6). Moreover, the globalization of commerce and the ease of international travel heighten the likelihood of encountering zoonotic pathogens. The 2003 U.S. outbreak of human monkeypox in six states is a prime example: Eighteen (25%) of 71 human monkeypox cases were in veterinarians or veterinary staff who contracted the disease from contact with pet prairie dogs infected by imported African rodents (7).

While the introduction of novel pathogens, such as monkeypox, highlights the need for infection control, these practices would also protect veterinary personnel from common

pathogens. In fact, many endemic zoonotic infections occur in veterinary personnel; among those that have been documented in the literature are:

- Multidrug-resistant *Salmonella* Typhimurium outbreaks with zoonotic transmission to veterinary staff and students (8-10).
- Cryptosporidiosis among veterinary students in multiple states (11-15).
- Cat-associated plague among veterinary personnel in eight Western states (16).
- Cat-associated sporotrichosis in veterinary personnel (17-21).
- Methicillin-resistant *Staphylococcus aureus* (MRSA) transmission among veterinary personnel and equine, canine and feline patients (10, 22-25).
- Dermatophytosis (ringworm) among British veterinarians (26).

As a national coalition of veterinary public health professionals, NASPHV recognizes the need for specific guidance addressing zoonotic disease risk in veterinary practices. NASPHV strongly believes that infection control guidance for veterinary personnel should be provided primarily by veterinary personnel. Public health veterinarians are uniquely qualified to address this issue because they understand and regularly address animal diseases as they relate to human health. This resulted in the formation of the Veterinary Infection Control Committee (VICC) and development of the compendium.

The VICC has set the following objectives for the compendium:

- Raise awareness of the scope of zoonotic disease risk in veterinary practice
- Address issues specific to veterinary practices, such as bites and other trauma from veterinary patients, and housing and monitoring of ill animals in common treatment areas
- Provide practical, science-based guidance that will reduce transmission from recognized and unrecognized sources of infection
- Outline sensible infection control practices
- Provide a model infection control plan for use by individual veterinary practices

B. Considerations

This Compendium focuses exclusively on protection of veterinary personnel in clinical practice. Although eliminating all risk from zoonotic pathogens in veterinary practice is not achievable, this report provides recommendations for minimizing disease and injury. The document may also be useful for preventing infectious agent transmission in facilities other than veterinary clinics and hospitals (such as shelters and kennels), but it is not intended to be inclusive for all animal facilities and practice types.

Since veterinary practices vary, these guidelines may be adapted to individual practice needs and circumstances, but should comply with federal, state, and local regulations. Modifications to these recommendations should adhere to the basic principles of infection control to prevent spread of occupational zoonoses by all routes of transmission.

Every effort has been made to compile existing scientific evidence for standard practices that will protect veterinary personnel from zoonotic diseases. As there have been few studies to test the efficacy of infection control in veterinary practice and gaps exist in the

knowledge of the epidemiology of some diseases, it is expected that the content of this publication will evolve.

Training is an essential part of understanding and implementing the guidelines. The Compendium will be most effective if each employee is aware of the relevance of the guidelines to his or her health and the health of others in the practice.

A client education program will help protect veterinary staff from zoonotic diseases, as well as protecting clients, their children, and other pets. Client education should include the importance of rabies vaccination, comprehensive internal and external parasite control, and bite prevention. Clients should be informed of zoonotic disease risks specific to their geographic area and the veterinarian promoted as a source of expert information on zoonotic disease control issues. Written educational information should be made available in clinic waiting areas and on websites.

Employers should promote safe work habits. The cost of implementing these guidelines should be compared to the potential consequences of inadequate infection control, including loss of business due to practice closure, sick leave or hospitalization of personnel, loss of credibility, and litigation (27-29).

II. ZOONOTIC DISEASE TRANSMISSION

Transmission of infections requires three elements: a source of pathogens, a susceptible host, and a means of transmission for the microorganism (4). Sources include animals or environments contaminated by animals. Pathogens may be transmitted to humans directly from the animal via blood or other body fluids during diagnostic or treatment procedures. Animals may be clinically ill, asymptomatic carriers of an infectious agent, or harbor endogenous flora that are pathogenic to humans. Pathogens may also be transmitted indirectly from objects in the environment including walls, floors, counters, equipment, supplies, animal feed, and water.

Host resistance to pathogenic microorganisms varies greatly. Some persons may be immune to infection or may be able to resist colonization by an infectious agent; others exposed to the same agent may establish a commensal relationship with the infecting microorganism and become asymptomatic carriers; still others may develop clinical disease. Host factors such as age, underlying diseases, irradiation, pregnancy, and breaks in the body's first-line of defense mechanisms (intact skin, cough reflex, stomach acid) may render a host more susceptible to infection. Conversely, vaccination may reduce susceptibility to infection.

A. Transmission Mechanisms

Transmission occurs through three main mechanisms: contact, aerosol, and vector-borne. The same agent may be transmitted by more than one route. Transmission is largely influenced by the stability of the pathogen, the pathogenesis of the disease it causes, and the routes by which it leaves the infected host. Different agents vary in their degree of infectivity through the various routes.

1. Contact transmission can occur when pathogens from animals or their environments enter the human host through three routes: ingestion, mucous membrane exposure, and cutaneous/percutaneous. Direct contact transmission may occur during activities such as examining, medicating, bathing, and handling animals. Indirect contact transmission involves contact with a contaminated intermediate object, such as occurs during cleaning cages and equipment and handling soiled laundry. Injuries from contaminated sharps, such as scalpel blades, needles, and necropsy knives, may result in exposure to live vaccines and pathogens. In addition, injury from sharps increases risk of exposure to other pathogens through direct and indirect contact (4).

2. Aerosol transmission can occur when pathogens from animals or their environments travel via the air and enter the human host through inhalation and/or mucous membranes. In general, risk to veterinary personnel increases with proximity to the source and the length of time over which exposure occurs. Transmission over short distances occurs when droplets created by coughing, sneezing, vocalizing, or procedures such as suctioning and bronchoscopy are propelled through the air and deposited on the host's conjunctivae, nasal or oral mucosa. Certain pathogens may remain infective over longer distances (4, 30). However, defining the infective distance is difficult because it depends on particle size, the nature of the pathogen, and environmental factors (30). Although data are not available to define specific infection risk from aerosol transmission for most pathogens, some pathogens known to be transmitted over longer distances include *Coxiella burnetii* (31-33) and *Mycobacterium bovis* (34).

3. Vector-borne transmission occurs when vectors such as mosquitoes, fleas, ticks, rats, and other animals transmit microorganisms. Animals may bring flea and tick vectors into contact with veterinary personnel. Veterinary personnel working in outdoor settings may be at risk for diseases carried by arthropods and other biological vectors.

III. VETERINARY STANDARD PRECAUTIONS

A. Personal Protective Actions and Equipment

1. Hand Hygiene

Handwashing is the single most important measure to reduce the risk of disease transmission (4, 35, 36). Hands should be washed between animal contacts and after contact with blood, body fluids, secretions, excretions, and equipment or articles contaminated by them. Staff with animal contact should keep fingernails short (37). Correct handwashing technique (38):

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

Handwashing with plain soap and running water mechanically removes soil and reduces the number of transient organisms on the skin, whereas antimicrobial soap kills or inhibits growth of both transient and resident flora (39, 40). All soaps also have the effect of dissolving the lipid envelope of enveloped viruses, and have cell wall effects that are bactericidal. Consideration for selection and use of soap products in practices include:

- Liquid or foam soap products should be selected rather than bar soaps to reduce the opportunity for cross-contamination
- Liquid soap dispensers should not be topped off. Refillable dispensers should be completely emptied, cleaned and then refilled to prevent creation of a bacterial reservoir
- Moisturizing soaps can preserve skin integrity and encourage compliance
- Plain or antibacterial products are appropriate for routine use

Alcohol-based gels are highly effective against bacteria and enveloped viruses and may be used if hands are not visibly soiled (35, 41, 42). Apply alcohol-based gel to palm of one hand and rub hands together until dry, covering all surfaces of hands and fingers. Follow the manufacturer's instructions regarding the amount of product to use (35). Alcohol-based gels are not effective against some non-enveloped viruses (e.g., norovirus, rotavirus, parvovirus), bacterial spores (e.g., anthrax, *Clostridium difficile*), or protozoal parasites (e.g., cryptosporidia) (35, 42).

Antimicrobial-impregnated wipes (i.e., towelettes), followed by alcohol-based gels, may be used when running water is not available. Used alone, wipes are not as effective as alcohol-based hand gels or washing hands with soap and running water (35).

2. Use of Gloves and Sleeves

Gloves reduce the risk of pathogen transmission by providing barrier protection. They should be worn when touching blood, body fluids, secretions, excretions, mucous membranes, and non-intact skin. However, wearing gloves (including sleeves) does not replace handwashing (43, 44).

Gloves should be changed between examinations of individual animals or animal groups (e.g., litter of puppies/kittens, group of cattle) and between dirty and clean procedures on a single patient. Changing gloves between patients reduces the likelihood of spreading microorganisms from an animal or a fomite to another animal or person. Gloves should be worn when cleaning cages and environmental surfaces. They should be removed promptly after use, avoiding contact between skin and the outer glove surface. Disposable gloves should not be washed and reused (45, 46). Hands should be washed immediately after glove removal.

Gloves come in a variety of materials. Choice of gloves depends on their intended use. If latex allergies are a concern, acceptable alternatives include nitrile or vinyl gloves. For more information on preventing allergic reactions to natural rubber in the workplace, refer to the National Institute of Occupational Safety and Health (NIOSH) website (47).

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

3. Facial Protection
Facial protection prevents exposure of mucous membranes of the eyes, nose and mouth to infectious materials. Facial protection should be used whenever exposures to splashes or sprays are likely to occur (4, 27).

Facial protection should include a mask worn with either goggles or a face shield. A surgical mask provides adequate protection during most veterinary procedures that generate potentially infectious aerosols. These include dentistry, nebulization, suctioning, bronchoscopy, lavage, flushing wounds and cleaning with high pressure sprayers.

4. Respiratory Protection
Respiratory protection is designed to protect the respiratory tract from zoonotic infectious diseases transmitted through the air. The need for this type of protection is limited in veterinary medicine. However, it may be necessary in certain situations, such as when investigating abortion storms in small ruminants (Q fever), significant poultry mortality (avian influenza), ill psittacines (avian chlamydiosis) or other circumstances where there is concern about aerosol transmission. The N-95 rated disposable particulate respirator is a mask that is inexpensive, readily available, and easy to use. Fit-testing of the N-95 respirator is recommended but not required by the OSHA Respiratory Protection Standard (Appendix C). Respiratory evaluation and training should be provided for all personnel who use respirators (48). For additional information about fit-testing, contact the state labor department or visit OSHA's website at www.osha.gov.

5. Protective Outerwear
a. Lab Coats, Smocks, and Coveralls
This apparel is designed to protect street clothes or scrubs from contamination but is generally not fluid resistant, so they should not be used in situations where splashing or soaking with potentially infectious liquids is anticipated. For most personnel, this outerwear should be changed daily. Garments should be changed promptly whenever visibly soiled or contaminated with body fluids or feces. These garments should not be worn outside of the work environment (4, 49, 50).

b. Non-Sterile Gowns
Gowns provide more coverage for barrier protection than lab coats. Permeable gowns can be used for general care of patients in isolation. Impermeable gowns should be used to provide greater protection when splashes or large quantities of body fluids are present or anticipated. Disposable gowns should not be reused. Reusable fabric gowns should be laundered between each use. Gloves are indicated whenever gowns are worn. Gowns and gloves should be removed and placed in the trash or laundry bin before leaving the animal's environment. Hands should be washed immediately afterwards (27).

Employees should be trained to properly remove gowns to avoid contaminating themselves or their environments. The outer (contaminated) surface of a gown should only be touched with gloves.

- After unfastening ties, peel the gown from the shoulders and arms by pulling on the chest surface with gloves.

- Remove the gown, avoiding contact between the outer surface and clean surfaces.
- Ball the gown up for disposal while keeping the contaminated surface on the inside.
- Remove gloves and wash hands.
- If body fluids have soaked through the gown, promptly remove the contaminated clothing and wash the skin.

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

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

NOTE: The personal protective measures in this document do not eliminate the need for appropriate environmental engineering controls, such as hazard removal and safety engineering (e.g., separation of patient areas from break rooms). Personal protective equipment (e.g., respirators) should always be the last line of defense and should always be accompanied by appropriate training for personnel. While engineering control measures are beyond the scope of this document, more information is available at www.osha.gov.

6. Bite and Other Animal-Related Injury Prevention
During their careers, the majority (61%-68%) of veterinarians suffer an animal-related injury resulting in hospitalization and/or significant lost work time (1, 51-54). These are mainly dog and cat bites, kicks, cat scratches and crush injuries, and account for most occupational injuries among veterinarians (1, 51-54). In a recent study seeking to identify factors associated with increased risk of being bitten by a dog or cat in a veterinary teaching hospital, pets identified with a warning sign or considered more difficult to handle were four to five times more likely than other animals to have bitten a staff member while hospitalized. Yet only 47% of dogs and cats considered likely to bite were muzzled (compared to 12% to 14% of animals considered unlikely to bite) (55). Veterinary personnel reliably interpret the behaviors associated with an animal's propensity to bite; their professional judgment should be relied upon to guide bite prevention practices.

Approximately 3% to 18% of dog bites and 28% to 80% of cat bites become infected (56). Most clinically infected dog and cat bite wounds are mixed infections of aerobic and anaerobic bacteria. The most commonly isolated aerobes are *Pasteurella multocida* (cats), *Pasteurella canis* (dogs), streptococci, staphylococci, *Moraxella,* and *Neisseria weaverii*; the most commonly isolated anaerobes include *Fusobacterium*, *Bacteroides,*

Porphyromonas, and *Prevotella* (56). In addition, rare but serious systemic infections with invasive pathogens including *Capnocytophaga canimorsus, Bergeyella zoohelicum*, *Bartonella henselae*, and CDC nonoxidizer 1 group may occur following bites or scratches (56-60).

Veterinary personnel should take all necessary precautions to prevent animal-related injuries in the clinic and in the field. These may include physical restraints, bite-resistant gloves, muzzles, sedation, or anesthesia, and relying on experienced veterinary personnel rather than owners to restrain animals. Practitioners should remain alert for changes in their patients' behavior.

Veterinary personnel attending large animals should have an escape route in mind at all times (1, 54). When bites and scratches occur, immediate and thorough washing of the wound with soap and water is critical. Prompt medical attention should be sought for puncture wounds and other serious injuries. The need for tetanus immunization, antibiotics or rabies post-exposure prophylaxis should be evaluated. Animal bites may need to be reported to local or state public health agencies. Emergency contact information should be posted in the clinic.

B. Protective Actions During Veterinary Procedures

1. Intake

Waiting rooms should be a safe environment for clients, animals and employees. Aggressive or potentially infectious animals should be placed directly into an exam room. Animals with respiratory or gastrointestinal signs, or a history of exposure to a known infectious disease should be asked to enter through an alternative entrance to avoid traversing the reception area (61). If they must come through the reception area, they should be carried or placed on a gurney and taken directly into an exam room.

2. Examination of Animals

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

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

3. Injections, Venipuncture, and Aspirations

a. Needlestick Injury Prevention

Needlestick injuries are among the most prevalent accidents in the veterinary workplace (62, 63). The most common needlestick injury is inadvertent injection of a vaccine (1, 64,

65). In a 1995 survey of 701 North Carolina veterinarians, 27% of respondents had accidentally self-inoculated rabies vaccine and 7% (23% of large animal veterinarians) live *Brucella* vaccine (1). Needle punctures sustained during procedures such as fine-needle aspiration are potential sources of zoonotic pathogens (66).

The most important precaution is to avoid recapping needles. Recapping causes more injuries than it prevents (67). When it is absolutely necessary to recap needles as part of a medical procedure or protocol, or if a puncture-proof, leak-resistant sharps container is not available, a mechanical device such as forceps can be used to replace the cap on the needle or the one-handed "scoop" technique may be employed (68). This technique involves holding the syringe with the attached needle or the needle hub alone (when unattached) and scooping or sliding the cap, which is lying on a horizontal surface, onto the needle's sharp end. Once the point of the needle is covered, the cap is tightened by pushing it against an object, or by pulling the base of the needle cap onto the hub of the needle with the same hand holding the syringe.

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

Sharps containers are safe and economical, and should be located in every area where animal care occurs (69-71). Sharps should not be transferred from one container to another. Devices that cut needles prior to disposal should not be used because they increase the potential for aerosolization of the contents (69).

b. Barrier Protection

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

4. Dental Procedures

Dental procedures create infectious aerosols and there is risk of exposure to splashes or sprays of saliva, blood, and infectious particles. There is also the potential for cuts and abrasions from dental equipment or teeth (72). The veterinary staff performing the dental procedure and anyone in the immediate vicinity (e.g. the veterinary anesthesiologist) should wear protective outerwear, gloves, mask, and a face shield or goggles. In one study, irrigating the oral cavity with a 0.12% chlorohexadine solution significantly decreased bacterial aerosolization (73).

5. Resuscitations

Resuscitations are particularly hazardous because they may occur without warning and unrecognized/undiagnosed zoonotic infectious agents may be involved. For example, a

dog that presents in respiratory failure after being hit by a car may have been in the road due to clinical rabies. Barrier precautions such as gloves, mask, and face shield or goggles should be worn at all times. Never blow into the nose/mouth of an animal or into an endotracheal tube to resuscitate an animal; instead, intubate the animal and use an ambubag or an anesthesia machine/respirator.

6. Obstetrics
Common zoonotic agents, including *Brucella*, *Coxiella burnetii*, and *Listeria monocytogenes,* may be found in high concentrations in the birthing fluids of aborting or parturient animals, stillborn fetuses, and neonates (74). Gloves, sleeves, mask or respirator, face shield or goggles, and impermeable protective outerwear should be employed as needed to prevent exposures to potentially infectious materials. During resuscitation, do not blow into the nose or mouth of a non-respiring neonate.

7. Necropsy
Necropsy is a high risk procedure due to contact with infectious body fluids, aerosols, and contaminated sharps. Non-essential persons should not be present. Veterinary personnel involved in or present at necropsies should wear gloves, masks, face shields or goggles and impermeable protective outerwear as needed. In addition, cut-proof gloves should be used to prevent sharps injuries. Respiratory protection (including environmental controls and respirators) should be employed when band saws or other power equipment are used.

Decisions regarding whether to perform necropsy on animals suspected of having a notifiable infectious disease or foreign animal disease should be made in consultation with the state veterinarian.

8. Diagnostic Specimen Handling
Feces, urine, aspirates, and swabs should be presumed to be infectious. Protective outerwear and disposable gloves should be worn when handling these specimens. Discard gloves and wash hands before touching clean items (e.g., microscopes, telephones, food).

Although in veterinary practices animal blood specimens have not been a significant source of occupational infection, percutaneous and mucosal exposure to blood and blood products should be avoided.

Eating and drinking must not be allowed in the laboratory.

C. Environmental Infection Control

1. Isolation of Infectious Animals
Patients with a contagious or zoonotic disease should be clearly identified so their infection status is obvious to everyone, including visitors allowed access to clinical areas. Prominent signage should indicate that the animal may be infectious and should outline any additional precautions that should be taken (27, 75).

Ideally, veterinary practices should utilize a single-purpose isolation room for caring for and housing contagious patients (75). Alternatively, a dedicated exam room that can be easily emptied of non-essential equipment, cleaned and disinfected can be transformed into an isolation room. A mobile cage unit may be brought in for exclusive use by the infectious animal. If an isolation room has negative pressure air handling, air pressures should be monitored daily while in use and the air should be exhausted outside of the building, away from animal and public access areas, employee break areas, and air intake vents (4, 75, 76).

Only the equipment and materials needed for the care and treatment of the patient should be kept in the isolation room. Items intended for use in the isolation room should remain in this area and duplicate new items purchased for use elsewhere in the hospital. When necessary, items removed from the isolation area should be taken apart, cleaned, and disinfected prior to removal. Use of disposable articles can minimize the need to bring soiled items out of the isolation room. Access to the isolation room should be limited and a sign-in sheet should be kept of all people having contact with a patient in isolation (75, 77).

Limited data are available on the efficacy of footbaths. When used, a disinfectant footbath should be placed just inside the door of the isolation area and used before departing the room (75, 78). Footbath disinfectant should be changed daily or when visibly dirty. If shoe or boot coverings are used, personnel should be trained to use, remove, and dispose of them properly.

Depending on the diagnosis and the mode of transmission of the disease, clean (non-sterile) gowns, shoe covers, gloves, masks and eye protection should be worn when handling an animal with a zoonotic disease. The gloves should be discarded, but typically the rest of the personal protective equipment (e.g., gown, mask) may be re-used and should remain in the isolation room with the patient. However, if the gown, mask, or other protective equipment is contaminated with body fluids, it should be replaced. Protective equipment should be cleaned and disinfected between patients. Potentially contaminated materials should be bagged before transport within the practice and disinfected or disposed of appropriately according to their level of hazard. In many cases, all the materials used in the isolation room would be treated as bio-waste (27, 71, 75).

2. Cleaning and Disinfection* of Equipment and Environmental Surfaces

Proper cleaning of environmental surfaces, including work areas and equipment, prevents transmission of zoonotic pathogens. Environmental surfaces and equipment should be cleaned between uses or whenever visibly soiled. A recent report indicates that directed misting application of a peroxygen disinfectant for environmental decontamination is effective in veterinary settings (79).

Surfaces where animals are housed, examined, or treated should be made of non-porous, easily cleanable materials. Surfaces should be cleaned to remove gross contamination before disinfection because organic material decreases the effectiveness of most disinfectants (80). When cleaning, avoid generating dust that may contain pathogens by

using central vacuum units, wet mopping, dust mopping, or electrostatic sweeping (e.g., Swiffer®). Surfaces may be lightly sprayed with water prior to mopping or sweeping. Areas to be cleaned should be appropriately ventilated.

Clean items should be kept separate from dirty items. Gloves should be worn when cleaning equipment, animal cages, and surfaces. Clean and disinfect equipment according to its intended use, the manufacturer's recommendations, and practice policy. Equipment must be cleaned before sterilization or chemical disinfection. Exposure to aerosols generated by brushes during cleaning can be minimized by implementing preventive work practices, such as wearing facial protection and containing splatter.

Normal dishwashing of food and water bowls is adequate for hospitalized patients with infectious diseases (4), although disposable dishes might be considered for animals hospitalized in isolation. Toys, litter boxes, and other miscellaneous items should be discarded or cleaned and disinfected between patients. If these items are visibly soiled, gloves should be worn. Litter boxes should be cleaned or disposed of at least daily by a non-pregnant staff member.

Hands should be washed after finishing a cleaning activity.

*NOTE: Environmental Protection Agency (EPA)-registered hospital disinfectants (see Appendix B) should be used. To ensure effectiveness, disinfectants should be used according to manufacturers' instructions, with particular regard to proper dilution and contact time. Personnel engaged in cleaning should be trained in safe practices and should be provided necessary safety equipment according to the product's Material Safety Data Sheet (MSDS).

3. Handling of Laundry

Although soiled laundry may be contaminated with pathogenic microorganisms, the risk of disease transmission is negligible if handled correctly. Gloves should always be worn when handling soiled laundry. Bedding and other laundry should be machine washed with standard laundry detergent and machine dried. To prevent cross-contamination, separate storage and transport bins should be used for clean and dirty laundry.

4. Decontamination and Spill Response

Spills and splashes of blood or other body fluids should be immediately sprayed with disinfectant and contained by dropping absorbent material (e.g., paper towels, sawdust, cat litter) on them. A staff person should wear gloves, a mask, and protective clothing (including shoe covers if the spill is on the floor and may be stepped in) before beginning the clean-up. The spilled material should be picked up and sealed in leak-proof plastic bags. After the spilled material is removed, the area should be cleaned, and disinfected according to the manufacturer's instructions. Clients, patients, and employees not involved in the clean-up should be kept away from the area until disinfection is completed (76).

5. Veterinary Medical Waste
Veterinary medical waste is a potential source of zoonotic pathogens if not handled appropriately (71, 81). Medical waste is defined and regulated at the state level by multiple agencies, but may include sharps, tissues, contaminated materials, and dead animals. AVMA recommends voluntary compliance with the OSHA Bloodborne Pathogen Standard (82) in order to best protect veterinary personnel. It is beyond the scope of this Compendium to describe veterinary medical waste management in detail. Consult with local and/or state health departments and municipal governments for guidance. Additional information and links to state regulating agencies can be found on the Environmental Protection Agency website: www.epa.gov/epaoswer/other/medical.

6. Rodent and Vector Control
Many important zoonotic pathogens are transmitted by rodents or insect vectors. The principles of integrated pest management (IPM) are central to effective prevention and control (83, 84). IPM practices include:

- Sealing entry and exit points into buildings. Common methods include the use of caulk, steel wool, or lath metal under doors and around pipes (85)
- Storing food and garbage in metal or thick plastic containers with tight lids
- Disposing of food-waste promptly
- Eliminating potential rodent nesting sites (e.g., clutter, hay storage)
- Maintaining snap traps throughout the practice to trap rodents (check daily)
- Removing sources of standing water (empty cans, tires, etc.) from around the building to prevent breeding of mosquitoes (86)
- Installing and maintaining window screens to prevent entry of insects into buildings (86)

Additional measures may be warranted for control of specific pests. Veterinary practices may wish to contact a pest control company for additional guidance.

7. Other Environmental Controls
Designated staff areas should be set aside for eating, drinking, smoking, etc. These activities should never occur in patient care areas. Separate refrigerators should be used for human food, animal food, and biologics. Dishes for human use should be cleaned and stored away from animal care areas.

IV. EMPLOYEE HEALH

A. General

Veterinary practice managers should promote infection control as part of a comprehensive program of employee health. Senior management support for workplace safety programs has been significantly associated with the level of staff compliance with safety policies and procedures (87).

1. Infection Control Personnel
Veterinary practices should designate a staff member to be responsible for developing and maintaining infection control policies, keeping records and managing workplace exposure and injury incidents.

2. Employee Immunization Policies and Record Keeping
a. Rabies
Veterinary personnel who have contact with animals should be vaccinated against rabies in accordance with recommendations of the Advisory Committee on Immunization Practices (ACIP) (88). Preexposure rabies vaccination consists of three doses of a licensed human rabies vaccine administered on days 0, 7, and 21 or 28. In addition to preexposure rabies vaccination, the ACIP guidelines recommend a rabies antibody titer be checked every two years for those in the frequent risk category, including veterinarians and their animal handling staff. Preexposure vaccination for rabies does not eliminate the need for appropriate treatment following a known rabies exposure, but it does simplify the postexposure treatment regimen (2 doses of vaccine without rabies immune globulin instead of rabies immune globulin plus 5 doses of vaccine). In addition, preexposure vaccination may protect against unrecognized rabies exposures or when postexposure treatment is delayed (88).

b. Tetanus
All staff should have an initial series of tetanus immunizations, followed by a booster vaccination every 10 years. In the event of a possible exposure to tetanus, such as a puncture wound, employees should be evaluated by their health care provider; a tetanus booster may be indicated (89).

c. Seasonal Influenza
Veterinary personnel are encouraged to receive the current seasonal influenza vaccine, unless contraindicated. This is intended to minimize the small possibility that dual infection of an individual with human and avian or swine influenza virus could result in a new hybrid strain of the virus. *Check with CDC for updated recommendations* (90).

d. Immunization and Other Health Records
Veterinary practices should maintain records on immunizations, rabies titers, exposures and emergency contact information for staff. This allows for an efficient response to occupational health incidents, such as rabies exposures, by providing necessary records to healthcare providers (91, 92). Records should be maintained in a retrievable, secure database (91). Maintaining these records will facilitate monitoring the work-related health status of employees (e.g., identifying when an employee is due for a rabies titer). Employee health records should be collected on a voluntary basis, with a clear understanding that confidentiality will be maintained. Other health-related issues that may influence employees' work duties should be documented in personnel files. Employees should inform their supervisor of changes in health status (e.g. pregnancy) that may affect work duties. All employees should inform their personal physicians that their work duties involve animal contact.

3. Staff Training and Education
Staff training and education are essential components of an effective employee health program. All employees should receive education and training on injury prevention and infection control at the beginning of their employment and at least annually. Additional in-service training should be provided as recommendations change or if problems with infection control policies are identified. Training should emphasize the potential for zoonotic disease exposure and hazards associated with work duties, and include animal handling, restraint, and behavioral cue recognition. Staff participation in training should be documented.

4. Documenting Exposure Incidents
Injuries or potential exposures to zoonotic pathogens should be reported to the practice owner or designee. Practice managers should develop policies that encourage reporting (92).

Any incident involving injury or a zoonotic pathogen should be thoroughly investigated and documented. Specific risk situations such as an immunocompromising condition or pregnancy and immunization status of those involved in the incident should be reviewed (92). A data collection form (e.g. OSHA form 300) should include:

- Time, date and location of the incident
- Person(s) involved
- Nature of the incident (injury, exposure or both) and a detailed description of the circumstances.
- Status of the animal involved (vaccination status, clinical condition, any infectious disease diagnostic test results or tests pending)
- Plans for follow up (evaluation by physician, reporting to public health)

Practices should contact their local or state health department to inquire about required reporting of bite incidents and zoonotic diseases.

B. Immunocompromised Personnel

Immune deficiencies may put veterinary personnel at increased risk for acquiring zoonotic infections. Additionally, immunocompromised personnel are more likely to develop serious complications from infections. Immune deficiencies may result from underlying medical conditions (e.g., HIV/AIDS, diabetes mellitus, asplenia, pregnancy, certain malignancies), therapy for a variety of conditions (e.g., steroids, chemotherapeutic and immunosuppressive agents, radiation) or may be congenital. Immunocompromised employees and their supervisors should be aware of the following workplace encounters that may result in exposure to zoonotic pathogens:

- Processing laboratory samples
- Direct patient care, especially with the following high risk animals (38):
    - Young animals (ruminants prior to weaning, dogs and cats less than six months of age)
    - Animals with diarrhea
    - Parturient animals

- Stray or feral animals (especially predators of rodents and wildlife)
- Animals fed raw meat diets
- Reptiles or exotic, imported species
- Animals housed in crowded conditions (e.g., shelters)
- Unvaccinated animals or those with untreated internal or external parasites.

Data are limited regarding the risks of zoonotic infection for HIV-infected persons employed in veterinary settings and none exist to justify their exclusion. The risks associated with exposure to zoonotic pathogens in the workplace can be mitigated by appropriate infection control measures (93).

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

Employees with immune dysfunction should discuss their status with the practice manager or owner so the practice can provide appropriate workplace accommodations to protect them. The use of infection control measures and personal protective equipment will reduce the risk of infection. In some cases, it may be advisable to consult the employee's healthcare provider or an infection control, public health or occupational health specialist in managing the zoonotic disease risk (94). Employers must abide by state and federal laws that protect pregnant women and persons with disabilities. The employee should be assured that confidential information will not be disclosed to others.

V. CREATING A WRITTEN INFECTION CONTROL PLAN

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

Effective infection control plans should:

- Be specific to the facility and practice type
- Be flexible to easily address new issues and incorporate new knowledge
- Provide explicit, well organized, understandable guidance
- Clearly describe the role of each staff member
- Be incorporated into new employee training and regularly reviewed with staff
- Include a process for the evaluation of infection control practices
- Be kept in work areas for quick reference
- Provide contact information, resources, and references (e.g., reportable disease list, public health contacts, local rabies codes and environmental health regulations, OSHA requirements, websites of interest, client education materials)

A. Communicating and Updating the Infection Control Plan

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

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

3. New Staff: New staff should be given a copy of the infection control plan and receive detailed training on the practice's infection control procedures, staff vaccination recommendations, and how to report exposure incidents. Some employers may ask new staff members to sign a form stating they have received and read the plan.

4. Continuing Education: Infection control procedures should be reviewed regularly with staff at staff meetings, and veterinary Continuing Education on zoonotic diseases should be encouraged.

5. Review and Revision: A designated staff person should be responsible for regularly reviewing and revising the infection control plan as needed when new information becomes available or when clinical practices change. When revisions are made, they should be shared with all staff members and all copies of the plan updated at the same time.

6. Assurance: A designated staff person should be responsible for assuring the plan components are being carried out consistently and correctly. This person should also ensure that staff are counseled and/or corrective measures are instituted when deficiencies in infection control procedures are identified.

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APPENDIX A

Zoonotic Diseases of Importance in the United States

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

Zoonotic Diseases of Importance in the United States

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans	Nationally notifiable for humans (H) or animals (A)	Severe disease usually associated with immune suppression	Fatalities reported in humans
Echinococcosis	*Echinococcus granulosus, E. multilocularis*	contact	dogs, wild canids, cats	H, A		Yes
Ehrlichiosis/ Anaplasmosis	*Ehrlichia* and *Anaplasma* species	vector	deer, rodents, horses, dogs	H	✔	Yes
Equine encephalomyelitis (WEE, VEE, EEE)	Togaviridae	vector	birds, horses	H, A (not VEE)		Yes
Erysipeloid	*Erysipelothrix rhusiopathiae*	contact	Pigs, fish, crustaceans, and mollusks			Yes
Giardiasis	*Giardia intestinalis* (*G. Lamblia*)	contact	thought to be highly species-specific and rarely transmitted from animals to humans	H	✔	No
Hantaviral diseases	Hantaviruses	aerosol	rodents	H		Yes
Herpes B virus	Cercopithecine herpesvirus 1	contact	macaque monkeys			Yes
Influenza	Influenza viruses	contact, aerosol	poultry, swine	H, A		Yes
Larval migrans: cutaneous (hookworm)	*Ancylostoma* sp.	contact	dogs, cats			Rare
Larval migrans: visceral, ocular, neuro (roundworm)	*Toxocara canis, Toxocara cati*	contact	dogs, cats			Rare
Leishmaniasis	*Leishmania* species	vector	dogs, wild canids			Yes
Leptospirosis	*Leptospira* species	contact, aerosol	rodents, pigs, cattle, sheep, goats, horses, dogs,	A		Yes
Listeriosis	*Listeria monocytogenes*	contact	cattle, sheep, goats, pigs, birds, dogs, cats	H	✔	Yes
Lyme disease	*Borrelia burgdorferi*	vector	small rodents, wild mammals	H		No
Lymphocytic choriomeningitis	Arenavirus (LCMV)	contact aerosol	mice, hamsters, guinea pigs		✔	Yes
Monkeypox	Orthopoxvirus	contact, aerosol	non-human primates, rodents	A		Yes
Mycobacteria, non-tuberculous	*Mycobacterium avium* complex*, Mycobacterium marinum,*	aerosol, contact	Poultry, birds, aquarium fish, reptiles		✔	Yes
Pasteurellosis	*Pasteurella multocida* and other species	contact	dogs, cats, rabbits, rodents		✔	No

Zoonotic Diseases of Importance in the United States

Disease	Agent	Means of transmission to humans	Most common species associated with transmission to humans	Nationally notifiable for humans (H) or animals (A)	Severe disease usually associated with immune suppression	Fatalities reported in humans
Plague	*Yersinia pestis*	vector, contact, aerosol	rodents, cats, dogs	H, A		Yes
Psittacosis/Chlamydiosis	*Chlamydophila psittaci*	aerosol, contact	pet birds, poultry	H	✔	Yes
Q Fever	*Coxiella burnetti*	contact, aerosol, vector	goats, sheep, cattle, cats, dogs, rodents, lagamorphs	H, A		Yes
Rabies	Lyssavirus	contact	Cats, dogs, cattle and other domestic animals, wild carnivores, raccoons, bats	H, A		Yes
Rat bite fever	*Streptobacillus moniliformis, Spirillum minus*	contact	rodents		✔	Yes
***Rhodococcus equi* infection**	*Rhodococcus equi*	aerosol, contact	horses		✔	Yes
Salmonellosis	various *Salmonella* species	contact	reptiles, poultry, horses, pocket pets, many species of mammals and birds	H	✔	Yes
Sporotrichosis	*Sporothirix schenckii*	contact	cats, dogs, horses		✔	Rare
Staphylococcosis	*Staphylococcus* species	contact	dogs, cats, horses	H (MRSA)	✔	Yes (some forms)
Streptococcosis	*Streptococcus* species	contact, aerosol	swine, other mammals, fish	some forms H		Yes (some forms)
Toxoplasmosis	*Toxoplasma gondii*	contact	cats		✔	Yes
Trichuriasis (whipworm infection)	*Trichuris suis, T. trichiura, T. vulpis*	contact	dogs, swine			Rare
Tuberculosis, bovine	*Mycobacterium bovis*	aerosol, contact	cattle, swine, sheep, goats	H, A		Yes
Tularemia	*Francisella tularensis*	vector, contact, aerosol	lagamorphs, pocket pets, wild aquatic rodents, sheep, cats, horses, dogs	H, A		Yes
Vesicular stomatitis	Vesicular stomatitis	vector, contact	horses, cattle, swine, sheep, goats	A		No
West Nile Virus	Flaviviridae	vector	wild birds	H		Yes
Yersiniosis	*Yersinia enterocolitica*	contact	swine, various animal and bird species			No

Note:

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

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APPENDIX B
Selected Disinfectants Used in Veterinary Practice

Characteristics of Selected Disinfectants

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

? Information not found

Disclaimer: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products.

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

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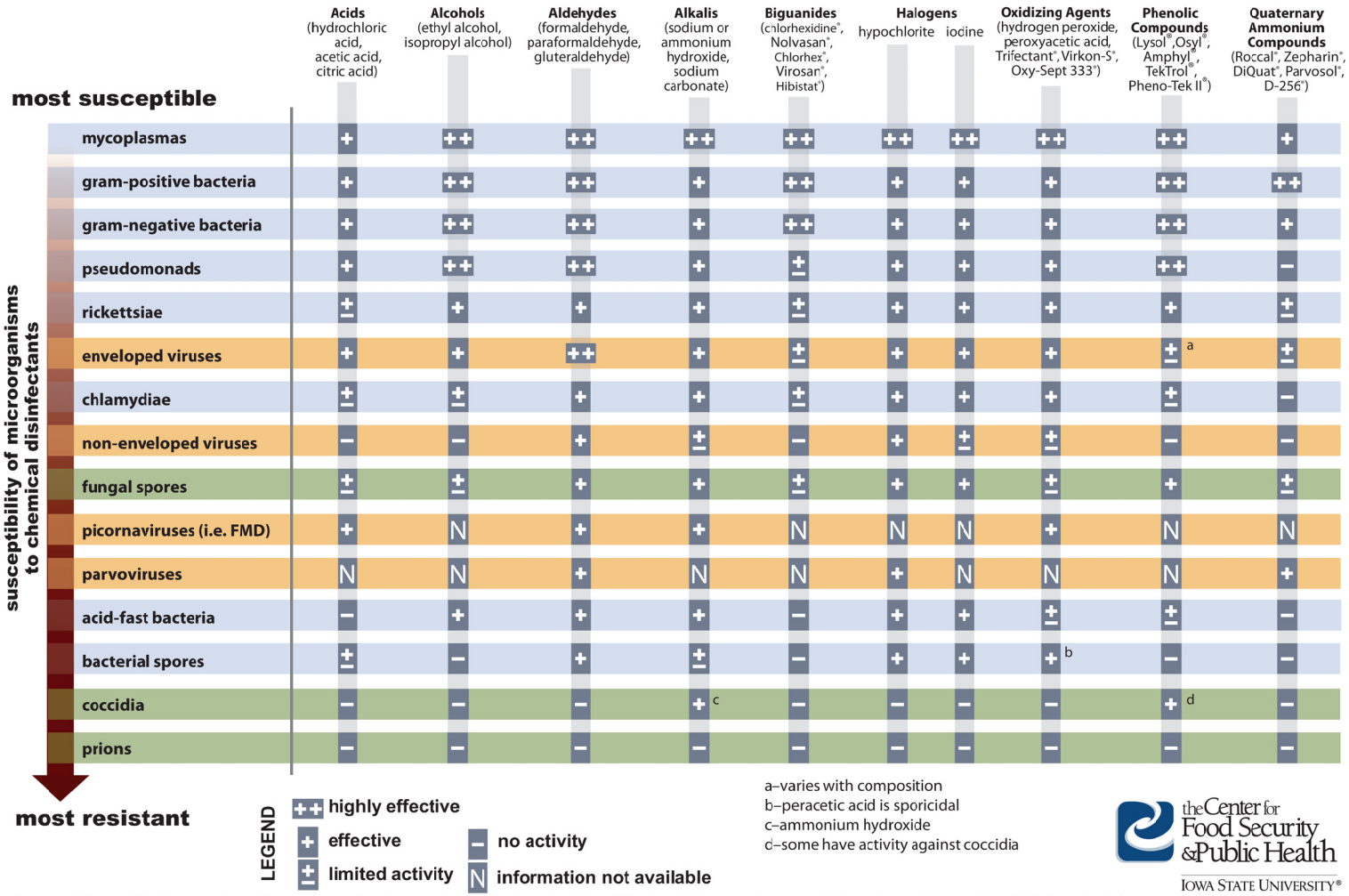
The Antimicrobial Spectrum of Disinfectants

Chemical Disinfectants

Note: Removal of organic material must always precede the use of any disinfectant.



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APPENDIX C

OSHA Respiratory Protection Standard

Sec. 1910.134 of Appendix D (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator’s limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

APPENDIX D

Model Infection Control Plan for Veterinary Practices, 2006

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

This model plan should be adapted to your practice in keeping with local, state and federal regulations. A modifiable electronic version is available on the website of the National Association of State Public Health Veterinarians at www.nasphv.org. Please refer the corresponding sections in 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 clinic's routine practices. The plan will be reviewed at least annually and as part of new employee training.

PERSONAL PROTECTIVE ACTIONS AND EQUIPMENT

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

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

Use of Gloves and Sleeves: Wear gloves or sleeves when touching blood, body fluids, secretions, excretions, mucous membranes, and non-intact skin. Wear gloves for dentistry, resuscitations, necropsies, and obstetrical procedures; when cleaning cages and contaminated environmental surfaces and equipment; when handling dirty laundry; when

handling diagnostic specimens (e.g., urine, feces, aspirates, swabs); and when handling an animal with a suspected infectious disease. Change gloves between examination of individual animals or animal groups (e.g., a litter of puppies) and between dirty and clean procedures on the same patient. Gloves should be removed promptly and disposed of after use. Disposable gloves should not be washed and reused. Hands should be washed immediately after glove removal.
Note: Gloves are not necessary when examining or handling normal, healthy animals.

Facial Protection: Wear facial protection whenever exposure to splashes or sprays is likely to occur. Facial protection should include a mask worn with either goggles or a face shield. Wear facial protection for the following procedures: dentistry, resuscitation, nebulization, suctioning, bronchoscopy, wound irrigation, obstetrical procedures, and necropsies. Use a surgical mask when cleaning with high-pressure sprayers.

Respiratory Protection: Wear a disposable N-95 respirator or other particulate respirator when investigating abortions in small ruminants or significant poultry mortality, when handling ill psittacine birds, and in any other circumstance where there is concern about aerosol transmission.

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

Bite and Other Animal-Related Injury Prevention: Take precautions to prevent bites and other injuries. Use physical restraints, muzzles, bite-resistant gloves, and sedation or anesthesia as needed. Plan an escape route when handling large animals. Do not rely on owners or untrained staff for animal restraint. Notify _____ if there concern for personal safety. When bites or scratches occur, wash the site with soap and water immediately. Report all bites and other injuries to _____ (Infection Control Officer*)* who will also maintain the incident report log. Consult a physician whenever the skin is broken. An evaluation of the need for medical attention, tetanus immunization, antibiotics, and rabies post-exposure prophylaxis will be made by a physician. Bite incidents will be reported to _____ (public health agency) as required by law.
Telephone number: _____.

PROTECTIVE ACTIONS DURING VETERINARY PROCEDURES

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

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

Injections, Venipuncture, and Aspirations: Wear gloves while performing venipuncture on animals suspected of having an infectious disease and when performing soft tissue aspirations. Currently, there is no data indicating that venipuncture on healthy animals carries a significant risk of infection.

Needlestick Injury Prevention: Do not recap needles except in rare instances when required as part of a medical procedure or protocol. Dispose of all sharps in designated puncture-proof sharps containers. Dispose of the used syringe with attached needle in the sharps container when injecting live vaccines or aspirating body fluids. For most other veterinary procedures, use the needle removal device on the sharps container and dispose of the syringe in the regular trash. Sharps containers are located in every area of the clinic where sharps are used. Do not transfer sharps from one container to another.

Dental Procedures: Wear protective outerwear, gloves, mask, and a face shield or goggles when performing dental procedures or working nearby (such as when monitoring anesthesia).

Resuscitation: Wear gloves, mask, and a face shield or goggles.

Obstetrics: Wear gloves and/or shoulder-length sleeves, mask or respirator, face shield or goggles, and impermeable outerwear.

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

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

ENVIRONMENTAL INFECTION CONTROL

Isolation of Infectious Animals: Animals with a contagious or zoonotic disease will be housed in isolation as soon as possible. Clearly mark the room or cage to indicate the patient's status and describe additional precautions. Only equipment needed for the care and treatment of the patient should be kept in the isolation room, and there should also be dedicated cleaning supplies. Disassemble and thoroughly clean and disinfect any equipment that must be taken out of the room. Discard gloves after use. Leave other personal protective equipment (e.g., gown, mask) in the isolation room for reuse. Clean and disinfect protective equipment between patients and whenever contaminated by body fluids. Bag potentially contaminated materials before removal from the isolation room. Use disinfectant footbath before entering and leaving the room. Access to the isolation room is limited. Keep a sign-in log of all people (including owners or other non-employees) having contact with a patient in isolation. Monitor air pressure daily while the room is in use.
Staff responsible _____

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

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

Decontamination and Spill Response: Immediately spray a spill or splash of blood or body fluids with disinfectant and contain it with absorbent material (e.g., paper towels, sawdust, cat litter). Don gloves, mask, and protective clothing (including shoe covers if the spill is on the floor and may be stepped in) before beginning the clean-up. Pick up the material then seal in leak-proof plastic bags. Clean the area, and disinfect according to manufacturer's instructions. 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.*

Rodent and Vector Control: Keep the facility free of wild rodents and mosquitoes and other arthropods by sealing entry portals, eliminating clutter and sources of standing water, keeping animal food in closed metal or thick plastic containers, and disposing of food waste properly.

Other Environmental Controls: There are designated areas for eating, drinking, smoking, applying make-up and similar activities. These activities should never be done in animal care areas or in the laboratory area. Human food or drink should not be kept in the same refrigerator as animal food, biologics, or laboratory specimens. Dishes for human use should be cleaned and stored away from animal care and animal food preparation areas.

EMPLOYEE HEALH

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

_____
_____
_____

Employee Immunization Policies and Record Keeping:

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

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

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

Seasonal Influenza Vaccination: Unless contraindicated, veterinary personnel are encouraged to receive the current seasonal influenza vaccine. *Check with CDC for updated recommendations at www.cdc.gov*.

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

Documenting and Reporting Exposure Incidents: Report incidents that result in injury or potential exposure to an infectious agent to _____.
The following information will be collected for each exposure incident: date, time, location, person(s) injured or exposed, other persons present, description of the incident, the status of any animals involved (e.g., vaccination history, clinical condition, diagnostic

information), and plans for follow-up. If consultation with a health care provider is necessary, be sure to inform them of the exposure to the animal(s).

Pregnant and Immunocompromised Personnel: Pregnant and immunocompromised employees are at increased risk from zoonotic diseases. Inform _____ if you are concerned about your work responsibilities, so that accommodations may be made. Consultation between the supervising veterinarian and a health care provider may be needed.

The following information is attached to the Infection Control Plan:

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