



# H. Animals in Health-Care Facilities

ENVIRONMENTAL INFECTION CONTROL GUIDELINES  
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Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

AT A GLANCE

Guidelines for animals in healthcare facilities from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003).

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## 1. General Information



Format Change [February 2017]

The format of this section was changed to improve readability and accessibility. The content is unchanged.

Animals in health-care facilities traditionally have been limited to laboratories and research areas. However, their presence in patient-care areas is now more frequent, both in acute-care and long-term care settings, prompting consideration for the potential transmission of zoonotic pathogens from animals to humans in these settings. Although dogs and cats may be commonly encountered in health-care settings, other animals (e.g., fish, birds, non-human primates, rabbits, rodents, and reptiles) also can be present as research, resident, or service animals. These animals can serve as sources of zoonotic pathogens that could potentially infect patients and health-care workers (Table 26).<sup>1327–1340</sup> Animals potentially can serve as reservoirs for antibiotic-resistant microorganisms, which can be introduced to the health-care setting while the animal is present. VRE have been isolated from both farm animals and pets,<sup>1341</sup> and a cat in a geriatric care center was found to be colonized with MRSA.<sup>1342</sup>

Table 26. Examples of diseases associated with zoonotic transmission\* (This table does not include vector-borne diseases.)

Table 26A. Virus

Infectious disease	Cats	Dogs	Fish	Birds	Rabbits	Reptiles§	Primates	Rodents§
Lymphocytic choriomeningitis	n/a	n/a	n/a	n/a	n/a	n/a	+	
Rabies	+	+	n/a	n/a	n/a	n/a	n/a	n/a

Viruses associated with transmission to humans by various animals.

Table 26B. Bacteria

Infectious disease	Cats	Dogs	Fish	Birds	Rabbits	Reptiles§	Primates	Rodents§
Campylobacteriosis	+	+	n/a	n/a	n/a	+	+	+
<i>Capnocytophaga canimorsus</i> infection	+	+	n/a	n/a	n/a	n/a	n/a	n/a
Cat scratch disease ( <i>Bartonella henselae</i> )	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Leptospirosis	+	n/a	n/a	n/a	n/a	n/a	+	+
Mycobacteriosis	n/a	n/a	+	+	n/a	n/a	n/a	n/a
Pasteurellosis	+	+	n/a	n/a	+	n/a	n/a	n/a
Plague	+	n/a	n/a	+	n/a	n/a	+	+
Psittacosis	n/a	n/a	n/a	+	n/a	n/a	n/a	n/a
Q fever ( <i>Coxiella burnetti</i> )	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Rat bite fever ( <i>Spirillum minus</i> , <i>Streptobacillus moniliformis</i> )	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+
Salmonellosis	+	+	n/a	+	+	+	+	+
Tularemia	+	n/a	n/a	n/a	+	n/a	n/a	+
Yersiniosis	n/a	n/a	n/a	n/a	+	+	+	+

bacteria associated with transmission to humans by various animals.

Table 26C. Parasites

Infectious disease	Cats	Dogs	Fish	Birds	Rabbits	Reptiles§	Primates	Rodents§
Ancylostomiasis	+	+	n/a	n/a	n/a	n/a	+	n/a
Cryptosporidiosis	+	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Giardiasis	+	+	n/a	n/a	n/a	n/a	+	n/a
Toxocariasis	+	+	n/a	n/a	n/a	n/a	+	n/a
Toxoplasmosis	+	+	n/a	n/a	n/a	n/a	+	n/a

parasites associated with transmission to humans by various animals.

Table 26D. Fungi

Infectious disease	Cats	Dogs	Fish	Birds	Rabbits	Reptiles§	Primates	Rodents§
Blastomycosis	n/a	+	n/a	n/a	n/a	n/a	n/a	n/a
Dermatophytosis	n/a	+	n/a	n/a	+	n/a	+	+

fungi associated with transmission to humans by various animals.

\* Material in this table is adapted from reference 1331 and used with permission of the publisher (Lippincott Williams and Wilkins).

§ Reptiles include lizards, snakes, and turtles. Rodents include hamsters, mice, and rats.

+ Indicates that the pathogen associated with the infection has been isolated from animals and is considered to pose potential risk to humans.

Zoonoses can be transmitted from animals to humans either directly or indirectly via bites, scratches, aerosols, ectoparasites, accidental ingestion, or contact with contaminated soil, food, water, or unpasteurized milk.<sup>1331, 1332, 1343–1345</sup> Colonization and hand transferral of pathogens acquired from pets in health-care workers' homes represent potential sources and modes of transmission of zoonotic pathogens in health-care settings. An outbreak of infections caused by a yeast (*Malassezia pachydermatis*) among newborns was traced to transfer of the yeast from the hands of health-care workers with pet dogs at home.<sup>1346</sup> In addition, an outbreak of ringworm in a NICU caused by *Microsporum*

*canis* was associated with a nurse and her cat,<sup>1347</sup> and an outbreak of *Rhodococcus (Gordona) bronchialis* sternal SSIs after coronary-artery bypass surgery was traced to a colonized nurse whose dogs were culture-positive for the organism.<sup>1348</sup> In the latter outbreak, whether the dogs were the sole source of the organism and whether other environmental reservoirs contributed to the outbreak are unknown. Nonetheless, limited data indicate that outbreaks of infectious disease have occurred as a result of contact with animals in areas housing immunocompetent patients. However, the low frequency of outbreaks may result from

- a. the relatively limited presence of the animals in health-care facilities and
- b. the immunocompetency of the patients involved in the encounters.

Formal scientific studies to evaluate potential risks of transmission of zoonoses in health-care settings outside of the laboratory are lacking.

## 2. Animal-Assisted Activities, Animal-Assisted Therapy, and Resident Animals

Animal-Assisted Activities (AAA) are those programs that enhance the patients' quality of life. These programs allow patients to visit animals in either a common, central location in the facility or in individual patient rooms. A group session with the animals enhances opportunities for ambulatory patients and facility residents to interact with caregivers, family members, and volunteers.<sup>1349–1351</sup> Alternatively, allowing the animals access to individual rooms provides the same opportunity to non-ambulatory patients and patients for whom privacy or dignity issues are a consideration. The decision to allow this access to patients' rooms should be made on a case-by-case basis, with the consultation and consent of the attending physician and nursing staff.

Animal-Assisted Therapy (AAT) is a goal-directed intervention that incorporates an animal into the treatment process provided by a credentialed therapist.<sup>1330, 1331</sup> The concept for AAT arose from the observation that some patients with pets at home recover from surgical and medical procedures more rapidly than patients without pets.<sup>1352, 1353</sup> Contact with animals is considered beneficial for enhancing wellness in certain patient populations (e.g., children, the elderly, and extended-care hospitalized patients).<sup>1349, 1354–1357</sup> However, evidence supporting this benefit is largely derived from anecdotal reports and observations of patient/animal interactions.<sup>1357–1359</sup> Guidelines for establishing AAT programs are available for facilities considering this option.<sup>1360</sup>

The incorporation of non-human primates into an AAA or AAT program is not encouraged because of concerns regarding potential disease transmission from and unpredictable behavior of these animals.<sup>1361, 1362</sup> Animals participating in either AAA or AAT sessions should be in good health and up-to-date with recommended immunizations and prophylactic medications (e.g., heartworm prevention) as determined by a licensed veterinarian based on local needs and recommendations. Regular re-evaluation of the animal's health and behavior status is essential.<sup>1360</sup> Animals should be routinely screened for enteric parasites and/or have evidence of a recently completed antihelminthic regimen.<sup>1363</sup> They should also be free of ectoparasites (e.g., fleas and ticks) and should have no sutures, open wounds, or obvious dermatologic lesions that could be associated with bacterial, fungal, or viral infections or parasitic infestations. Incorporating young animals (i.e., those aged <1 year) into these programs is not encouraged because of issues regarding unpredictable behavior and elimination control. Additionally, health of these animals at risk. Animals should be clean and well-groomed. The visits must be supervised by persons who know the animals and their behavior. Animal handlers should be trained in these activities and receive site-specific orientation to ensure that they work efficiently with the staff in the specific health-care environment.<sup>1360</sup> Additionally, animal handlers should be in good health.<sup>1360</sup>

The most important infection-control measure to prevent potential disease transmission is strict enforcement of hand-hygiene measures (e.g., using either soap and water or an alcohol-based hand rub) for all patients, staff, and residents after handling the animals.<sup>1355, 1364</sup> Care should also be taken to avoid direct contact with animal urine or feces. Clean-up of these substances from environmental surfaces requires gloves and the use of leak-resistant plastic bags to discard absorbent material used in the process.<sup>2</sup> The area must be cleaned after visits according to standard cleaning procedures.

The American Academy of Allergy, Asthma, and Immunology estimates that dog or cat allergies occur in approximately 15% of the population.<sup>1365</sup> Minimizing contact with animal saliva, dander, and/or urine helps to mitigate allergic responses.<sup>1365–1367</sup> Some facilities may not allow animal visitation for patients with

- a. underlying asthma,
- b. known allergies to cat or dog hair,

- c. respiratory allergies of unknown etiology, and
- d. immunosuppressive disorders.

Hair shedding can be minimized by processes that remove dead hair (e.g., grooming) and that prevent the shedding of dead hair (e.g., therapy capes for dogs). Allergens can be minimized by bathing therapy animals within 24 hours of a visit.<sup>1333, 1368</sup>

Animal therapists and handlers must take precautions to prevent animal bites. Common pathogens associated with animal bites include *Capnocytophaga canimorsus*, *Pasteurella* spp., *Staphylococcus* spp., and *Streptococcus* spp. Selecting well-behaved and well-trained animals for these programs greatly decreases the incidence of bites. Rodents, exotic species, wild/domestic animals (i.e., wolf-dog hybrids), and wild animals whose behavior is unpredictable should be excluded from AAA or AAT programs. A well-trained animal handler should be able to recognize stress in the animal and to determine when to terminate a session to minimize risk. When an animal bites a person during AAA or AAT, the animal is to be permanently removed from the program. If a bite does occur, the wound must be cleansed immediately and monitored for subsequent infection. Most infections can be treated with antibiotics, and antibiotics often are prescribed prophylactically in these situations.

The health-care facility's infection-control staff should participate actively in planning for and coordinating AAA and AAT sessions. Many facilities do not offer AAA or AAT programs for severely immunocompromised patients (e.g., HSCT patients and patients on corticosteroid therapy).<sup>1339</sup> The question of whether family pets or companion animals can visit terminally-ill HSCT patients or other severely immunosuppressed patients is best handled on a case-by-case basis, although animals should not be brought into the HSCT unit or any other unit housing severely immunosuppressed patients. An in-depth discussion of this issue is presented elsewhere.<sup>1366</sup>

Immunocompromised patients who have been discharged from a health-care facility may be at higher risk for acquiring some pet-related zoonoses. Although guidelines have been developed to minimize the risk of disease transmission to HIV-infected patients,<sup>8</sup> these recommendations may be applicable for patients with other immunosuppressive disorders. In addition to handwashing or hand hygiene, these recommendations include avoiding contact with

- a. animal feces and soiled litter box materials,
- b. animals with diarrhea,
- c. very young animals (i.e., dogs <6 months of age and cats <1 year of age), and
- d. exotic animals and reptiles.<sup>8</sup>

Pets or companion animals with diarrhea should receive veterinary care to resolve their condition.

Many health-care facilities are adopting more home-like environments for residential-care or extended-stay patients in acute-care settings, and resident animals are one element of this approach.<sup>1369</sup> One concept, the "Eden Alternative," incorporates children, plants, and animals (e.g., dogs, cats, fish, birds, rabbits, and rodents) into the daily care setting.<sup>1370, 1371</sup> The concept of working with resident animals has not been scientifically evaluated. Several issues beyond the benefits of therapy must be considered before embarking on such a program, including

- a. whether the animals will come into direct contact with patients and/or be allowed to roam freely in the facility
- b. how the staff will provide care for the animals;
- c. the management of patients' or residents' allergies, asthma, and phobias;
- d. precautionary measures to prevent bites and scratches; and
- e. measures to properly manage the disposal of animal feces and urine, thereby preventing environmental contamination by zoonotic microorganisms (e.g., *Toxoplasma* spp., *Toxocara* spp., and *Ancylostoma* spp.).<sup>1372, 1373</sup>

Few data document a link between health-care acquired infection rates and frequency of cleaning fish tanks or rodent cages. Skin infections caused by *Mycobacterium marinum* have been described among persons who have fish aquariums at home.<sup>1374, 1375</sup> Nevertheless, immunocompromised patients should avoid direct contact with fish tanks and cages and the aerosols that these items produce. Further, fish tanks should be kept clean on a regular basis as determined by facility policy, and this task should be performed by gloved staff members who are not responsible for patient care. The use of the infection-control risk assessment can help determine whether a fish tank poses a risk for patient or resident safety and health in these situations. No evidence, however, links the incidence of health-care acquired infections among

immunocompetent patients or residents with the presence of a properly cleaned and maintained fish tank, even in dining areas. As a general preventive measure, resident animal programs are advised to restrict animals from

- a. food preparation kitchens,
- b. laundries,
- c. central sterile supply and any storage areas for clean supplies, and
- d. medication preparation areas.

Resident-animal programs in acute-care facilities should not allow the animals into the isolation areas, protective environments, ORs, or any area where immunocompromised patients are housed. Patients and staff routinely should wash their hands or use waterless, alcohol-based hand-hygiene products after contact with animals.

### 3. Service Animals

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Although this section provides an overview about service animals in health-care settings, it cannot address every situation or question that may arise (see Appendix E – Information Resources). A service animal is any animal individually trained to do work or perform tasks for the benefit of a person with a disability.<sup>1366, 1376</sup> A service animal is not considered a pet but rather an animal trained to provide assistance to a person because of a disability. Title III of the "Americans with Disabilities Act" (ADA) of 1990 mandates that persons with disabilities accompanied by service animals be allowed access with their service animals into places of public accommodation, including restaurants, public transportation, schools, and health-care facilities.<sup>1366, 1376</sup> In health-care facilities, a person with a disability requiring a service animal may be an employee, a visitor, or a patient.

An overview of the subject of service animals and their presence in health-care facilities has been published.<sup>1366</sup> No evidence suggests that animals pose a more significant risk of transmitting infection than people; therefore, service animals should not be excluded from such areas, unless an individual patient's situation or a particular animal poses greater risk that cannot be mitigated through reasonable measures. If health-care personnel, visitors, and patients are permitted to enter care areas (e.g., inpatient rooms, some ICUs, and public areas) without taking additional precautions to prevent transmission of infectious agents (e.g., donning gloves, gowns, or masks), a clean, healthy, well-behaved service animal should be allowed access with its handler.<sup>1366</sup> Similarly, if immunocompromised patients are able to receive visitors without using protective garments or equipment, an exclusion of service animals from this area would not be justified.<sup>1366</sup>

Because health-care facilities are covered by the ADA or the Rehabilitation Act, a person with a disability may be accompanied by a service animal within the facility unless the animal's presence or behavior creates a fundamental alteration in the nature of a facility's services in a particular area or a direct threat to other persons in a particular area.<sup>1366</sup> A "direct threat" is defined as a significant risk to the health or safety of others that cannot be mitigated or eliminated by modifying policies, practices, or procedures.<sup>1376</sup> The determination that a service animal poses a direct threat in any particular healthcare setting must be based on an individualized assessment of the service animal, the patient, and the health-care situation. When evaluating risk in such situations, health-care personnel should consider the nature of the risk (including duration and severity); the probability that injury will occur; and whether reasonable modifications of policies, practices, or procedures will mitigate the risk (J. Wodatch, U.S. Department of Justice, 2000). The person with a disability should contribute to the risk-assessment process as part of a pre-procedure health-care provider/patient conference.

Excluding a service animal from an OR or similar special care areas (e.g., burn units, some ICUs, PE units, and any other area containing equipment critical for life support) is appropriate if these areas are considered to have "restricted access" with regards to the general public. General infection-control measures that dictate such limited access include

- a. the area is required to meet environmental criteria to minimize the risk of disease transmission,
- b. strict attention to hand hygiene and absence of dermatologic conditions, and
- c. barrier protective measures [e.g., using gloves, wearing gowns and masks] are indicated for persons in the affected space.

No infection-control measures regarding the use of barrier precautions could be reasonably imposed on the service animal. Excluding a service animal that becomes threatening because of a perceived danger to its handler during treatment also is appropriate; however, exclusion of such an animal must be based on the actual behavior of the particular animal, not on speculation about how the animal might behave.

Another issue regarding service animals is whether to permit persons with disabilities to be accompanied by their service animals during all phases of their stay in the health-care facility. Healthcare personnel should discuss all aspects of anticipatory care with the patient who uses a service animal. Health-care personnel may not exclude a service animal because health-care staff may be able to perform the same services that the service animal does (e.g., retrieving dropped items and guiding an otherwise ambulatory person to the restroom). Similarly, health-care personnel can not exclude service animals because the health-care staff perceive a lack of need for the service animal during the person's stay in the health-care facility. A person with a disability is entitled to independent access (i.e., to be accompanied by a service animal unless the animal poses a direct threat or a fundamental alteration in the nature of services); "need" for the animal is not a valid factor in either analysis. For some forms of care (e.g., ambulation as physical therapy following total hip replacement or knee replacement), the service animal should not be used in place of a credentialed health-care worker who directly provides therapy. However, service animals need not be restricted from being in the presence of its handler during this time; in addition, rehabilitation and discharge planning should incorporate the patient's future use of the animal. The health-care personnel and the patient with a disability should discuss both the possible need for the service animal to be separated from its handler for a period of time during non-emergency care and an alternate plan of care for the service animal in the event the patient is unable or unwilling to provide that care. This plan might include family members taking the animal out of the facility several times a day for exercise and elimination, the animal staying with relatives, or boarding off-site. Care of the service animal, however, remains the obligation of the person with the disability, not the health-care staff.

Although animals potentially carry zoonotic pathogens transmissible to man, the risk is minimal with a healthy, clean, vaccinated, well-behaved, and well-trained service animal, the most common of which are dogs and cats. No reports have been published regarding infectious disease that affects humans originating in service dogs. Standard cleaning procedures are sufficient following occupation of an area by a service animal.<sup>1366</sup> Clean-up of spills of animal urine, feces, or other body substances can be accomplished with blood/body substance procedures outlined in the Environmental Services section of this guideline. No special bathing procedures are required prior to a service animal accompanying its handler into a health-care facility.

Providing access to exotic animals (e.g., reptiles and non-human primates) that are used as service animals is problematic. Concerns about these animals are discussed in two published reviews.<sup>1331, 1366</sup> Because some of these animals exhibit high-risk behaviors that may increase the potential for zoonotic disease transmission (e.g., herpes B infection), providing health-care facility access to nonhuman primates used as service animals is discouraged, especially if these animals might come into contact with the general public.<sup>1361, 1362</sup> Health-care administrators should consult the Americans with Disabilities Act for guidance when developing policies about service animals in their facilities.<sup>1366, 1376</sup>

Requiring documentation for access of a service animal to an area generally accessible to the public would impose a burden on a person with a disability. When health-care workers are not certain that an animal is a service animal, they may ask the person who has the animal if it is a service animal required because of a disability; however, no certification or other documentation of service animal status can be required.<sup>1377</sup>

## 4. Animals as Patients in Human Health-Care Facilities

The potential for direct and indirect transmission of zoonoses must be considered when rooms and equipment in human health-care facilities are used for the medical or surgical treatment or diagnosis of animals.<sup>1378</sup> Inquiries should be made to veterinary medical professionals to determine an appropriate facility and equipment to care for an animal.

The central issue associated with providing medical or surgical care to animals in human health-care facilities is whether cross-contamination occurs between the animal patient and the human health-care workers and/or human patients. The fundamental principles of infection control and aseptic practice should differ only minimally, if at all, between veterinary medicine and human medicine. Health-care-associated infections can and have occurred in both patients and workers in veterinary medical facilities when lapses in infection-control procedures are evident.<sup>1379–1384</sup> Further, veterinary patients can be at risk for acquiring infection from veterinary health-care workers if proper precautions are not taken.<sup>1385</sup>

The issue of providing care to veterinary patients in human health-care facilities can be divided into the following three areas of infection-control concerns:

- a. whether the room/area used for animal care can be made safe for human patients,
- b. whether the medical/surgical instruments used on animals can be subsequently used on human patients, and
- c. which disinfecting or sterilizing procedures need to be done for these purposes.

Studies addressing these concerns are lacking. However, with respect to disinfection or sterilization in veterinary settings, only minimal evidence suggests that zoonotic microbial pathogens are unusually resistant to inactivation by chemical or physical agents (with the exception of prions). Ample evidence supports the contrary observation (i.e., that pathogens from human- and animal sources are similar in their relative intrinsic

resistance to inactivation).<sup>1386–1391</sup> Further, no evidence suggests that zoonotic pathogens behave differently from human pathogens with respect to ventilation. Despite this knowledge, an aesthetic and sociologic perception that animal care must remain separate from human care persists. Health-care facilities, however, are increasingly faced with requests from the veterinary medical community for access to human health-care facilities for reasons that are largely economical (e.g., costs of acquiring sophisticated diagnostic technology and complex medical instruments). If hospital guidelines allow treatment of animals, alternate veterinary resources (including veterinary hospitals, clinics, and universities) should be exhausted before using human health-care settings. Additionally, the hospital's public/media relations should be notified of the situation. The goal is to develop policies and procedures to proactively and positively discuss and disclose this activity to the general public.

An infection-control risk assessment (ICRA) must be undertaken to evaluate the circumstances specific to providing care to animals in a human health-care facility. Individual hospital policies and guidelines should be reviewed before any animal treatment is considered in such facilities. Animals treated in human health-care facilities should be under the direct care and supervision of a licensed veterinarian; they also should be free of known infectious diseases, ectoparasites, and other external contaminants (e.g., soil, urine, and feces). Measures should be taken to avoid treating animals with a known or suspected zoonotic disease in a human health-care setting (e.g., lambs being treated for Q fever).

If human health-care facilities must be used for animal treatment or diagnostics, the following general infection-control actions are suggested:

- a. whenever possible, the use of ORs or other rooms used for invasive procedures should be avoided [e.g., cardiac catheterization labs and invasive nuclear medicine areas]
- b. when all other space options are exhausted and use of the aforementioned rooms is unavoidable, the procedure should be scheduled late in the day as the last procedure for that particular area such that patients are not present in the department/unit/area;
- c. environmental surfaces should be thoroughly cleaned and disinfected using procedures discussed in the Environmental Services portion of this guideline after the animal is removed from the care area;
- d. sufficient time should be allowed for ACH to help prevent allergic reactions by human patients [Table B.1. in Appendix B];
- e. only disposable equipment or equipment that can be thoroughly and easily cleaned, disinfected, or sterilized should be used;
- f. when medical or surgical instruments, especially those invasive instruments that are difficult to clean [e.g., endoscopes], are used on animals, these instruments should be reserved for future use only on animals; and g) standard precautions should be followed.

## 5. Research Animals in Health-Care Facilities

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The risk of acquiring a zoonotic infection from research animals has decreased in recent years because many small laboratory animals (e.g., mice, rats, and rabbits) come from quality stock and have defined microbiologic profiles.<sup>1392</sup> Larger animals (e.g., nonhuman primates) are still obtained frequently from the wild and may harbor pathogens transmissible to humans. Primates, in particular, benefit from vaccinations to protect their health during the research period provided the vaccination does not interfere with the study of the particular agent. Animals serving as models for human disease studies pose some risk for transmission of infection to laboratory or health-care workers from percutaneous or mucosal exposure. Exposures can occur either through

- a. direct contact with an infected animal or its body substances and secretions or
- b. indirect contact with infectious material on equipment, instruments, surfaces, or supplies.<sup>1392</sup>

Uncontained aerosols generated during laboratory procedures can also transmit infection.

Infection-control measures to prevent transmission of zoonotic infections from research animals are largely derived from the following basic laboratory safety principles:

- a. purchasing pathogen-free animals,
- b. quarantining incoming animals to detect any zoonotic pathogens,
- c. treating infected animals or removing them from the facility,

- d. vaccinating animal carriers and high-risk contacts if possible,
- e. using specialized containment caging or facilities, and
- f. using protective clothing and equipment [e.g., gloves, face shields, gowns, and masks].<sup>1392</sup>

An excellent resource for detailed discussion of these safety measures has been published.<sup>1013</sup>

The animal research unit within a health-care facility should be engineered to provide

- a. adequate containment of animals and pathogens;
- b. daily decontamination and transport of equipment and waste;
- c. proper ventilation and air filtration, which prevents recirculation of the air in the unit to other areas of the facility; and
- d. negative air pressure in the animal rooms relative to the corridors.

To ensure adequate security and containment, no through traffic to other areas of the health-care facility should flow through this unit; access should be restricted to animal-care staff, researchers, environmental services, maintenance, and security personnel.

Occupational health programs for animal-care staff, researchers, and maintenance staff should take into consideration the animals' natural pathogens and research pathogens. Components of such programs include

- a. prophylactic vaccines,
- b. TB skin testing when primates are used,
- c. baseline serums, and
- d. hearing and respiratory testing.


Work practices, PPE, and engineering controls specific for each of the four animal biosafety levels have been published.<sup>1013, 1393</sup> The facility's occupational or employee health clinic should be aware of the appropriate post-exposure procedures involving zoonoses and have available the appropriate post-exposure biologicals and medications.

Animal-research-area staff should also develop standard operating procedures for

- a. daily animal husbandry [e.g., protection of the employee while facilitating animal welfare]
- b. pathogen containment and decontamination;
- c. management, cleaning, disinfecting and/or sterilizing equipment and instruments; and
- d. employee training for laboratory safety and safety procedures specific to animal research worksites.<sup>1013</sup>

The federal Animal Welfare Act of 1966 and its amendments serve as the regulatory basis for ensuring animal welfare in research.<sup>1394, 1395</sup>

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- + Indicates that the pathogen associated with the infection has been isolated from animals and is considered to pose potential risk to humans.

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