NATIONAL ASSOCIATION of STATE PUBLIC HEALTH VETERINARIANS, INC.

DATE: July 5, 2007

TO: State Public Health Veterinarians
State Epidemiologists
State Veterinarians
Others Concerned with Disease Associated with Animals in Public Settings

FROM: Jeffrey B. Bender, DVM, MS, DACVPM
Carina Blackmore, DVM, PhD
Co-Chairs, Compendium Committee

SUBJECT: *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007*

The MMWR will be publishing the "Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007" on July 6th. This compendium may generate some media inquiries, so we have prepared a few key talking points. The compendium is available electronically at CDC's website, http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5605a1.htm

In addition, a summary letter of the changes for the 2007 Compendium compared to the 2006 Compendium will be distributed to highlight additional or deleted materials.

If you have further questions, you can contact one of the compendium committee members.

Animal Contact Compendium Risk Communication Messages

SOCO – *These recommendations were developed by the NASPHV. There has been an increasing recognition of human disease outbreaks associated with animal exhibit settings. We believe that the positive benefits of human-animal contact are important and that the risks of such contacts can be minimized in properly supervised and managed settings. The intent of this Compendium is to provide standard recommendations for minimizing disease and injury to the public.*

Key Messages

- Infectious disease outbreaks, rabies exposures, and injuries associated with animal exhibit settings have increasingly been reported.
- Outbreaks are often associated with hand-to-mouth contact (fecal-oral transmission).
- Serious illnesses have occurred, especially in persons at high risk like children.
- Many of these pathogens do not cause illness in animals.
- The increase in outbreaks is likely multifactorial involving emerging pathogens (e.g. *Cryptosporidium* and *E. coli* O157), host immunity, or unique environments allowing for disease transmission.

Prevention Steps

The single most important step in preventing human infection from animal exhibit settings is to wash hands.

Other recommendations in this compendium include:

1) Education of operators, staff, and visitors about the potential risk and measures to prevent infection.
    a. This includes visible signage to refrain from eating in animal contact areas.
    b. These signs should be age and language appropriate.
    c. Staff should supervise animal-visitor interactions.
2) Design and management of facilities to control potential transmission events.
    a. Facilities should have designated animal areas and non-animal areas (i.e., where food consumption may occur).
    b. Hand washing facilities should be clearly identified and able to handle the number of visitors.
3) More specific recommendations may be important for animals in school settings.
    a. Some animals may not be appropriate in school settings (e.g., wild or exotic animals).
    b. The type of animals allowed depends on the age of the children and the type of interaction.
    c. All interactions should be supervised.
4) At risk populations should take “extra” care.

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On behalf of the National Association of State Public Health Veterinarians (NASPHV), we are pleased to announce the availability of the *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007*. There are many positive benefits of human-animal contact; however, infectious disease outbreaks related to such contacts have been increasingly reported. This Compendium provides standardized recommendations for use by public health officials, veterinarians, animal venue operators, animal exhibitors, and others concerned with disease-control and with minimizing risks associated with animals in public settings.

This Compendium updates the 2006 Compendium that was released on-line (www.nasphv.org). The 2007 Compendium provides the following updates:

- A revised list of references to reflect recent publications and disease outbreaks. This includes recent publications about rodent-associated infections and contact with contaminated animal products, such as owl pellets.
- Consumer friendly appendices for venue operators and staff (Appendix A)
- An example of an educational handout that can be displayed at venue events (Appendix B)
- Revised handwashing recommendations to better protect the public (Appendix C)
- Updated guidelines for schools (Appendix D)
- For simplicity and clarity, the disinfectant appendix was removed. The Compendium of Veterinary Standard Precautions is cited instead to highlight recommended standard precautions and a comprehensive list of appropriate disinfectants.

We recommend that you distribute this cover memorandum and the Compendium widely to persons responsible for oversight or regulation of animal contact venues, persons who operate such venues, and settings where animal contact may occur. You also may wish to distribute the Appendices as stand-alone handouts, including Appendix A: Information and Instructions for Venue Operators and Staff about Animals in Public Settings; Appendix B: "How to be Safe Around Animals" handout; Appendix C: Hand-Washing Recommendations; and Appendix D: Guidelines for Animals in school setting.

If you update any web links to this document, please delete links to prior versions of the Compendium. This Compendium will be available on the web at the NASPHV website: www.nasphv.org, in the Publications section, along with the 2007 rabies, psittacosis/avian chlamydiosis, and veterinary infection control compendia.

This Compendium is periodically updated. We encourage your comments or suggestions for future Compendium issues. Comments should be sent to Dr. Bender at Veterinary Public Health, University of Minnesota, 1354 Eckles Ave., 136F ABLMS Bldg., St. Paul, Minnesota 55108.

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Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007

National Association of State Public Health Veterinarians, Inc. (NASPHV)

INSIDE: Continuing Education Examination

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

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On the Cover: *Top and bottom right photos:* Casey Barton Behravesh DVM, DrPH. *Bottom left photo:* North Carolina Division of Public Health. *Top left photo:* Xin Tong, MPH. *Center Photo:* Julie Smith, MBA.

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007

National Association of State Public Health Veterinarians, Inc. (NASPHV)

Prepared by NASPHV

Summary

Certain venues encourage or permit the public to contact animals, resulting in millions of human-animal interactions each year. These settings include county or state fairs, petting zoos, animal swap meets, pet stores, zoologic institutions, circuses, carnivals, farm tours, livestock-birthing exhibits, educational exhibits at schools, and wildlife photo opportunities. Although multiple benefits of human-animal contact exist, infectious diseases, rabies exposures, injuries, and other human health problems associated with these settings are possible. Infectious disease outbreaks reported during the previous decade have been caused by Escherichia coli *O157:H7,* Salmonella, Cryptosporidium, Coxiella burnetii, Mycobacterium tuberculosis, *ringworm, and other pathogens. Such incidents have substantial medical, public health, legal, and economic effects.*

This report provides recommendations for public health officials, veterinarians, animal venue staff, animal exhibitors, visitors to animal venues, physicians, and others concerned with minimizing risks associated with animals in public settings. The recommendation to wash hands is the single most important prevention step for reducing the risk for disease transmission. Other critical recommendations are that venues not allow food in animal areas, venues include transition areas between animal areas and nonanimal areas, visitors be educated about disease risk and prevention procedures, and animals be properly cared for and managed.

Introduction

Contact with animals in public settings (e.g., fairs, farm tours, petting zoos, and schools) provides opportunities for entertainment and education. However, inadequate understanding of disease transmission and animal behavior can increase the likelihood of infectious diseases, rabies exposures, injuries, and other health problems among visitors, especially children, in these settings. Zoonotic diseases (i.e., zoonoses) are diseases transmitted from animals to humans. Of particular concern are instances in which large numbers of persons become ill. Since 1991, approximately 50 human infectious disease outbreaks involving animals in public settings have been reported to CDC (*1*). During the preceding 10 years, an increasing number of enteric disease outbreaks associated with animals in public settings (e.g., fairs and petting zoos) have been reported (*1*).

This report has been endorsed by CDC, the Council of State and Territorial Epidemiologists, and the American Veterinary Medical Association. The material in this report originated in the Coordinating Center for Infectious Diseases, Mitch Cohen MD, Director; and the Division of Foodborne, Bacterial, and Mycotic Diseases, David Warnock PhD, Director.

Corresponding preparer: J.B. Bender DVM, Co-chair, NASPHV Animal Contact Compendium Committee, University of Minnesota, Veterinary Public Health, 136F Andrew Boss, 1354 Eckles Avenue, St. Paul, MN 55108, Telephone: 612-625-6203; Fax: 612-624-4906; E-mail: bende002@umn.edu.

The National Association of State Public Health Veterinarians (NASPHV) understands the positive benefits of human-animal contact. Although eliminating all risk from animal contacts is not possible, this report provides recommendations for minimizing disease and injury.

NASPHV recommends that local and state public health, agricultural, environmental, and wildlife agencies use these recommendations to establish their own guidelines or regulations for reducing the risk for disease from human-animal contact in public settings. Multiple venues exist where public contact with animals is permitted (e.g., animal displays, petting zoos, animal swap meets, pet stores, zoological institutions, nature parks, circuses, carnivals, farm tours, livestock-birthing exhibits, county or state fairs, schools, and wildlife photo opportunities). Persons responsible for managing these venues should use the information in this report to reduce risk for disease transmission.

Guidelines to reduce risks for disease from animals in healthcare and veterinary facilities and from service animals (e.g., guide dogs) have been developed (*2–5*). These settings are not specifically addressed in this report, although the general principles and recommendations are applicable to these settings.

Methods

NASPHV periodically reviews the "Compendium of Measures to Prevent Disease Associated with Animal in Public Settings". This includes reviewing recent literature; updating

reported outbreaks, diseases, or injuries attributed to human-animal interactions in a public setting; and soliciting comments or suggestions from the NASPHV membership and questions posed by the public. During November 27–29, 2006, NASPHV members and external expert consultants met at CDC in Atlanta, Georgia. The first day of the meeting was dedicated to reviewing scientific information regarding recent outbreaks, associated risk factors, pathogen biology, and interventional studies. A moderated discussion of each section of the recommendations was conducted. The committee reviewed scientific evidence and expert opinion in revising the document. A committee consensus was needed to add or modify existing language or recommendations.

Enteric (Intestinal) Diseases

Infections with enteric bacteria and parasites pose the highest risk for human disease from animals in public settings (*6*). Healthy animals can harbor human enteric pathogens. Many of these organisms have a low infectious dose (*7–9*). Because of the popularity of animal venues, a substantial number of persons might be exposed. Illness and outbreaks of enteric diseases among visitors to fairs, farms, and petting zoos are well documented. Pathogens responsible for outbreaks include *Escherichia coli* O157:H7 and other Shiga toxin-producing *E. coli* (STEC), *Campylobacter, Salmonella*, and *Cryptosporidium* (*10–22*). Although reports often document cattle, sheep, or goats as sources for infection, poultry (*23–26*), rodents (*25–27*), and other domestic and wild animals also are potential sources.

The primary mode of transmission for enteric pathogens is fecal-oral. Because animal fur, hair, skin, and saliva (*28*) can become contaminated with fecal organisms, transmission can occur when persons pet, touch, feed, or are licked by animals. Transmission has occurred from fecal contamination of food, including raw milk (*29–31*), sticky foods (e.g., cotton candy [*32*]), and water (*33–35*). Illness also has been associated with contaminated clothing and shoes (*11,17*), animal bedding, flooring, barriers, and other environmental surfaces (*15,17,25,36–38*).

Animals carrying enteric organisms pathogenic to humans (e.g., STEC, *Salmonella*, and *Campylobacter*) frequently exhibit no signs of illness and can shed these pathogens intermittently. Removing ill animals (especially those with diarrhea) is necessary but not sufficient to protect animal and human health. Animals that appear to be healthy often shed pathogens that contaminate the environment (*39*). Some pathogens live for months or years in the environment (*40–44*). Because of intermittent shedding and limitations of laboratory tests, culturing fecal specimens or attempting to identify, screen, and remove infected animals might reduce, but will not eliminate, the risk for transmission. Antimicrobial treatment of animals cannot reliably eliminate infection and shedding of enteric pathogens or prevent reinfection.

Multiple factors increase the probability of disease transmission at animal exhibits. Animals are more likely to shed pathogens because of stress induced by prolonged transportation, confinement, crowding, and increased handling by persons (*45–51*). Commingling increases the probability that animals shedding organisms will infect other animals (*52*). The prevalence of certain enteric pathogens is often higher in young animals (*53–55*), which are frequently used in petting zoos and educational programs. Shedding of STEC and *Salmonella* is highest in the summer and fall when substantial numbers of traveling animal exhibits, agricultural fairs, and petting zoos are scheduled (*50,55,56*).

The risk for infections is increased by certain human factors and behaviors, especially in children. These factors include lack of awareness of the risk for disease, inadequate hand washing, lack of close supervision, and hand-to-mouth activities (e.g., use of pacifiers, thumb-sucking, and eating) (*57*). Children are particularly attracted to animal venues and have increased risk for serious infections.

The layout and maintenance of facilities and animal exhibits also can affect the risk for infection (*58*). Risk factors include inadequate hand-washing facilities (*59*), structural deficiencies associated with temporary food-service facilities (*12,14,17*), inappropriate flow of visitors, and incomplete separation between animal exhibits and food preparation and consumption areas (*60*). Other factors include contaminated or inadequately maintained drinking water and sewage- or manure-disposal systems (*33–35,38*).

Lessons from Outbreaks

In 2000, two *E. coli* O157:H7 outbreaks in Pennsylvania and Washington prompted CDC to establish recommendations for enteric disease prevention associated with farm animal contact. Risk factors identified in both outbreaks were direct animal contact and inadequate hand washing (*60,61*). In the Pennsylvania outbreak, 51 persons (median age: 4 years) became ill within 10 days after visiting a dairy farm. Eight (16%) of these patients acquired hemolytic uremic syndrome (HUS), a potentially fatal consequence of STEC infection. The same strain of *E. coli* O157:H7 was isolated from cattle, patients, and the farm environment. In addition to the reported cases, an increased number of diarrhea cases in the community were attributed to visiting the farm. An assessment of the farm environment determined that no areas existed for eating and drinking separate from the animal con-

tact areas, and the limited hand-washing facilities were not configured for children (*60*).

The protective effect of hand washing and the persistence of organisms in the environment were demonstrated in an outbreak of *Salmonella* infections at a Colorado zoo in1996. A total of 65 cases (most among children) were associated with touching a wooden barrier around a temporary Komodo dragon exhibit. Children who were not ill were substantially more likely to have washed their hands after visiting the exhibit. *Salmonella* was isolated from 39 patients, a Komodo dragon, and the wooden barrier (*17*).

In 2005, an *E. coli* O157:H7 outbreak among 63 patients, including seven who had HUS, were associated with multiple fairs in Florida. Both direct animal contact and contact with sawdust or shavings were associated with illness (*12*). Persons who reported feeding animals were at increased risk. Among persons who washed their hands after leaving the animal area, using soap and water was protective for those who created a lather (*62*). Drying hands on clothes increased the risk for illness. Persons were less likely to become ill if they reported washing their hands before eating or drinking or were aware of the risk for illness before visiting the fair.

During 2000–2001 at a Minnesota children's farm day camp, washing hands with soap after touching a calf and washing hands before going home were protective factors in two outbreaks involving multiple enteric organisms. A total of 84 illnesses were documented among attendees. Implicated organisms for the human infections were *E. coli* O157:H7, *Cryptosporidium parvum*, non-O157 STEC, S*almonella enterica* serotype Typhimurium, and *Campylobacter jejuni*. These organisms and *Giardia* were isolated from calves. Risk factors for children included caring for an ill calf and getting visible manure on their hands (*20*).

Enteric pathogens can contaminate the environment and persist in animal housing areas for long periods. For example, *E. coli* O157:H7 can survive in soil for months (*38,40,42,63*). Prolonged environmental persistence of pathogens was documented in an Ohio outbreak in 2001 of *E. coli* O157:H7 infections in which 23 persons became ill at a fair after handling sawdust, attending a dance, or eating and drinking in a barn where animals were exhibited during the previous week (*38*). Fourteen weeks after the fair, *E. coli* O157:H7 was isolated from multiple environmental sources within the barn, including sawdust on the floor and dust on the rafters. Forty-two weeks after the fair, *E. coli* O157:H7 was recovered from sawdust on the floor. In 2004, an outbreak of *E. coli* O157:H7 infection was associated with attendance at the North Carolina State Fair goat and sheep petting zoo (*12*). Health officials identified 108 patients, including 15 who had HUS. The outbreak strain was isolated from the animal bedding 10 days after the fair was over, and from the soil 5 months after the animal bedding and topsoil were removed (*58*). In 2003, a total of 25 persons acquired *E. coli* O157:H7 at a Texas agricultural fair. The strain isolated from patients also was found in environmental samples 46 days after the fair ended (*15*).

Transmission can occur even in the absence of direct animal contact if the pathogen is disseminated in the environment. In an Oregon county fair outbreak, 60 cases occurred, mostly among children (*25*). Illness was associated with visiting an exhibition hall that housed goats, sheep, pigs, rabbits, and poultry; however, illness was not associated with touching animals or their pens, eating, or inadequate hand washing. The same organism was recovered from ill persons and the building. Transmission of *E. coli* O157:H7 from contaminated dust was implicated in two outbreaks in Ohio and Oregon (*25,38*).

Improper facility design and inadequate maintenance might increase risk, as illustrated by one of the largest waterborne outbreaks in the United States (*34,35*). In 1999, approximately 800 suspected cases of *E. coli* O157:H7 and *Campylobacter* infection were identified among attendees of a New York county fair where the water and sewage systems had deficiencies. Temporary facilities are particularly vulnerable to design flaws (*12,17*). Such venues include those that add an animal display or petting zoo for the purpose of attracting children to zoos, festivals, roadside attractions, farm stands, pick-your-own-produce farms, and Christmas tree lots. In 2005, an *E. coli* O157:H7 outbreak in Arizona was associated with a temporary petting zoo at a municipal zoo (*12*). Child care and school field trips to a pumpkin patch with a petting zoo resulted in 44 cases of *E. coli* O157:H7 infection in British Columbia (*14*). The same strain of *E. coli* was found both in children and in a petting zoo goat. Running water and signage recommending hand washing were not available, and alcohol hand sanitizers were at a height that was unreachable for some children. A total of 163 persons became ill with STEC O111:H8 and/or *Cryptosporidium* at a New York farm stand that sold unpasteurized apple cider and had a petting zoo with three calves (*64*).

Several outbreaks have occurred because of failure to understand and properly implement disease-prevention recommendations. Following a Minnesota outbreak of cryptosporidiosis with 31 ill students at a school farm program, specific recommendations provided to teachers were inadequately implemented (*18*). A subsequent outbreak occurred with 37 illnesses. Hand-washing procedures were inadequate (e.g., only water available, crowding at sink, and drying hands on clothes). Coveralls and boots were dirty, cleaned infrequently, and removed after hand-washing. In

addition, inadequate hand washing and cleaning of contact surfaces resulted in an outbreak of salmonellosis associated with dissection of owl pellets in elementary schools (*65*).

Sporadic Infections

Although not identified as part of recognized outbreaks, sporadic infections have been associated with animal environments. A study of sporadic *E. coli* O157:H7 infections in the United States determined that patients, especially children, were more likely than healthy persons to have visited a farm with cows (*66*). Additional studies also documented an association between *E. coli* O157:H7 infection and visiting a farm (*67*) or living in a rural area (*68*). Studies of human cryptosporidiosis have documented contact with cattle or visiting farms as risk factors for infection (*69–71*). A case-control study identified multiple factors, including raw milk consumption and contact with farm animals, associated with *Campylobacter* infection (*72*). In other studies, farm residents were at a lower risk for infection with *Cryptosporidium* (*71*) and *E. coli* O157:H7 (*73*) than farm visitors, presumably because the residents had acquired immunity as a result of their early and frequent exposure to these organisms. However, livestock exhibitors became infected with *E. coli* O157:H7 in at least one fair outbreak (*15*).

Additional Health Concerns

Although enteric diseases are the most commonly reported illnesses associated with animals in public settings, other health risks are of concern. For example, allergies can be associated with animal dander, scales, fur, feathers, body wastes (e.g., urine), and saliva (*74–76*). Additional health concerns addressed in this report include injuries, rabies exposures, and other infections.

Injuries

Injuries associated with animals in public settings include bites, kicks, falls, scratches, stings, crushing of the hands or feet, and being pinned between the animal and a fixed object. These injuries have been associated with big cats (e.g., tigers), monkeys, and other domestic and zoo animals. The settings have included public stables, petting zoos, traveling photo opportunities, schools, children's parties, and animal rides (M. Eidson, DVM, New York State Department of Health, personal communication, 2003; J.B. Bender, DVM, University of Minnesota, personal communication, 2003; M.T. Jay-Russell, DVM, California Department of Health, personal communication, 2003; G.L. Swinger, DVM, Tennessee Department of Health, personal communication, 2003). For example, a Kansas teenager was killed while posing for a photograph with a tiger being restrained by its handler at an animal sanctuary (*77*).

Rabies Exposures

Contact with rabid mammals can expose persons to rabies virus through bites or contamination of mucous membranes, scratches, or other wounds with infected saliva or nervous tissue. Although no human rabies deaths caused by animal contact in public exhibits have been recorded, multiple rabies exposures have occurred, requiring extensive public health investigation and medical follow-up. For example, thousands of persons have received rabies postexposure prophylaxis (PEP) after being exposed to rabid or potentially rabid animals (including cats, goats, bears, sheep, ponies, and dogs) at a variety of venues: a pet store in New Hampshire (*78*), a county fair in New York State (*79*), petting zoos in Iowa (*80,81*) and Texas (J. Wright, Texas Department of Health, personal communication, 2004), and school and rodeo events in Wyoming (*59*). Substantial public health and medical care challenges associated with potential mass rabies exposures include difficulty in identifying and contacting persons, correctly assessing exposure risks, and providing timely medical prophylaxis. Prompt assessment and treatment are critical to prevent this disease, which is usually fatal.

Other Infections

Multiple bacterial, viral, fungal, and parasitic agents have been associated with animal contact. These organisms are transmitted through various modes. Infections from animal bites are common and frequently require extensive treatment or hospitalization. Bacterial pathogens associated with animal bites include *Pasteurella*, *Francisella tularensis (82)*, *Staphylococcus*, *Streptococcus*, *Capnocytophaga canimorsus*, *Bartonella henselae* (cat-scratch disease), and *Streptobacillus moniliformis* (rat-bite fever). Certain monkey species (especially macaques) kept as pets or used in public exhibits can be infected with herpes B virus, either asymptomatically or with mild oral lesions. Human exposure through monkey bites or bodily fluids can result in a fatal meningoencephalitis (*83,84*).

Skin contact with animals in public settings is also a public health concern. In 1995, a total of 15 cases of ringworm (club lamb fungus) caused by *Trichophyton* species and *Microsporum gypseum* were documented among owners and family members who exhibited lambs in Georgia during a show season (*85*). Ringworm in 23 persons and multiple animal species was traced to a *Microsporum canis* infection in a hand-reared

zoo tiger cub (*86*). Orf virus infection (contagious ecthyma or sore mouth) has occurred following contact with sheep at a public setting (E. Lederman, CDC, personal communication, 2006). In addition, orf virus infection has been described in goats and sheep at a children's petting zoo (*87*) and in a lamb used for an Easter photo opportunity (M. Eidson, New York State Department of Health, personal communication, 2003). After handling various species of infected exotic animals, a zoo attendant experienced an extensive papular skin rash from a cowpox-like virus (*88*). In 2003, multiple cases of monkeypox occurred among persons who had contact with infected prairie dogs either at a child care center (*89,90*) or a pet store (J.J. Kazmierczak, Wisconsin Department of Health and Family Services, personal communication, 2004).

Ecto- and endoparasites pose concerns when humans and exhibit animals interact. *Sarcoptes scabiei* is a skin mite that infests humans and animals, including swine, dogs, cats, foxes, cattle, and coyotes (*91, 92*). Although human infestation from animal sources is usually self-limiting, skin irritation and itching might occur for multiple days and can be difficult to diagnose (*92,93*). Animal flea bites to humans increase the risk for infection or allergic reaction. In addition, fleas can carry a tapeworm species that can infect children who unintentionally swallow the flea (*94,95*). Animal parasites also can infect humans who ingest soil or other materials contaminated with animal feces. Parasite control through veterinary care and proper husbandry combined with hand washing reduces the risks associated with ecto- and endoparasites (*96*).

Tuberculosis (TB) is another disease of concern in certain animal settings. In 1996, a total of 12 circus elephant handlers at an exotic animal farm in Illinois were infected with *Mycobacterium tuberculosis,* and one handler had signs consistent with active disease after three elephants died of TB. Medical history and testing of the handlers indicated that the elephants had been a probable source of exposure for most of the human infections (*97*). During 1989–1991 at a zoo in Louisiana, seven animal handlers who were previously negative for TB tested positive after a *Mycobacterium bovis* outbreak in rhinoceroses and monkeys (*98*). In 2003, the U.S. Department of Agriculture (USDA) developed guidelines regarding removal of TB-infected animals from public contact as a result of concerns over the risk for exposure to the public (*99*).

Zoonotic pathogens also can be transmitted by direct or indirect contact with reproductive fluids, aborted fetuses, or newborns from infected dams. Live-birthing exhibits, usually involving livestock (e.g., cattle, pigs, goats, or sheep), are popular at agricultural fairs. Although the public usually does not have direct contact with animals during birthing, newborns and their dams are frequently available for petting afterwards. Q fever (*Coxiella burnetii*), leptospirosis, listeriosis, brucellosis, and chlamydiosis are serious zoonoses that can be acquired through contact with reproductive materials (*100*).

Coxiella burnetii is a rickettsial organism that most frequently infects cattle, sheep, and goats. The disease can cause abortion in animals, but more frequently the infection is asymptomatic. During birthing, infected animals shed substantial numbers of organisms that might become aerosolized. Most persons exposed to *C. burnetii* develop an asymptomatic infection, but clinical illness can range from an acute influenza-like illness to life-threatening endocarditis. A Q fever outbreak involving 95 confirmed patients and 41 hospitalizations was linked to goats and sheep giving birth at petting zoos in indoor shopping malls (*101*). Indoor-birthing exhibits might pose an increased risk for Q fever transmission attributed to inadequate ventilation.

Chlamydophila psittaci infections cause respiratory disease (commonly called psittacosis) and are usually acquired from psittacine birds (*102*). For example, an outbreak of *C. psittaci* pneumonia occurred among the staff at the Copenhagen, Zoological Garden (*103*). On rare occasions, chlamydial infections acquired from sheep, goats, and birds result in reproductive problems in humans (*102,104,105*).

Recommendations

Guidelines from multiple organizations contributed to the recommendations in this report (*106–108*). No federal laws in the United States address the risk for transmission of pathogens at venues where the public has contact with animals. Certain states have specific legislation for venues where animals are present in public settings (*59,61,109–111*). In 2005, after a state fair outbreak, North Carolina passed a law requiring agricultural fairs to obtain a permit from the Department of Agriculture for all animal exhibits open to the public (http://www.ncleg.net/Sessions/2005/Bills/Senate/html/S268v4.html).

Certain federal agencies and associations in the United States have developed standards, recommendations, and guidelines for venues where animals are present in public settings. The Association of Zoos and Aquariums has accreditation standards for reducing risk for animal contact with the public in zoologic parks (*112*). In accordance with the Animal Welfare Act, USDA licenses and inspects certain animal exhibits for humane treatment of animals; however, the act is not intended for human health protection. In 2001, CDC issued guidelines to reduce the risk for infection with enteric pathogens from farm visits (*61*). CDC also has issued recommendations for preventing transmission of *Salmonella* from reptiles to

humans (*113*). The Association for Professionals in Infection Control and Epidemiology (APIC) developed guidelines to address risks associated with the use of service animals in health-care settings (*2*).

Recommendations for Local, State, and Federal Agencies

Communication and cooperation among human and animal health agencies should be enhanced and include cooperative extension offices. Additional research should be conducted into the risk factors and effective prevention and control methods for health issues associated with animal contact. To improve use of these recommendations, agencies should:

- Disseminate this report to venue operators. Most states do not have a complete list of animal contact venues (*59*). States should strive to develop a complete list to facilitate dissemination of recommendations.
- Disseminate educational and training materials to venue operators and other interested persons. Material formats could include PowerPoint slide presentations, videos, and written guidelines (*109,110,114*).
- Encourage or require oversight to ensure compliance with recommendations at animal contact venues.

To evaluate and improve these recommendations, surveillance for health issues associated with animal contact should be enhanced. Agencies should:

- Conduct thorough epidemiologic investigations of outbreaks.
- Include questions about exposure to animals and their environment on disease report forms and outbreak investigation questionnaires.
- Follow appropriate protocols for sampling of humans, animals, and the environment and for testing and subtyping of isolates.
- Report outbreaks to state health departments and CDC.

Recommendations for Education

Education is essential to reduce risks associated with animal contact in public settings. Experience from outbreaks suggests that visitors knowledgeable about potential risks are less likely to become ill (*12*). Even in well-designed venues with operators who are aware of the risks for disease, outbreaks can occur when visitors do not understand and apply disease-prevention recommendations.

Venue operators should:

- Know the risks for disease and injury associated with animals and be able to explain risk-reduction measures to staff and visitors.
- Be familiar with and implement the recommendations contained in this report.
- Consult with state and local agencies and county extension agents on implementation of the recommendations.
- Develop or obtain training and education materials and train staff.
- Assure that visitors receive educational messages before they enter the exhibit, including information that animals can cause injuries or carry organisms that can cause serious illness (Appendix A and B).
- Provide information in a simple and easy-to-understand format that is age- and language-appropriate.
- Provide information in multiple formats (e.g., signs, stickers, handouts, and verbal information).
- Provide information to persons arranging school field trips or classroom exhibits so they can educate participants before the visit.

Venue staff should:

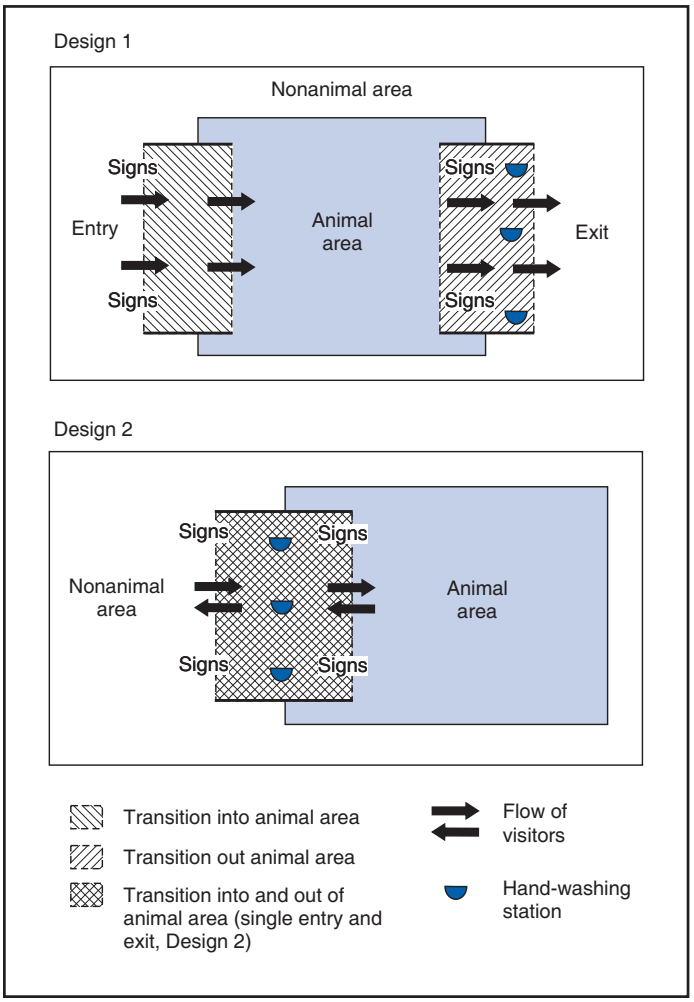
- Know the risks for disease and injury associated with animals and be able to explain risk-reduction recommendations to visitors.
- Assure that visitors receive educational messages.
- Encourage compliance by the public with risk-reduction recommendations, especially compliance with handwashing procedures (Appendix C) as the visitors exit animal areas.
- Comply with local and state requirements for reporting animal bites, scratches, or other injuries.

Recommendations for Managing Public and Animal Contact

The recommendations in this report were developed for settings in which direct animal contact is encouraged (e.g., petting zoos) and in which animal contact is possible (e.g., county fairs). They should be tailored to specific settings and incorporated into guidelines and regulations developed at the state or local level. The public's contact with animals should occur in settings where measures are in place to reduce the potential for injuries or disease transmission and to increase the probability that incidents or problems identified with animal contact settings will be reported, documented, and handled appropriately.

The design of facilities and animal pens (Figure) should minimize the risk associated with animal contact, including contact with manure, and should encourage hand washing (Appendix C). The design of facilities or contact settings might include double barriers to prevent contact with animals or contaminated surfaces except for specified interaction areas.

FIGURE. Examples of designs for animal contact settings, including clearly designated animal areas, nonanimal areas, and transition areas with hand-washing stations and signage



Temporary exhibits should be carefully planned, designed, and managed to avoid problems identified from previous outbreaks. Common problems include inadequate barriers, floor surfaces that are difficult to keep clean, insufficient plumbing, and inadequate hand-washing facilities (*12,17,34,35*). Specific guidelines might be necessary for certain settings (i.e., schools [Appendix D]).

Recommendations for cleaning procedures also should be tailored to the specific situation. All surfaces should be cleaned thoroughly to remove organic matter before disinfection. A 1:32 dilution of household bleach (e.g., half a cup of bleach per gallon of water) is needed for basic disinfection. Quaternary ammonium compounds (e.g., Roccal® or Zephiran®) also can be used per the manufacturer label. For disinfection when a particular organism has been identified, additional guidance is available at http://www.cfsph.iastate.edu/BRM/resources/disinfectants/Disinfection101Feb2005.pdf. All compounds require a contact time of ≥10 minutes.

The venue should be divided into three types of areas: nonanimal areas (areas in which animals are not permitted, with the exception of service animals), transition areas (located at both entrances and exits to animal areas), and animal areas (where animal contact is possible or encouraged) (Figure).

Nonanimal Areas

Nonanimal areas are those in which animals are not permitted.

- Do not permit animals, except service animals, in nonanimal areas.
- Prepare, serve, and consume food and beverages only in nonanimal areas.
- Provide hand-washing facilities and display hand-washing signs where food or beverages are served (Appendix C).

Transition Areas Between Nonanimal and Animal Areas

Establishing transition areas through which visitors pass when entering and exiting animal areas is critical. One-way visitor flow is preferred with separate entrance and exit points. The transition areas should be designated as clearly as possible, even if they must be conceptual rather than physical (Figure).

Entrance transition areas should be designed to facilitate education.

- Post signs or otherwise notify visitors that they are entering an animal area.
- Instruct visitors not to eat, drink, smoke, place their hands in their mouth, or use bottles or pacifiers while in the animal area.
- Exclude strollers, food, and beverages (establish storage or holding areas for these items).
- Control visitor traffic to avoid overcrowding.

Exit transition areas should be designed to facilitate hand washing.

- Post signs or otherwise instruct visitors to wash their hands.
- Provide accessible hand-washing stations for all visitors, including children and persons with disabilities (Figure).
- Position venue staff near exits to encourage compliance with hand washing.

Animal Areas

- Provide adequate ventilation for both animals (*115*) and humans.
- Exclude food and beverages. Animal feed and water should not be accessible to the public.
- Exclude toys, pacifiers, spill-proof cups, baby bottles, and strollers.

- Prohibit smoking.
- Promptly remove manure and soiled animal bedding from animal areas.
- Store animal waste and specific tools for waste removal (e.g., shovels and pitchforks) in designated areas restricted from public access.
- Avoid transporting manure and soiled bedding through nonanimal areas or transition areas. If this is unavoidable, take precautions to prevent spillage.
- Where feasible, disinfect animal areas (e.g., flooring and railings) at least once daily.
- Supervise children closely to discourage hand-to-mouth activities (e.g., thumb-sucking), contact with manure, and contact with soiled bedding. If hands become soiled, supervise hand washing.
- Assign trained staff to encourage appropriate human-animal interactions, to identify and remove potential risks for patrons (e.g., by promptly cleaning up wastes), and to process reports of injuries and exposures.
- Allow feeding only when contact with animals is controlled (e.g., with barriers).
- Do not provide animal feed in containers that can be eaten by persons (e.g., ice cream cones) to prevent children from eating food that has come into contact with animals.
- Use animals or animal products (e.g., animal pelts, animal waste, and owl pellets) (*65*) for educational purposes only in designated animal areas (Figure). Animals and animal products should not be brought into school cafeterias and other food-consumption areas.
- Do not use animal areas for public (nonanimal) activities. Zoonotic pathogens can contaminate the environment for substantial periods of time (*38*). If animal areas must be used for public events (e.g., weddings and dances), these areas should be cleaned and disinfected, particularly if food and beverages are served. Materials with smooth, impervious surfaces (e.g., steel, plastic, and sealed concrete) are easier to clean than other materials (e.g., wood or dirt floors). Remove organic material (e.g., bedding, feed, and manure) before using disinfectants.
- For animals in school classrooms, specific areas must be designated for animal contact (Appendix D). Designated animal areas must be thoroughly cleaned after use. Parents should be informed of the benefits and potential risks associated with animals in school classrooms.

Animal Care and Management

The risk for disease or injuries from animal contacts can be reduced by carefully managing the specific animals used for such contacts. These recommendations should be considered for management of animals in contact with the public.

- **Animal care:** Monitor animals daily for signs of illness, and ensure that animals receive appropriate veterinary care. Ill animals, animals known to be infected with a pathogen, and animals from herds with a recent history of abortion or diarrhea should not be exhibited. Animals should be housed to minimize stress and overcrowding, which can increase shedding of pathogens.
- **Veterinary care:** Retain and use the services of a licensed veterinarian. Vaccination, preventive care, and parasite control appropriate for the species should be provided. Certificates of veterinary inspection from an accredited veterinarian should be up-to-date according to local or state requirements for animals in public settings. A herd or flock inspection is a critical component of the health certificate process. Routine screening for diseases is not recommended, except for TB in elephants (*97-99*) and primates, and for Q fever in ruminants in birthing exhibits (*116,117*).
- **Rabies:** All animals should be housed to reduce potential exposures from wild animal rabies reservoirs. Mammals should also be up-to-date on their rabies vaccinations (*118*). These steps are particularly critical in areas where rabies is endemic and in venues where animal contact is encouraged (e.g., petting zoos). Because of the extended incubation period for rabies, unvaccinated mammals should be vaccinated at least 1 month before they have contact with the public. If no licensed rabies vaccine exists for a particular species used in a setting where public contact occurs (e.g., goats, swine, llamas, and camels), consultation with a veterinarian is recommended regarding the off-label use of rabies vaccine. Use of off-label vaccine cannot provide the same level of assurance as vaccines labeled for use in particular species; however, off-label use of vaccine might provide protection for certain animals and thus decrease the probability of rabies transmission. Vaccinating slaughter-class animals before displaying them at fairs might not be feasible because of the vaccine withdrawal period that occurs as a result of antibiotics used as preservatives in certain vaccines. Mammals that are too young to be vaccinated should be used only if additional restrictive measures are available to reduce risks. These measures can include using only animals that were born to vaccinated mothers and housed to avoid rabies exposure.
- **Dangerous animals:** Because of their strength, unpredictability, venom, or the pathogens that they might carry, prohibit certain domestic, exotic, or wild animals

in exhibit settings where a reasonable possibility of animal contact exists. Species of primary concern include nonhuman primates (e.g., monkeys and apes) and certain carnivores (e.g., lions, tigers, ocelots, wolves/wolf-hybrids, and bears). In addition, rabies-reservoir species (e.g., bats, raccoons, skunks, foxes, and coyotes) should not be used for direct contact.

- **Animal births:** Ensure that the public has no contact with animal birthing by-products. In live-birth exhibits, the environment should be thoroughly cleaned after each birth, and all waste products should be properly discarded. Holding such events outside is preferable. If held indoors, ventilation should be maximized.

Additional Recommendations

- **Populations at high risk:** Children aged <5 years are at particularly high risk for serious infections. Other groups at increased risk include persons with waning immunity (e.g., older adults) and persons who are mentally impaired, pregnant, or immunocompromised (e.g., persons with human immunodeficiency virus/acquired immunodeficiency syndrome, without a functioning spleen, or on immunosuppressive therapy). Persons at high risk should take precautions at any animal exhibit. In addition to thorough and frequent hand washing, heightened precautions could include avoiding contact with animals and their environment (e.g., pens, bedding, and manure). Animals of particular concern for transmitting enteric diseases include young ruminants, young poultry, reptiles, amphibians, and ill animals.
- **Consumption of unpasteurized products:** Prohibit the consumption of unpasteurized dairy products (e.g., milk, cheese, and yogurt) and unpasteurized apple cider or juices.
- **Drinking water:** Local public health authorities should inspect drinking water systems before use. Only potable water should be used for consumption by animals and humans. Back-flow prevention devices should be installed between outlets in livestock areas and water lines supplying other uses on the grounds. If the water supply is from a well, adequate distance should be maintained from possible sources of contamination (e.g., animal-holding areas and manure piles). Maps of the water distribution system should be available for use in identifying potential or actual problems. The use of outdoor hoses should be minimized, and hoses should not be left on the ground. Hoses that are accessible to the public should be labeled "water not for human consumption." Operators and managers of these settings in which treated municipal water is not available should consider alternative methods for disinfection of their water supply or should consider methods to disinfect their water supply.

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Consultants to the Committee: Casey Barton Behravesh, DVM, DrPH, CDC, Atlanta, GA; Sue K. Billings, DVM, MSPH, National Assembly of State Animal Health Officials; James E. Keen, DVM, PhD, U.S. Department of Agriculture, Washington, D.C.; John P. Huntley, DVM, MPH, Council on Public Health and Regulatory Veterinary Medicine, Schaumburg, IL; Timothy F. Jones, MD, Council of State and Territorial Epidemiologists, Atlanta, GA; Thomas P. Meehan, DVM, Association of Zoos and Aquariums, Silver Spring, MD.

Appendix A

Information and Instructions for Venue Operators and Staff About Animals in Public Settings

Venue operators should know about risks for disease and injury, maintain a safe environment, and inform staff and visitors about appropriate disease and injury-prevention measures. This handout provides basic information and instructions for venue operators and staff. Reading this handout does not substitute for reading the entire compendium.

Operators and staff must know about risks, for example:

- Disease and injury have occurred following contact with animals in public settings.
- Healthy animals can carry organisms that make visitors sick.
- Visitors can become infected with organisms when they touch animals or their droppings or enter the animal's environment and do not wash their hands.
- Some visitors are at increased risk for developing serious or life-threatening illnesses, especially young children (i.e., aged <5 years), older adults, pregnant women, persons who are mentally impaired, and persons with weakened immune systems.

Operators and staff must maintain a safe environment:

- Design the venue with safety in mind by having designated animal areas, nonanimal areas, and transition areas as described in the *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007*.
- Do not permit animals, except service animals, in nonanimal areas. Provide hand-washing facilities where food and beverages are prepared, served, or consumed.
- Assign trained staff to monitor animal contact areas. Exclude food and beverages, toys, pacifiers, spill-proof cups, and baby bottles and prohibit smoking. Keep the animal areas clean and disinfected to the extent possible and limit visitor contact with manure and animal bedding. Allow feeding of animals only if contact with animals can be controlled (e.g., over a barrier). Do not use animal areas for public (nonanimal) activities.
- Design transition areas for entering and exiting animal areas with appropriate signs or other forms of notification regarding risks for and location of hand-washing facilities. Maintain hand-washing stations that are accessible to children and require hand washing upon exiting animal areas.
- Ensure that animals are appropriately cared for.
- Prohibit consumption of unpasteurized products (e.g., milk products and juices).
- Provide potable water for animals to consume.

Operators and staff must educate visitors, for example:

- Provide simple instructions in multiple formats that are age- and language-appropriate.
- Warn visitors about the risks for disease and injury.
- Notify visitors that eating and drinking or placing things in their mouths should not occur after leaving the animal area until after their hands are washed.
- Advise visitors to closely supervise children and to be aware that objects such as clothing, shoes, and stroller wheels can become soiled and serve as a source of germs after leaving an animal area.
- Direct visitors to wash their hands and assist children with hand washing following contact with animals or visiting an animal area.
- Make visitors aware that young children, older adults, pregnant women, persons who are mentally impaired or immunocompromised are at increased risk for illness.

Appendix B

Suggested Visitor Handout for Petting Zoo Visitors*

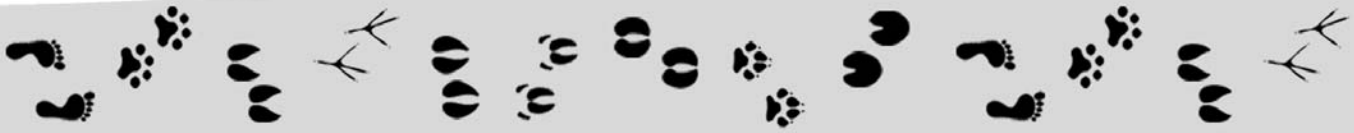
Know that animals carry germs that can make people sick

Never eat, drink, or put things into your mouth in animal areas

Older adults, pregnant women, and young children should be extra careful around animals

Wash your hands with soap and water right after visiting the animal area

How to be Safe Around Animals!



* Handout available at http://www.nasphv.org/documentscompendiaanimals.html. Additional resources on animals in public settings or zoonotic diseases are available at http://www.cdc.gov/healthypets.

Appendix C

Hand-Washing Recommendations to Reduce Disease Transmission From Animals in Public Settings

Hand washing is the single most important prevention step for reducing disease transmission. Hands should always be washed upon exiting animal areas and before eating or drinking. Venue staff should encourage hand washing as persons exit animal areas.

How to Wash Hands

- 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.
- If possible, turn off the faucet by using a disposable paper towel.
- Dry hands with a disposable paper towel. Do not dry hands on clothing.
- Assist young children with washing their hands.

Hand-Washing Facilities or Stations

- Hand-washing facilities should be accessible and sufficient for the maximum anticipated attendance and configured for use by children (low enough for them to reach or equipped with a stool), adults, and those with disabilities.
- Hand-washing stations should be conveniently located in transition areas between animal and nonanimal areas and in the nonanimal food concession areas.
- Maintenance should include routine cleaning and restocking to ensure adequate supply of paper towels and soap.
- Running water should be of sufficient volume and pressure to remove soil from hands. Volume and pressure might be substantially reduced if the water supply is furnished from a holding tank. Therefore, a permanent pressured water supply is preferable.
- The hand-washing station should be designed so that both hands are free for hand washing by having operation with a foot pedal or water that stays on after turning on hand faucets.
- Hot water is preferable, but if the hand-washing stations are supplied with only cold water, a soap that emulsifies easily in cold water should be provided.
- Communal basins, where water is used by more than one person, do not constitute adequate hand-washing facilities.

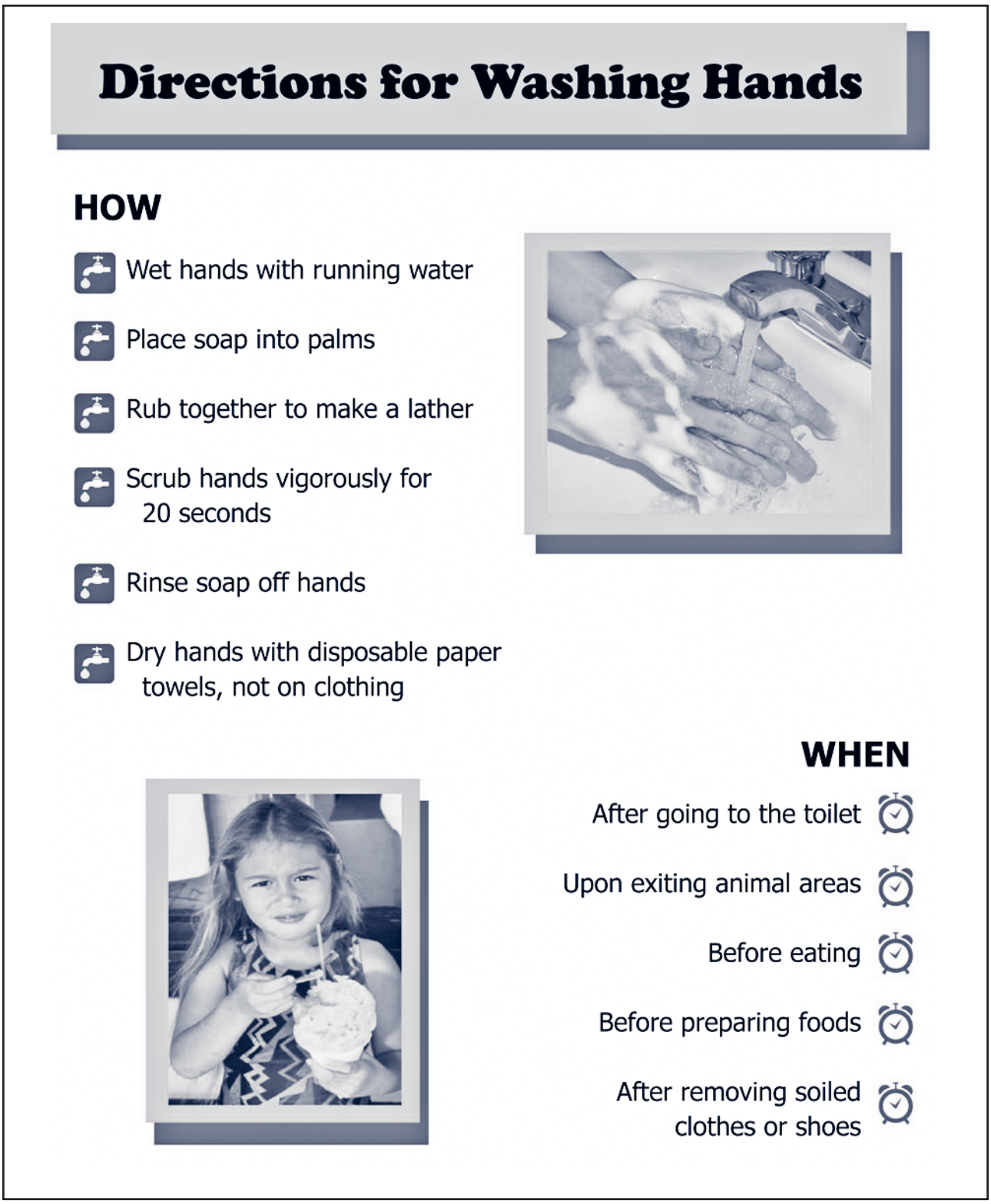
Hand-Washing Agents

- Liquid soap dispensed by a hand or foot pump is recommended.
- Alcohol-based hand sanitizers can be used if soap and water cannot be made available and are effective against multiple common disease agents (e.g., shiga toxin-producing *E. coli*, *Salmonella*, and *Campylobacter*). However, they are ineffective against certain organisms (e.g., bacterial spores, *Cryptosporidium*, and certain viruses).
- The U.S. Food and Drug Administration recommends using an alcohol-based hand sanitizer with a concentration of 60% or higher to be effective against common disease agents.
- Hand sanitizers are less effective if hands are visibly soiled. Therefore, visible contamination and dirt should be removed to the extent possible before using hand sanitizers.

Hand-Washing Signs

- At venues where human-animal contact occurs, signs regarding proper hand-washing practices are critical to reduce disease transmission.
- Signs that are reminders to wash hands should be posted at exits from animal areas (exit transition areas) and in nonanimal areas where food is served and consumed.
- Signs should be present to direct all visitors to hand-washing stations upon exiting animal areas.
- Signs with proper hand-washing instructions should be posted at hand-washing stations and restrooms to encourage proper practices.
- Depending on the setting, hand washing signs might need to be available in different languages.

Example of a Hand-Washing Sign*



* Sign available at http://www.nasphv.org/documentscompendiaanimals.html. Additional resources on animals in public settings or zoonotic diseases are available at http://www.cdc.gov/healthypets.

Appendix D

Guidelines for Animals in School Settings

Animals are effective and valuable teaching aids, but safeguards are required to reduce the risk for infection and injury. These abbreviated recommendations are based on guidelines developed by the Alabama Department of Public Health* and the Kansas Department of Health and Environment†. Recommendations are also available from the National Science Teachers Association§ and the National Association of Biology Teachers.¶

General Guidelines for School Settings**

- Wash hands after contact with animals, animal products, or animal environments.
- Supervise human-animal contact, particularly for children aged <5 years.
- Display animals in enclosed cages or under appropriate restraint.
- Designate specific areas for animal contact.
- Do not allow food in animal contact areas; do not allow animals in areas where food and drink are prepared or consumed.
- Do not allow animals to roam, fly free, or have contact with wild animals.
- Clean and disinfect all areas where animals have been present. Children should only perform this task while supervised by an adult.
- Obtain appropriate veterinary care, a certificate of veterinary inspection, and/or proof of rabies vaccination according to local or state requirements.
- Keep animals clean and free of intestinal parasites, fleas, ticks, mites, and lice.
- Parents should be informed of the benefits and potential risks associated with animals in school classrooms. Consult with parents to determine special considerations needed for children who are immunocompromised, who have allergies, or who have asthma.
- Ensure that personnel providing animals for educational purposes are knowledgeable regarding animal handling and zoonotic disease issues. Individuals or facilities that display animals to the public should be licensed by the USDA.

Animal-Specific Guidelines

- Fish — Use disposable gloves when cleaning aquariums, and do not dispose of aquarium water in sinks used for food preparation or for obtaining drinking water.
- Nonpsittacine birds — See General Guidelines.
- Psittacine birds (e.g., parrots, parakeets, and cockatiels) — Consult the psittacosis compendium,†† and seek veterinary advice. Use birds treated or testing negative for avian chlamydiosis.
- Domestic dogs, cats, rabbits, and rodents (e.g., mice, rats, hamsters, gerbils, guinea pigs, and chinchillas) — See General Guidelines.
- Baby chicks and ducks — To prevent *Salmonella* or *Campylobacter* infection, children aged <5 years should not have contact with baby chicks and ducks.
- Reptiles (including turtles, lizards, and snakes) and amphibians — To prevent *Salmonella* infection, children aged <5 years should not have contact with reptiles and amphibians.
- Ferrets — To prevent bites, children aged <5 years should not have direct contact with ferrets.
- Farm animals — See General Guidelines. Certain animals (e.g., young ruminants and young poultry) excrete *E. coli* O157:H7, *Salmonella*, *Campylobacter*, and *Cryptosporidium* intermittently and in substantial numbers; therefore these animals are not appropriate unless meticulous attention to personal hygiene can be assured.
- Mammals at high risk for transmitting rabies (e.g., bats, raccoons, skunks, foxes, and coyotes) — Students should not be permitted to touch these animals, nor are these animals appropriate as residents in the classroom.

* W.B. Johnston, DVM, Alabama Department of Public Health, personal communication, 2002.

† Hansen GR. Animals in Kansas schools: guidelines for visiting and resident pets. Topeka, KA: Kansas Department of Health and Environment; 2004. Available at http://www.kdhe.state.ks.us/pdf/hef/ab1007.pdf.

§ National Science Teachers Association. Standards for Science Teacher Preparation. Arlington, VA: National Science Teachers Association; 2003. Available at http://www.nsta.org/main/pdfs/NSTAstandards2003.pdf.

¶ National Association of Biology Teachers. The use of animals in biology education. Reston, VA: National Association of Biology Teachers; 1995. Available at http://www.nabt.org/sub/position_statements/animals.asp.

** Guide, hearing, or other service animals and law enforcement animals can be used when they are under the control of a person familiar with the specific animal and in accordance with recommendations from the sponsoring organizations.

†† National Association of State Public Health Veterinarians. Compendium of measures to control *Chlamydophila psittaci* infection among humans (psittacosis) and pet birds (avian chlamydiosis), 2006. Available at http://www.nasphv.org/83416/index.html.

- Owl pellets — Assume owl pellets to be contaminated with *Salmonella.* Dissections should not be done in areas where food is consumed. Thoroughly clean and disinfect contact surfaces. Wash hands after contact.

Animals Not Recommended in School Settings

- Inherently dangerous animals (e.g., lions, tigers, cougars, and bears).
- Nonhuman primates (e.g., monkeys and apes).
- Mammals at higher risk for transmitting rabies (e.g., bats, raccoons, skunks, foxes, and coyotes).
- Aggressive or unpredictable animals, wild or domestic.
- Stray animals with unknown health and vaccination history.
- Venomous or toxin-producing spiders, insects, reptiles, and amphibians.

MMWR
Morbidity and Mortality Weekly Report

Recommendations and Reports
July 6, 2007 / Vol. 56 / RR-5

Continuing Education Activity Sponsored by CDC

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007
National Association of State Public Health Veterinarians, Inc. (NASPHV)

EXPIRATION — July 6, 2009

You must complete and return the response form electronically or by mail by **July 6, 2009**, to receive continuing education credit. If you answer all of the questions, you will receive an award letter for 1.25 hours Continuing Medical Education (CME) credit; 0.1 Continuing Education Units (CEUs); 1.25 contact hours Continuing Nursing Education (CNE) credit; or 1.0 credit hours Continuing Veterinary Education (CVE). If you return the form electronically, you will receive educational credit immediately. If you mail the form, you will receive educational credit in approximately 30 days. No fees are charged for participating in this continuing education activity.

INSTRUCTIONS

By Internet

1. Read this *MMWR* (Vol. 56, RR-5), which contains the correct answers to the questions beginning on the next page.
2. Go to the *MMWR* Continuing Education Internet site at http://www.cdc.gov/mmwr/cme/conted.html.
3. Select which exam you want to take and select whether you want to register for CME, CEU, CNE, or CVE credit.
4. Fill out and submit the registration form.
5. Select exam questions. To receive continuing education credit, you must answer all of the questions. Questions with more than one correct answer will instruct you to "Indicate all that apply."
6. Submit your answers no later than **July 6, 2009**.
7. Immediately print your Certificate of Completion for your records.

By Mail or Fax

1. Read this *MMWR* (Vol. 56, RR-5), which contains the correct answers to the questions beginning on the next page.
2. Complete all registration information on the response form, including your name, mailing address, phone number, and e-mail address, if available.
3. Indicate whether you are registering for CME, CEU, CNE, or CVE credit.
4. Select your answers to the questions, and mark the corresponding letters on the response form. To receive continuing education credit, you must answer all of the questions. Questions with more than one correct answer will instruct you to "Indicate all that apply."
5. Sign and date the response form or a photocopy of the form and send no later than **July 6, 2009**, to
   Fax: 404-498-2388
   Mail: MMWR CE Credit
   CCHIS, Centers for Disease Control and Prevention
   1600 Clifton Rd, N.E., MS E-90
   Atlanta, GA 30333
6. Your Certificate of Completion will be mailed to you within 30 days.

ACCREDITATION

Continuing Medical Education (CME). CDC is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. CDC designates this educational activity for a maximum of 1.25 hours in category 1 credit toward the AMA Physician's Recognition Award. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Continuing Education Unit (CEU). CDC has been reviewed and approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 8405 Greensboro Drive, Suite 800, McLeon, VA 22102. CDC will award 0.1 continuing education unit to participants who successfully complete this program.

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Continuing Veterinary Education (CVE). CDC has been approved as an authorized provider of veterinary credit by the American Association of Veterinary State Boards (AAVSB) RACE program. CDC will award 1.0 hour of continuing education credit to participants who successfully complete this activity.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

Goal and Objectives

This *MMWR* provides evidence-based guidelines for reducing risks associated with animals in public settings. The recommendations were developed by the National Association of State Public Health Veterinarians, in consultation with representatives from CDC, the National Assembly of State Animal Health Officials, the U.S. Department of Agriculture, the American Veterinary Medical Association Council on Public Health and Regulatory Veterinary Medicine, the Association of Zoos and Aquariums, and the Council of State and Territorial Epidemiologists. The goal of this report is to provide guidelines for public health officials, veterinarians, animal venue operators, animal exhibitors, and others concerned with disease control to minimize risks associated with animals in public settings. Upon completion of this activity, the reader should be able to describe 1) the reasons for the development of the guidelines; 2) the disease risks associated with animals in public settings; 3) populations at high risk; and 4) recommended prevention and control methods to reduce disease risks.

1.`Which one of the following is true about the reasons why these recommendations were developed?

A. Animal contacts are too risky and thus must be regulated against.
B. Only petting zoos are of concern for disease risk.
C. Multiple venues allow public contact with animals and thus pose a disease risk.
D. These recommendations were developed to control zoonoses, which are diseases contracted only at zoos.
E. Following these guidelines will eliminate all disease risk.

2.`Which of the following are enteric pathogens that might result in human infection after animal contact?

A. *Escherichia coli* O157.
B. *Campylobacter.*
C. *Salmonella.*
D. *Cryptosporidium.*
E. All of the above.

3.`Animals with *E. coli* O157:H7 in their gastrointestinal tract. . .

A. always have fever and diarrhea.
B. usually show no signs of illness.
C. shed the organism continuously.
D. might only shed the organism intermittently.
E. B and D.
F. A and C.

4.`Based on scientific studies, which of the following factors increase the risk for human enteric infections after animal contact?

A. Inadequate hand-washing facilities.
B. Structural deficiencies associated with temporary food-service facilities.
C. Poor separation between animal exhibits and food-consumption areas.
D. Contaminated or poorly maintained drinking water and sewage/manure disposal systems.
E. All of the Above.

5. Which of the following groups are at higher risk for serious infections from animal contact?

A. Persons with waning immunity (e.g., older adults).
B. Children aged <5 years.
C. Women who are pregnant.
D. Persons who are on immunosuppressive therapy.
E. All of the Above.

6. Which of the following are recommendations for animal care and management to reduce the risk for disease from animal contact?

A. Animals in contact with the public should be monitored daily by the owners or caretakers for signs of illness.
B. Veterinarians can easily perform screening tests for all diseases of concern and provide treatment to eliminate organism shedding.
C. Rabies vaccinations will be successful if provided 1 day before the public contact venue.
D. A and B.
E. None of the above.

7. Which one of the following are recommendations for animal areas to reduce the risk for disease from animal contact?

A. The best time to remove manure and soiled bedding is at the end of the event when the animals are removed.
B. Removal of animals with *E. coli* 0157:H7 in their gastrointestinal tract will eliminate the risk for infection associated with the animal contact venue.
C. Ice-cream cones are an ideal container for feeds used by children in feeding animals.
D. Animal contacts should be carefully supervised for children aged <5 years to discourage hand-to-mouth contact and ensure appropriate hand washing.
E. None of the above.

8. Which of the following is true about hand-washing recommendations to reduce disease transmission from animals in public settings?

A. Hands must be washed vigorously with soap and running water for at least 2 minutes.
B. If no hand sinks are available, use alcohol-based hand-sanitizers.
C. Cold water is more effective than warm water.
D. A and B.
E. All of the above.

9. Which of the following is true about guidelines for animals in school settings?

A. Baby chicks and ducks are an excellent choice for all children in school settings because of their small size.
B. Animals can be allowed in food settings (e.g., a school cafeteria) if they have a health certificate from a veterinarian.
C. Animals should not be allowed to roam or fly free, and areas for contact should be designated.
D. A and C.
E. All of the above.

10. If no licensed rabies vaccine exists for an animal species on display in a petting zoo, options to manage human rabies exposure risk include. . .

A. using an animal born from a vaccinated mother if it is too young to vaccinate.
B. penning the animal each night in a cage or pen that will exclude rabies reservoirs (e.g., bats and skunks).
C. asking a veterinarian to vaccinate the animal off-label with a rabies vaccine.
D. A and B.
E. A, B, and C.

11. Which best describes your professional activities?

A. Physician.
B. Nurse.
C. Health educator.
D. Office staff.
E. Other.

12. I plan to use these recommendations as the basis for …(*Indicate all that apply.*)

A. health education materials.
B. insurance reimbursement policies.
C. local practice guidelines.
D. public policy.
E. other.

13. Overall, the length of the journal report was…

A. much too long.
B. a little too long.
C. just right.
D. a little too short.
E. much too short.

14. After reading this report, I am confident I can describe the reasons for the development of the guidelines.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

15. After reading this report, I am confident I can describe the disease risks associated with animals in public settings.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

16. After reading this report, I am confident I can identify populations at high risk.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

17. After reading this report, I am confident I can recommend prevention and control methods to reduce disease risks.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

18. The learning outcomes (objectives) were relevant to the goals of this report.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

19. The instructional strategies used in this report (appendices and figure) helped me learn the material.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

(Continued on pg CE-4)

Detach or photocopy.

***MMWR* Response Form for Continuing Education Credit**
July 6, 2007/Vol. 56/No. RR-5

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007
National Association of State Public Health Veterinarians, Inc. (NASPHV)

To receive continuing education credit, you must
1. provide your contact information (**please print or type**);
2. indicate your choice of CME, CEU, CNE, or CVE credit;
3. answer all of the test questions;
4. sign and date this form or a photocopy;
5. submit your answer form by July 6, 2009.

Failure to complete these items can result in a delay or rejection of your application for continuing education credit.

Check One
☐ CME Credit
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☐ CNE Credit
☐ CVE Credit

Last Name (**print or type**) First Name

Street Address or P.O. Box

Apartment or Suite

City State ZIP Code

Phone Number Fax Number

E-Mail Address

Fill in the appropriate blocks to indicate your answers. Remember, you must answer all of the questions to receive continuing education credit!

1. [ ]A [ ]B [ ]C [ ]D [ ]E
2. [ ]A [ ]B [ ]C [ ]D [ ]E
3. [ ]A [ ]B [ ]C [ ]D [ ]E [ ]F
4. [ ]A [ ]B [ ]C [ ]D [ ]E
5. [ ]A [ ]B [ ]C [ ]D [ ]E
6. [ ]A [ ]B [ ]C [ ]D [ ]E
7. [ ]A [ ]B [ ]C [ ]D [ ]E
8. [ ]A [ ]B [ ]C [ ]D [ ]E
9. [ ]A [ ]B [ ]C [ ]D [ ]E
10. [ ]A [ ]B [ ]C [ ]D [ ]E
11. [ ]A [ ]B [ ]C [ ]D [ ]E
12. [ ]A [ ]B [ ]C [ ]D [ ]E
13. [ ]A [ ]B [ ]C [ ]D [ ]E
14. [ ]A [ ]B [ ]C [ ]D [ ]E
16. [ ]A [ ]B [ ]C [ ]D [ ]E
17. [ ]A [ ]B [ ]C [ ]D [ ]E
18. [ ]A [ ]B [ ]C [ ]D [ ]E
19. [ ]A [ ]B [ ]C [ ]D [ ]E
20. [ ]A [ ]B [ ]C [ ]D [ ]E
21. [ ]A [ ]B [ ]C [ ]D [ ]E
22. [ ]A [ ]B [ ]C [ ]D [ ]E
23. [ ]A [ ]B [ ]C [ ]D [ ]E
24. [ ]A [ ]B [ ]C [ ]D [ ]E
25. [ ]A [ ]B [ ]C [ ]D [ ]E
26. [ ]A [ ]B
27. [ ]A [ ]B [ ]C [ ]D [ ]E [ ]F

Signature ***Date I Completed Exam***

20. The content was appropriate given the stated objectives of the report.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

21. The content expert(s) demonstrated expertise in the subject matter.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree

22. Overall, the quality of the journal report was excellent.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

23. These recommendations will improve the quality of my practice.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

24. The availability of continuing education credit influenced my decision to read this report.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

25. The *MMWR* format was conducive to learning this content.

A. Strongly agree.
B. Agree.
C. Undecided.
D. Disagree.
E. Strongly disagree.

26. Do you feel this course was commercially biased? (*Indicate yes or no; if yes, please explain in the space provided.*)

A. Yes.
B. No.

27. How did you learn about the continuing education activity?

A. Internet.
B. Advertisement (e.g., fact sheet, *MMWR* cover, newsletter, or journal).
C. Coworker/supervisor.
D. Conference presentation.
E. *MMWR* subscription.
F. Other.

Correct answers for questions 1–10.
1. C; 2. E; 3. E; 4. E; 5. E; 6. A; 7. D; 8. B; 9. C; 10. E.

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