HIV/AIDS Education: Still an Important Issue for Veterinarians

Radford G. Davis, DVM, MPH, DACVPM[a]

SYNOPSIS

Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) is a significant cause of immunosuppression that puts infected individuals at higher risk for developing severe complications from zoonotic infections and other animal-related hazards. The number of people living with HIV grows each year, assuring that veterinary practitioners will have clients and/or employees who are afflicted with HIV/AIDS. Veterinarians need to better understand HIV/AIDS for many reasons: to dispel unfounded beliefs; to address discrimination and liability issues; to educate and protect the health of clients and employees; to help those with HIV/AIDS keep their pets; and to meet legal and professional requirements. To do this, veterinarians must become proactive in learning about HIV/AIDS and in reaching out to pet owners living with HIV/AIDS, as well as the physicians of those individuals. Through discussion on historical and contemporary issues surrounding HIV/AIDS, this article examines why veterinarians need to better understand HIV/AIDS, advocates for more time in the veterinary curriculum on the topic of HIV/AIDS, and provides resources for veterinarians and their clients.

[a]Department of Veterinary Microbiology and Preventive Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA

Address correspondence to: Radford G. Davis, DVM, MPH, DACVPM, Department of Veterinary Microbiology and Preventive Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA 50011; tel. 515-294-8972; fax 515-294-8500; e-mail <rgdavis@iastate.edu>.

©2008 Association of Schools of Public Health

In June 2006, acquired immunodeficiency syndrome (AIDS)—a disease that is caused by the human immunodeficiency virus (HIV) and has claimed the lives of more than 22 million people worldwide, including more than 500,000 in the U.S—turned 25 years old.[1] It is arguably the most important infectious disease of the 20th century and, very likely, of the 21st century as well. The numbers speak to its unwelcome ranking: HIV/AIDS is the fourth-leading cause of death worldwide behind (*1*) ischemic heart disease, (*2*) cerebrovascular disease, and (*3*) lower respiratory infections.[2] By the end of 2005, an estimated 38.6 million people were living with HIV, with 4.1 million new infections that year.[3] Within the U.S., the incidence of AIDS is in decline, and individuals infected with HIV/AIDS are living longer due to the widespread use of antiviral medication—medication that is often out of reach for the majority of the world's HIV-infected populace due to its expense.[4] Today, more than a million people in the U.S. are infected with HIV, with roughly 25% of them unaware of their status.[1,4]

While the risk of acquiring a zoonotic disease from pets is fairly small for the general population,[5,6] because of their immunocompromised state, individuals with HIV infection that has progressed to the stage of AIDS face significant health risks from pathogens associated with animals, insects, food, and water[7,8] and are more likely to develop serious illnesses from such infections than nonimmunocompromised people.[9] As those with HIV/AIDS live longer, veterinarians are more likely to see them as clients and employ them in their offices. It is, therefore, important that veterinarians have a clear scientific understanding of HIV/AIDS from which to intelligently advise and educate HIV/AIDS clients, coworkers, employees, and community health professionals on zoonotic diseases and other animal-related hazards, with the ultimate goal of protecting human life. Veterinarians must also be fully knowledgeable of the legal and liability issues that surround HIV/AIDS in the workplace.

The purpose of this article is to educate veterinarians on certain aspects of HIV/AIDS, demonstrate how veterinarians are intimately connected with the myriad issues surrounding HIV/AIDS, provide resources to veterinarians and pet owners, advocate for more veterinary involvement in addressing the needs of those with HIV/AIDS, and advocate for more HIV/AIDS education in the veterinary curriculum.

HIV/AIDS ORIGINS AND IMPACT

HIV could be considered the world's most cunning, most deadly disease of zoonotic origin, as humans are not the original species from which this virus emerged.[10] The two major types of the virus are HIV-1 and HIV-2, two distinct viruses that lead to AIDS. It is believed that the ancestors to HIV-1 and HIV-2 are the simian immunodeficiency viruses (SIV) from nonhuman primates of Africa. Roughly 26 species of Old World African monkeys and apes have been reported to be infected with SIVs.[10] HIV-1 (the most common worldwide) has its origins from SIV_{cpz} (chimpanzee), and HIV-2 originated from SIV_{sm} (sooty mangabey).[10,11] However, it is important to point out that HIV is not itself a zoonosis, but instead the adaptation of SIV viruses to humans. AIDS is also not a zoonosis, but is, rather, the end stage of HIV infection. The full sociological and health impact of this successful cross-species transmission is unmatched in history; only influenza and plague come close.

Globally speaking, the incidence rate of HIV appears to have stabilized,[3] and nearly every country must grapple with the grim reality that HIV is now an endemic problem. While the AIDS epidemic shows signs of slowing in several regions around the world, the evidence does not indicate we are winning the war.[12] In fact, the full impact of AIDS has yet to be realized in many parts of the world.[3] The decline in HIV mortality that the U.S. has experienced is slowing;[13] this is unwelcome news. HIV/AIDS is currently ranked as the 22nd most common cause of death among all Americans, but is ranked seventh for African Americans.[14] Awareness and education efforts have reduced the number of new HIV infections in the U.S. each year from the more than 150,000 per year in the 1980s to the current rate of 40,000 per year,[1] a rate that has changed little in the last 10 years.[4,15] New antiretroviral drugs are continually coming to market to battle the virus and, fortunately, have helped slow the progression of HIV infection to AIDS—and ultimately death—for millions. But many individuals experience severe side effects, and the drugs do not help everyone.[16]

WHY VETERINARIANS NEED TO UNDERSTAND HIV/AIDS

Veterinarians need to understand HIV/AIDS for many reasons, including:

- To educate clients, coworkers, and employees with HIV/AIDS on zoonotic diseases and other animal-related risks (e.g., bites and scratches) and to safeguard their health
- To identify and address liability or discrimination issues in the workplace
- To understand HIV/AIDS clients' perspectives and concerns

- To dispel misconceptions about HIV/AIDS, particularly transmission routes
- To promote the human/animal bond and help those with HIV/AIDS keep their pets
- To provide appropriate advice to HIV/AIDS clients on new pet selection, pet care, and pet health
- To fulfill the veterinary obligation in protecting public health
- To facilitate discussions with HIV/AIDS clients' physicians about animal-related issues
- To enhance outreach efforts to HIV/AIDS clients, their physicians, and community support groups
- To meet state licensing requirements

Safety and liability

The potential for human blood exposure in the veterinary practice setting is a real possibility; bites, scratches, and needlestick injuries are not uncommon among workers. Animal owners may also sustain bites and scratches while at the clinic, or may arrive at the clinic already bearing such injuries in times of emergency. Veterinarians and their staff should be trained and prepared to render first aid to victims of animal bites or other injuries where there is the potential for blood loss.

The American Veterinary Medical Association guidelines on HIV/AIDS in the veterinary workplace outline simple measures and precautions that all veterinarians need to know regarding human blood exposures. These guidelines advocate for instructing all employees about HIV/AIDS so they understand what is and is not a hazard. The guidelines state that ". . . veterinarians must know enough about the disease to understand and deal with the real hazards, to plan and implement effective control and preventive measures, and to avoid unproductive efforts directed toward unfounded fears."[17]

The Occupational Safety and Health Administration (OSHA) recommends that veterinary clinics follow human bloodborne pathogen standards (29 CFR 1910.1030) when an employee suffers a bite, sharps-related injury, needlestick, or other injury.[18] Knowledge regarding universal precautions[19,20] is essential for protecting personnel and clients against accidental infection with HIV, hepatitis B and C, and other bloodborne pathogens. Veterinarians should also be aware that states may have their own bloodborne-pathogen standards and enforcement policies, which may differ from OSHA's, and that these state standards must be adopted as well. Information on individual state policies can generally be obtained by contacting the state's department of labor.

Public health efforts today are encouraging more people to know their HIV status, and this means that more employers will have employees or employees with family members who have tested positive for HIV infection.[21] This is an important consideration for veterinarians operating their own clinics. A person with HIV/AIDS is covered under the Americans with Disabilities Act (ADA) and cannot be discriminated against in employment, access to public accommodations, transportation, state and local government services, and telecommunications.[22] Surveys of senior veterinary students at Iowa State University College of Veterinary Medicine reveal that most students do not know this (unpublished data).

In spite of the ADA, discrimination cases involving HIV/AIDS continue to be litigated. Employers must provide those covered under the ADA with "reasonable accommodations" and maintain the confidentiality of medical information.[21] Reassigning, suspending, isolating, or firing a person with HIV/AIDS raises serious legal and moral concerns that employers will have an arduous task of defending. An employer can defend a case of disability discrimination by showing that the employee posed a substantial risk of serious injury to others; however, this is a defense that rarely works in cases involving HIV/AIDS because the employer must demonstrate a clear risk for HIV transmission.[21] Employee or customer fear is also not a valid reason for denying employment.[21] How will employees treat an HIV/AIDS coworker? Seven out of 10 Americans in a 2006 Kaiser Family Foundation survey indicated they were very or somewhat comfortable working with someone with HIV or AIDS,[15] but discrimination, stigmatization, and harassment of those with HIV/AIDS continues in the work environment. Veterinary clinic owners and supervisors need to be educated on how to handle HIV/AIDS in the workplace, to allay fears and concerns of employees, to maintain strict confidentiality, and to use sound judgment in managing an HIV/AIDS employee, while not running afoul of the law.

Zoonotic disease concerns

At the point in which their immune system is most weak—the AIDS stage—those with HIV are highly susceptible to opportunistic infections (OIs), including zoonoses.[23] Prior to 1998, approximately 90% of deaths among those with HIV/AIDS were due to OIs, 7% to cancer, and 3% to other reasons.[24] Today, thanks to highly active antiretroviral therapy and prophylactic treatment of OIs, roughly 50% of HIV/AIDS deaths are from OIs—a remarkable decline.

As for the zoonoses that can infect those with HIV/AIDS, the list of potential candidates is long; thus, it is important to discriminate between what people with HIV/AIDS *can* get and what they often *do* get.[25] Some of the zoonoses of primary concern for people with HIV/AIDS include the following:[6,8,26,27] *Toxoplasma gondii, Cryptosporidium* spp., *Salmonella* spp., *Campylobacter* spp., *Bartonella* spp., *Mycobacterium* spp., *Giardia* spp., *Dermatophytes*,[28] *Mycobacterium marinum*,[29] and *Listeria monocytogenes*. Other, less frequent pathogens include *Microsporidia*[30] (unclear zoonotic potential), *Rhodococcus equi*,[31] and *Bordetella bronchiseptica*, which very rarely infects humans.[32] AIDS-defining diseases (of which there are 26) that are animal-related include Cryptococcosis, cryptosporidiosis, mycobacteriosis, salmonellosis, and toxoplasmosis.[24] It should be noted that food, water, and the environment all can serve as sources of infection for several of these agents, in addition to animals. One study of individuals with AIDS found no significant difference between pet owners and non-pet owners in rates of OIs,[5] indicating that pet ownership does not dramatically increase the risk of AIDS-defining zoonotic OIs.

Hundreds of zoonotic diseases can afflict humans,[33] and many books and articles have been written covering them. Of these publications, several deal specifically with the topic of zoonoses and HIV/AIDS, or the topic of pets, veterinarians, and immunocompromised owners, and would be beneficial reading for veterinary practitioners.[6,8,27,34–39] Other publications are targeted to veterinarians to aid in the management of pets of immunocompromised owners and/or to aid and educate the pet owner as well.[6,9,25,35,38,40,41] Guidelines for preventing OIs among HIV-infected people are published periodically by the Centers for Disease Control and Prevention. The 2002 guidelines cover several zoonoses and offer a section specifically on pet-related exposures.[26] Veterinary practitioners are urged to read these publications and become familiar with their recommendations so that they can provide advice and care that meets the prevention goals of their immunocompromised clients. Helpful Internet resources and publications are listed (Figures 1–3), as is a summary of recommendations for veterinarians and animal owners (Figures 4 and 5).

Uniqueness of HIV/AIDS and common misconceptions

As noted previously, individuals with HIV/AIDS are at a higher risk of severe illness from zoonotic diseases than nonimmunocompromised individuals. Of course, other groups of immunocompromised people also have a similar risk of illness from zoonotic diseases. These groups include pregnant women, infants younger than 1 year, people older than 65 years of age, people taking immunosuppressive medications (such as organ recipients), people receiving chemotherapeutic agents, and people suffering from diabetes, renal failure, malnutrition, liver cirrhosis, or various other immunosuppressive diseases or conditions.[6,8,35] Conservatively speaking, nearly 20% of the U.S. population is considered immunocompromised.[7]

Among these various immunocompromised conditions, HIV/AIDS is unique enough to demand special attention by veterinarians for many reasons:

- Its many routes of transmission (including blood)
- The prolonged duration of infection (life expectancy for a person with HIV under medical care in the U.S. is approximately 24 years)[42]
- The highly susceptible end stage (AIDS) from which a person can suffer repeated and/or numerous OIs
- Demonstrated zoonotic threats
- Liability issues facing employers
- Disability issues, discrimination, and the stigma and shunning of those infected[43,44]
- Continued myths and misunderstandings of transmission (including animal transmission) and cures
- The negative impact on families, communities, economic growth, and national security[3,45]
- The importance of the human/animal bond

A survey of Americans conducted in 2006 shed light on how the nation perceives HIV/AIDS. According to those surveyed, HIV/AIDS ranks second behind cancer as the most urgent health problem facing the world today.[15] In regard to the most urgent health-care issues facing the U.S., respondents ranked HIV/AIDS as the third most important, behind cancer and heart disease. Four out of 10 Americans said they knew someone with HIV. The study also revealed how much Americans really understand about HIV/AIDS: 37% of Americans still believed HIV can be transmitted through kissing, 22% through sharing a drinking glass, and 16% by touching a toilet seat. In a survey conducted in 2000, 41% of 5,641 respondents believed that HIV transmission could occur from being coughed or sneezed on by an HIV-infected person.[44] Despite two and a half decades of living with HIV/AIDS, misconceptions and lack of knowledge still continue.

Figure 1. Internet resources

• Bloodborne pathogens and needlestick prevention	http://www.osha.gov/SLTC/bloodbornepathogens/index.html
• CDC—HIV/AIDS	http://www.cdc.gov/hiv/default.htm
• CDC—Healthy Pets Healthy People	http://www.cdc.gov/healthypets
• Companion Animal Parasite Council	http://www.capcvet.org
• Food Safety for Persons with AIDS	http://www.fsis.usda.gov/fact_sheets/Food_Safety_for_Persons_with_AIDS/index.asp
• Guidelines for preventing opportunistic infections among HIV-infected persons—2002	http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5108a1.htm
• HIV—workplace education	http://www.hivatwork.org
• Pets Are Wonderful Support	http://www.pawssf.org
• UNAIDS	http://www.unaids.org/en/default.asp
• U.S. Department of Justice—Americans with Disabilities Act	http://www.usdoj.gov/crt/ada
• World Bank HIV/AIDS	http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTHEALTHNUTRITIONANDPOPULATION/EXTHIVAIDS/0,,menuPK:376477~pagePK:149018~piPK:149093~theSitePK:376471,00.html

CDC = Centers for Disease Control and Prevention
HIV = human immunodeficiency virus
AIDS = acquired immunodeficiency syndrome
UNAIDS = Joint United Nations Programme on HIV/AIDS

Veterinarians and human health professionals—working together

There is a recognized need for the free sharing of information and collaboration among human and animal health experts (often called "one medicine" or "one health") to tackle today's, and tomorrow's, crucial public health problems.[46–49] Fully addressing the health implications of zoonotic diseases for individuals with HIV/AIDS requires the involvement of a team of professionals, including the collaboration of physicians and veterinarians. Given that 61% of human pathogens and 75% of emerging pathogens are zoonotic, there is a demonstrated need for veterinary involvement in human diseases.[33] Veterinarians are experts on zoonotic diseases, animal-related hazards, and the human/animal bond,[50] and are essential in protecting the health of the HIV/AIDS pet owner. The role of the veterinarian in HIV/AIDS has been documented more than once.[35,38] This is not to say that veterinarians should be diagnosing and treating HIV/AIDS patients—they should not—but they should be in communication with the HIV/AIDS client's physician, providing accurate,

Figure 2. Brochures

• Preventing infections from pets	http://www.cdc.gov/hiv/pubs/brochure/oi_pets.htm
• Exposure to blood: what healthcare personnel need to know	http://www.cdc.gov/ncidod/dhqp/pdf/bbp/Exp_to_Blood.pdf
• You can prevent toxo [toxoplasmosis]	http://www.cdc.gov/hiv/pubs/brochure/oi_toxo.htm
• AVMA—animal health	http://www.avma.org/communications/brochures/allbrochures.asp
• Zoonotic diseases: the shared threat	http://www.npwm.com/zoonosis.htm
• Safe pet guidelines (PAWS)	http://www.pawssf.org/library_safepetguidelines.htm

AVMA = American Veterinary Medical Association
PAWS = Pets Are Wonderful Support

Figure 3. Articles and publications

- Brunt J, Guptill L, Kordick DL, Kudrak S, Lappin MR. American Association of Feline Practitioners 2006 Panel report on diagnosis, treatment, and prevention of *Bartonella* spp. infections. J Feline Med Surg 2006;8:213-26.
- Stine GJ. AIDS update 2005. San Francisco: Pearson Benjamin Cummings; 2005.
- Brown RR, Elston TH, Evans L, Glaser C, Gulledge ML, Jarboe L, et al. American Association of Feline Practitioners 2003 report on feline zoonoses [cited 2007 Jul 24]. Available from: URL: http://www.aafponline.org/resources/guidelines/ZooFinal2003.pdf
- Guidelines for preventing opportunistic infections among HIV-infected persons—2002. MMWR Recomm Rep 2002;51(RR-8):1-46. Also available from: URL: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5108a1.htm [cited 2007 Jul 24].
- Lappin MR. Pet ownership by immunocompromised people. Compend Contin Educ Pract Vet 2002;24S:16-25.
- Gill DM, Stone DM. The veterinarian's role in the AIDS crisis. J Am Vet Med Assoc 1992;201:1683-4.
- National Association of State Public Health Veterinarians. Compendium of veterinary standard precautions: zoonotic disease prevention in veterinary personnel, 2006 [cited 2007 Jul 24]. Available from: URL: http://nasphv.org/Documents/VeterinaryPrecautions.pdf
- Angulo FJ, Glaser CA, Juranek DD, Lappin MR, Regnery RL. Caring for pets of immunocompromised persons. J Am Vet Med Assoc 1994;205:1711-8.

science-based information on zoonotic and animal-related threats as appropriate.

Many veterinarians may view the education of clients on zoonotic diseases as the domain of physicians, but many physicians do not feel comfortable discussing zoonotic risks from animals and, therefore, do not advise their patients on them.[35,36] A survey of Wisconsin physicians and veterinarians concerning the risk and prevention of zoonoses in immunocompromised people found that veterinarians saw or discussed zoonoses more frequently (weekly) with their clients than physicians (occasionally).[36] A survey of physicians and veterinarians in Miami, Florida, reported that most veterinarians (79%) and physicians (89%) had never contacted their medical counterpart to discuss zoonoses or risks of pet ownership.[51] It also found that veterinarians (38%) were more likely to have zoonotic disease brochures in their waiting rooms than physicians (4%). Another Florida study of individuals with AIDS found that only 10% of pet owners were informed about zoonotic diseases by health-care workers, and some of this information was incorrect or misleading.[5] All of these studies indicate that there is a need to improve

Figure 4. Recommendations for pet owners with HIV/AIDS[a–g]

Avoid owning and coming in contact with the following:

- Immunosuppressed animals
- Reptiles and amphibians
- Exotic/wild animals
- Stray dogs and cats
- Sick animals
- Farm animals

Hygiene:

- Change litter box and birdcage liner daily. Use of plastic litter box liners is encouraged.[h]
- Pick up dog feces daily.[h]
- Maintain a clean, healthy aquarium.
- Wear gloves when cleaning litter box, picking up dog feces, cleaning birdcage, gardening, handling raw meat, or similar exposures. For aquariums, use heavy rubber gloves.[h]
- Disinfect litter box with hot water and detergent and scrub well.[h]
- Spray soiled birdcage liner with 1% bleach solution and let sit for 10 minutes before removing paper. (Do not expose bird to bleach fumes.)[h]
- Minimize contact with animal feces, blood, and urine.
- Wash hands for 20 seconds after touching animals, changing litter box, cleaning birdcage or aquarium, gardening, or handling meat, even if using gloves.
- Follow USDA Food Safety and Inspection Service recommendations for cooking meats: Cook beef, veal, and lamb steaks/chops/roasts to 145°F; pork, ground beef, ground veal and lamb, egg dishes, and casseroles to 160°F; leftovers to 165°F; and poultry to 165°F.
- Wash bites and scratches immediately with copious amounts of soap and water.
- Seek medical care for bites and scratches.
- Do not allow pets to lick wounds or face.
- Do not share food or eating utensils with pets.
- Do not kiss pets.
- Do not clean chicken coops.

Pets:

- Use flea and tick repellents regularly.
- Have pets examined by veterinarian every six months for preventive care.
- Maintain regular vaccine schedule.
- Do not let pets drink from toilet.
- Keep cats indoors at all times.
- Feed only good quality commercial food.
- Do not feed raw meat.
- Keep pets' toenails trimmed.
- Have sick animals seen by veterinarian promptly.

continued on p. 272

Figure 4 (continued). Recommendations for pet owners with HIV/AIDS[a–g]

Pets:

- Have nonimmunocompromised person take any animal with diarrhea to the veterinarian. Animals with diarrhea should be separated from immunocompromised owner until healthy.
- Routinely deworm dogs and cats with a broad-spectrum dewormer and heartworm preventative.
- Have a fecal exam performed at least every six months.
- Adopt only adult dogs and cats (at least one year of age).
- Adopt from private family.
- Have newly adopted pet seen by veterinarian prior to allowing it to live with immunocompromised person.
- Keep dogs on leash or adequately fenced.
- Do not let pets hunt.
- Do not let pets eat the feces of other animals.
- Prevent pets from eating garbage.

[a]Lappin MR. Pet ownership by immunocompromised people. Compend Contin Educ Pract Vet 2002;24S:16-25.

[b]Gill DM, Stone DM. The veterinarian's role in the AIDS crisis. J Am Vet Med Assoc 1992;201:1683-4.

[c]Angulo FJ, Glaser CA, Juranek DD, Lappin MR, Regnery RL. Caring for pets of immunocompromised persons. J Am Vet Med Assoc 1994;205:1711-8.

[d]Brown RR, Elston TH, Evans L, Glaser C, Gulledge ML, Jarboe L, et al. American Association of Feline Practitioners 2003 report on feline zoonoses. American Association of Feline Practitioners [cited 2007 Jul 12]. Available from: URL: http://www.aafponline.org/resources/guidelines/ZooFinal2003.pdf

[e]Centers for Disease Control and Prevention (US). Preventing infections from pets [cited 2007 Jul 10]. Available from: URL: http://www.cdc.gov/hiv/pubs/brochure/oi_pets.htm

[f]Pets Are Wonderful Support. Safe pet guidelines [cited 2007 Jul 10]. Available from: URL: http://www.pawssf.org/library_safepetguidelines.htm

[g]U.S. Department of Agriculture, Food Safety and Inspection Service. Food safety for persons with AIDS [cited 2007 Jul 17]. Available from: URL: http://www.fsis.usda.gov/fact_sheets/Food_Safety_for_Persons_with_AIDS/index.asp

[h]Should be performed by someone who is not immunocompromised whenever possible.

HIV = human immunodeficiency virus

AIDS = acquired immunodeficiency syndrome

USDA = U.S. Department of Agriculture

communication between the two professions on the risks of pets and zoonoses.

The human-animal bond

It is estimated that 63% of U.S. households have a pet,[52] and those infected with HIV are just as likely to own pets as those not infected.[53] The importance and healthful benefits (including psychological) of companion animals to people have been demonstrated in several studies, including among people with HIV/AIDS.[53–56] These studies have shown that people with AIDS who owned pets reported less depression than those with AIDS who did not own a pet, especially among those with less social support.[53] Because of societal stigmas and discrimination, perhaps even isolation, HIV/AIDS clients may have very strong bonds with their pets, a bond the veterinary practitioner must recognize and protect.

Some people with HIV/AIDS have been advised to give up their pets to better protect their health,[5,37,38] but most experts today recognize that pet ownership and health are not at odds with each other.[5,55,57] Some people may even forgo medical care or forgo taking steps to ameliorate their medical condition for fear of having to give up their pet. A recent study on pet ownership and health concluded, "Many people would welcome advice and support to enable them to reconcile or manage pet ownership and health problems whenever possible."[55] This is an area where veterinarians, in combination with the pet owner's physician, can provide sound, scientific advice, allowing HIV/AIDS clients to keep their pets and their health, too.

HIV/AIDS EDUCATION IN THE VETERINARY CURRICULUM

The Institute of Medicine, in its 2003 report *Microbial Threats to Health: Emergence, Detection, and Response*, stated, "To rebuild the public health workforce needed to respond to microbial threats, health profession students (especially those in the medical, nursing, veterinary, and laboratory sciences) must be educated in public health as a science and as a career."[58] In the last several years, the number of programs globally to train veterinarians in the areas of public health, public practice, or population medicine has increased.[59] In fact, today in the U.S., more veterinary colleges are offering a master of public health degree to veterinary students than ever before.[60]

In the face of such new training efforts, however, very little time, if any, is spent on HIV/AIDS in the veterinary curriculum. *The Proposed Model Veterinary Public Health/Preventive Medicine Curriculum*—the recommendations developed by the American College for Veterinary Preventive Medicine—proposes one hour on the topic of zoonoses and immunocompromised populations in the veterinary curriculum (it does not mention HIV/AIDS directly).[61] This is not enough time to cover such an important topic properly. The veterinary curriculum at Iowa State University delivers a minimum of four hours of instruction on HIV/AIDS, covering history, clinical illness, virology, epidemiology,

myths, social impact, client education, community outreach, and other aspects. We recommend that all veterinary schools allot a minimum of four hours to cover the topic of HIV/AIDS adequately and to meet state licensing requirements, because at least one state (Washington) requires veterinarians to certify that they have received four hours of instruction on HIV/AIDS to become licensed. Whether this regulation will be adopted by other states remains to be seen.

CONCLUSION

HIV/AIDS is unlike any disease our planet has ever faced, and the veterinary profession has accepted the obligation to protect human health, including the health of those with HIV/AIDS, to the best of its abilities and within its professional province. Liability issues, discrimination, zoonotic threats, confidentiality, disease misconceptions—they are all part of HIV/AIDS and the concerns of a modern veterinary profession. The psychological and physical benefits of having a pet outweigh the small risk of zoonoses to an educated and careful pet owner;[25] we do not want to overstate the risk of pets to HIV/AIDS clients nor discourage them from enjoying the companionship of pets. The HIV/AIDS pet owner may receive confusing or conflicting information from television, magazines, newspapers, health-care providers, or other sources about the risk their pet poses. There is, therefore, a need for sound professional counseling and education of HIV/AIDS clients—indeed all clients—on zoonoses, animal-related hazards, and precautionary measures. Veterinary practitioner knowledge of HIV/AIDS is paramount to achieving this goal, and this means spending a minimum of four hours on the topic of HIV/AIDS in the veterinary curriculum and offering more continuing education and publications focusing on this topic for veterinary practitioners.

Finally, veterinarians can be proactive and reach out to HIV/AIDS clients in many ways. These include the use of small signs in exam rooms, waiting room posters or pamphlets, new client forms that allow clients to mark their request for more information on HIV/AIDS and pets, brochures in new puppy/new kitten packages, the clinic website, the clinic newsletter, community speaking engagements, affiliation with HIV/AIDS support groups, and direct mailings.

With close client communication, education, and good preventive care for the pets of people with HIV/AIDS, veterinarians can reduce the risk of zoonoses to these clients and allow them to make educated decisions on the hazards and benefits of pet ownership. It is only through understanding the disease and listening to the HIV/AIDS client that the veterinarian can truly provide what the client and pet both need.

Figure 5. Recommendations for veterinarians working with pets of people with HIV/AIDS

- Be familiar with zoonotic diseases and discuss them with clients in light of pet ownership benefits.
- Make clear you and your staff are discreet and will keep all client medical information confidential.
- Use signs/brochures in waiting area or exam room on the topic of HIV/AIDS to prompt clients to seek your advice.
- Document any discussion on zoonoses or animal-related hazards in the client record.
- Know the reportable animal diseases in your state.
- Always provide the owner with written educational material on zoonoses for which their pet is at risk, or on suspected or diagnosed zoonoses.
- Refer clients who are ill or who have suffered animal trauma to a physician/emergency department.
- Volunteer to speak to the client's physician about zoonotic risks or other animal-related issues.
- Get to know your state Public Health Veterinarian (for disease reporting and zoonotic assistance).
- Get to know physicians in your community.
- Do not allow clients to restrain animals under your care, even their own.
- Familiarize yourself with the Americans with Disabilities Act and implications for the workplace.
- Speak to local HIV/AIDS groups about pets and zoonoses.
- Make an effort to become educated on HIV/AIDS.

HIV = human immunodeficiency virus

AIDS = acquired immunodeficiency syndrome

REFERENCES

1. Twenty-five years of HIV/AIDS—United States, 1981–2006. MMWR Morb Mortal Wkly Rep 2006;55(21):585-9.
2. World Health Organization. The world health report 2004—changing history. Geneva: WHO; 2004. p. 120-5. Also available from: URL: http://www.who.int/whr/2004/en [cited 2007 Jun 28].
3. Joint United Nations Programme on HIV/AIDS. 2006 report on the global AIDS epidemic [cited 2007 Jun 19]. Available from: URL: http://www.unaids.org/en/HIV_data/2006GlobalReport/default.asp
4. Epidemiology of HIV/AIDS—United States, 1981–2005. MMWR Morb Mortal Wkly Rep 2006;55(21):589-92.
5. Conti L, Lieb S, Liberti T, Wiley-Bayless M, Hepburn K, Diaz T. Pet ownership among persons with AIDS in three Florida counties. Am J Public Health 1995;85:1559-61.
6. Lappin MR. Pet ownership by immunocompromised people. Compend Contin Educ Pract Vet 2002;24S:16-25.
7. Gerba CP, Rose JB, Haas CN. Sensitive populations: who is at the greatest risk? Int J Food Microbiol 1996;30:113-23.
8. Trevejo RT, Barr MC, Robinson RA. Important emerging bacterial zoonotic infections affecting the immunocompromised. Vet Res 2005;36:493-506.

9. Lappin MR. General concepts in zoonotic disease control. Vet Clin North Am Small Anim Pract 2005;35:1-20.
10. Hahn BH, Shaw GM, De Cock KM, Sharp PM. AIDS as a zoonosis: scientific and public health implications. Science 2000;287:607-14.
11. Chakrabarti L. Natural history of simian immunodeficiency viruses: clues to the emergence and virulence of AIDS viruses. In: Burroughs T, Knobler S, Lederberg J, editors. The emergence of zoonotic diseases: understanding the impact on animal and human health. Washington: National Academy Press; 2002. p. 61-3.
12. Altman LK. Report shows AIDS epidemic slowdown in 2005. The New York Times 2006 May 31 [cited 2007 Jun 19]. Available from: URL: http://www.nytimes.com/2006/05/31/world/31aids.html?ex=1150603200&en=9834c19264dd7b18&ei=5070
13. National Center for Health Statistics (US). Health, United States, 2005. Hyattsville (MD): National Center for Health Statistics; 2005 November. Also available from: URL: http://www.cdc.gov/nchs/data/hus/hus05.pdf [cited 2007 Jul 18].
14. Anderson RN, Smith BL. Deaths: leading causes for 2002. Natl Vital Stat Rep 2005;53:1-89.
15. Kaiser Family Foundation. Survey of Americans on HIV/AIDS [cited 2007 Jun 20]. Available from: URL: http://www.kff.org/kaiserpolls/pomr050806pkg.cfm
16. Kates J, Sorian R, Crowley JS, Summers TA. Critical policy challenges in the third decade of the HIV/AIDS epidemic. Am J Public Health 2002;92:1060-3.
17. Tennyson AV. AVMA guidelines for dealing with AIDS-infected persons in the veterinary workplace. J Am Vet Med Assoc 1989; 195:190-3.
18. Occupational Safety and Health Administration (US). Application of the bloodborne pathogens standard to veterinary clinics [cited 2007 Sep 6]. Available from: URL: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24608
19. Centers for Disease Control and Prevention (US). Universal precautions for prevention of transmission of HIV and other bloodborne infections [cited 2007 Sep 4]. Available from: URL: http://www.cdc.gov/ncidod/dhqp/bp_universal_precautions.html
20. Occupational Safety and Health Administration (US). Bloodborne pathogens and needlestick prevention [cited 2007 Sep 6]. Available from: URL: http://www.osha.gov/SLTC/bloodbornepathogens/index.html
21. Petesch P. Expert perspectives: dealing with HIV/AIDS in the workplace, Fall 2003 [cited 2007 Jul 18]. Available from: URL: http://www.hivatwork.org/resource/expert/petesch.htm
22. U.S. Department of Justice. Americans with Disabilities Act: questions and answers [cited 2007 Jul 10]. Available from: URL: http://www.usdoj.gov/crt/ada/q%26aeng02.htm
23. 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR Recomm Rep 1992;41(RR-17):1-19.
24. Stine GJ. AIDS update 2005. San Francisco: Pearson Benjamin Cummings; 2005.
25. Burton BJ. Pets and PWAs: claims of health risk exaggerated. AIDS Patient Care 1989;3:34-7.
26. Kaplan JE, Masur H, Holmes KK. Guidelines for preventing opportunistic infections among HIV-infected persons—2002. Recommendations of the U.S. Public Health Service and the Infectious Diseases Society of America. MMWR Recomm Rep 2002;51(RR-8):1-52.
27. Glaser CA, Angulo FJ, Rooney JA. Animal-associated opportunistic infections among persons infected with the human immunodeficiency virus. Clin Infect Dis 1994;18:14-24.
28. Kho GT, Bandel C, Cockerell CJ. Dermatologic manifestations of HIV infection. In: Cohen J, Powderly WG, Berkley SF, Calandra T, Clumeck N, Finch RG, editors. Infectious diseases. 2nd ed. London: Mosby; 2004. p. 1323-32.
29. Lewis FM, Marsh BJ, von Reyn CF. Fish tank exposure and cutaneous infections due to Mycobacterium marinum: tuberculin skin testing, treatment, and prevention. Clin Infect Dis 2003;37:390-7.
30. Weber R. Protozoa: intestinal Coccidia and Microsporidia. In: Cohen J, Powderly WG, Berkley SF, Calandra T, Clumeck N, Finch RG, editors. Infectious diseases. 2nd ed. London: Mosby; 2004. p. 2425-33.
31. Weinstock DM, Brown AE. Rhodococcus equi: an emerging pathogen. Clin Infect Dis 2002;34:1379-85.
32. Dworkin MS, Sullivan PS, Buskin SE, Harrington RD, Olliffe J, MacArthur RD, et al. Bordetella bronchiseptica infection in human immunodeficiency virus-infected patients. Clin Infect Dis 1999;28:1095-9.
33. Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. Philos Trans R Soc Lond B Biol Sci 2001;356: 983-9.
34. Robinson RA. Zoonoses and immunosuppressed populations. In: Macpherson CNL, Meslin FX, Wandeler AI, editors. Dogs, zoonoses and public health. New York: CABI Publishing; 2000. p. 273-98.
35. Angulo FJ, Glaser CA, Juranek DD, Lappin MR, Regnery RL. Caring for pets of immunocompromised persons. J Am Vet Med Assoc 1994;205:1711-8.
36. Grant S, Olsen CW. Preventing zoonotic diseases in immunocompromised persons: the role of physicians and veterinarians. Emerg Infect Dis 1999;5:159-63.
37. Nowotny N, Deutz A. Preventing zoonotic diseases in immunocompromised persons: the role of physicians and veterinarians. Emerg Infect Dis 2000;6:208.
38. Gill DM, Stone DM. The veterinarian's role in the AIDS crisis. J Am Vet Med Assoc 1992;201:1683-4.
39. AIDS patients can acquire some infections from animals. J Am Vet Med Assoc 1990;197:1268-9.
40. Centers for Disease Control and Prevention (US). Preventing infections from pets [cited 2007 Jul 10]. Available from: URL: http://www.cdc.gov/hiv/pubs/brochure/oi_pets.htm
41. Pets Are Wonderful Support. Safe pet guidelines [cited 2007 Jul 10]. Available from: URL: http://www.pawssf.org/library_safepetguidelines.htm
42. Schackman BR, Gebo KA, Walensky RP, Losina E, Muccio T, Sax PE, et al. The lifetime cost of current human immunodeficiency virus care in the United States. Med Care 2006;44:990-7.
43. Herek GM, Capitanio JP, Widaman KF. HIV-related stigma and knowledge in the United States: prevalence and trends, 1991–1999. Am J Public Health 2002;92:371-7.
44. HIV-related knowledge and stigma—United States, 2000. MMWR Morb Mortal Wkly Rep 2000;49(47):1062-4.
45. Garrett L. The lessons of HIV/AIDS. Foreign Affairs 2005;84:51.
46. Stewart C, Cowden J, McMenamin J, Reilly B. Veterinary public health. BMJ 2005;331:1213-4.
47. Kahn LH. Confronting zoonoses, linking human and veterinary medicine. Emerg Infect Dis 2006;12:556-61.
48. Task force to study one-health initiative. J Am Vet Med Assoc 2007;230:1434-9.
49. World Health Organization. Future trends in veterinary public health: report of a WHO study group. WHO technical report series, 907. Geneva: WHO; 2002. Also available from: URL: http://whqlibdoc.who.int/trs/WHO_TRS_907.pdf [cited 2007 Jul 20].
50. Spencer L. Study explores health risks and the human/animal bond. J Am Vet Med Assoc 1992;201:1669.
51. von Matthiessen PW, Sansone RA, Meier BP, Gaither GA, Shrader J. Zoonotic diseases and at-risk patients: a survey of veterinarians and physicians. AIDS 2003;17:1404-6.
52. American Pet Products Manufacturers Association. Industry statistics and trends [cited 2007 Jun 29]. Available from: URL: http://www.appma.org/press_industrytrends.asp
53. Siegel JM, Angulo FJ, Detels R, Wesch J, Mullen A. AIDS diagnosis and depression in the Multicenter AIDS Cohort Study: the ameliorating impact of pet ownership. AIDS Care 1999;11:157-70.
54. Carmack BJ. The role of companion animals for persons with AIDS/HIV. Holist Nurs Pract 1991;5:24-31.
55. McNicholas J, Gilbey A, Rennie A, Ahmedzai S, Dono JA, Ormerod E. Pet ownership and human health: a brief review of evidence and issues. BMJ 2005;331:1252-4.
56. Spencer L. Pets prove therapeutic for people with AIDS. J Am Vet Med Assoc 1992;201:1664-8.
57. Castelli P, Hart LA, Zasloff RL. Companion cats and the social support systems of men with AIDS. Psychol Rep 2001;89:177-87.
58. Institute of Medicine. Microbial threats to health: emergence, detection, and response. Washington: The National Academies Press; 2003.

59. Murray AL, Sischo WM, Hueston WD. Evaluation of veterinary public practice education programs. J Am Vet Med Assoc 2006; 228:529-36.
60. Riddle C, Mainzer H, Julian M. Training the veterinary public health workforce: a review of educational opportunities in U.S. veterinary schools. J Vet Med Educ 2004;31:161-7.
61. American College of Veterinary Preventive Medicine. Proposed model veterinary public health/preventive medicine curriculum [cited 2007 Jul 10]. Available from: URL: http://www.acvpm.org/html/htmlos/002473.2.425692819311580524