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Veterinary Medicine and Public Health at CDC

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Introduction

People readily associate the role of veterinarians with private veterinary practice focused on pets and farm animals, but the true dimensions and contributions of veterinary medicine are much broader and reflect expanding societal needs and contemporary challenges to animal and human health and to the environment (*1*). Veterinary medicine has responsibilities in biomedical research; ecosystem management; public health; food and agricultural systems; and care of companion animals, wildlife, exotic animals, and food animals. The expanding role of veterinarians at CDC reflects an appreciation for this variety of contributions.

Veterinarians' educational background in basic biomedical and clinical sciences compare with that of physicians. However, unlike their counterparts in human medicine, veterinarians must be familiar with multiple species, and their training emphasizes comparative medicine. Veterinarians are competent in preventive medicine, population health, parasitology, zoonoses, and epidemiology, which serve them well for careers in public health. The history and tradition of the profession always have focused on protecting and improving both animal health and human health (*2*).

Veterinary Contributions to Public Health

The veterinary profession contributes to improvement of human and public health by improving agriculture and food systems, advancing biomedical and comparative medical research, preventing and addressing zoonotic diseases, enhancing environmental and ecosystem health, and helping manage 21st century public health challenges (*3,4*).

Bridging Agriculture and Medicine

Since 1892, a total of 14 diseases have been eliminated from equine, poultry, and livestock populations in the United States (*5*). The elimination of these livestock diseases, along with outstanding research in animal health, is key to the remarkable gains in the efficiency of U.S. animal production. Partly as a consequence, U.S. residents spend only approximately 10% of their disposable income on food, whereas residents in other countries pay three or four times more (*7*). Although this achievement is recognized to have added billions of dollars to other parts of the U.S. economy, its success in allowing the U.S. public access to a nutritious, affordable, and sustainable food supply---also important for the public's health and well-being---is far less appreciated. The success of the national brucellosis and tuberculosis elimination campaigns has benefited not only the U.S. livestock industries but also human health by substantially reducing these zoonotic threats in animals. Additional public health contributions can be attributed to the Food Safety and Inspection Service of the U.S. Department of Agriculture (USDA), which has substantially reduced the burden of foodborne illnesses, improved food safety, and eliminated other zoonotic threats. Over the years, CDC has worked closely with USDA and the Food and Drug Administration to improve the safety of U.S. foods and reduce antimicrobial resistance in pathogens that infect both humans and animals.

Research

Research in veterinary science is critical to understanding and improving human health (*8*). In 1858, Rudolph Virchow, the father of comparative medicine, stated, "Between animal and human medicine there are no dividing lines---nor should there be. The object is different but the experience obtained constitutes the basis of all medicine" (*9*). Today comparative and interdisciplinary research is critical to translating scientific advances from one discipline or species to another and providing new insights into human health problems. Scientific fields such as laboratory animal medicine, pathology, and toxicology, when combined with veterinary medicine, have proven especially relevant to success in biomedical research (*10*).

Zoonoses in Companion Animals

Veterinarians also have contributed to public health through the care of companion animals. Fifty-seven percent of all U.S. households own a dog, cat, or both. In addition, millions of exotic animals, birds, and reptiles are kept as pets (*11*). Although pets enrich the lives of humans, they also potentially can threaten public health. Veterinarians help educate the public about prevention of zoonoses; vaccinate large numbers of pets for zoonotic diseases, such as rabies and leptospirosis; and reduce the level of ecoparasites that can transmit human diseases and intestinal worms, such as roundworms and hookworms, which can cause serious health problems in humans. The 60,000 private-practice veterinarians in the United States form a valuable front line for detecting adverse health events, reducing zoonotic diseases, and delivering public health education (*7*).

Environmental Health

Because veterinarians work at the interface of human, animal, and environmental health, they are uniquely positioned to view this dynamic through the lens of public health impact. Significant changes in land use, expansion of large and intensified animal-production units, and microbial and chemical pollution of land and water sources have created new threats to the health of both animals and humans (*12*). Because animals share human environment, food, and water, they are effective sentinels for environmental, human, and public health problems, including bioterrorism.

Concerns are increasing about antimicrobial resistance of pathogens, waste and nutrient management, and potential runoffs into streams, rivers, and oceans. Food animal and wildlife populations are inextricably linked to some environmental problems. Together these have led to creation of a new scientific discipline called ecosystem health, and veterinarians are assuming a leadership role in the field (*13*).

Contemporary Challenges: Convergence of Animal and Human Health in a New Era

Several decades ago, special factors came together to create a new epidemiologic era characterized by increases in emerging and reemerging zoonoses (*14*). Humans, animals, and animal products now move rapidly around the world, and pathogens are adapting, finding new niches, and jumping across species into new hosts. In 2005, approximately 21 billion food animals were produced to help feed a world population of 6.5 billion persons; the United Nations' Food and Agriculture Organization estimates that demand for animal protein will increase by 50% by 2020, especially in developing countries (*15*).

The lessons learned from severe acute respiratory syndrome, West Nile virus, monkeypox, and avian influenza are reminders of the need to view diseases globally; integrate animal and public health surveillance, epidemiology, and laboratory systems; and create new strategic partnerships among animal, human, and public health professions (*16,17*). Veterinarians are essential to the detection and diagnosis of and response to these threats and are integral to first-line defense and surveillance for bioterrorism agents.

Veterinary Contributions and the Changing Emphasis at CDC

Just as CDC has expanded its role, scope, and influence in public health since its inception in 1946, so has the veterinary profession (D. Satcher, CDC, personal communication, October 21, 1996). Early in the history of CDC, veterinarians in the U.S. Public Health Service and the CDC Veterinary Public Health Division helped reduce zoonotic diseases, especially rabies and foodborne illnesses (*18*). Today, 89 veterinarians serve throughout CDC in positions that address not only infectious diseases but also the entire spectrum of public health challenges: environmental health, chronic diseases, human immunodeficiency virus infection and acquired immunodeficiency syndrome, injuries, immunizations, laboratory animal medicine, global health, migration and quarantine, health education, and bioterrorism. Veterinarians contribute as epidemiologists, laboratory scientists, policymakers, researchers, and surveillance experts and in environmental and disease prevention and control programs both domestically and globally.

At CDC, 228 veterinarians have participated in the Epidemic Intelligence Service since 1951 (*19*). Forty-one states now have State Veterinary Public Health officials. In 2005, almost 300 students and faculty attended the first veterinary student day at CDC; in April 2007, CDC will co-host an inaugural conference with the Association of Schools of Public Health and Association of American Veterinary Medical Colleges. In addition, CDC has been recognized as a World Association for Animal Health Collaborating Center for Emerging and Re-Emerging Zoonoses. The CDC publication, *Emerging Infectious Diseases*, has highlighted zoonotic diseases in nearly every issue to zoonotic diseases and has devoted an annual issue in each of the previous 2 years. Thus, CDC has provided an important scientific forum for zoonotic disease research and programs both domestically and globally.

The convergence of human and animal health drove creation of the newly proposed National Center for Zoonotic, Vector-Borne, and Enteric Diseases. Plans are being completed to establish several multidisciplinary state-level zoonosis research and development centers. The veterinary profession at CDC has evolved in prominence as a member of the health professions and has established its importance and

usefulness to human and public health. Because their education is based on the concept of multiple determinants of health in populations, veterinarians are well suited to help define and achieve the new CDC health protection goals and to continue to contribute to the CDC mission in ways more important, diverse, and profound than ever before.

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