

Joint Degree Programs in Public Health

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ABSTRACT

Public health and veterinary medicine share a focus on population health and primary prevention, along with a commitment to preparedness, response, and recovery in the event of disease outbreaks. Public-health and veterinary professional degree programs share commonalities in their educational accreditation requirements related to epidemiology and public-health practice. The initiation of a number of joint professional degree programs over the last five years, including the joint Doctor of Veterinary Medicine and Master of Public Health (DVM/MPH), represents an exciting development for inter-professional education for veterinarians interested in public health. Various models for joint DVM/MPH educational programs are discussed, including pre-veterinary public-health credentialing, integrated programs, and post-DVM executive programs. Collaborations between colleges of veterinary medicine and schools of public health show great promise in both educational and research innovation.

Key words: inter-professional education, DVM, MPH, colleges of veterinary medicine, schools of public health

BACKGROUND

While most health-related professional and academic degrees are offered by schools representing a single discipline, more and more evidence points to the need for inter-professional educational programs.^{1,2} Much health-related inter-professional literature focuses on individual care, but two health professions stand out for their focus on populations: public health and veterinary medicine. Combined Master of Public Health (MPH) and Doctor of Veterinary Medicine (DVM)^a programs address many of the current recommendations for creating inter-professional educational programs and provide a unique public-health resource.

Schools of public health^b (SPHs) and colleges of veterinary medicine^c (CVMs) have much in common. Both offer professional and graduate degrees (SPHs award the MPH, CVMs award the DVM), and both have a range of master's and PhD programs. Accreditation standards for both the MPH³ and the DVM⁴ include requirements for coursework in public health and epidemiology. Sufficient overlap exists in the scholarship of SPH and CVM faculty that students interested in food safety or zoonotic infectious diseases might pursue an advanced academic degree equally well in either setting. Both SPHs and CVMs focus on the health of populations and the betterment of society. The "promotion of public health," in fact, is one of the obligations captured in the Veterinarian's Oath taken by all DVM graduates in the United States:

Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, *the promotion of public health, and the advancement of medical knowledge.*⁵

The development of collaborative programs between SPHs and CVMs offers tremendous potential

to address some of today's veterinary and public-health issues:

- Bioterrorism threats (all but one of the Category A bioterrorism agents are zoonotic)
- Multi-state and multinational food-borne disease outbreaks and development of global food-safety systems
- Emergence of new infectious diseases (an estimated three-quarters of new and emerging infectious diseases are zoonoses⁶)
- Public-health implications (including mental health) of catastrophic animal diseases such as foot-and-mouth disease (e.g., increased suicide among farmers and disruption of rural economies that affects public-health infrastructure)
- Emergency preparedness (animal response plans are an integral component of effective evacuation programs)
- Sustainable development and food security (provision of adequate and safe food supplies for all)

Given the complementary curricula and shared interests of CVMs and SPHs, this article reviews the evolution of veterinary public health educational programs, explores models for joint educational programs, and relates lessons learned from collaborations between schools of public health and colleges of veterinary medicine.

THE EVOLUTION OF VETERINARY PUBLIC HEALTH EDUCATIONAL PROGRAMS

Informal collaborations between SPHs and CVMs date back at least 50 years, with the admission of a veterinarian into the MPH program at the University of Minnesota (UMN) in 1947, one year after the SPH's founding. Between 1947 and 1956, the university's SPH and CVM continued to cooperate,

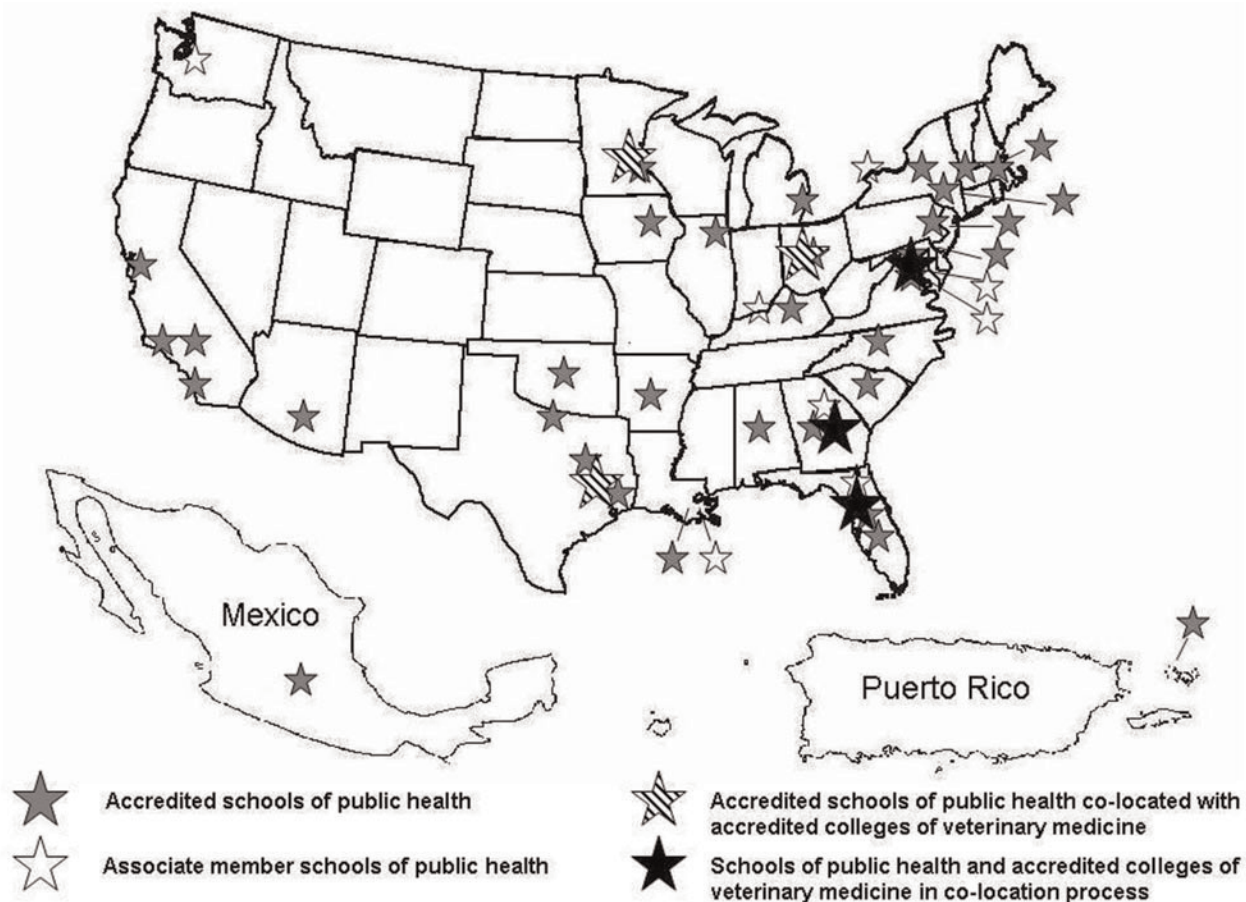


Figure 1: Schools of public health co-located with colleges of veterinary medicine

allowing veterinarians in the SPH a flexible schedule that enabled them to take elective courses in the CVM. The University of Minnesota formalized a veterinary public health (VPH) emphasis MPH in 1956 and named a director with a dual CVM/SPH appointment. This VPH program used a summer epidemiology institute as well as didactic instruction throughout the school year. A large number of public-practice veterinarians completed the MPH through this program while working for the US Department of Agriculture, and, to date, hundreds of veterinarians have completed an MPH at UMN.⁷

Formal collaborations between CVMs and SPHs have been dictated partially by proximity. While most CVMs have developed on land-grant university campuses, SPHs tend to be located on non-land-grant public or private campuses. Consequently, CVM and SPH are co-located at only three land-grant universities, despite there being 38 accredited SPHs and 28 accredited CVMs in the United States. No CVM and SPH share the same building, so, for the purpose of this summary, programs are said to be co-located when the CVM and SPH are located at the same university and on the same campus.

The three co-located campuses are those of the Ohio State University, the University of Minnesota, and Texas A&M University, although, in the case of the UMN's Twin Cities campus, the CVM and SPH are several miles apart. Two additional new SPHs are nearing accreditation on

campuses that already house a CVM: the University of Florida and the University of Georgia.

Accredited public-health programs can be located on campuses where no SPH exists. There are 67 accredited public-health graduate programs on campuses without SPHs.⁸ Four of these programs are co-located on campuses with a CVM: the University of California, Davis; the University of Pennsylvania; the University of Tennessee; and Tufts University (the Tufts CVM is on the Grafton campus, while the MPH program resides at the Tufts Medical School in Boston).

Perhaps because of limited co-location with SPHs, public-health-emphasis programs have often arisen within CVMs themselves. Almost all CVMs provide the option to emphasize public health in a graduate academic degree program (MS or PhD). Specialized master's degree programs also have emerged, including the Master of Preventive Veterinary Medicine at UC Davis; the Master of Science in Veterinary Public Health at Texas A&M; and, recently, a Master of Veterinary Public Health at North Carolina State University. None of these programs, however, has gained public-health professional accreditation from the Council on Education for Public Health (CEPH).

The first combined DVM/MPH curriculum was inaugurated by the Tufts University CVM in 1994 through an arrangement with the Tufts University School of Medicine's accredited MPH program.⁹ Selected veterinary students

(on average, two to three per year) are transported from the North Grafton, Massachusetts, campus to the Boston campus to take MPH classes one day per week at the medical school. These students complete both the DVM and the MPH in four years.

Since 2002, at least six formal CVM/SPH collaborations have been initiated. Two of these collaborations—at the University of Minnesota and the Ohio State University—involve co-located SPHs and CVMs, as discussed earlier. Four collaborations have developed between SPHs and CVMs on different campuses: the SPH at the University of Minnesota and the CVM at Michigan State University, the SPH at the University of Iowa and the CVM at Iowa State University, the SPH at the University of Illinois at Chicago and the CVM at the University of Illinois at Urbana-Champaign, and, most recently, Auburn University and the University of Alabama at Birmingham. In addition, at least three CVMs have developed collaborations with accredited MPH programs affiliated with medical schools or other health science colleges or departments: Colorado State University, the University of Tennessee at Knoxville, and Tufts University. Additional collaborations are in progress between CVMs and public-health programs working toward accreditation, including Kansas State University, the University of Wisconsin, and the Virginia–Maryland Regional College of Veterinary Medicine (working with the University of Maryland, Baltimore).

MODELS FOR JOINT DEGREE PROGRAMS

Both the DVM and MPH are stand-alone professional degrees, typically requiring four and two years, respectively, of post-baccalaureate education. Both DVM and MPH educational programs involve a combination of required and elective courses, and both usually require hands-on experience through clinical rotations or a culminating experience. For the DVM, the standard curriculum begins with two years of classroom and laboratory training in basic science, with a transition to clinical work beginning in the third year. The fourth year of the DVM curriculum typically involves a series of two- or three-week rotations (also called clerkships, externships, or preceptorships). The MPH curriculum usually comprises core and elective courses during the first 12 to 18 months, followed by a culminating field experience and, in many cases, a research project or thesis.

Almost all joint degree programs exploit the curricular flexibility of DVM and MPH programs. Within the core curricula of the DVM and MPH are several courses that may serve to meet the requirements of both degrees as either core or elective courses. The fourth-year flexibility of the DVM curriculum also allows for blocks of time that can be used for the MPH field experience or to complete a MPH research project.

In the past, most students have earned the MPH after the DVM, many through accelerated programs designed for medical professionals. Other students have elected to pursue a DVM after completion of an MPH. In addition, a variety of new options have emerged for combining DVM and MPH programs. These options reduce the overall time required to complete the degree by a year or two and reduce the combined tuition expense. As the DVM curriculum

requires the longer time frame, the options are described below in terms of the temporal location of the MPH coursework within the DVM course of study.

The MPH Tailored as a Pre-veterinary Preparatory Program

Admission to veterinary colleges is highly competitive. Not all qualified students are admitted, and there are up to 12 applicants for each available position. As a result, aspiring veterinarians often look for a master's degree program that will increase the competitiveness of their CVM application. Previously, many pre-veterinary students entered MS programs in veterinary-related fields but failed to complete the required research and master's thesis once accepted into veterinary college. The professional MPH curriculum is more reasonable for students to complete if they are accepted into the DVM program after a year's worth of MPH coursework. The Ohio State University SPH and CVM, for example, have collaborated to create a VPH specialization targeted at such students.¹⁰ While the MPH traditionally takes two years to complete, students admitted to veterinary college after only one year of the MPH curriculum can complete the public-health degree concurrently with their veterinary degree.

1+4 Programs (Joint Admission with One Year of MPH Prior to Beginning the DVM)

Several programs offer the opportunity to apply concurrently for both veterinary and public-health degrees. The College of Veterinary Medicine and Biomedical Sciences at Colorado State University and the University of Colorado at Denver Health Sciences Center Department of Preventive Medicine and Biometrics offer a five-year combined MPH/DVM program. Students accepted into the program are guaranteed a position in the CVM if they successfully complete the first year of the MPH program. Students complete the first year of the MPH at Denver (36 credits in two to three semesters) before moving to Ft. Collins to continue with the DVM curriculum.¹¹

Five-Year Programs with MPH Initiated in the Middle of the DVM Curriculum

Another five-year model involves completing two or three years of the veterinary curriculum, followed by a year of MPH coursework, before returning to complete the clinical component of the DVM. The MPH program at the University of Wisconsin stresses multidisciplinary education, allowing veterinary students to take a leave of absence to complete an accelerated MPH curriculum before returning to complete the DVM.¹²

Fully Integrated Four-Year Programs Leading to Both DVM and MPH

Several models allow students to complete both degrees within a four-year time frame. Tufts University⁹ and the University of Tennessee¹³ provide some MPH coursework during the regular school year, sometimes using evening courses. The University of Iowa and Iowa State University¹⁴ use distance-education strategies for veterinary students to complete courses offered by the SPH. The University of Minnesota¹⁵ and Michigan State University¹⁶ use distance-education strategies plus a summer public-health institute representing up to seven credits of intensive coursework compressed into three weeks of instruction. All these CVMs

use the flexibility of fourth-year rotations and summers to accommodate field experience and MPH projects.

4+1 Programs (Joint Admission with an Additional Year to Complete the MPH)

Finally, many veterinary students begin but do not complete their MPH coursework during veterinary school. These students can complete their MPH most expeditiously by finishing the coursework, field experience, and project during the year immediately after completing their DVM. This strategy allows students to take some MPH coursework during their veterinary program and then focus exclusively on completion of the MPH for the year following the DVM. Some students enrolled in concurrent DVM/MPH programs choose to enter clinical practice immediately after their veterinary graduation and then take courses part-time or return to complete the MPH degree some years later.

Executive Programs and Opportunities for Graduate Veterinarians to Earn an MPH

Graduate veterinarians have earned MPHs at most of the accredited SPHs. Some enter regular MPH programs immediately after completing their DVM. More commonly, however, veterinarians enter an MPH program as they evaluate alternative career paths after some years of clinical veterinary practice. Traditionally, several SPHs have offered accelerated MPH programs, usually one year in duration, designed specifically for the credentialed health professional (MD, DVM, DDS, etc.). While recent changes in accreditation standards have reduced the number of full-time accelerated programs, several part-time programs have emerged that are compatible with continued clinical practice at some level. Several SPHs have developed executive programs that reach out to veterinarians and include coursework addressing areas of particular interest to veterinarians, such as infectious diseases, food safety and protection, and emergency preparedness and response. Executive programs typically involve a combination of distance education and short, intensive on-campus instruction. The University of Minnesota¹⁵ and Iowa State University/University of Iowa¹⁴ have active executive programs catering to veterinarians. The Minnesota program is interdisciplinary, bringing together veterinarians, physicians, pharmacists, and other health professionals; the Iowa program is designed specifically for veterinarians.

LESSONS LEARNED FROM SUCCESSFUL COLLABORATIONS

The first joint DVM/MPH degree program (Tufts) and several of the more recently established or proposed programs (including Colorado State and the University of Wisconsin) involve collaborations between CVMs and medical schools or health science centers. One of the lessons learned from these collaborations is the tendency for MPH programs within a medical school or community health program to focus exclusively on the human side of public health, often with little or no appreciation or encouragement for the veterinarian's role. The first CVM/medical school collaboration predates any formal collaborations between CVM and SPH.

The early CVM/SPH partnerships offer insights into the establishment of inter-professional joint degree programs.

The first three formal collaborations, in chronologic order, were between the University of Minnesota's College of Veterinary Medicine and School of Public Health; between Iowa State University's College of Veterinary Medicine and the University of Iowa's College of Public Health; and between the Ohio State University's College of Veterinary Medicine and School of Public Health. Representatives from each CVM/SPH partner in these first three collaborations shared their perspectives on lessons learned during the ASPH/AAVMC joint symposium Partnerships for Preparedness: Future Directions for Schools of Public Health and Colleges of Veterinary Medicine, held in April 2007.^d Further detail on each of these programs appears elsewhere in this issue of *JVME*. Several common themes underpin the principal lessons learned in these early partnerships.

Strong Collaborations and Good Communication Are Essential

A successful joint program requires strong advocates at both the CVM and the SPH. Support is required from both faculty and administrators. Furthermore, a critical mass of committed faculty must exist at each institution (at least three and preferably five faculty actively engaged at each partner institution). Establishing good communication and proactive problem solving early in the collaboration helps build longer-term trust and credibility. The necessity for good communication also extends to community partners, because these programs rely on field experiences, role models working in public health, and mentors.

Differences in DVM and MPH Professional Cultures Must Be Understood

Even though veterinarians take an oath "to promote public health," the typical veterinarian sees the world quite differently than the typical public-health worker. Failure to understand the different cultures of veterinarians and public-health workers can undermine nascent cooperation. Beyond the obvious animal versus human focus of much of the professional training, veterinary medical education developed largely to train individual clinical practitioners to operate their own small businesses, while public-health programs train practitioners to be part of interdisciplinary teams working in large public and private organizations. The successful veterinarian is considered entrepreneurial and capable of working alone, while success in public health is often traced back to good teamwork and community-organizing skills. In the author's experience, public-health professionals tend to have a larger worldview and broader social consciousness.

Differences in CVM and SPH Organizational Cultures Must Be Bridged

The educational enterprises of veterinary medicine and public health are different, too. SPHs are organized around the five pillars of public-health education: epidemiology, biostatistics, environmental health, social and behavioral health, and public-health management. In contrast, CVMs typically organize around clinical orientation and basic sciences. Large-animal clinicians are usually housed in a separate department from small-animal veterinarians, or, alternatively, food-animal practitioners are separate from those with companion-animal focus. The basic science faculty may be housed together or in separate departments

focusing on basic sciences such as anatomy, biochemistry, physiology, microbiology, and pathology. Interestingly, epidemiology is rarely captured in a separate organizational unit. Rather, epidemiologists work in both the clinical sciences and the basic sciences according to their primary focus area. Clinical specialties are often further divided into sections or services along lines of organ system (cardiology, nephrology) and technique (radiology, surgery).

The teaching hospital looms large in the overall management of a CVM, with clinical service a major income and expense item. SPHs, in contrast, tend to have proportionally larger research components, as grant monies and indirect cost recovery contribute more significantly to their budgets. These professional and organizational differences represent both opportunities and challenges. Open discussion of the similarities and differences helps to set the stage for productive communication.

Human and Financial Resources Provide Significant Challenges

Just as universities have different business models, so do individual colleges and schools within a university. Joint programs require coordination of logistical support, including admissions, student aid and scholarships, and registration.

Differences in business models also emerge as partners attempt to document their individual contributions and to solicit institutional resources for program support. Student enrollment and tuition provide a good example of the differences between CVMs and SPHs. All US veterinary colleges have fixed enrollments, dictated in large part by physical-plant constraints of classroom, laboratory, and clinic space. In contrast, most SPHs use enrollment as one measure of their recruitment success, and class sizes can grow dramatically in response to new courses or programs, simply by moving into larger classrooms.

Faculty Effort Systems May Differ

Measures of faculty effort often differ between CVMs and SPHs. For example, at the University of Minnesota, academic advising is considered part of the instructional effort of SPH faculty, and their workload estimate for each credit hour taught reflects that expectation. In the CVM, on the other hand, academic advising is provided centrally through the Office of Academic Programs and through graduate program offices; therefore, it is not considered in estimating and monitoring CVM faculty effort. While an individual SPH faculty member may routinely provide academic advising to 10 to 20 MPH students, veterinary faculty do not advise DVM students in the same way and usually have fewer than five graduate students at any given time. Veterinary faculty often do not feel rewarded for the time they spend advising MPH students. Part of this reaction may stem from the fact that the MPH is a professional degree awarded by the SPH and not a CVM or graduate school degree.

When collaboration discussions turn to the allocation of financial resources (i.e., tuition dollars), the differences in perspective can create disagreements as, for example, CVMs attempt to get resources to support their faculty members' new function as academic advisors to MPH students while SPHs assume that advising many students is part of the

faculty's regular responsibility in teaching. While most MPH courses are taught by SPH faculty, these same faculty may feel inadequate to advise veterinary students, looking instead to CVM faculty to provide that guidance.

Different Curriculum Design and Delivery Call for Innovative Approaches

Many veterinary faculty are not familiar with the MPH. The differences between MPH degrees and MS degrees may add to veterinary faculty members' disenchantment with MPH projects that they see as applied research or service rather than as true academic research. The MPH project is a culminating experience that may include a final paper but is not a research project of the same depth as would be required in an academic research program such as many MS and PhD degrees.

The average veterinary student takes more than 20 credit hours per semester and spends seven to 10 hours a day, five days a week, in the classroom, laboratory, or clinic. Veterinary students take most of their courses and study together, leading to a strong group identity and support network within each matriculating class. Classes are taken in a formalized sequential manner, based on students' year of matriculation, with relatively few electives. Most courses are offered only once a year, so that failure in any major course (e.g., anatomy, physiology, cardiology) requires waiting out a year to repeat the course in order to stay in the right sequence.

The average SPH student, on the other hand, can build his or her course schedule flexibly around the required core courses and electives. This difference means that veterinary students often do not take SPH classes with MPH students at their normal time offering. Evening courses work in some cases, when the two schools are close to each other, but veterinary students in the clinical years of the curriculum often must work or be on call during the evenings and weekends for case management and clinics. Innovative approaches such as distance learning or intensive institutes can help overcome these differences. In some situations, CVMs have reorganized their class schedules to accommodate students interested in dual-degree programs.

CVM/SPH Partnerships Are Mutually Beneficial

The average public health-faculty member has little understanding of or appreciation for the role of veterinarians in public health, and the reverse is also true. In developing joint programs, several SPHs have been surprised by the breadth and depth of expertise to be found in CVMs. Developing joint programs has allowed SPHs to dramatically expand their infectious-disease programs, especially in food safety and zoonoses such as avian influenza, and the biostatistics expertise in SPHs is a welcome addition for veterinary faculty and students. Collaborations have set the stage for the development of new courses and the expansion of elective offerings.

Joint degree programs also attract additional students. In two of the three examples, Minnesota and Ohio State, the new programs emphasizing VPH have attracted students who might not previously have considered either veterinary medicine or public health alone. These new programs are sufficiently unique that they have increased the visibility of both colleges to new audiences and stakeholders.

Finally, linking CVMs and SPHs has fostered innovative research collaborations and new service opportunities.

Technology Is Not a Panacea

Many of the existing joint programs and most executive programs rely heavily on technology to provide coursework. However, distance education covers a wide range of approaches, and simply uploading handouts and PowerPoint presentations does not create a robust learning experience for most students. The potential of technology—through simulations, artificial intelligence, and self-directed learning—has yet to be fully leveraged. Developing good distance-education courses takes a lot of time and money; no single standard for distance learning exists to unify the competing software platforms and various computer operating systems. The resource demand for effective distance learning is often underestimated, leading to frustration and burnout for both faculty and students.

Be Prepared for Success

All three of the pioneer programs exceeded their initial business plans; student interest exceeded expectations. The downside of this success has been significant stress on the institutions to find sufficient advisors and mentors, field experiences and projects. Staff support has been stretched, as program coordinators must understand the idiosyncrasies of two different academic programs and navigate two different academic cultures. Engaging additional faculty within the SPHs and CVMs represents only part of the solution, not all of it. Community faculty are important partners, providing role models, mentoring, field experiences, and projects—although, if schools are not located in a major metropolitan area or state capital, engaging community faculty may be more difficult.

CONCLUSION

Collaboration between CVMs and SPHs has increased dramatically over the past five years. In 2002 there appear to have been only a handful of veterinary students concurrently enrolled in an MPH program (only the Tufts program existed), and perhaps a dozen graduate veterinarians could be found in an accredited SPH or MPH program at any given time. As 2008 dawns, there are approximately 200 veterinary or pre-veterinary students enrolled in MPH programs, and another 50 or more graduate veterinarians are pursuing either an executive or a regular MPH.

Questions about employment opportunities and marketability of VPH graduates continue to be raised by some academics and veterinary leaders. Despite repeated findings in veterinary manpower studies suggesting that public-health needs are unmet, the prevailing paradigm among many academic and veterinary leaders holds that most veterinarians employed in public health do meat inspection, that the salaries are low, and that alternative veterinary career opportunities are limited. No systematic tracking of the careers of veterinarians with public-health credentials currently exists, so the debate is likely to continue. A systematic evaluation would be useful, examining questions such as the number of students who complete MPH programs within the designated time frames; what employment opportunities exist for these graduates, including job type, employer, salary, and benefits; and, finally, some

measure of career satisfaction among those who pursue VPH directly out of veterinary college compared to those who change careers after some years of practice experience.

Skeptics notwithstanding, a vocal group of veterinary and public health academic leaders has crafted an array of public-health programs over the past five years. Some of the new programs appear to be strong and growing, while others have an uncertain future. Program enrollments range from a few students to more than 100; some veterinary colleges have only a single faculty member with any interest in public health, while others have critical masses of five or more faculty. Several of the existing publicized offerings are not accredited by the Council on Education in Public Health, which raises sensitive questions in light of current moves toward public-health licensing exams that may be limited to those with credentials from accredited institutions.

No one program or single CVM/SPH collaboration can do it all. Not only do the demands exceed the capacity of any school but the opportunities span a wider range of interest areas and career paths than can be found in any single program. The availability of a range of delivery styles addresses the varied learning styles of adult students, many of whom are approaching public health as a second or third career. The creation of CVM/SPH collaborations and joint degree programs captures the potential of inter-professional education. CVM/SPH collaborations and joint degree programs will also help the nation and the world in an era of increasing concern about emerging infectious diseases. The shared commitment to population health and the primary focus on prevention provide strong shared values to underpin such collaborations.

NOTES

- a Also awarded in Latin as the *Veterinariae Medicinae Doctoris* (VMD).
- b While colleges of public health also exist at North American universities, the term “school of public health” (SPH) will be used here to denote all accredited colleges and schools of public health.
- c While some veterinary professional programs are housed at schools of veterinary medicine, the term “colleges of veterinary medicine” will be used here to denote all accredited professional schools awarding a doctoral degree in veterinary medicine.
- d The author was joined by Deb Olson and Larissa Minicucci from the University of Minnesota, Jim Roth from Iowa State University and Mary Aquilino from the University of Iowa, and Armando Hoet and Jeff Caswell from Ohio State University.

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