

A Flexible Approach to Training Veterinarians in Public Health: An Overview and Early Assessment of the DVM/MPH Dual-Degree Program at the University of Minnesota

Larissa A. Minicucci ■ Kate A. Hanson ■ Debra K. Olson ■ William D. Hueston

ABSTRACT

As a result of the growing need for public-health veterinarians, novel educational programs are essential to train future public-health professionals. The University of Minnesota School of Public Health, in collaboration with the College of Veterinary Medicine, initiated a dual DVM/MPH program in 2002. This program provides flexibility by combining distance learning and on-campus courses offered through a summer public-health institute. MPH requirements are completed through core courses, elective courses in a focus area, and an MPH project and field experience. Currently, more than 100 students representing 13 veterinary schools are enrolled in the program. The majority of initial program graduates have pursued public-practice careers upon completion of the program. Strengths of the Minnesota program design include accessibility and an environment to support multidisciplinary training. Continued assessment of program graduates will allow for evaluation and adjustment of the program in the coming years.

Key words: dual-degree program, veterinary public health, DVM/MPH, distance education

INTRODUCTION

In response to emerging public-health issues, there has been an increased focus on filling the positions created by new programs and the vacancies created by attrition. These opportunities have necessitated creative proposals to recruit and train the next generation of specialized professionals. In particular, there has been a desire to train more veterinarians in the field of public health, since they bring additional insight into topics such as zoonotic diseases, food safety, and emerging infectious diseases. While veterinarians and veterinary students have always been able to pursue public-health degrees from multiple institutions, as recently as 2004 only seven professional degree programs in the United States specifically targeted veterinarians in public practice.¹ The number of available programs aimed at veterinarians and veterinary students has continued to increase. The American Association of Veterinary Medical Colleges (AAVMC) currently estimates approximately 16 professional public-health degree programs for veterinary students.²

The need for veterinarians in public-health practice is great. It is estimated that 20% of veterinarians in the United States are engaged in private population-health practice with a food-animal component or in public practice of some type. To continue to satisfy existing job needs, more than 500 of the approximately 2,500 new graduates each year will need to enter these fields of practice.³ In addition, the role of the veterinarian in public health is dynamic, creating new avenues for veterinary participation in public practice. For example, veterinarians are being asked to contribute to global health through food-safety initiatives, prevention of emerging infectious diseases, preparedness initiatives, and protection of environmental health.⁴

Though the numbers vary, students enrolled in DVM programs in the United States receive a median of 60 hours on public health, epidemiology, and preventive medicine in their curricula.⁵ Multiple initiatives have called for additional training programs to develop veterinary leaders, especially in the areas of emerging diseases, terrorism preparedness, the human-animal interface, with a focus on communication and interdisciplinary teamwork.^{6,7}

The purpose of this report is to describe the design, implementation, and early results of a DVM/MPH dual-degree program at the University of Minnesota.

HISTORICAL PERSPECTIVE

Veterinary public health (VPH) education at the University of Minnesota has a long-standing tradition of excellence spanning more than 50 years. The inaugural director of the Veterinary Public Health Program, Dr. R.K. Anderson, was hired in 1956 as part of a collaboration between the university's School of Public Health and its College of Veterinary Medicine. Dr. Anderson continues to be recognized as a leader in human health through the promotion of the human-animal bond.⁸

Other faculty pioneers in VPH at the University of Minnesota include Dr. Stanley Diesch, who worked to develop the Food Animal Disease Reporting System in Minnesota; Drs. James Libby and Mike Pullen, food-safety and meat-hygiene experts; and Dr. R. Ashley Robinson, clinical epidemiologist and international consultant.⁸

Graduates from VPH programs at the University of Minnesota have performed successfully in careers across

the public-practice spectrum, working in federal agencies such as the US Department of Agriculture (USDA) and the Centers for Disease Control and Prevention (CDC). Minnesota VPH graduates have also served in the US Army, Air Force, and Public Health Service. Other graduates have worked in state public-health and agriculture agencies and taught at colleges and universities across the country.⁸

The University of Minnesota is home to an Academic Health Center that houses the schools and colleges of medicine, dentistry, nursing, pharmacy, veterinary medicine, and public health as well as many allied health sciences programs.⁹ This unique co-location of training centers for multiple health disciplines positions the University of Minnesota to effectively design and manage dual-degree programs in the health sciences. In addition to dual-degree programs, the university has successful collaborations across the health disciplines, including the Interprofessional Education Resource Center and the Center for Health Interprofessional Programs (CHIP).^{10,11}

PROGRAM DEVELOPMENT

In an effort to improve the quality of public-health education available to public-health professionals, the University of Minnesota School of Public Health (SPH) adopted several strategic directions in 1999. These included development of a school-wide MPH program to broadly address knowledge across public-health disciplines, the offering of innovative educational programs, and the development of closer relationships with the public-health professional community.¹²

The opportunities for practicing professionals, such as veterinarians, continued to expand with the creation of the Public Health Practice (PHP) major in the fall of 2001. The target audience for this program included working health and human services professionals and students in related fields. In addition to a public-health medicine (PHM) program for medical students leading to a dual MD/MPH, the major included the Executive Program in Public Health Practice (EPHP) for working professionals with completed advanced degrees including MD, DVM, DDS, PharmD, MS, or PhD.¹³

The strength of the EPHP is the flexible nature of the program. The MPH degree can be completed through a combination of online distance education focusing on core public-health courses and intensive summer courses offered as part of the Public Health Institute (PHI) held each year on the Minnesota campus during May and June. Students also complete a field experience and MPH project as part of the EPHP.

Since its inception, veterinarians have been well represented in the EPHP program: 50% of the 16 graduates have been veterinarians, and among currently enrolled students, 33 (39%) are veterinarians. Typically, veterinarians have been able to complete the program in just over seven terms.¹⁴

In 2002, the offerings in the PHP major expanded with the approval and introduction of the VPH program, leading to a dual DVM/MPH degree. This program was designed with the collaboration of faculty at University of Minnesota's College of Veterinary Medicine, allowing students at any qualified veterinary college to earn a concurrent MPH.

THE DVM/MPH DUAL-DEGREE PROGRAM

Program Objectives

The program is intended to provide veterinary students with the skills to apply public-health principles and practices in veterinary medicine. To encourage veterinary students to pursue public-health training and acquire the MPH credential, the program was designed to be comprehensive and integrative, yet flexible.

Program Design

To maximize flexibility and cost-effectiveness in the pursuit of the MPH degree, the University of Minnesota dual-degree program has capitalized on a unique program design. Students can earn their MPH degree in the same four years as they complete their DVM degree. The MPH curriculum features a combination of summer classes held on campus and distance-learning courses. Coursework is completed through a mix of online and in-person classes; the majority of online courses are taken during summer terms before and during the veterinary curriculum. In-person classes are typically completed during two three-week sessions at the University of Minnesota—Twin Cities during May and June, known as the Public Health Institute (PHI). The PHI is a unique opportunity not only because of the breadth of courses offered in such a short period but also because its multidisciplinary environment allows professionals from many health fields to interact and discuss emerging public-health issues. This interaction is facilitated by the fact that PHI courses are attended by public-health students across a spectrum of programs, including graduate degrees, MPH programs spanning multiple disciplines, and certificate programs for practicing public-health professionals. The DVM/MPH program at the University of Minnesota is the only program of its kind in the United States, combining distance and traditional courses to facilitate concurrent pursuit of the MPH during enrollment at any AVMA-accredited veterinary school.¹ Although it is possible to complete the dual-degree program in four years, students have up to seven years to complete the MPH degree.

Program Curriculum

To complete the MPH in VPH, students complete coursework in the basic curriculum of core public-health competencies and a focus curriculum in Food Safety and Biosecurity; Preparedness, Response, and Recovery; or Occupational Health.

The basic curriculum consists of courses in biostatistics, epidemiology, environmental health, social/behavioral sciences, health services administration, and ethics. These courses are all available online through distance-education offerings. In addition, students are required to take Public Health Is a Team Sport—The Power of Collaboration to explore interdisciplinary approaches to public health (see Table 1). This course is offered as a weekend course each year on the University of Minnesota campus.

Working with an academic advisor, students select elective courses to develop additional expertise in a focus area, typically one of the three described above. Elective courses may be taken during the summer, as part of the PHI, or may be courses taken as part of the DVM curriculum that are approved for transfer. Up to 14 elective credits can be

Table 1: Required coursework for the basic core curriculum

Course	Title	Credits
PubH 6299	Public Health Practice: Public Health is a Team Sport—The Power of Collaboration	1.5
PubH 6320	Fundamentals of Epidemiology*	3
PubH 6414	Biostatistical Methods I	3
PubH 6020	Fundamentals of Social and Behavioral Science	3
PubH 6741	Ethics in Public Health: Professional Practice and Policy	1
or PubH 6742	Ethics in Public Health: Research and Policy	1
PubH 6752	Public Health Management	3
PubH 6102	Issues in Environmental and Occupational Health	2
PubH 7296	Field Experience: Public Health Practice*	3
PubH 7294	MPH Project: Public Health Practice***	3
	Total credits	22.5

*It is recommended that students take Biostatistical Methods I prior to or concurrently with Fundamentals of Epidemiology.

**A minimum of 135 hours in a public-health setting is required for completion of the MPH Field Experience; the same site may be counted as a clinical rotation in a CVM as long as it meets content and credit standards for both experiences and receives prior approval from the student's advisor.

***Students may complete their MPH Project as part of their CVM curriculum as long as it meets content and credit standards for both experiences and receives prior approval from the student's advisor.

transferred to the MPH degree from qualifying programs. Within the focus curriculum, students must have at least one elective course in each of the following public-health domains:

- Public health policy and systems development
- Community intervention
- Assessment and basic sciences
- Program management and communication

These domains are required by the Council on Linkages for an accredited MPH degree.¹⁵In addition, DVM/MPH students must take at least one elective course in each of five VPH competencies: biostatistics, surveillance, infectious disease, zoonoses, and environmental health (see Table 2). For ease in designing a focus curriculum, courses are listed by domains and competencies to facilitate students' selection of courses that will fulfill these requirements.

The final requirements for the VPH MPH are culminating experiences. The first of these consists of three credits of field experience, during which students identify and spend time with organizations or agencies that have a public-health focus. Given the breadth of VPH, students also have the option to work with an agency that has a more traditional veterinary focus, as long as the agency works toward some elements of public health (e.g., USDA APHIS). However, at least one credit of the field-experience work must be completed with a public-health agency that has a stronger focus on human health (e.g., the CDC, a health department). Students are required to develop specific learning objectives related to the experience and must have the approval of both a preceptor and an academic advisor to ensure a high-quality learning experience in public-health practice. An added level of flexibility enables

veterinary students to earn credits toward their MPH field-experience requirement through a senior externship at their respective veterinary school. Field-experience assignments have ranged from local community work to time spent with international agencies (see Table 3).

The second component of the final requirement is the MPH project. For this project, students are asked to identify an area of interest, in collaboration with an academic advisor or community preceptor, and expand on that topic in one of four ways to satisfy the project requirements. The final product for the project is a formal written report demonstrating an ability to synthesize, interpret, and convey information surrounding a public-health topic to an appropriate audience; the written report can take the form of a systematic literature review, a research paper, a consultative report, or a grant proposal. Students present the project and sit for a subsequent oral examination with a committee of faculty members. MPH projects have been quite diverse, ranging from data analysis of zoonotic diseases to a review of gender roles in avian influenza planning to an assessment of burnout among volunteers at a crisis center (see Table 3). As is demonstrated by the diversity of topics, the project must have a public-health element but may or may not include a veterinary component.

Advising

For student advising, multiple advisors are encouraged. Students in the dual-degree program are assigned an academic advisor through the SPH. This individual is a regular or adjunct faculty member in the SPH and has the responsibility of advising assignees on coursework and career goals and in identifying projects and fieldwork. Currently there are 17 such VPH program faculty. The academic advisor will approve field-experience assignments

Table 2: Veterinary public health competencies

VPH Competencies	How Acquired	How Measured
Apply biostatistics to VPH practice in populations of animals and humans	PubH 7200: Application of Epidemiology Information Software; Designing and Conducting Focus Group Interview; Omaha System: Documentation, Data Analysis and Reporting; Qualitative Research Methods: Discovering the Value of "Voice" in Words, Stories and Photographs	Course evaluations, examinations
Design and interpret surveillance in human and animal populations	PubH 7200: Principles of Public and Animal Health Surveillance System; Surveillance of Foodborne Pathogens in Humans	Course evaluations, examinations
Apply and interpret the principles, application, and interpretation of infectious-disease epidemiology	PubH 7200: Topics in Infectious Disease: Malaria, <i>E. coli</i> , Epidemiology and Ecology of Mycobacterial Diseases	Course evaluations, examinations
Identify zoonoses and other animal diseases with significant public-health implications	PubH 7200: Antimicrobial Resistance; Topics in Infectious Disease: <i>E. coli</i> , Epidemiology and Ecology of Mycobacterial Diseases	Course evaluations, examinations
Integrate knowledge of environmental-health principles to the study of population-health issues	PubH 6103: Exposure to Environmental Hazards; PubH 6104: Environmental Health Effects: Introduction Toxicology; PubH 7200: Global Food Systems: Dairy, Poultry; Personal Protective Equipment and Respiratory Protection, Applications of Microbiology to Food Systems Monitoring, Cleaning and Sanitation for Food Facilities for Food Safety and Security, Ecosystem Health	Course evaluations, examinations

Table 3: Examples of VPH field experiences and MPH projects

Field Experiences	MPH Projects
USDA/APHIS eradication of 2002/2003 exotic Newcastle disease outbreak in California	"Characterization of environmental factors that influence the evolution of antimicrobial resistance of <i>E. coli</i> and <i>Salmonella</i> in waterways of rural Chile"
Food and Agriculture Organisation of the United Nations (FAO)	"Compassion fatigue for volunteers at a crisis intervention center: Its causes, effects, and prevention"
Epidemiology elective at the Centers for Disease Control and Prevention	"Modeling West Nile virus (WNV) positive birds for forecasting human WNV cases, New York State"
State and county health departments in Minnesota, Michigan, and Colorado	"Rabies in Minnesota: An evaluation of human and animal exposures, 1994–2004"
Chronic wasting disease (CWD) and bovine tuberculosis surveillance with Minnesota Department of Natural Resources	"The role of gender as it relates to avian influenza disease control and eradication efforts within the joint United Nations programs"
World Organisation for Animal Health (OIE)	"Public health implications of the African bush meat trade"

and project proposals and sit as a committee member for evaluation of the student's MPH project presentation and defense. Students will also have one or more community preceptors, who typically oversee and advise on field-experience opportunities. An MPH project advisor may be the student's academic advisor, another faculty member, a community preceptor, or another professional at a public-health institution or agency, depending on the topic and the advisor's area of expertise. Once a student identifies a project of interest, in collaboration with his or her academic advisor, the professional most closely affiliated with the project will typically advise on the project itself.

Admissions

Applications to the DVM/MPH program at the University of Minnesota are made through the SPH using the Schools of Public Health Application System (SOPHAS).¹⁶ Students are evaluated based on academic performance, GRE score, letters of recommendation, and a statement of intent. Since the program's inception in 2002, applicant numbers have varied, ranging from three in 2002 to 51 in 2006. Acceptance and matriculation rates tend to be high (see Table 4).

Current Enrollment

The DVM/MPH program currently has 110 students actively enrolled. These students are currently attending

Table 4: DVM/MPH program admissions (2002–2007)

Year	Total Applicants	Accepted (%)	Denied (%)	Matriculated (%)	Deferred (%)
2002	3	3 (100)	0 (0)	3 (100)	0 (0)
2003	21	21 (100)	0 (0)	18 (86)	0 (0)
2004	11	11 (100)	0 (0)	7 (64)	1 (9)
2005	46	45 (98)	1 (2)	42 (93)	2 (4)
2006	51	44 (86)	7 (14)	42 (95)	2 (5)
2007	22	18 (82)	4 (18)	13 (72)	3 (17)

Table 5: Fall 2007 DVM/MPH enrollment by CVM

CVM	# of students
Colorado State University	6
Cornell University	2
Iowa State University	5
Michigan State University	28
Mississippi State University	1
Tufts University	1
University of California—Davis	1
University of Georgia	1
University of Illinois	1
University of Minnesota	60
University of Pennsylvania	1
University of Wisconsin—Madison	1
Virginia—Maryland Regional College of Veterinary Medicine	2
Total	110

or have recently graduated from one of 13 US veterinary schools (see Table 5). The largest number of veterinary students currently in the program are at the University of Minnesota (60) and Michigan State University (28); formal agreements are in place between these veterinary schools and the University of Minnesota SPH. Students at other AVMA-accredited colleges of veterinary medicine may seek admission to the program without formal agreements between institutions. Currently, formal memoranda are being investigated at two other veterinary schools, and designated faculty liaisons are being sought at other veterinary institutions with MPH students. Since the inception of the program, DVM students from 15 different veterinary colleges have participated.

Program Graduates

To date, nine students enrolled in the DVM/MPH program have earned the MPH degree. Three of these students are currently finishing the DVM curriculum. Of the six other graduates, two went into residency programs (in pathology and preventive medicine, respectively); one is employed by

a state animal-health agency; one works for the USDA Food Safety Inspection Service (FSIS) as a veterinary medical officer; one is a US Army veterinary officer; and one is employed in private (predominantly food-animal) practice. In this initial cohort, the average time to completion of the MPH degree has been 2.8 years.

DISCUSSION

Given recent recommendations to increase the VPH workforce, it is important that appropriate training programs be designed and implemented. In addition, the institutions hosting these programs should be well suited to deliver effective training. The University of Minnesota is an excellent choice for a dual DVM/MPH degree program, given that an accredited CVM and SPH reside on the same campus. Furthermore, both schools are housed in the university's Academic Health Center, allowing for additional structured collaboration. Only two other universities in the United States house multiple health professional schools on the same campus (the Ohio State University and Texas A&M University).¹⁷

An added benefit to using the University of Minnesota as the host university for a program of this type relates to its long history of excellence in VPH. Despite variations to the programs offered since the 1950s, a large number of veterinarians have been trained in public health at Minnesota. This history provides essential resources, core faculty, and an understanding of the veterinary culture as it relates to public health.

Based on the number of students currently enrolled in the DVM/MPH dual-degree program and on informal discussions with enrolled students, the program design appears to be very appealing to current veterinary students. Flexibility and a veterinary-related focus are often cited as reasons for choosing the Minnesota program over other similar opportunities. For veterinary students across the country with an interest outside the realm of private practice, the DVM/MPH dual-degree program provides an alternative yet complementary field of study. The enrollment of students from many veterinary colleges has also stimulated networking between veterinary schools and sharing of public-health-related learning opportunities available to veterinary students, both domestically and internationally. Offering the MPH degree through the Public Health Practice major at the University of Minnesota has been beneficial to DVM students, as interaction with multiple health disciplines is

fostered through diverse enrollment in online and on-campus courses.

The existence of a formal memorandum of understanding or an official faculty liaison at partner veterinary colleges has been a tremendous asset to the dual-degree program. While students from any accredited veterinary college are encouraged to apply to the Minnesota program, we have found that the student experience is significantly better when a more formal relationship exists. A designated faculty member at partner veterinary colleges represents a local resource for students, and these liaisons have been especially beneficial in helping students to identify field experiences and projects. As we continue to move forward in the expansion and growth of the University of Minnesota DVM/MPH, we seek liaison faculty who have the support of their colleges.

Advising continues to be a challenge for the program. The large number of students and the relatively small number of affiliate faculty make it difficult to meet students' needs. For this reason, we have expanded our model of advising to include multiple individuals, especially public-health professionals in the community. Students are able to identify projects and experiences of interest when they can reach outside the boundaries of faculty expertise. This role of community advisors also builds on the practice-based model of the MPH degree by encouraging students to apply their skills to real-world practice settings and problems. Students are also encouraged to connect with faculty and professionals outside the VPH arena. Public health spans many disciplines, and one of the program's aims is to enable students to see past the traditional roles of the veterinarian in public health. The expanded advisor model works to facilitate the achievement of this goal.

Given the relative novelty of the DVM/MPH program at the University of Minnesota, it is difficult to draw conclusions about the success of the program or the quality of its graduates. Early results are encouraging, however, with a large proportion of the graduates entering public and non-traditional career tracks within veterinary medicine. The program will continue to assess graduation rates and career tracks over time. The implementation of exit interviews and outcomes assessment is planned.

CONCLUSION

This article describes a novel DVM/MPH degree program combining in-person, distance, and practical educational experiences. The program stresses interdisciplinary and practical approaches; flexibility has been built into the program to allow for participation from multiple veterinary colleges and variable time to completion. Initial program results have been promising, with graduates choosing careers related to public health and service. Current program information can be found at the program Web site.^a

NOTE

- a University of Minnesota Veterinary Public Health Program <<http://www.sph.umn.edu/education/vph/home.html>>.

REFERENCES

- 1 Murray AL, Sischo WM, Hueston WD. Evaluation of veterinary public practice education programs. *J Am Vet Med Assoc* 228:529–536, 2006.
- 2 AAVMC. *Veterinarians in Public Health* [brochure]. Washington, DC: AAVMC, 2005.
- 3 Hoblet KH, Maccabe AT, Heider L. Veterinarians in population health and public practice: meeting critical national needs. *J Vet Med Educ* 30:232–239, 2002.
- 4 Pappaioanou M. Veterinarians in global public health. *J Vet Med Educ* 30:105–109, 2003.
- 5 Riddle C, Mainzer H, Julian M. Training the veterinary public health workforce: a review of educational opportunities in US veterinary schools. *J Vet Med Educ* 31:161–167, 2004.
- 6 Walsh D, ed. Strategies for educational action to meet veterinary medicine's role in biodefense and public health. *J Vet Med Educ* 30:164–172, 2003.
- 7 Hendrix CM, McClelland CL, Thompson I. A punch list for changing veterinary medicine's public image in the 21st century. *J Am Vet Med Assoc* 228:506–510, 2006.
- 8 Buhr A. *Veterinary Public Health Program Alumni Highlights and Memory Book*. St. Paul: University of Minnesota, 2005.
- 9 Academic Health Center, University of Minnesota. Our Schools and Colleges <<http://www.ahc.umn.edu/about/schools/>>. Accessed 11/16/07.
- 10 Center for Health Interprofessional Programs [CHIP] Student Center. CHIP home page <<http://www.chip.umn.edu/>>. Accessed 02/05/08.
- 11 Interprofessional Education and Resource Center [IERC]. IERC home page <<http://www.ierc.umn.edu/>>. Accessed 02/05/08.
- 12 Olson D. Personal communication.
- 13 School of Public Health, University of Minnesota. Executive Program in Public Health Practice <<http://www.sph.umn.edu/education/exec/home.html>>. Accessed 02/06/08.
- 14 Ehrenberg A. Personal communication.
- 15 Council on Linkages. Competencies Project <<http://www.TrainingFinder.org/competencies>>. Accessed 11/10/07.
- 16 Schools of Public Health Application Service [SOPHAS]. SOPHAS home page <<http://www.sophas.org/>>. Accessed 11/12/07.
- 17 Hueston WD. Joint degree programs in public health: partnerships for preparedness 4/23/07 <<http://www.asph.org/VETMED/ppt/Hueston.ppt>>. Accessed 11/18/07. Association of Schools of Public Health, 2007.

AUTHOR INFORMATION

Larissa A. Minicucci, DVM, MPH, Dipl. ACVPM, is Director of the DVM/MPH program and an assistant professor in the

Department of Veterinary Population Medicine, University of Minnesota, College of Veterinary Medicine, 108A Pomeroy Center, 1964 Fitch Avenue, St. Paul, MN 55108 USA.
E-mail: minic001@umn.edu.

Kate A. Hanson, MLS, is Coordinator of the DVM/MPH program at the University of Minnesota, College of Veterinary Medicine, 108 Pomeroy Center, 1964 Fitch Avenue, St. Paul, MN 55108 USA.

Debra K. Olson, MPH, RN, is Associate Dean for Public Health Education and Outreach at the University of Minnesota, School of Public Health, A-306 Mayo MMC 197, 420 Delaware St. SE, Minneapolis, MN 55455 USA.

William D. Hueston, DVM, PhD, Dipl. ACVPM, is Director of the Center for Animal Health and Food Safety, University of Minnesota, 146 Andrew Boss Laboratory, 1354 Eckles Avenue, St. Paul, MN 55108 USA.