

Commentary

Tailoring veterinary medicine for the future by emphasizing one health

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Perhaps the most important strategic challenge facing veterinary medicine today is deciding on and implementing actions that will exploit the promises of one health to enhance the profession's service to society. This focus on one health is a logical—if not imperative—response to the unrelenting increases in the biophysical and socioeconomic connectedness of the world. By definition, one health views animals, people, and environments as integrated components of ecosystems.¹ Therefore, if veterinary medicine wishes to play a major role in advancing the concept of one health, it must strengthen its roots in biology and become more attuned to the social sciences that come into play when dealing with a normative domain like “health.” But, tailoring our educational curricula, research programs, and clinical practices to develop and incorporate these new competencies will likely require major modifications to the present arguably too rigid educational and licensing systems, which currently focus on more traditional fields of practice. Fortunately, the profession now has the resources to successfully tackle this challenge, if it has the vision and the will.

Over the past 50 years, there have been truly remarkable increases in the range and complexity of clinical veterinary services available in the United States and Canada, driven by the expansion of veterinary teaching hospitals, the development of specialty colleges and residency training programs, the increase in clinical research, the founding of professional associations dedicated to enhancing the competence of their members in specific fields of practice, the profession's tenacious and explicit pursuit of high standards, and the explosion in information technology. One effect has been to create the potential for private veterinary practices to become more engaged in clinical education, thereby allowing academia to redeploy some of its resources to develop the new curricula and programs needed to fully embrace one health. Ultimately, embracing one health will depend on the eventual introduction of educational and licensing policies that would require veterinary medical students to choose a career track during their training and provide for appropriate categories of designated licensure. Such changes are a tall order, but

are surely feasible if the profession deems them desirable. And, they would have the added benefit of providing new flexibility and opportunities to address other issues vexing the profession, such as the rise in student debt, the long periods of education needed for students to become practice ready or to specialize in a particular species or discipline, and the need to enhance veterinary academia's contribution to medical research.²

Implementing a One-Health Career Track

Developing a one-health career track in the veterinary curriculum will require including a greater emphasis on ecology and cognate biology, ecological medicine,¹ computer modeling, social sciences, and comparative medicine. Schwabe³ has suggested that “it is essential that veterinarians acquire the view during their training that they are, first of all, biologists.” Within the broad field of biology, knowledge of ecology is crucial to understanding how interactions among people, animals, and the environment relate to disease and health at all scales, ranging from individuals to single populations, multiple populations, and entire ecosystems. For veterinary medicine, this means the profession needs to develop a clinical career track that might best be described as ecological medicine. And, it seems reasonable to speculate that over time this field could become a specialty college for veterinarians who wish to focus their career on one health. It is rational to contend that veterinary medicine could lead the medical world in this sphere if it sets that objective for itself.

Although one medicine and comparative medicine rest largely on the medical sciences, the concept of one health must incorporate a substantial measure of social sciences, because health is defined in part by human goals that are subject to change and evolving public policy. The effectiveness of the veterinary profession in the field of one health will depend on its ability to influence public policy,⁴ informed by the medical, biological, and social sciences, and capacity to produce veterinarians sufficiently knowledgeable

about ecological medicine to be able to play an active role in this process.

The concept of one health is interwoven with that of comparative medicine, and both must evolve in parallel. Schwabe^{3,5} is generally acknowledged as a seminal proponent for the concepts of one medicine and, inferentially, one health. He recognized the profession's unique opportunity to advance general medicine through the wider biological window of disease and health in all animals, including humans. His book *Cattle, Priests, and Progress in Medicine*, published in 1978, describes the historical basis for the primary importance of comparative medicine in veterinary education and medical research. He recognized that comparative medicine was the logical foundation for educating veterinarians whose careers would inevitably be focused on a variety of species, including humans. Building on this foundation, he advocated for the development of veterinary educational tracks that would provide students an opportunity to begin to focus their clinical education and experiences in the field of their interest. This has happened to a limited extent, but needs to be more universally available and in greater depth.

For academia, focusing on comparative medicine will be crucial if one health is to flourish. It can be argued that comparative medicine, despite its many advocates in the veterinary profession, has not lived up to its potential because its strategic importance has not been adequately recognized operationally in veterinary academia. Comparative medicine has been regarded by many as an approach whose primary value is to serve the interests of human medicine. In contrast, its primary purpose in veterinary education should be to elucidate general principles that prepare students to deal with disease in the wider animal kingdom, including humans, in a wide variety of careers. Veterinary curricula pay heed to comparative medicine, mostly in courses devoted to pathology, microbiology, physiology, general medicine, and the like, but not with sufficient breadth and emphasis, especially now, considering its importance in one health.

Well-established venues to provide experiential or clinical training appropriate to ecosystem health will be needed for a one-health career track program to survive. Developing a one-health career track will require a broader knowledge of wildlife diseases and health, as they are important indicators of ecosystem health. This will also strengthen comparative medicine as a matter of course. Knowledge about health and disease in wildlife will expand naturally as caseloads build. A key requirement for this to happen will be the establishment of cooperative links with governmental and private agencies working in the environmental field. Some guidance on how this might be achieved is provided in the experience of the Canadian Wildlife Health Cooperative,⁶ a unique consortium of the Canadian veterinary colleges and other agencies that provide wildlife health services to various levels of government.

It is difficult to see how current veterinary curricula could be modified to equip new graduates with sufficient knowledge and skills for direct entry into the one-health field, as there simply is no room, given the demands of established fields. Thus, major changes will be needed to make one-health career tracks a reality.

Some general guidance for how such a change to the system of education for veterinarians might impact the profession can be obtained from the engineering profession,^{7,8} a highly successful comparable model in which general relationships to the physical sciences and technology are similar to the relationships veterinary medicine has with biology and medicine. Also, social science is involved in both professions. More than a century ago, the expanding scope of the engineering profession had become too great for any single college graduate to cover, so engineering education was differentiated into a number of distinct branches (eg, civil, mechanical, electrical, and chemical). Typically, engineering education begins immediately following high school. A university degree in engineering takes at least 4 years of undergraduate study, beginning with courses in science, mathematics, technology, and core engineering principles that apply to all fields, followed by professional education that is deliberately tailored to one or the other of the specified branches of the profession. A comparable veterinary medical curriculum might take 6 years to complete: 2 years of preveterinary undergraduate courses, followed by 4 years of professional education during which a student would choose 1 of a number of parallel career tracks designed to match the main branches of veterinary practice, such as general (community) practice, companion animal practice, food animal production medicine, equine medicine, or one health.

Adapting to One Health to Address Issues In Veterinary Medicine

If the veterinary profession embraces one health by providing more flexibility in professional education and accreditation, an added benefit will be the opportunity to address other important issues bearing on the profession's service to society.²

Despite some limited opportunity for tracking in recent years, all-purpose veterinary education endures. Instead, students should be launched into the career field of their choice in a much more substantial way. It is no longer economical to dilute veterinary students' programs with technical information and skills they will never use in their chosen career. If veterinary students are required to select a career track during their education, their competence in that field at graduation should be greater, facilitating their adaptation to practice and accelerating the process of acquiring competence for specialty board certification, if so desired.

Of course, provisions would have to be made for veterinarians wishing to change their career track. But, contemporary resources in continuing education and information technology, combined with opportunities for experiential internships in sophisticated practices, would seem to be sufficient to effectively provide the education needed for career changes subsequent to graduation. Colleges could offer certifiable full-time or part-time programs of study, including online coursework, appropriate to the field. Such programs, however, would have to be flexible and affordable.

The path to becoming practice ready in veterinary medicine is currently unnecessarily long and could potentially be shortened through the use of a career track model. Veterinary student debt in the United States is a huge issue that deservedly is getting greater attention from academia and the profession. High student debt loads at graduation are a disincentive for students to opt for graduate studies in fields where there is societal need, such as one health, but that are not sufficiently lucrative to override concerns about personal debt. The reliance on postgraduate education to prepare veterinary graduates for fields not directly involved in general practice associated with domestic animals is wasteful of student and academic resources. Presently, students are around 26 years old when admitted to veterinary degree programs, an age that should be desired for graduates. Somehow, it should become the norm for veterinarians to attain reasonable mastery of their designated field of veterinary medicine with 6 years of university education and 2 years of postgraduate experience. Essentially, education and licensing policies need to facilitate students being practice ready in both conventional and emerging fields in a way that costs less in terms of time and money than at present.

Nearly all veterinary schools have invested heavily in sophisticated multispecies hospitals or medical center facilities that put an emphasis on the kinds of diagnostic, treatment, and skills training necessary for maintaining accreditation. However, some schools have developed a distributed network of private practices to provide much of the necessary clinical training, a development that has been associated with some controversy. The creation of a national system for approving practices in carefully defined fields that were congruent with curricular career tracks would provide the freedom and flexibility for college teaching hospitals and medical centers to put more focus on basic medical research and on specific clinical fields seen as a priority. This need not weaken veterinary education; rather, it could create an opportunity to make academia even more effective in serving society.

There should be no better education to prepare students for a biomedical research career than a veterinary degree for which the core curriculum emphasized general principles of medical biology and comparative medicine and that provided students the flexibility to focus on laying the groundwork for such a career in the last years of the veterinary curriculum unencumbered by irrelevant clinical subjects. This could complement the increased opportunities for research in veterinary

teaching hospitals and medical centers that chose to re-deploy resources presently used in clinical teaching into research. The result would be an increased flow of veterinary scientists trained in doctoral and postdoctoral programs and an increased ability for veterinary academia to compete for research funding and exploit the potential for comparative medicine to expand medical knowledge.

Conclusion

Schwabe^{3,5} recognized the danger of the veterinary profession becoming so preoccupied with the medical care of a few domestic species that it neglects general medicine, to the detriment of its potential contributions to comparative and human medicine. He suggested that “almost all veterinarians everywhere are, of necessity, so fully involved day to day with the exigencies of the particular that they almost completely neglect the general.” We would contend that Schwabe’s fears about professional myopia have become reality. The profession has made some adjustments congruent with his aspirations, but has never adopted the structural changes that would take full advantage of its potential. It remains constrained by a system that, while advancing the profession admirably in the last half of the twentieth century, now lacks the flexibility required to grasp opportunities to better serve society in the present world. Fortunately, it seemingly has embraced a broader vision of one health, but a more robust educational system will need to be defined and implemented to make the promises of one health a reality. It would be a huge mistake if one health becomes functionally synonymous with medical science and public health and insufficient weight is given to its essential biological dimensions.

We posit that a cascade of salutary changes would occur in veterinary education, research, and practice if the profession were to adopt strategic policies based on Schwabe’s premise that veterinarians, “first of all, are biologists.”³ The wide support for one health in our profession is a golden opportunity to make it so.

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