Epidemiology has changed remarkably during its growth in the past quarter century. One of those changes has been the ever-increasing specialization among its practitioners. In this commentary, the author explores the degree to which this phenomenon has shaped the field. A partial explanation for this trend is found in the decline in the availability of training funds not focused on specific disease areas. Although it appears likely that epidemiology can continue to flourish without general epidemiologists, the field will lose some of its ability to quickly respond to emerging public health challenges. The author considers steps necessary for the training and inclusion of general epidemiologists.

education; epidemiology; public health research

Abbreviations: CDC, Centers for Disease Control and Prevention; NIH, National Institutes of Health.

Until June 2006, I served as a member of the Neurology, Aging, and Musculoskeletal Disorders Study Section of the National Institutes of Health (NIH). Three times a year, I spent 2 days with 30 or so of my epidemiology colleagues reviewing about one third (usually 70–130) of the investigator-initiated grant applications in epidemiology submitted to the NIH. At the beginning of each Study Section meeting, we would go around the table and introduce ourselves to new members. Most members described themselves as “genetic epidemiologists,” “neuroepidemiologists,” “cardiovascular disease epidemiologists,” and so on. At a recent meeting, I described myself as a “generalist,” that is, a general epidemiologist. Having worked in the areas of cardiovascular disease, cancer, neurologic disease, infectious disease, pulmonary disease, and (most recently) pharmacoepidemiology, I thought this description fit; yet it was greeted with a mix of amazement and puzzlement, a reaction leading me to wonder about the current standing of the generalist in epidemiology today. To be clear, a general epidemiologist is one working in different areas of epidemiologic endeavor throughout his/her professional life. In contrast, a specialist is one who works only in one area, such as cardiovascular disease, cancer, or neuroepidemiology. Over the past three decades, epidemiology has become a field of specialists; yet the epidemiology community formed in the aftermath of World War II consisted of little, albeit some, specialization (1–3). Harold Dorn, the de facto (if not de jure) chief epidemiologist at the NIH, moved late in his career from the National Cancer Institute to the National Heart Institute (4–6). In Buffalo, New York, Milton Terris went from cancer epidemiology to epidemiology with a gastrointestinal focus, while his colleague Warren Winkelstein shifted from the epidemiology of infectious diseases to heart disease and air pollution, followed by cancer epidemiology (2, 7, 8). With the appearance of human immunodeficiency virus three decades later, Winkelstein returned to the infectious disease epidemiology arena. In the United Kingdom, Sir Bradford Hill moved from therapeutics and randomized trials to cancer epidemiology (9). His protégé, Sir Richard Doll, moved from cancer epidemiology to occupational/environmental epidemiology and subsequently to pharmacoepidemiology (10). Specialists were also active in epidemiology back then. Leonard Kurland, for example, focused on neuroepidemiology; Brian MacMahon, cancer epidemiology; William Kannel, cardiovascular epidemiology; and George Comstock, earlier...
in his career, tuberculosis epidemiology (11–14). With the subsequent growth in epidemiologic activity, specialists became dominant in the discipline, perhaps reflecting the increasing specialization present at the NIH, modern epidemiology’s chief patron. (The Centers for Disease Control and Prevention (CDC) is another supporter of epidemiologic activity, though providing considerably less support than the NIH; specialization has also had an impact on the CDC.) Other forces were additionally at play, such as the presence of specialists as epidemiology department chairs at schools of public health and advances in laboratory medicine requiring considerable expertise. For each area of specialty, yet another set of technical tests needs to be mastered. The result is a not-inconsequential amount of time spent on learning about these tests.

At one time, a solid graduate student might complete his/her doctoral training in epidemiology in 3–4 years. In the early 1960s, Baruch Modan completed his Doctor of Public Health degree at the Johns Hopkins University in less than 3 years, as did Leonard Kurland a decade before at Harvard University. Today, 5 years or longer is not uncommon, reflecting the increase in specialized material to be mastered. Whether this increase in training time is good for the discipline is outside the scope of this commentary.

In the 1980s, the late Sam Greenhouse observed a decline in the number of physicians seeking training in epidemiology departments in the United States (15, 16). He associated it with the decline in training grants supporting these programs. Greenhouse dated the change to 1965. Epidemiology training programs had focused on developing epidemiologists to address the public health problems of the day. As those problems changed, the research focus of these epidemiologists shifted. Since then, Greenhouse noted, non-physicians have constituted an ever-increasing majority of the students in these programs, obtaining considerable training in methods. (Though Greenhouse did not so mention, physician-epidemiologists also usually receive training in methods.)

In 1971, President Nixon began the “War on Cancer.” The singular focus on one disease (or one disease group), associated with increased funding for research and training, was welcomed by epidemiologists and other public health researchers. Similar events occurred in the field of cardiovascular disease, with the National Heart, Lung, and Blood Institute providing considerable increases in support for training programs in cardiovascular disease epidemiology. The consequent increase in the corps of epidemiologists no doubt strengthened these fields. However, a consequence of that focus on developing cancer and cardiovascular disease epidemiology specialists was the decline of the general epidemiologist, as the training programs sought to train epidemiologists whose interest was in some specific disease group, not in public health generally. (The irony of the criticism of the trend towards specialization in medicine by many of those specialty epidemiologists should not be lost on the reader.)

I came to be a general epidemiologist as a conscientious choice. During my childhood, my father, Abraham M. Lilienfeld, was Professor and Chair of the Department of Chronic Diseases, then the Department of Epidemiology (following its merger with the Department of Chronic Diseases in 1970), then the Department of Mental Hygiene, and then the Department of Behavioral Sciences (along the way, also the first Director of the Master of Public Health program), all at the Johns Hopkins University School of Hygiene and Public Health; clearly, his view of epidemiology was as a generalist (17–20). His initial foray into epidemiology focused on cerebral palsy and then changed to gastrointestinal epidemiology, specifically cirrhosis of the liver (7, 18). Subsequent work in hepatitis was followed by much activity in cancer epidemiology. He returned to gastrointestinal diseases with pioneering work in inflammatory bowel disease, even as he began work on cardiovascular disease (with his student Lewis Kuller, another generalist), stroke, hematology (with another student, the late Baruch Modan, also a generalist), psychiatric diseases, and reproductive events (including Down’s syndrome). Although his reputation had been established in cancer epidemiology in the 1950s, Lilienfeld served in the early 1960s on the National Heart Advisory Council. He returned to gastrointestinal epidemiology before moving on to behavioral epidemiology and mental hygiene. It was as a generalist that he penned the first Wade Hampton Frost Lecture, “The Epidemiology of Infectious and Non-Infectious Diseases,” in which he focused on the universality of epidemiologic concepts and the application of such infectious disease epidemiology concepts as the log-normal distribution of incubation periods to noninfectious disorders (21).

Another influence on my selection was my uncle (my mother’s brother-in-law) Jacob Yerushalmi, the first Professor and Chair of the Biostatistics Department at the University of California, Berkeley, School of Public Health. Yerushalmi’s career included investigations of tuberculosis, childhood growth, the health effects of smoking, indices of mortality, and (with his student Chin Long Chiang) the life table (22). He taught the wide applicability of biostatistical methods to advance the public’s health (23, 24).

The appeal of being a generalist includes the opportunity to engage one’s interests in a variety of diseases, chiefly dependent upon what are perceived as the current threats to the public’s health. In this manner, the general epidemiologist is able to leverage his/her skills to great effect—having an impact regardless of whatever may be the major public health issue of the day. Of course, there is the challenge of developing and maintaining knowledge of a greater range of diseases, their diagnosis, and their treatment. At the same time, it is the general epidemiologist, lacking the “intellectual baggage” of specialization, who is best positioned to begin investigations into a disease of uncertain etiology or into a physiologic process, such as aging. The rationale is the same as that associated with the appropriateness of a primary care provider’s attending to a patient on an ongoing basis, with the focus on the whole patient, rather than having a specialist, whose focus is on one particular organ or system, provide that same care.

Aside from an ability to leverage one’s epidemiologic knowledge to whatever the pressing matters of public health may be at any one time, the generalist also has a unique ability to cross-fertilize among the areas of public health and epidemiologic endeavor. The specialist in modern
epidemiology may well be able to occasionally engage in cross-fertilization, but the challenge of remaining proficient in a specialized area precludes the breadth of knowledge (perhaps at less depth) that forms the generalist’s key asset. Indeed, general epidemiologists will ask different questions in various situations than would a specialist. The specialist has “tunnel vision,” and the issues the specialist is prepared to address are necessarily constrained to those in the area of specialty (25, 26).

As with specialists in medicine, the epidemiologic specialist may be comforted by the bounds of knowledge s/he must maintain; the generalist must always be mastering many areas at once as a seemingly open-ended stream of information is assimilated (27). Such effort can be taxing, and it may motivate a general epidemiologist to specialize. The foundation for the generalist—a firm grounding in epidemiologic methods—will serve any epidemiologist choosing to specialize well, since an understanding of methods facilitates the design of epidemiologic studies providing clinically relevant answers. (A clinically relevant question is one with public health importance.)

Is there a role for the generalist in epidemiology today? Most certainly. Is there a need for generalists in modern epidemiology? The answer is a resounding yes. With the imminent retirement of the corps of epidemiology professors trained in the 1960s and early 1970s, a group which includes the last large group of generalists to enter epidemiology, the profession must contend with a dilemma: how to recreate a group of generalists in the absence of an identifiable peer group and given the lack of clear funding support for training such a group. Unless the American College of Epidemiology acts, the window of opportunity for recreating this group will close, as general epidemiologists retire or otherwise leave the profession. Once that window closes, a major means by which modern epidemiology was formed will have passed, depriving future epidemiologists of a source of strength, sapping some vitality from the discipline, and adversely affecting future efforts to train generalists in epidemiology.

What actions need be considered to create a place for generalists in today’s epidemiology? There are a number of activities that would assist in creating a place for such generalists. First, training programs for general epidemiologists need to be created and funding commitments to support such programs secured. There is no institute at the NIH with a mandate to support general medical research and public health research; perhaps a consortium of institutes could be formed to provide the needed funding and external review. Funding from the private sector, that is, foundations, is also requisite; yet no foundations currently focus on general epidemiology as such. A focus on public health is also important (28). In the past, epidemiologists in training frequently undertook training with a local or state health department. Although the opportunities in such agencies have diminished along with their funding, the experiences provided by such assignments are often invaluable in a young epidemiologist’s development. (Of note, the CDC’s Epidemic Intelligence Service trains general epidemiologists through postings in state and local health departments.) Lastly, the American College of Epidemiology should convene a series of workshops focused on developing training programs for the general epidemiologist. Included in such workshops could be discussions of health agency internships and the like; funding issues should also be considered.

In summary, there is a place for the generalist in today’s epidemiology, and the roles to be filled by general epidemiologists during the next two to three decades are key to the continued development of the field. The $64,000 question is whether the epidemiology community—through the College—recognizes this need and is prepared to shift its focus from an exclusive one fostering specialty epidemiologists. I think it is, but only time will tell.

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REFERENCES