

Bridging the Gap Between Knowledge and Health

The Epidemiologist as Accountable Health Advocate ("AHA!")

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Abstract: Epidemiology occupies a unique role as a knowledge-generating scientific discipline with roots in the knowledge translation of public health practice. As our fund of incompletely-translated knowledge expands and as budgets for health research contract, epidemiology must rediscover and adapt its historical skill set in knowledge translation. The existing incentive structures of academic epidemiology – designed largely for knowledge generation – are ill-equipped to train and develop epidemiologists as knowledge translators. A useful heuristic is the epidemiologist as Accountable Health Advocate (AHA) who enables society to judge the value of research, develops new methods to translate existing knowledge into improved health, and actively engages with policymakers and society. Changes to incentive structures could include novel funding streams (and review), alternative publication practices, and parallel frameworks for professional advancement and promotion.

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From new vaccines to better treatment for coronary heart disease, scientific knowledge has dramatically improved the public's health in the past century.¹ As a discipline with historic roots in public health but with modern emphasis on scientific discovery,² epidemiology is at the center of trans-

lating scientific knowledge into better health.^{3–5} Although the “triumphs” of epidemiology—from understanding the importance of physical exercise⁶ to the elimination of folate-preventable spina bifida⁷—have been well documented, these are widely recognized not as triumphs of science alone, but also of evidence synthesis, engagement with stakeholders, and communication.^{8–10} The past decade has witnessed great strides in the translation of epidemiologic research into public health,^{11–14} including increased funding for translational research,¹⁵ implementation science,¹⁶ community-based participatory research,¹⁷ and most recently, comparative effectiveness research.¹⁸ At the same time, however, the discretionary budget of the Centers for Disease Control and Prevention—the major funder of public health research in the United States—is falling.¹⁹ Programs that could foster such translation (such as investigator-initiated extramural funding and Academic Centers for Public Health Preparedness²⁰) are being eliminated.

Epidemiology in the United States (and to a lesser extent, other developed economies) is at a crossroads. On the one hand, the raw amount of scientific knowledge is exploding, and the translation²¹ of that knowledge into population-level public health benefit is increasingly difficult. For example, despite the sequencing of the human genome and the development of genetically targeted therapies, the first such therapy (trastuzumab) has saved fewer life-years in 12 years on the market^{22,23} than one day's burden of fatal road accidents.²⁴ After 30 years of developing experimental therapies to reverse myocardial ischemia, only one (early reperfusion) has affected clinical practice.²⁵ On the other hand, academic epidemiology is evolving into a scientific discipline with increasing focus on objectivity²⁶ and on education in methods to deduce causality.²⁷ Although etiologic epidemiology is as necessary as ever, academic epidemiology in the United States could do more to develop scientists with integrative knowledge-translating skill sets, as well.

The process of knowledge translation in epidemiology may be understood diagrammatically (Fig.). As knowledge expands, a given increment of new knowledge generates incrementally less health impact than the translation of existing knowledge could produce. Knowledge generation and knowledge translation are 2 steps in the same value chain, but their

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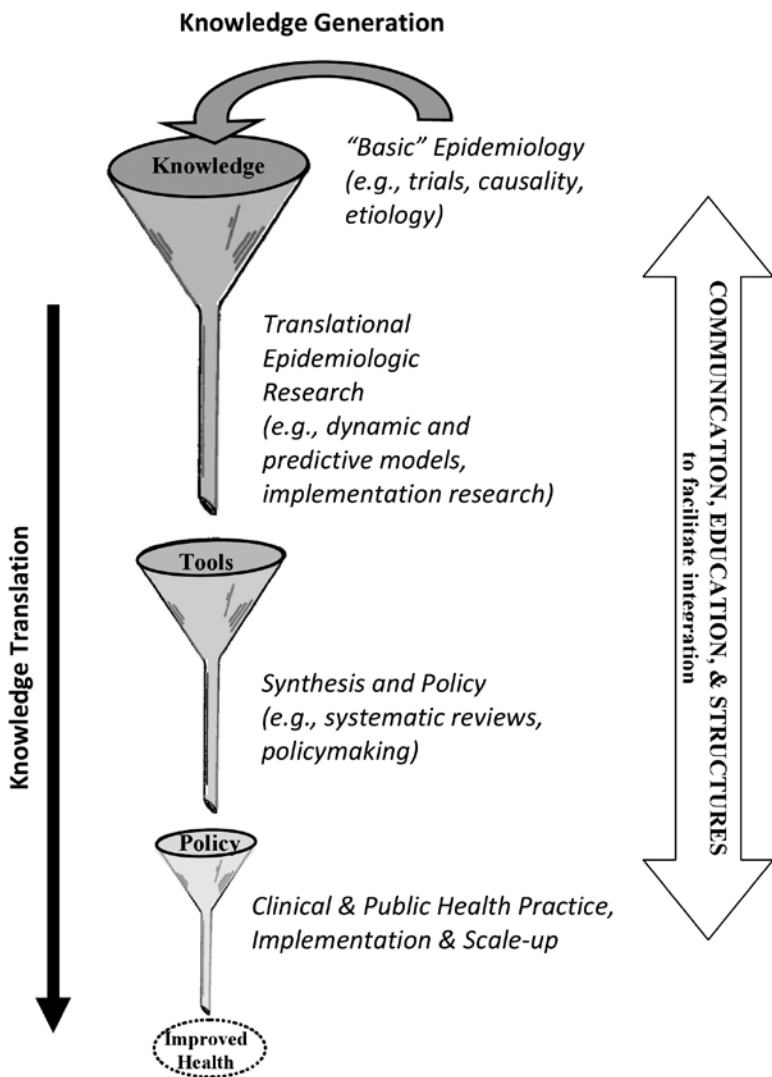


FIGURE. Knowledge generation and translation in epidemiology. Processes (italicized) generate goods (in ovals). When knowledge is scant, new knowledge must be generated before translation will have substantive benefit. However, knowledge generally increases faster than health (portrayed by differential shading). As a result, when knowledge accumulates (ie, filling of the “funnel”), more integrated processes of knowledge translation (ie, wider funnel “spouts,” and stronger communication/structures to promote integration between levels) are required to achieve maximum health impact. Additional important considerations (not shown here) include resource utilization and multiple determinants of health.

relative importance to achieve the goal of improved health differs by the amount of knowledge available, with translation becoming more important as the amount of knowledge increases. By analogy, the explosion of information on the World Wide Web is useless without a corresponding search engine. The incremental value of generating additional information (eg, more Web sites) is dwarfed by that of improving knowledge translation (ie, better search engines and algorithms). Although supplying new knowledge will always be an essential task, the balance of scientific effort must, at some point, shift from knowledge generation to translation. Although this progression is common to all scientific disciplines, epidemiology is (unlike the basic sciences) historically an applied discipline, with public health and policymaking at its core.^{28,29} As our fund of incompletely translated knowledge grows, and translation of that knowledge into improved health becomes more difficult;³⁰ epidemiology must resist an

increasingly narrow focus on knowledge generation. Rather, epidemiology must expand and adapt its historical skill set to meet a new reality (Table).

A NEW BRAND OF EPIDEMIOLOGY: ACCOUNTABLE HEALTH ADVOCACY

In the United States, many of the structures and incentives of academic epidemiology reflect a scientific enterprise designed to generate knowledge.³⁴ Knowledge-generating scientists (eg, climate change experts³⁵) often fear professional fallout, if they engage with policymakers or advocates. Similarly, such researchers have little incentive to study or publish negative results³⁶ (eg, lack of efficacy—or even harm—from new diagnostics³⁷ and drugs³⁸), as such findings are not “novel” and may generate professional controversy, despite their obvious health importance. Similarly, many of academic epidemiology’s existing structures (eg, funding

TABLE. Three Key Skills Required for Knowledge Translation in Epidemiology**1. Communication (“accountable”)**

Historical perspective: Communication with the public has frequently been cited as a core skill of epidemiologists,³¹ but current academic epidemiology values communication within the scientific community more highly.

Adaptation for the future: Academic epidemiology must teach communication in a wider variety of media (eg, newspapers, blogs, social networking sites) in order to accurately convey their results to the public.

2. Adopting a public health perspective (“health”)

Historical perspective: Epidemiologic measures such as attributable risk were developed to address “issues of health policy and priorities in the population as a whole,”³² but are generally de-emphasized in modern epidemiology in favor of alternative metrics that either emphasize causality (eg, relative risk) or assume it (eg, population attributable fraction³³).

Adaptation for the future: Academic epidemiology must emphasize translational methods (eg, predictive mathematical models, decision support tools, and health economics) that are designed not to generate new etiologic knowledge, but to use existing knowledge to benefit the public’s health.

3. Engagement with society (“advocate”)

Historical perspective: Epidemiologists have frequently engaged in policymaking,²⁸ but modern academic departments often deemphasize relevant methods to synthesize epidemiologic evidence for societal decision making.

Adaptation for the future: Academic epidemiology must incorporate methods for knowledge synthesis (eg, systematic review) and decision making (eg, health impact assessment) as core competencies.

sources, publication venues, and promotion practices) are designed to “fill the funnel” of knowledge, leaving others to “widen the spout” to health through translation. In an era of “knowledge surplus,” academic epidemiology should rediscover and adapt its historical emphasis on knowledge translation. As a heuristic, we suggest the term “accountable health advocate” (AHA), a model for the epidemiologist who specializes in knowledge synthesis, translation, implementation, and dissemination, in addition to knowledge generation. We focus on the epidemiologist as an individual, rather than epidemiology as a method, to emphasize the importance of training and equipping individuals to serve specific societal roles, rather than to use specific methods. Ultimately, the larger health science enterprise must address similar challenges, but epidemiology has a head start based on its history as a public health discipline.

The term “accountable health advocacy” emphasizes 3 key concepts. First, “accountability” states the importance of performing and communicating research in a way that makes sense to a broader nonexpert society. Second, “health” acknowledges that, unlike measurement of photons or cell signaling pathways, the work of epidemiology directly affects human lives. Third, “advocacy” implies that epidemiology should not limit itself to the traditional scientific domain, but

rather that it should also act in the social, policy, and political domains to promote population health.

How might epidemiologists function as AHAs? In making themselves more accountable to society, epidemiologists might position themselves closer to the ideal of the “honest broker” of policy options,³⁹ bringing scientific evidence to bear in policy decisions and speaking to the strengths and weaknesses of the data available. Epidemiologists would take sides on public health matters and defend their positions to society, acknowledging their intrinsic bias as scientists to seek positive results—and the corollary that most statistically significant findings will be clinically irrelevant or even false.⁴⁰ Rather than make “vague and unattainable calls for objectivity,”⁴¹ epidemiologists would use methods and precise language that convey transparency and neutrality to both fellow scientists and the broader public.

In promoting health, epidemiologist should find innovative ways to pursue translational projects that might not generate new knowledge but would use existing knowledge to benefit the public’s health—benefits that would not accrue without epidemiologic expertise. Examples might include evidence-based, point-of-care clinical decision support tools,¹⁵ and market-based innovations to scale-up health technologies to marginalized populations through social entrepreneurs.⁴² When faced with professional conflict between promoting knowledge and promoting health (eg, whether to prioritize projects of etiologic interest or public health importance), epidemiologists should value both, but with a primary commitment to the improvement of human health.

As advocates, epidemiologists cannot operate within a strictly scientific domain but must actively engage with society. Faced with convincing data (eg, the benefit of antiretroviral therapy for HIV/AIDS), epidemiologists would join other health professionals in support of the requisite political or social change.⁴³ By contrast, seeing data with multiple reasonable interpretations (eg, benefit of screening mammography before age 50⁴⁴), they would speak out against narrow characterizations. Scientific opinion is molded by those who speak and those who remain silent⁴⁵; epidemiologists need to provide their perspectives both where the data require action, and also when data require confirmation or exploration first.

MOVING TOWARD A NEW IDEAL: TARGETING FUNDING, PUBLICATION, AND PROMOTION

We present above an idealized portrait of the epidemiologist as AHA, acknowledging that many epidemiologists (eg, the Joint Policy Committee, Societies of Epidemiology⁴⁶) already function in this mold, that certain programs (eg, Epidemic Intelligence Service⁴⁷) provide relevant practical training, and that not all epidemiologists (eg, those engaged solely in etiologic research) need to master the “AHA skill set.” We argue not for a new paradigm in epidemiology, but rather for reallocation of academic resources—money, training, and professional

support—to raise the knowledge translation enterprise to a level commensurate with knowledge generation efforts. The most efficient road to this goal would be to target the incentive structures that govern academic epidemiologists today: funding, publication, and professional advancement. We have suggestions for potential mechanisms to expand these incentive structures. We do not propose that existing structures be dismantled, but rather that alternative and parallel structures be established to train and develop epidemiologists (especially junior faculty), who wish to function as AHAs.

Current funding streams are dominated by industry, foundations, and public institutions in which public health practitioners, nonacademic physicians, and other guardians of the public's health have little voice.⁴⁸ Existing programs to translate knowledge into population health (eg, Centers for Disease Control and Prevention and Agency for Healthcare Research and Quality) are already underfunded relative to the total size of the health care industry.⁴⁸ Given that these politically dependent agencies are unlikely to receive large budget increases, we should consider novel funding mechanisms for health research that serve the priorities of the public's health, rather than the interests of individual politicians, industries, or philanthropists. Just as the American Recovery and Reinvestment Act has invigorated the field of comparative effectiveness research,¹⁸ a similarly bold initiative could energize the field of translational public health research. This initiative should include not only epidemiologists but also health educators, policymakers, and advocates for end users. In addition, funding initiatives should promote knowledge translation (eg, implementation science in cancer research⁴⁹), expand the voice of clinical and public health practitioners on funding review committees, and provide more direct support (eg, National Institute of Health "New Innovator" Awards and institutional salary support). This would allow faculty members to pursue innovative knowledge-translation activities without having to rely solely on grants from traditional funding bodies.⁵⁰

As with funding, existing publication practices often lack a voice that explicitly represents the public's health. Although scientific journals may publish lay summaries, their editorial boards, peer reviewers, and readership are still largely composed of scientists, not public health practitioners, health advocates, or nonacademic clinicians. The ultimate goals of scientists and nonacademic health professionals are the same (to improve health), but their methods of interacting with society often differ. If epidemiologists were encouraged to write convincingly, not just to other scientists and health professionals, but to other members of society, their writing might take a different tone and, by achieving a wider audience, have more impact. Moving more journal content to open-access format, having practitioners contribute to the editorial and peer-review process, and encouraging communication in a wider variety of media (eg, newspapers, blogs,

and social networking sites) would all enable epidemiologists to operate more closely to the AHA ideal, and make the output of epidemiology more accessible to the public. Journals that encourage diversity in their submissions are currently undervalued by a community that prizes metrics of impact on the scientific community (eg, number of scientific citations), rather than on the public's health. Developing and promoting alternative metrics that evaluate publications' impact in improving the health of populations could be a valuable step in providing incentives to journals and the epidemiologists who publish in them.

Finally, the criteria for professional advancement reward epidemiologists mostly for contributions to science not public health; hence, the importance of peer-reviewed publications and grants, and the weight of recommendation letters from other scientists in the tenure/promotions process. If we wish to recast epidemiologists as AHAs, leaders of the community of epidemiologists (eg, department chairs and deans of public health schools) must develop alternative frameworks for professional advancement that acknowledge the importance of knowledge translation. Such frameworks could better recognize accountability (eg, valuing an open and well-documented data set rather than personally authored publications), health promotion (eg, considering a scientist's contributions to public health as well as science), and advocacy (eg, including public-sphere activities in curricula vitae). Changing advancement frameworks is a tremendously difficult task, and such changes could be implemented only on an institution-by-institution basis, with substantial political resolve. However, they need not replace the traditional promotions framework, rather specific faculty members could request—or be assigned—an evaluation by a given set of criteria (contributions to science vs. public health). The availability of such alternative frameworks would further encourage epidemiologists to adopt practices such as opening data sets, engaging with public health practitioners, and promoting health outside the scientific community (eg, through policy or lay publications). All of these practices are likely to have direct positive impact on public health, and they may ultimately lead to greater funding, as society comes to recognize which research institutions are most closely committed to improving health.

There is an urgent need to translate the growing fund of scientific knowledge into improved health, and to do so even while budgets are being slashed. Existing incentive structures (funding, publication, and promotion) are designed for knowledge generation rather than knowledge translation and are not appropriate for all aspects of epidemiology. We propose an alternative scheme in which some epidemiologists serve as "accountable health advocates"—scientific experts who also remain accountable to a larger society, prioritize population health over etiology, and actively engage with policymakers and opinion leaders. Creating additional funding streams for translational public health research, alternative journals, and

impact metrics, as well as parallel frameworks for advancement and promotion, could all empower epidemiologists to operate more closely to the AHA ideal. In this way, epidemiology could maximize its impact on the public's health and maintain the support of society at large.

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