

Invited Commentary

Invited Commentary: Consequential(ist) Epidemiology: Let's Seize the Day

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Now is the time for the science of epidemiology to embrace its pragmatic roots. The article by Galea in this issue of the *Journal* (*Am J Epidemiol.* 2013;178(8):1185–1191) calls for us to become more “consequentialist.” The Affordable Care Act allows us to access population-level databases from which we can examine how to deliver care more efficiently and cost-effectively. Asking the questions “so what” and “how much” will increase our relevance over the next decade.

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Nearly 2 decades ago in my presidential address to the Society for Epidemiologic Research in Miami, I examined the role of “consequential epidemiology” in the future of our science (1). I appealed to all young epidemiologists to seize the day of impending health care reform (Hillary Clinton’s failed attempt). I hoped they would fashion study designs and use creative analyses to make the new health system both more equitable and more efficient. Politics intervened, so let’s fast forward to 20 years later. With the Affordable Care Act now a reality, the current president of the Society for Epidemiologic Research, Sandro Galea, is making a similar plea (2).

When I proposed the topic in 1994, epidemiology as a discipline was under siege from both internal criticisms and external challenges. Internally, a review of abstracts published from our 1990 and 1992 Society for Epidemiologic Research annual meetings concluded they were evidence of the “scientific poverty” of our discipline (3). The bulk of our research efforts identified risk factors but rarely affected public health actions. We were told that epidemiologists tended to “torture” our data until some—frequently obscure—associations were found.

Externally, the challenges were more subtle, though more threatening. Bureaucratic hurdles to epidemiologic research appeared to pop up everywhere. Frustration with the seemingly infinite institutional review board processes led to speculation about the “rise and fall” of epidemiology as a discipline (4). In 1993, a colleague stated in exasperation, “If John Snow wanted to remove the pump handle today, he would need to network with community leaders, interface with government agencies, write an environmental impact statement and obtain

Human Subjects Committee approval” (5, p. 3). Undertaking epidemiologic research, even with adequate funding, had become a burden.

Despite the foreboding environment 20 years ago, epidemiology survived—maybe even thrived—as a discipline; yet apparently, it changed relatively little. In his article, Dr. Galea (2) described the deontological orientation of his more academic colleagues. He showed that our journals are still dominated by “etiologic” articles rather than more programmatic (though still rigorous) examination of public health interventions. The deontological norms of epidemiologists—assessing causality, reducing bias, comparing counterfactuals—became ends in themselves, rather than means to use their etiologic truths to improve public health outcomes. Dr. Galea’s analysis of articles published in 2012 in the 4 leading epidemiology journals found that 85% of papers were devoted specifically to determining etiology (2); by implication, only 15% addressed how to change our lives for the better. So, although epidemiology as the science of causality is still alive and well, it can do so much more.

Dr. Galea and I will not win any prediction awards by stating the obvious, namely that major growth in epidemiology in the United States—like all other health disciplines—depends on how well we adapt to the ongoing process of health care reform. Theoretically, we should be on stronger ground than most—and this is an optimistic point. After all, ours is a science of populations, of numerators and denominators, ideally suited for the “outcomes research” that the forthcoming consumer and provider collectives will demand.

The key will be our ability to market our epidemiologic skills in a way that is seen by society as making a difference. Over 3 decades ago, this was termed “consequential epidemiology” by Bill Foege in the 1983 American Public Health Association Frost Lecture (6), and it has been reinvigorated today by Dr. Galea as “consequentialist epidemiology.” We begin with the important “who, what, when, where, and why” of basic descriptive and analytic epidemiology. Whether labeled as “risk factor epidemiology” in the 1990s (3) or “etiologic epidemiology” more recently (7), these scientific designs provide a starting point for intervening. Thereafter, we also need to ask the 2 main consequential epidemiologic questions implied by the terminology: First, “so what” (i.e., do our inferences work to change people’s lives) and second, in today’s climate of scarce resources, “how much” (i.e., what do the interventions cost for the benefits they provide)?

Our suggestions are neither original nor earth-shattering. The importance of epidemiology’s achieving a real-world public health impact has been trumpeted since the pump handle was removed. However, given the reality of health reform, now (again) is the time to reframe our science to emphasize our consequential outcomes. As epidemiologists, we need to cast our nets more broadly into the social and program sciences arenas, to help assess effectiveness rather than efficacy, and to ensure society gets the best value for its health investment.

In pondering the implications of this broader approach, I realized my career was fortunate because I had been expected to be both an etiologic and a consequentialist epidemiologist. At the Centers for Disease Control and Prevention, every disease outbreak investigation and *Morbidity and Mortality Weekly Report* article ended with addressing the question “so what”. Likewise, at FHI 360, we are expected to evaluate the question “how much” regarding the return-on-investment of public health interventions applied to low-resource settings. It is no wonder that I found consequential epidemiology so gratifying.

To be consequential, we must also continue our efforts to increase community involvement in our investigations. In the past, we’ve learned the multiple benefits of close interaction with community groups—not the least of which are high participation and follow-up rates—of close interaction with community groups in the San Francisco Men’s Health Study (8). The regular communications by newsletter with those of us in the Physicians Health Study (9, 10) maintained our interest, our adherence, and our buy-in to advocate for the inferences coming from the data.

Demonstrating our consequential impact should not be difficult and is, in fact, truly exciting! Past and present examples of our profound epidemiologic influence are everywhere. To name a few, in the cancer area, our Nobel prize–deserving collective epidemiologic contributions identified tobacco as the single greatest cause of human neoplasms. Epidemiologists have kept relentless scientific pressure on both lawmakers and the tobacco industry to change the environments in which we live. In the reproductive area, epidemiologic studies provided the objective public health basis for the 1973 Supreme Court decision in *Roe versus Wade*, which struck down state laws that prevented pregnant women from having access to safer pregnancy termination procedures. In the area of acquired immunodeficiency syndrome, the science of epidemiology both discovered the routes of transmission and provided the consequential recommendations for

prevention more than a year before the virus was identified through molecular microbiology. Finally, in the injury epidemiology area, sophisticated epidemiologic techniques documented the strong relationship between handgun control and the temporal reduction in firearm-related morbidity and mortality. These 4 examples are but a few of the more visible areas in which our epidemiologic methods have already had definite public health consequences.

Yet, these 4 examples also reflect a potential downside of consequential(ist) epidemiology. By getting into the fray of evaluating public health interventions, epidemiologic evidence enters the realm of politics and thus is subject to political scrutiny. Unlike scientific scrutiny based on methods, data, and replication, political scrutiny is founded on ideology, emotion, and suppression. If the evidence does not support the political position of those in power, the tendency is to kill the messenger by shutting down the public health programs designed to evaluate the impact of the interventions, hence the tempering of the Center for Disease Control and Prevention’s abortion surveillance activities in the 1980s or its handgun monitoring programs in the 1990s.

However, such challenges should energize rather than frighten epidemiologists. Using the power of population-level evidence to advocate for more efficient and equitable public health programs is our equivalent of clinicians using individual-level evidence to help treat their clients. Imagine if the only action taken by clinicians was to use the medical history, physical examination, and laboratory findings to draw diagnostic inferences but then to do nothing to manage the patient.

To conclude, the field of epidemiology is at a crossroads. In the next several years, as the Affordable Care Act becomes a reality, our epidemiologic discipline will have a clearer role. Because we intuitively think in terms of both numerators and denominators unlike our sister disciplines in the health field who are more numerator-prone, we gain an invaluable social perspective upon which we should build. We have a unique opportunity to actually affect the future in 3 ways: not only by clarifying etiologies, but also by planning public health actions and evaluating interventions.

Let’s think of ourselves as both consequentialist and etiologic epidemiologists so that we can provide a crucial interface between our roles as research scientists and public policy advocates. Let’s ask the questions “so what” and “how much.” During the next decade amidst health reform, we should have a lot of fun.

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