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# Evidence-Based Public Health Policy and Practice: Promises and Limits

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## Introduction

Gathering scientific information for decision making in the United States dates back to the mid-1800s when, in 1863, President Abraham Lincoln established the National Academy of Sciences to get advice on technical matters from the leading thinkers in the United States.<sup>1</sup> The use of scientific knowledge for policymaking has since grown in importance, fueled by the growth in information, increasing reliance on technologies, and the need to balance benefits and harms in decision processes.

The complexity and potential utility of information now available for guiding policy and practice decisions have led to methods for synthesis of research information.<sup>2,3</sup> To assimilate large bodies of research information, systematic reviews are undertaken that apply “strategies that limit bias in the systematic assembly, critical appraisal, and synthesis of all relevant studies on a specific topic.”<sup>4</sup> For clinical practice decisions, the Cochrane Collaboration and the U.S. Preventive Services Task Force are among several groups that have systematized evidence-based approaches.<sup>5,6</sup> These efforts have been designed to distinguish effective interventions from those that are less likely to work and to highlight voids in knowledge about effective interventions.

What began in the 1980s as the Oxford Database of Perinatal Trials evolved into a library of over 2170 systematic reviews. The Cochrane database of reviews of clinical interventions exceeds any in public health.<sup>5</sup>

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Public health is a relative newcomer to the area of research synthesis and evidence-based practice. In the United States, the Task Force on Community Preventive Services (Task Force) was formed in 1996 to synthesize scientific information about the effectiveness of health promotion and disease prevention interventions, and has, to date, reviewed more than 175 topics for recommendations on effective practices.<sup>7</sup> The Cochrane Field of Health Promotion, officially registered in 1996 and expanded to include public health in 1999, has 150 completed reviews within the Field’s scope.<sup>8</sup>

In the mid-1990s, when the Task Force formed, few public health practitioners and policymakers were familiar with methods of research synthesis for evidence-based practice. Almost a decade later that is no longer the case—the theme of evidence-based public health dominates international, national, and regional public health meeting agendas and the term “evidence of effectiveness” has become a central part of public health dialogue. Public health improvement plans in states across the country cite evidence of program effectiveness as requisite for considering intervention options to meet state health goals. The demand for evidence in public health is at an all-time high.

At the same time that demand for evidence-based practice has reached a peak, a parallel understanding of how scientific evidence contributes to the larger realm of knowledge for decision making has not been adequately explicated. In this paper, we describe the importance of evidence-based approaches, but also we review important lessons learned from the efforts of the Task Force since the mid-1990s to build an evidence base for public health decision making. As we will describe, developing public health policy and practice recommendations based on evidence of intervention effectiveness has significant advantages along with associated limitations.

## The Task Force on Community Preventive Services

The work of the Task Force represents the most comprehensive effort to date to assess the body of evidence for health interventions at the population level.<sup>7</sup> In 1996, shortly after its inception, the Task Force developed a list of 52 major public health topic areas in

which evidence-based reviews would be completed, in part based on priority areas outlined in *Healthy People 2010*.<sup>9</sup> The Task Force then selected 12 topics shown in Table 1 to include in the first edition of a *Guide to Community Preventive Services*.<sup>9</sup> These topics were chosen by consensus based on burden of the problem, preventability, relationship to other public health initiatives, and usefulness to practitioners.<sup>10</sup>

A multidisciplinary review team was formed for each topic identified in Table 1.<sup>10</sup> Each team was asked to develop a logic framework illustrating underlying determinants of public health relevant to each topic, indicating areas where interventions might be useful, and describing expected outcomes.<sup>11</sup> These logic frameworks were used to generate lists of potential interventions for systematic review. For the topics in Table 1, the number and kinds of possible interventions varied widely; most review teams choose approximately 10 to 15 interventions to review. For each intervention reviewed, studies evaluating effectiveness were identified, collected, and assessed in terms of their quality.<sup>11</sup> Program main effects were summarized, intervention characteristics that influenced effectiveness were described, barriers to implementation and unintended consequences of the interventions were detailed, and costs were estimated when data were available. Then, depending on the availability and strength of the evidence, the Task Force recommended for or against an intervention, or determined that the evidence was insufficient to draw a conclusion.<sup>11</sup> A research agenda was proposed for important remaining questions. The results of systematic reviews in nine topic areas are compiled in the first edition of the *Community Guide*.<sup>7</sup>

As systematic reviews of evidence were completed, it became clear that the body of evidence across topics and interventions was quite uneven. Far more evidence existed about determinants of public health problems than about the effective solutions (i.e., disease etiology

vs intervention effectiveness). Evidence was ample for some public health areas but insufficient for others. Where evidence of intervention effectiveness was found, the time and resources required for thorough review and synthesis of the information were considerable. Where evidence was found lacking, the more formidable challenge of collecting it through new evaluations of programs and policies was recommended.

## Task Force Outcomes and Early Lessons

Since the inception of the Task Force in 1996, more than 175 interventions have been reviewed for program effectiveness and practice recommendations. In some intervention areas, such as increasing the uptake of vaccines or preventing tobacco use, an extensive literature allows assessment of a variety of intervention strategies,<sup>12,13</sup> but it quickly became clear that the evidence base for public health effectiveness was not evenly distributed across policies and programs targeting leading determinants of population health. Among interventions reviewed by the Task Force thus far, approximately half have received the designation “insufficient evidence to determine effectiveness” because few studies of adequate quality and/or few studies reporting pertinent and comparable evaluation outcomes across interventions could be found. Additionally, interventions that address new or emerging issues (e.g., recent bioterrorism threats) may lack an evidence base because more time is needed for evaluative information to accumulate.

What contributes to gaps in evidence? The Task Force has learned that some program-effectiveness questions are easier to answer than others. Part of this challenge involves the level of impact of the intervention. Interventions shown to work in specific settings or with individuals or small groups may prove difficult to evaluate when implemented on a broader community scale when more complex processes of social change must be taken into account. For example, school interventions to change dietary and physical activity behaviors of children and adolescents are influenced by the broader social context. If children’s behavior is, in part, the result of social influences at different levels of analysis (family, social networks, organizations, public policy, culture), it may be difficult to evaluate these cumulative effects.<sup>14</sup>

Some outcomes are easier to evaluate than others. The Task Force looks for improvements in health or established proxies for better health (e.g., smoking cessation) to support their recommendations.<sup>11</sup> Where valid, readily accepted outcome measures exist (e.g., tobacco use, immunization status), evidence of intervention effect may be more easily captured and reported. However, relevant and comparable measures may be missing for other important topics (e.g., health literacy, cultural competency).<sup>15</sup> Furthermore, it is dif-

**Table 1.** Topics for initial review in *The Guide to Community Preventive Services*

### Addressing the environmental challenges

Sociocultural environment\*

### Changing health-risk behaviors

Tobacco product use\*

Poor nutrition

Physical inactivity\*

Risky sexual behavior

### Addressing health conditions

Vaccine-preventable diseases\*

Cancer\*

Diabetes\*

Mental health

Motor vehicle occupant injury\*

Oral health\*

Violence\*

\*Indicates topics included in the first edition of the *Community Guide*.

difficult to accurately assess intermediate outcomes of community interventions aimed at broad, social determinants of health (e.g., community advocacy, educational and economic opportunities) that effect change across multiple intermediate and distal health outcomes because of difficulty establishing links between upstream, community health promotion interventions and traditional epidemiologic outcomes (e.g., incidence of disease or mortality).<sup>16</sup>

Program effectiveness questions must be revisited periodically. Some interventions found to be highly effective at one point in time may be less effective at a later date if the conditions that contributed to their effectiveness have changed. For example, effective interventions that promote the use of screening tests or vaccinations may become less effective as baseline rates improve. Also, the feasibility of implementing interventions may change over time. Privacy laws (e.g., Health Insurance Portability and Accountability Act of 1996 [HIPAA]), for instance, may influence the ability of healthcare systems to carry out interventions such as sending personalized reminders. When population behavior changes from intermittent to regular use (e.g., mammography screening), new interventions may be needed to influence the maintenance of behaviors. Finally, endpoints for determining program success may change. As years accrue to allow evaluation of more distal outcomes (e.g., morbidity and mortality), earlier intermediate outcomes (e.g., health behaviors) may no longer be the yardstick for judging intervention success. The changing needs for evidence over time suggest an investment in evidence-based public health that is both continuous and long term in nature.

Sociopolitical processes influence the uneven distribution of research evidence across the myriad of potential public health topics. Historical and cultural values shape currently acceptable public health theories and paradigms. Which research questions are acceptable to ask, and what methodology will be used, are subject to conventions and priorities of funding agencies (e.g., condom use vs abstinence for HIV prevention).

Like the evidence base for much of clinical medicine, public health is still short of the material base for comprehensive, evidence-based decision making. Even in areas of public health where many published intervention studies exist, the evidence base always will be incomplete for some variation in intervention design and/or subpopulation of interest. How should we best approach evidence-based decision making for public health in light of incomplete scientific information?

### **Making Decisions with Incomplete Evidence**

Every day, decisions about courses of action to address public health problems are made in the context of incomplete empirical evidence on intervention effectiveness. Decision makers often confront the pressing

need to act in the absence of good evidence. It is unrealistic to demand that every decision be based on robust scientific evidence from systematic reviews when we know we are far from having all the information we need. For example, the urgency to take steps to control problems such as upward trends in overweight and obesity among children cannot wait for conclusive evidence of intervention effectiveness in important settings like schools, where few studies have been done to address this issue.<sup>17</sup> All available information must be weighed: assessment data on the magnitude of the problem, epidemiologic data on determinants, stakeholder opinion on the nature of the problem and acceptable solutions, existing practices and traditions, less robust yet promising intervention evaluations, program options within budgetary constraints, legal considerations such as privacy laws, and the political will to address the issues. [Table 2](#) lists both quantitative and qualitative factors to consider in making decisions. If all public health decisions required convincing scientific evidence, new approaches could not emerge. As innovations are implemented, it is crucial to evaluate them carefully so that they can add to the evidence base. Having said this, the trade-offs in choosing a course of action lacking an evidence base must be acknowledged as well: it may be difficult to stop or change practices once they become commonplace, even when new information becomes available about more effective strategies or shows that existing practices have minimal effect.

Implementing an evidence-based process requires reliance on various forms of information.<sup>2,18,19</sup> It involves understanding the context for intervention and local preferences. Often, information on context—culture, local norms, history, resources, and constraints—requires collection of new data that may be either quantitative (a telephone survey) or qualitative (a series of focus groups). In addition, implementation of evidence-based programs often results in a tension between fidelity (maintaining the original program design) and re-invention (changes needed for replication in a new setting). Increasingly, participatory processes are being used with evidence-based efforts to understand local context while maintaining some degree of fidelity.<sup>20</sup>

### **Conclusion**

Numerous benefits accrue when decisions in public health are based on sound scientific evidence. Evidence synthesis combines many studies with different methods and results to find consistencies in a set of findings. Systematic reviews can be more robust than a single study and can pinpoint why studies differ, showing what is effective and why. This approach tends to be less biased than the selective use of evidence—that is, using single studies of varying quality to support a particular position. While evidence should be weighed along with community beliefs, opinions, and local considerations,

**Table 2.** Quantitative and qualitative factors in decision making

Factor	Specific questions
Size of the problem	Is it important? What is the public health burden?
Problem preventability	What is the efficacy? Can it work at least in ideal circumstances? What do we know about the biological plausibility. Is it logical (theory-based)?
Intervention effectiveness	What is the effectiveness? Does it work in real-world settings? Would it work in the settings being considered (is it generalizable)? How much less effective would it be compared with ideal settings? Is there better evidence for alternative interventions?
Benefits and harms	What are all the consequences of the intervention? What are the trade-offs?
Intervention cost	Is it affordable?
Comparison of benefits and costs	What is the value? How does it compare to other alternatives?
Incremental gain	What are the additional cost and benefits (value) compared to what is already being done (if anything)?
Feasibility	Are adequate time and money available?
Acceptability	Is it consistent with community priorities, culture, values, the political situation?
Appropriateness	Is it likely to work in this specific setting? Are there ways to better understand the context for intervention in various populations?
Equitability	Does it distribute resources fairly?
Sustainability	Are resources and incentives likely to support conditions to maintain the intervention?

systematic reviews and evidence-based recommendations are very useful for formulating choices among programs likely to be effective and avoiding ineffective or even harmful interventions.

The systematic reviews and recommendations of the Task Force are one part of many worldwide efforts to use evidence from research synthesis as a tool for decision making. Underlying the creation of the Task Force was the notion that the use of evidence synthesis to support decision making has the potential to improve population health and reduce health inequality, while investing limited resources in interventions known to work. But relatively few people in public health practice have been trained to be effective consumers of systematic reviews and to weigh the promise and limits of evidence-based approaches. An immense amount of information exists about the successes and failures of public health programs. Research synthesis can inform strategic decisions—especially those that require significant use of resources, affect a considerable proportion of the population, and are not without risk—yet scientific evidence alone is rarely sufficient in deciding what action to take.

The Task Force is building and maintaining an evidence base for public health policy and practice. This long-term process is challenging and at times uneven. Advancing forward requires the evolution of quantitative and qualitative synthesis methods, improvement in research practice and reporting, and critical interpretation of empirical findings. Along this path several lessons have been learned: scientific knowledge changes over time; decisions are often necessary in the absence of complete evidence; and evidence of program effectiveness should be interpreted in terms of the context in which the intervention will be implemented. By understanding the promise and limits of the evidence base for public health, we can take full advantage of our scientific knowledge base while also recognizing the contribution of the many factors relevant to sound policy and practice decisions.

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