

Evidence-Based Public Health

An Evolving Concept

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Abstract: Evidence-based public health (EBPH) has been proposed as a practice model that builds upon the success of evidence-based medicine (EBM). EBM has been described as a more scientific and systematic approach to the practice of medicine. It has enhanced medical training and practice in many settings. Both EBM and EBPH systematically use data, information, and scientific principles to enhance clinical care and population health, respectively. In this paper, we review the evolution of EBPH, propose a new definition for EBPH, and discuss developments that may support its further advancement.
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Decisions and policies in public health are frequently driven by crises, political concerns, and public opinion.^{1,2} A number of researchers, however, are proposing a more evidence-based approach to public health, based on the advances of evidence-based medicine (EBM).^{3–5} EBM was first formally described in 1992 by Guyatt et al.⁶ as a more scientific and systematic approach to the practice of medicine.^{6–8} Hailed as a new approach to teaching medicine, EBM has been widely incorporated in medical training.⁹ EBM has even been described as a “revolution” in medical practice.¹⁰ The popularity of EBM has spawned a host of “evidence-based” approaches in a wide variety of fields, including ethics,¹¹ psychotherapy,¹² occupational therapy,¹³ dentistry,¹⁴ nursing,¹⁵ and librarianship.¹⁶ In this paper, we examine the evolution of evidence-based public health (EBPH) and discuss how EBPH can be further advanced.

The Rise of Evidence-Based Medicine

Evidence-based medicine has been defined as, “the integration of best research evidence with clinical expertise and patient values.”¹⁷ The process of EBM in practice involves five steps (Table 1).¹⁷ While these steps may appear daunting to physicians in the time-pressured clinical environment, EBM is meant to be applied to mainstream medical practice, and not just limited to the academic teaching environment. Some data suggest that this goal is at least potentially achievable.¹⁷ Literature citations of EBM have grown exponentially over the last decade. In addition, many jour-

nals now have sections dealing with EBM, and an expanding number of journals focus exclusively on evidence-based methods and reports.¹⁷

Interest in evidence-based medicine has grown for a number of reasons, including the overwhelming size and continued expansion of the medical literature¹⁸; inadequacy of textbooks and review articles, which can be compromised by outdated, inaccurate information¹⁹; and the difficulty of synthesizing clinically gathered information with evidence from scientific studies to arrive at the best decisions with respect to prevention, diagnosis, prognosis, and treatment.¹⁷ Other factors driving the development of EBM include the increasing number of high-quality, randomized, controlled clinical trials, and the wide availability of computerized health information databases, such as search engines for Internet locations of EBM articles.¹⁷ Methodologic advancements associated with EBM include the development of reproducible strategies for gathering and evaluating evidence,²⁰ and the structured use of systematic reviews that address specific clinical areas.²¹

Critiques of Evidence-Based Medicine

Despite general enthusiasm for EBM, the field has its share of critics. The major criticism of EBM is that it is perceived as de-emphasizing the patient’s values, perspectives, and choices, as well as failing to account for individual social and biological variation. Critics also claim that EBM guidelines devalue clinical judgment.^{9,22} Proponents, however, argue that EBM does explicitly include clinical information and patient values in the equation leading to clinical management decisions.²³ Others note that EBM methods do not specify how to blend patient preferences, clinical judgment, and evidence synthesized from the medical literature.^{9,24} Sheridan et al.²⁴ describe a patient-centered

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Table 1. A comparison of processes: evidence-based medicine versus evidence-based public health

Step	Evidence-based medicine Sackett (2000) ¹⁷	Evidence-based public health Brownson (1999, 2003) ^{3,4}
1. State the scientific question of interest	Convert the need for information (about prevention, diagnosis, prognosis, therapy, causation) into an answerable question	Develop an initial statement of the issue
2. Identify the relevant evidence	Track down the best evidence to answer that question	Search the scientific literature and organize information
3. Determine what information is relevant to answering the scientific question of interest	Critically appraise that evidence for its validity (closeness to the truth), impact (size of the effect), and applicability (usefulness in one's clinical practice)	Quantify the issue using sources of existing data
4. Determine the best course of action considering the patient or population	Integrate the critical appraisal with one's clinical expertise and with the patient's unique biology, values, and circumstances	Develop and prioritize program options; develop an action plan and implement interventions
5. Evaluate process and outcome	Evaluate one's effectiveness and efficiency in executing Steps 1 to 4 and seek ways to improve both for the next time	Evaluate the program or policy

approach to preventive health care that is one possible solution to this dilemma. Another limitation of EBM, acknowledged even by its advocates, is the difficulty of demonstrating improved clinical outcomes that can be directly attributed to the practice of EBM. This problem is related to both methodologic and ethical constraints.¹⁷

The Development of Evidence-Based Public Health

In 1997, Jenicek⁵ published a review discussing the links between epidemiology, EBM, and EBPH. He noted that the foundation for both EBM and EBPH was epidemiology. Jenicek defined EBPH as the appropriate use of current best evidence to make decisions about the care of communities and populations in the area of disease prevention and health promotion (see Table 2 for the complete definition). While acknowledging many parallels with EBM, Jenicek observed that EBPH had unique challenges due to its often complex interventions and involvement with multiple community and societal issues.

The concept of EBPH was further developed by Brownson et al.,^{3,4} who characterized EBPH as the development, implementation, and evaluation of public health programs through application of principles of scientific reasoning (see Table 2 for the complete definition). Brownson et al.^{3,4} have also described a framework for putting EBPH into practice by public health practitioners (Table 1). As shown in Table 1, the processes of EBM and EBPH frameworks consist of analogous steps. The EBPH framework by Brownson et al.^{3,4} actually consists of six steps; both Steps 4 and 5 of this EBPH framework, however, functionally relate to Step 4 of the EBM approach and are displayed as such in Table 1. While the framework is useful to organize the concepts, EBPH in practice is a dynamic non-linear process, largely because it occurs in communities that are neither static nor controlled scientific environments.

An important resource that has fostered the development of EBM, and that has utility for EBPH is the Cochrane Collaboration.²⁵ The Collaboration's Health Promotion and Public Health Field (HPPHF) is aimed

Table 2. Three definitions of EBPH

Definition 1 Jenicek (1997) ⁵	Definition 2 Brownson (1999, 2003) ^{3,4}	Definition 3 Kohatsu (2004, current paper)
EBPH is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of communities and populations in the domain of health protection, disease prevention, health maintenance and improvement (health promotion).	EBPH is the development, implementation, and evaluation of effective programs and policies in public health through application of principles of scientific reasoning, including systematic uses of data and information systems and appropriate use of program planning models.	EBPH is the process of integrating science-based interventions with community preferences to improve the health of populations.

EBPH, evidence-based public health.

at increasing the quality and quantity of systematic reviews that can be used to provide evidence to answer practical, public health questions. Waters and Doyle,^{26,27} however, in describing the value of the HPPHF to EBPH, acknowledged that, in addition to evidence, “politics and timeliness” are factored into public health decision making. Others have also noted that, in comparison to EBM, EBPH must currently work with a smaller evidence base; serve a broader, more diverse field; and use a wider range of scientific approaches to gather information for practice improvement.^{28–32}

Another important EBPH resource is the *Guide to Community Preventive Services*.³³ The *Guide* is a valuable source of systematic reviews and evidence-based recommendations for public health practice. In addition, the Task Force on Community Preventive Services and Centers for Disease Control and Prevention staff, who sponsor the *Guide*, have developed methods that may be used to evaluate the impact of EBPH interventions.³⁴

A Current Perspective on Public Health

Public health has been defined as “what we as a society do collectively to assure the conditions in which people can be healthy.”¹ Consistent with that broad vision, the 2002 Institute of Medicine report, *The Future of the Public’s Health in the 21st Century*, emphasizes that public health extends beyond government and encompasses, “the efforts, science, art, and approaches used by all sectors of society (public, private, and civil society) to assure, maintain, protect, promote, and improve the health of the people.”¹ The report defines six critical “actors” who are in a position to greatly affect health: communities, the healthcare delivery system, employers and business, the media, academia, and government.¹

This expansive view of public health is consistent with other published definitions of the field. Savitz et al.³⁵ commented on the breadth of public health, noting that it “can be seen as an ideology, a profession, a movement, or a set of actions, but not as a single scientific discipline.”³⁵ The significance of this current perspective on public health is that individuals and communities can no longer be viewed as **passive recipients** of public health services, but instead must be accepted as **active participants** in the public health system. This perspective has direct implications on the concept of EBPH, as discussed below.

A New Definition of Evidence-Based Public Health

Incorporating the discussion of the modern scope of public health with the models outlined by Jenicek⁵ and Brownson et al.^{3,4} leads us to propose a new definition of EBPH as **the process of integrating science-based interventions with community preferences to improve the health of populations**. In Table 2, this new defini-

tion of EBPH (definition 3 in the table) is compared with those of Jenicek⁵ and Brownson et al.^{3,4} The new definition differs from previous EBPH concepts by explicitly stating the community role in EBPH. In this regard, the new EBPH definition is similar to that of EBM (“the integration of best research evidence with clinical expertise and patient values”¹⁷).

Analogous to Sheridan’s model of patient-centered preventive health care, the new definition of EBPH places a stronger emphasis on the perspectives of community members. This focus can be viewed as a “population-centered” approach to public health, in which the viewpoints of the affected population are at the forefront of decision making regarding public health interventions. The proposed, new definition of EBPH also highlights the desired endpoint of the process (“to improve the health of populations”), thus distinguishing the concept from previous descriptions of EBM and EBPH.

Finally, the term “science based” is integral to the definition. It is meant to encompass the range of disciplines, besides epidemiology, that provide the science base for public health, including sociology, psychology, toxicology, molecular biology, anthropology, nutrition, engineering, economics, political science, and others. “Science based” is also a deliberately broad term that includes quantitative and qualitative approaches to gathering information that can affect public health practice. For example, EBPH is an area in which tools should be developed to answer practical questions such as, “What does an optimal governmental public health system look like in terms of structure and function?”^{29,31}

Evaluating and Improving Evidence-Based Public Health in Practice

Based on the key elements of the proposed definition of EBPH, application of this model should be evaluated with respect to three characteristics: (1) the quality of the science base, (2) involvement of the community, and (3) effect on the desired public health outcome. These three features are discussed in more detail below.

Quality of the Science Base

Researchers and theorists have defined how the quality of the science base for EBPH can be improved. Several of these concepts are mentioned.

For example, Eriksson³⁰ has proposed that four knowledge domains should be addressed comprehensively to support EBPH: distribution of health (e.g., indicators of social inequality); determinants of health (causal web); consequences of health on the individual and society; and methods for changing health determinants.

Hawe et al.³⁶ and others^{37–39} have suggested a reinterpretation of **standardized intervention** to enable broader use of randomized controlled trials (RCTs) in answering EBPH-related questions. For such applications, RCTs are often conducted using a group-randomized (cluster) design. Since such trials may also involve multiple community sites with widely varying profiles, a narrowly defined, standardized intervention may be unfeasible or inappropriate. An example of such an intervention would be distribution, across all study sites, of an identical health education kit to increase knowledge about diabetes. An alternative intervention, standardized by function rather than content, would be to require all study sites to distribute diabetes information “tailored to local literacy, culture, and learning styles.”³⁶ Hawe et al.³⁶ contend that their reinterpretation of standardized intervention in EBPH-related RCTs will enable meaningful evaluation of complex, community-based interventions.

Randomized controlled trials, however, are not appropriate for studying every question in public health. Victora et al.⁴⁰ have argued that while RCTs are critical for evaluating the efficacy of clinical interventions, the complex causal chains in large-scale, public health interventions require the use of adequacy or plausibility designs. Such designs use comparison groups and adjustment for confounding to assess the impact of interventions.

Addressing the need to improve the quality of studies employing nonrandomized designs, the Transparent Reporting of Evaluations with Non-randomized Designs (TREND) statement was recently published by a multidisciplinary group of researchers and methodologists. The TREND statement follows the format of the Consolidated Standards of Reporting Trials (CONSORT) statement, which was developed to improve the quality of RCTs.⁴¹ Thus, the TREND statement provides a checklist and description of elements that should be present in papers reporting results from nonrandomized studies. The TREND statement should prove useful for EBPH, since nonrandomized studies are frequently used to evaluate public health programs.

Another working group statement of value to EBPH was recently published by an international group of guideline methodologists. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was developed in response to the variability in ranking systems used by various health-related organizations to assess the quality of evidence and the strength of recommendations. The GRADE group analyzed and addressed the deficiencies and disadvantages of existing evidence-ranking systems in designing a new systematic and explicit approach to assessing quality of evidence and strength of recommendations.⁴² One advantage to the GRADE system is that it was designed to be applied across a wide range of

interventions and settings, and so should prove useful in both EBM and EBPH.

Community Involvement

One of the 12 principles of the ethical practice of public health is that “[p]ublic health institutions should provide communities with the information they have that is needed for decisions on policies or programs and should obtain the community’s consent for their implementation.”⁴³ In another words, there is an ethical requirement for public health practitioners to obtain **informed consent** from a community prior to conducting a public health intervention. This consent corresponds to the community preferences referenced in the proposed definition of EBPH (definition 3, Table 2). Obtaining informed consent for a public health intervention at the community level, however, is more complex than the consent process at the individual level in a medical setting.

One promising framework for engaging communities in EBPH is community-based participatory research (CBPR). In perhaps its broadest sense, CBPR is an approach that “entails involving all potential users of the research and other stakeholders in the formulation as well as application of the research.”⁴⁴ CBPR builds on resources with a community, facilitates collaboration among all parties, and integrates knowledge and action for mutual benefit of all partners.⁴⁵ In addition, it may enable researchers to better understand complex community health problems, ensure the practical application of findings, and help to promote structural, societal changes that can improve health.⁴⁶ It would seem that the principles of CBPR could be applied to all public health interventions, not just research studies, to advance EBPH as defined in this paper.

Another potential approach for engaging communities in EBPH is the use of community advisory boards. Such boards have been proposed as a means of involving individuals with ties to the community in designing the informed consent process. The intent is to enhance informed decision making by potential subjects recruited from that same community.⁴⁷ These boards, however, could also be used to develop acceptable community-level, informed consent processes for public health interventions.

Effect on Desired Public Health Outcome

The ultimate determinant of the importance of any public health intervention, or approach such as EBPH, is whether the intervention achieved the intended outcome: reduced mortality, improved quality of life, decreased risk factor prevalence, or increased adoption of a healthy lifestyle. Just as for EBM, the most rigorous examination of the effectiveness of EBPH is prevented by methodologic and ethical constraints.¹⁷ EBPH, in fact, may be even more difficult to evaluate due to the

complexity of communities and public health interventions. Nevertheless, the methodologic developments described previously will enable better understanding of the strengths and weaknesses of EBPH in practice.

Summary

Evidence-based medicine has transformed the practice of medicine in significant ways by providing the techniques to access and improve the science base on which to base clinical decisions.³² The success of EBM has led to a broader adoption of evidence-based approaches in a number of fields and has fostered the development of EBPH. As does EBM, the field of EBPH continues to evolve with respect to methods and practice. As part of that evolution, contemporary perspectives on public health that view communities as part of the public health system¹ suggest that a new definition of EBPH, as we offer here, might be warranted.

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