

Introduction

*Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?*
T. S. Eliot, *The Rock* (1934).

Abstract: *This chapter presents the objectives and context for this report, defines the key concepts used throughout the report, and describes the approach of the Institute of Medicine (IOM) Committee on Reviewing Evidence to Identify Highly Effective Clinical Services to undertaking the study. The committee was charged with recommending an organizational framework for assessing evidence on clinical effectiveness so that consumers, clinicians, professional specialty societies, payers, purchasers, and other decision makers have independent, valid information for making health care decisions. The central premise underlying the report is that decisions about the care of individual patients should be based on the conscientious, explicit, and judicious use of the current best evidence on the effectiveness of clinical services. The conceptual context is the continuum beginning with research evidence, moving to systematic review of the overall body of evidence, and then to interpretation of the strength of the overall evidence for developing evidence-based clinical practice guidelines. The report provides a general blueprint for a national clinical effectiveness assessment program (the Program) with responsibility for three fundamental processes: (1) setting priorities for evidence assessment, (2) assessing evidence (systematic review), and (3) developing (or endorsing) standards for evidence-based clinical practice guidelines.*

In the early 21st century, despite unprecedented advances in biomedical knowledge and the highest per capita health care expenditures in the world, the quality and outcomes of health care vary dramatically across the United States (Fisher et al., 2003a, 2003b; Fisher and Wennberg, 2003; McGlynn et al., 2003). The economic burden of constantly inflating health care spending is weakening American industry's competitive edge and in the global economy, and this burden is increasingly being transferred to consumers as they are held more financially at risk for the health care services that they use (Gabel et al., 2002; U.S. Government Accountability Office, 2006a, 2006b; Webster, 2006). Enabling and incentivizing "consumer choice" is viewed by some as a potential market strategy to rationalize what most agree is a health care system plagued by overuse, underuse, and misuse (Schwartz, 1984; Wennberg, 2004). Yet even the most sophisticated health care consumer struggles to learn which care is appropriate for his or her circumstance and to obtain it at the right time (Berwick, 2003; Rettig et al., 2007; Wennberg, 2002).

With these trends in view, the Robert Wood Johnson Foundation (RWJF) asked the Institute of Medicine (IOM) to address problems in how the nation uses scientific evidence to identify the most effective clinical services. The IOM appointed the Committee on Reviewing Evidence to Identify Highly Effective Clinical Services in June 2006 to respond to the RWJF's request and prepare this report. The 16-member committee included experts in clinical research, health care

coverage, drug development, health care benefits selection (large employers and other purchasers), health care delivery, clinical guideline development, economics, statistical methods and epidemiology, consumer and patient perspectives, child health, preventive medicine, behavioral health, and ethics. Brief biographies of the committee members appear in Appendix G.

STUDY SCOPE

The committee was charged with recommending a sustainable, replicable approach to identifying and evaluating the clinical services that have the highest potential effectiveness. The charge specified three principal tasks:

- (1) To recommend an approach to identifying highly effective clinical services across the full spectrum of health care services—from prevention, diagnosis, treatment, and rehabilitation, to end of life care and palliation.
- (2) To recommend a process to evaluate and report on evidence on clinical effectiveness.
- (3) To recommend an organizational framework for using evidence reports to develop recommendations on appropriate clinical applications for specified populations.

The committee's initial deliberations focused on articulating its charge in a strategic work plan for the 18-month study period. The committee chose to focus on developing an organizational framework for a national clinical effectiveness assessment program, referred to throughout the report as "the Program." The mission of the Program would be to optimize the use of evidence to identify effective health care services. Three functions would be central to this mission: setting priorities for conducting evidence assessments, conducting evidence assessments (systematic review), and developing (or endorsing) standards for trusted clinical practice guidelines. The objective of this report is twofold: first, to examine the scientific rationale for these three functions and, second, to recommend an organizational context for implementing the three functions.

The committee reviewed, and ultimately excluded, a number of topics that might be related to the charge including cost-effectiveness, knowledge transfer and adherence to guidelines, program costs and sources of program funding, placement of the program (e.g., within a governmental or private sector framework), patient values and preferences, legal issues, and technical methods underlying evidence assessment or guideline development.

The committee explored the relevance of cost and cost-effectiveness analysis (CEA) to the committee's charge over the course of several meetings. The committee decided not to make recommendations about the role of costs in evaluating clinical services for two reasons. First, in the United States, the role of cost in government health policy and coverage decisions, clinical guidelines, and practice measures is unresolved albeit often debated (Congressional Budget Office, 2007; Medicare Payment Advisory Commission, 2007; Wilensky, 2006). Although CEA has been used for decades to estimate the relative value of alternative health interventions, particularly with respect to new prescription medications, most policy makers do not use it explicitly. Many policy makers believe information on cost-effectiveness has the potential to guide more efficient use of health care resources. The committee noted, however, that—regardless of the cost side of the equation—reliable cost-effectiveness analysis depends on high quality evidence on effectiveness. In fact, the Medicare Payment Advisory Commission has recommended that before policy makers routinely employ CEA for decision making, they must address concerns about CEA methods, including how to assess the effectiveness of health services (Medicare

Payment Advisory Commission, 2005). By this reasoning, high quality comparative effectiveness research is a prerequisite to performing valid cost-effectiveness analyses. Second, RWJF, the sponsor of this study, urged the committee to limit its work to the non-cost issues related to determining the effectiveness of health care services. Following the completion of the IOM study, RWJF intends to fund additional research into how cost affects access to effective health care services (Lumpkin, 2006).

The committee also discussed at length whether the report should delve into issues related to knowledge transfer and adherence to clinical guidelines. Clearly, identifying effective health services is just one step toward ensuring an effective health care system. There is little value to identifying effective services or developing evidence-based practice guidelines, if the knowledge gained does not lead to higher quality health care delivery and improved patient outcomes. However, setting standards for best practices (e.g., through clinical guidelines) differs fundamentally from successfully implementing them through quality improvement projects, which take place at a local level.

STUDY METHODS

The committee deliberated during five in-person meetings and 14 telephone conferences between July 2006 and October 2007. As previously noted, during its early discussions, the members of the committee agreed to first develop a strategic work plan for organizing the study. This soon led to a primary focus on three processes deemed integral to identifying effective health care services.

Given the dynamic nature of the issues involved in the study, the committee decided to supplement its planned review of the relevant literature with expert testimony on current issues. It thus convened two public workshops. The first workshop, held in November 2006, focused on evidence generation, evidence synthesis, and evidence assessment of new health care technologies and new applications of existing technologies. The committee heard testimony from various experts, including the developers of health care technologies, government regulators, research scientists, and technology assessors, on their experiences with the use of positron-emission tomography scanning for the diagnosis of Alzheimer's disease; pharmacotherapy with bevacizumab (Avastin) and ranibizumab (Lucentis) for age-related macular degeneration; and two technologies related to the early identification and treatment of colorectal cancer, that is, the fecal DNA screening test and an assay to test toxicity for the chemotherapy agent irinotecan.

The second workshop, held in January 2007, focused on organizations that set priorities for developing systematic reviews, clinical practice guidelines, and practice standards. The committee heard testimony from senior representatives of the Agency for Healthcare Research and Quality (AHRQ), the U.S. Preventive Services Task Force (USPSTF), Consumers Union's Best Buy Drugs, the American Heart Association (in collaboration with the American College of Cardiology), the National Quality Forum, the National Committee for Quality Assurance, the Joint Commission, the American Medical Association (AMA)-convened Physician Consortium for Performance Improvement, United Healthcare, the Cochrane Collaboration, the Blue Cross and Blue Shield Association Technology Evaluation Center (an Evidence-based Practice Center), Johnson & Johnson, the ECRI Institute, Genentech, and the Dartmouth-Hitchcock Department of Orthopedic Surgery. In addition to oral testimony, the experts provided written responses to the committee's questions.

Appendix B provides further details on the public workshops.

CONTEXT FOR THIS REPORT

Conceptual Framework

The committee based its work on the central premise that decisions about the care of individual patients should be based on “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett et al., 1996). This means that individual clinical expertise should be integrated with the best information from scientifically based, systematic research and should be applied in light of the patient’s unique values and circumstances (Straus et al., 2005). Centering on the patient is integral to improving the quality of health care (IOM, 2001) and is also imperative if consumers are to take an active role in making informed health care decisions based on known risks and benefits. The committee also recognizes that health care resources are finite. Thus, setting priorities for the systematic assessment of the scientific evidence is essential.

What Is Evidence?

In the everyday sense, “evidence” is considered a collection of facts that ground one’s belief that something is true (Dictionary.com, 2007). In searching for evidence that a health care service is highly effective, the notion of what constitutes evidence is more complex. It also depends on one’s perspective. In a systematic review of the different views on the nature of evidence, Lomas and colleagues (2005) observed that scientists view evidence as knowledge that is explicit (codified and propositional), systematic (with transparent and explicit methods used to codify the evidence), and replicable. However, outside the research community, decision makers, such as patients, clinicians, health plan managers, and employers, see evidence as being more contextual. For the decision maker, scientific evidence demonstrates what works under ideal circumstances, but it has relevance only when it is adapted to a particular set of circumstances. Someone must interpret the evidence for it to be used to guide clinical decision making.

Who Is a Health Care Decision Maker?

The era of physician as sole health care decision maker is long past. In today’s world, health care decisions are made by multiple persons, individually or in collaboration, in multiple contexts for multiple purposes. Decision makers are likely to be the consumer choosing among health plans, patients or the patients’ caregivers making treatment choices, payers or employers making health care coverage and reimbursement decisions, professional medical societies developing practice guidelines or clinical recommendations, regulatory agencies assessing new drugs or devices, and public programs developing population-based health interventions. Every decision maker needs credible, unbiased, and understandable evidence on the effectiveness of health care services.

Conceptual Context for the Study

The committee defined the conceptual context for this study as the continuum that begins with research evidence and that then moves to a scientific, systematic review of the overall body of evidence and then to the interpretation of the strength of the overall evidence for the development of trusted clinical practice guidelines (Figure 1-1). The systematic review is an essential element of scientific inquiry into what is known and not known about what works in health care

(Glasziou and Haynes, 2005; Helfand, 2005; Mulrow and Lohr, 2001; Steinberg and Luce, 2005). The strength of the evidence depends on the quality of the individual studies that comprise the body of evidence, the combined number of participants and events observed in the relevant studies, the consistency of the findings of the relevant studies, and the magnitude of the observed effects (Higgins and Green, 2006; Khan et al., 2001; West et al., 2002).

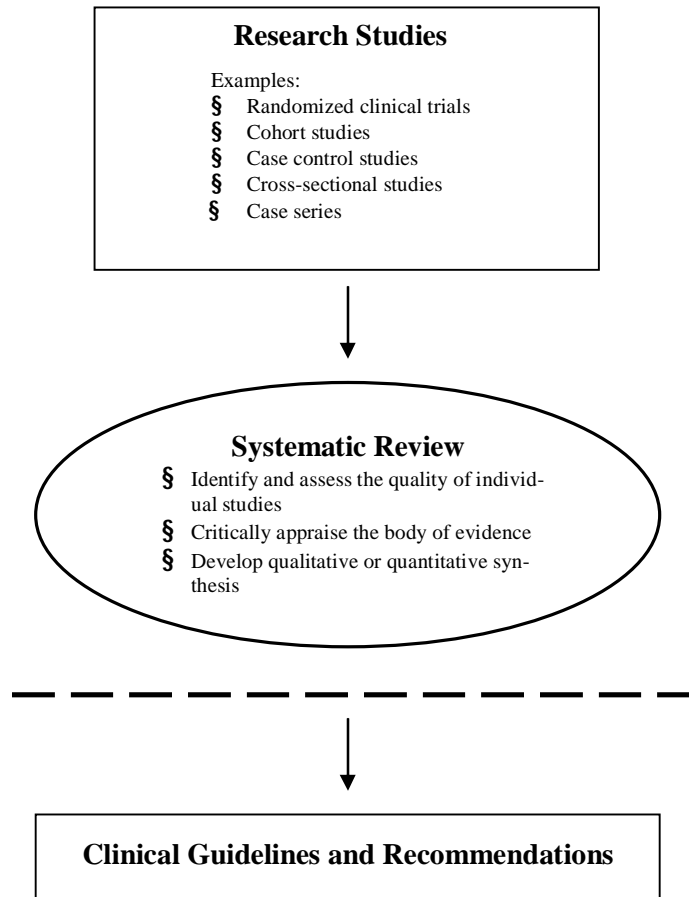


FIGURE 1-1 Continuum from research studies to systematic review to development of clinical guidelines and recommendations.

NOTE: The dashed line is the theoretical dividing line between the systematic review of the research literature and its application to clinical decision making, including the development of clinical guidelines and recommendations. Below the dashed line, decision makers and developers of clinical recommendations interpret the findings of systematic reviews to decide which patients, health care settings, or other circumstances they relate to.

SOURCE: Adapted from *Systems to Rate the Strength of Scientific Evidence* (West et al., 2002).

What Is an Effective Clinical Service?

The terms “effectiveness” and “clinical effectiveness” refer to the extent to which a specific intervention, procedure, regimen, or service does what it is intended to do when it is used under real world circumstances (Cochrane Collaboration, 2005; Last, 2001). Recently, numerous proposals have called for a large expansion in the generation of comparative effectiveness infor-

mation (BCBSA, 2007a; Congressional Budget Office, 2007; IOM, 2007; Medicare Payment Advisory Commission, 2007; The Health Industry Forum, 2006; Wilensky, 2006). These proposals call for systems to compare the impacts of different options for caring for a medical condition (e.g., prostate cancer) for a defined set of patients (e.g., men at high risk of prostate cancer recurrence). The comparison may be between similar treatments, such as competing prescription medications, or for very different treatment approaches, such as surgery or radiation therapy. Or, the comparison may be between using a specific intervention and its nonuse (sometimes called “watchful waiting”). This report uses the terms “effectiveness,” “clinical effectiveness,” and “comparative effectiveness” interchangeably.

See Box 1-1 for other key terms that are referred to in the report.

BOX 1-1 Selected Terms Used in the Report

Experimental study—A study in which the investigators actively intervene to test a hypothesis. **Controlled trials** are experimental studies in which an experimental group receives the intervention of interest while a comparison group receives no intervention, a placebo, or the standard of care and the outcomes are compared. In a **randomized controlled trial**, the participants are randomly allocated to the experimental group or the comparison group.

Observational or nonexperimental study—A study in which the investigators do not seek to intervene but simply observe the course of events. In **cohort studies**, groups with certain exposures or characteristics are monitored over time to observe an outcome of interest. In **case-control studies**, groups with and without an event or condition are examined to see whether a past exposure or event is more prevalent in one group than in the other. **Cross-sectional studies** determine the prevalence of a condition or an exposure at a specific time or time period. **Case series** describe a group of patients with a characteristic in common, for example, individuals undergoing a new type of surgery or the users of a new device.

Systematic review—A systematic review is a scientific investigation that focuses on a specific question and that uses explicit, preplanned scientific methods to identify, select, assess, and summarize the findings of similar but separate studies. It may or may not include a quantitative synthesis of the results from separate studies (meta-analysis). In this report, the term “systematic review” is used to encompass reviews that incorporate meta-analyses as well as reviews that present the study descriptively rather than inferentially.

Meta-analysis—The process of using statistical methods to combine quantitatively the results of similar studies in an attempt to allow inferences to be made from the sample of studies and applied to the population of interest.

Technology assessment—An assessment of the effectiveness of medical technologies that uses either single studies or systematic reviews.

SOURCES: Cochrane Collaboration (2005); Haynes et al. (2006); Last (2001); West et al. (2002).

Historical Context

This study occurs at a time when there is heightened interest in optimizing U.S. health care through the generation of new knowledge on the effectiveness of health care services. As noted earlier, numerous stakeholders, policy makers, and government entities have proposed substantial new investment in comparative effectiveness research (America’s Health Insurance Plans,

2007; BCBSA, 2007a; IOM, 2007; Medicare Payment Advisory Commission, 2007; Wilensky, 2006). These calls for the generation of evidence underscore the urgency of the concern that the nation's health care decision makers be able to discern which evidence is valid, for whom, and under what circumstances. Marked increases in the evidence base for health care decision making will inevitably bring a concomitant need for an increased capability for the synthesis and the interpretation of the evidence.

The recent efforts to expand comparative effectiveness research follow more than four decades of progress and setbacks in this area. Overall, there have been significant gains in the science of effectiveness research, from the adoption of randomized controlled trials in the 1960s to the introduction of technology assessment in the 1970s, the methodological advances of the 1980s, and the creation of the Cochrane Collaboration in the 1990s (Box 1-2). Along the way, various government entities and private organizations have been launched to perform clinical effectiveness research or have been given the responsibility for clinical effectiveness research. Many of these initiatives have faltered because of inadequate funding or political conflicts with vested interests (Gray, 1992; Gray et al., 2003). This committee hopes that the nation now has the will to address the urgent need to bolster the U.S. health care system with a foundation built on research evidence and scientific methods.

BOX 1-2 Selected Milestones in U.S. Efforts to Identify Effective Health Care Services

1930s	The U.S. Food and Drug Administration (FDA) is given authority to regulate the premarket review of new drugs for safety by the Federal Food, Drug, and Cosmetic Act (1938).
1960s	<p>Technology assessment arises on the basis of the recognition that modern technology may have unintended, harmful consequences.</p> <p>The Kefauver-Harris Drug Amendments expand the FDA's responsibilities to include evaluations of safety and effectiveness. Effectiveness must be proved by "substantial evidence" (1962).</p>
1970s	<p>Congress gives the FDA significant authority through the Medical Device Amendments to regulate the testing and marketing of medical devices to ensure their safety and efficacy (1976).</p> <p>ECRI (now the ECRI Institute) publishes its first monthly publication dedicated to assessing medical technologies (1971).</p> <p>Congress establishes the U.S. Office of Technology Assessment (OTA) (P.L. 92-484) to perform objective analyses of technologies, including health care services, to aid policy making (1972). (Congress eliminated funding for OTA in 1995.)</p> <p>Wennberg and colleagues document wide variations in physician practices, making evident that the style of U.S. health care practice is likewise variable (1973).</p> <p>Congress establishes the National Center for Health Care Technology (P.L. 95-623) in 1978 to conduct medical technology assessments related to Medicare coverage decisions. (The program was dissolved in 1981 after Congress cut its funding.)</p>
1980s	<p>RAND Corporation researchers document that large proportions of the procedures that physicians perform are inappropriate, as judged by evidence-based decision criteria.</p> <p>The Veterans Administration institutes a Technology Assessment Committee to make recommendations on priority technologies for assessment and appropriate methods for technology assessment (1984).</p> <p>The American College of Physicians initiates the Clinical Efficacy Assessment Project and begins publishing clinical guidelines (1981).</p> <p>The Blue Cross and Blue Shield Association (BCBSA) establishes the Technology Evaluation Center to assess medical technologies through comprehensive reviews of clinical evidence (1985).</p> <p>The Agency for Health Care Policy and Research (AHCPR) (now the Agency for Healthcare Research and Quality [AHRQ]) is created and is given the responsibility for federal health services research by the Omnibus Budget Reconciliation Act of 1989 (P.L. 101-239). The agency's Center for Medical Effectiveness Research forms several Patient Outcome Research Teams to study the outcomes and costs of alternative treatments for specific clinical problems.</p> <p>The Council of Medical Specialty Societies convenes a national meeting to promote guidelines and training programs for specialty societies and commissions the creation of a manual of evidence-based methods (1987).</p> <p>Significant methodological advances enable the generation and use of evidence in medical decisions. These include decision trees, utility theory, Bayes theorem for analyzing diagnostic tests, mathematical models, cost-effectiveness analysis, clinical epidemiology, outcomes assessment, meta-analysis, and systematic review.</p> <p>The U.S. Preventive Services Task Force (USPSTF) is convened in 1984 to evaluate research and issue guidelines for preventive interventions. It pioneers the use of comprehensive literature reviews and publishes the first <i>Guide to Clinical Preventive Services</i> in 1989.</p>
1990s	<p>AHCPR (now AHRQ) launches a program to create evidence-based guidelines (1990-1996).</p> <p>The Cochrane Collaboration creates a network of organizations from 13 countries, including the United States, to promote evidence-based health care through the production of systematic reviews and clinical guidelines (1993).</p>

BOX 1-2 Selected Milestones in U.S. Efforts to Identify Effective Health Care Services

Funding for AHCPR operations is seriously threatened in response to lobbying by a small group of orthopedic surgeons angered by a Patient Outcomes Research Team report on the treatment of back pain (1995-1996).

Congress eliminates funding for the Office of Technology Assessment (1995).

AHRQ establishes the Evidence-based Practice Centers (EPCs) program to produce reports on clinical evidence and technology assessments (1997).

AHRQ, the American Medical Association, and the American Association of Health Plans (now America's Health Insurance Plans) create the National Guideline Clearinghouse (1998).

Health plans, specialty societies, disease-based associations, and foundations create numerous programs that produce clinical guidelines.

The Centers for Medicare and Medicaid Services (CMS) establishes the Medicare Coverage Advisory Committee (now the Medicare Evidence Development and Coverage Advisory Committee) to provide objective assessments of the available evidence on the safety, efficacy, and clinical benefits of medical services or products for national coverage decisions (1998).

2000s CMS introduces Coverage with Evidence Development to generate data on the utilization and impacts of services being considered for a national Medicare coverage decision. The overall objective is to improve the evidence base for providers' recommendations to Medicare beneficiaries (2005).

AHRQ creates the Effective Health Care Program, authorized by Section 1013 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (P.L. 108-173) (2005).

The Institute of Medicine establishes the Roundtable on Evidence-Based Medicine (2006).

BCBSA, America's Health Insurance Plans, the Medicare Payment Advisory Commission, and others propose substantial new investment in comparative effectiveness research.

NOTE: The USPSTF was modeled on the Canadian Task Force on the Periodic Health Examination, which the Canadian Government created in 1976 to weigh the scientific evidence for and against using specific preventive services in asymptomatic populations (Canadian Task Force on Preventive Health Care, 2003).

SOURCES: Atkins et al. (2005); BCBSA (2007b); Canadian Task Force on Preventive Health Care (2003); CMS (2006); Congressional Research Service (2005); Eddy (2005); Gazelle et al. (2005); Gray et al. (2003); Helfand (2005); IOM (1985, 2006); Levin (2001); Steinberg and Luce (2005); USPSTF (2007).

ORIENTATION TO THE ORGANIZATION OF THE REPORT

This report provides a general blueprint for a national clinical effectiveness assessment program ("the Program"). The overall intent is to outline key Program functions and to recommend an overarching Program infrastructure. The following section describes the organization of the report and the objective of each chapter.

Chapter Objectives

This introductory chapter has described the objectives and context for this report, including the conceptual framework, key terminology, historical context, and methods used to perform the study. The subsequent chapters sequentially outline the building blocks of the Program, i.e., priority setting, assessing evidence (systematic review), and developing (or endorsing) standards for clinical practice guidelines. The final chapter explores how best to organize these three functions in an overarching Program with maximum potential to benefit patients and the health care system overall.

Chapter 2, *An Imperative for Change*, documents the imperative for immediate action to change how the nation marshals clinical evidence and applies it to endorse the use of the most effective clinical interventions.

Chapter 3, *Setting Priorities for Evidence Assessment*, provides the committee's findings and recommendations on setting priorities for evidence assessment (systematic review) and describes key programmatic challenges in establishing a priority setting process for the Program.

Chapter 4, *Systematic Reviews: The Central Link Between Evidence and Clinical Decision Making*, reviews how high quality evidence assessment (systematic review) is integral to identifying effective clinical services and presents the committee's recommendations for ensuring high quality evidence assessment. Key programmatic challenges are highlighted.

Chapter 5, *Developing Trusted Clinical Practice Guidelines*, presents the committee's findings and recommendations for developing (or endorsing) standards for trusted clinical practice guidelines. Key programmatic challenges are highlighted.

Chapter 6, *Building a Foundation for Knowing What Works in Health Care*, considers how the previous chapters' recommendations may best be implemented. It provides guiding principles, assesses three basic alternatives, and recommends a general organizational framework for the Program. Key programmatic challenges are highlighted.

REFERENCES

- America's Health Insurance Plans. 2007. *Setting a higher bar: We believe there is more the nation can do to improve quality and safety in health care*. Washington, DC: AHIP.
- Atkins, D., K. Fink, and J. Slutsky. 2005. Better information for better health care: The Evidence-based Practice Center program and the Agency for Healthcare Research and Quality. *Annals of Internal Medicine* 142(12 Part 2):1035-1041.
- BCBSA (Blue Cross and Blue Shield Association). 2007a. Blue Cross and Blue Shield Association proposes payer-funded institute to evaluate what medical treatments work best. <http://www.bcbs.com/news/bcbsa/blue-cross-and-blue-shield-association-proposes-payer-funded-institute.html> (accessed May 2007).
- . 2007b. *What is the Technology Evaluation Center?* <http://www.bcbs.com/betterknowledge/tec/what-is-tec.html> (accessed August 8, 2007).
- Berwick, D. M. 2003. *Escape fire: Designs for the future of health care*. San Francisco: Jossey-Bass.
- Canadian Task Force on Preventive Health Care. 2003. *CTFPHC history/methodology* <http://www.ctfphc.org/> (accessed July 24, 2007).
- CMS (Centers for Medicare and Medicaid Services). 2006. *National coverage determinations with data collection as a condition of coverage: Coverage with evidence development* http://www.cms.hhs.gov/mcd/ncpc_view_document.asp?id=8 (accessed July 24, 2007).
- Cochrane Collaboration. 2005. *Glossary of terms in the Cochrane Collaboration. Version 4.2.5.* www.cochrane.org (accessed November 27, 2006).
- Congressional Budget Office. 2007. Research on the comparative effectiveness of medical treatments: Options for an expanded federal role. *Testimony by Director Peter R. Orszag before House Ways and Means Subcommittee on Health*, http://www.cbo.gov/ftpdocs/82xx/doc8209/Comparative_Testimony.pdf (accessed June 12, 2007).
- Congressional Research Service. 2005. *Technology assessment in Congress: History and legislative options, CRS report to Congress*. Washington, DC: Library of Congress.
- Dictionary.com. 2007. Results for "evidence". *Dictionary.com Unabridged (v 1.1)*, <http://dictionary.reference.com/browse/evidence> (accessed October 2, 2007).

- Eddy, D. M. 2005. Evidence-based medicine: A unified approach. *Health Affairs* 24(1):9-17.
- Eliot, T. S. 1934. The Rock. In *T.S. Eliot's drama: A research and production sourcebook* edited by Randy Malamud in 1992: Greenwood Press.
- Fisher, E. S., D. E. Wennberg, T. A. Stukel, D. J. Gottlieb, F. L. Lucas, and E. L. Pinder. 2003a. The Implications of Regional Variations in Medicare Spending. Part 1: The Content, Quality, and Accessibility of Care. *Annals of Internal Medicine* 138(4):273.
- . 2003b. The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care. *Annals of Internal Medicine* 138(4):288.
- Fisher, E. S., and J. E. Wennberg. 2003. Health care quality, geographic variations, and the challenge of supply-sensitive care. *Perspectives in Biology and Medicine* 46(1):69-79.
- Gabel, J. R., A. T. Lo Sasso, and T. Rice. 2002. Consumer-driven health plans: Are they more than talk now? *Health Affairs*:w2.395.
- Gazelle, G. S., P. M. McMahon, U. Siebert, and M. T. Beinfeld. 2005. Cost-effectiveness analysis in the assessment of diagnostic imaging technologies. *Radiology* 235(2):361-370.
- Glasziou, P., and B. Haynes. 2005. The paths from research to improved health outcomes. *ACP Journal Club* 142(2):A8-A10.
- Gray, B. H. 1992. The legislative battle over health services research. *Health Affairs* 11(4):38-66.
- Gray, B. H., M. K. Gusmano, and S. Collins. 2003. AHCPR and the changing politics of health services research. *Health Affairs*:w3.283.
- Haynes, R. B., D. L. Sackett, G. H. Guyatt, and P. Tugwell. 2006. *Clinical epidemiology: How to do clinical practice research*. 3rd ed. Philadelphia, PA: Lipincott Williams & Wilkins.
- Helfand, M. 2005. Using evidence reports: Progress and challenges in evidence-based decision making. *Health Affairs* 24(1):123-127.
- Higgins, J. T., and S. Green. 2006. *Cochrane handbook for systematic reviews of interventions 4.2.6 [updated September 2006]*, *The Cochrane Library, Issue 4, 2006*. Chichester, UK: John Wiley & Sons, Ltd.
- IOM (Institute of Medicine). 1985. *Assessing medical technologies*. Washington, DC: The National Academies Press.
- . 2001. *Crossing the quality chasm: A new health System for the 21st Century*. Washington, DC: National Academies Press.
- . 2006. *Safe medical devices for children*. Edited by Field, M. J. and H. Tilson. Washington, DC: National Academies Press.
- . 2007. *Learning what works best: The nation's need for evidence on comparative effectiveness in health care*. Washington, DC: The National Academies Press. <http://www.iom.edu/ebm-effectiveness>.
- Khan, K. S., G. Riet, J. Popay, J. Nixon, and J. Kleijnen. 2001. Stage II Conducting the review: Phase 5 Study quality assessment. In *CRD Report Number 4*, edited by Khan, K. S., G. ter Riet, H. Glanville, A. J. Sowden and J. Kleijnen. York: NHS Centre for Reviews and Dissemination, University of York.
- Last, J. M. 2001. *A dictionary of epidemiology*. New York: Oxford University Press.
- Levin, A. 2001. The Cochrane Collaboration. *Annals of Internal Medicine* 135(4):309-312.
- Lomas, J., T. Culyer, C. McCutcheon, L. McAuley, and L. Law. 2005. *Conceptualizing and combining evidence for health system guidance*. Ottawa (Ontario): Canadian Health Services Research Foundation.
- Lumpkin, J. R. 2006. *Presentation to the HECS Committee Meeting July 24, 2006*. Washington, DC.
- McGlynn, E. A., S. M. Asch, J. Adams, J. Keesey, J. Hicks, A. DeCristofaro, and E. A. Kerr. 2003. The quality of health care delivered to adults in the United States. *The New England Journal of Medicine* 348(26):2635-2645.
- Medicare Payment Advisory Commission. 2005. Chapter 8: Using clinical and cost effectiveness in Medicare. (accessed June 2005).

- . 2007. Chapter 2: Producing comparative effectiveness information. 29-54, http://www.medpac.gov/documents/Jun07_EntireReport.pdf (accessed June 2007).
- Mulrow, C., and K. Lohr. 2001. Proof and policy from medical research evidence. *Journal of Health Politics, Policy and Law* 26(2):249-266.
- Rettig, R., P. Jacobsen, C. Farquhar, and W. Aubrey. 2007. *False hope: Bone marrow transplantation for breast cancer*. New York: Oxford University Press.
- Sackett, D. L., W. M. C. Rosenberg, J. A. M. Gray, R. B. Haynes, and W. S. Richardson. 1996. Evidence based medicine: What it is and what it isn't. *BMJ* 312(7023):71-72.
- Schwartz, J. S. 1984. The role of professional medical societies in reducing practice variations. *Health Affairs* 3(2):90-101.
- Steinberg, E. P., and B. R. Luce. 2005. Evidence based? Caveat emptor! *Health Affairs* 24(1):80-92.
- Straus, S. E., P. Glasziou, W. S. Richardson, and R. B. Haynes. 2005. *Evidence-based medicine: How to practice and teach EBM (3rd edition)*. London: Churchill Livingstone.
- The Health Industry Forum. 2006. *Comparative effectiveness forum: Key themes*. Washington, DC: The Health Industry Forum.
- U.S. Government Accountability Office. 2006a. *Consumer-directed health plans: Small but growing enrollment fueled by rising cost of health care coverage*. GAO-06-514. Government Printing Office.
- . 2006b. *Employee compensation: Employer spending on benefits has grown faster than wages, due largely to rising costs for health insurance and retirement benefits*. GAO-06-285. Government Printing Office.
- USPSTF (U.S. Preventive Services Task Force). 2007. *About USPSTF* <http://www.ahrq.gov/clinic/uspstfab.htm> (accessed July 28, 2007).
- Webster, P. 2006. US big businesses struggle to cope with health-care costs. *The Lancet* 367(9505):101-102.
- Wennberg, J. E. 2002. Unwarranted variations in healthcare delivery: Implications for academic medical centres. *BMJ* 325(7370):961-964.
- . 2004. Perspective: Practice variations and health care reform: Connecting the dots. *Health Affairs*:var.140.
- West, S., V. King, T. Carey, K. Lohr, N. McCoy, S. Sutton, and L. Lux. 2002. *Systems to rate the strength of scientific evidence. Evidence Report/Technology Assessment No. 47. (Prepared by the Research Triangle Institute-University of North Carolina Evidence-based Practice Center under Contract No. 290-97-0011). AHRQ Publication No. 02-E016*. Rockville, MD: Agency for Healthcare Research and Quality.
- Wilensky, G. R. 2006. Developing a center for comparative effectiveness information. *Health Affairs*:w572.