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A Research Agenda to Advance Quality Measurement and Improvement

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Background. In developing a conceptual framework for the design of a national quality measurement and reporting system (NQMRS), the Strategic Framework Board (SFB) recommends that such a system be built on a strong evidence base.

Objectives. To identify critical gaps in the evidence needed for a fully functional NQMRS and to recommend a starting point for the development of a research agenda.

Research Design. Selective review of literature in quality of care measurement and reporting and identification of strategic issues that must be addressed.

Findings. There is some limited evidence that measurement and reporting can improve quality. Substantial advances have been made in the science of measurement and reporting but important gaps remain, specifically in (1) measurement methods and tools, (2) uses of quality performance data, (3) organizational and cultural factors, (4) information and informatics, and (5) impact evaluation/research.

Conclusions. To achieve a sustainable research agenda, three strategic issues will have to be addressed: (1) the policy rationale for the research agenda, (2) adequate levels of public-sector funding, and (3) sustainability in a rapidly changing environment.

Key words: Impact evaluation; national quality measurement and reporting system; quality performance data; research agenda; Strategic Framework Board. (Med Care 2003; 41:I–80–I–86)

The measurement, reporting, and improvement of health care quality, although currently central to the health care policy and practice environment, are relatively new undertakings. The beginnings of systematic measurement have been traced back to Florence Nightingale during the Crimean War, through mortality data released in 1754 by a Pennsylvania hospital,[1] and to efforts by Ernest Codman, a surgeon at Massachusetts General Hospital in the early 20th century.[2] However, quality measurement, specifically as a tool for targeted intervention and public reporting by the health care industry, is a relatively recent phenomenon, spanning the last 30 years.

As a still-embryonic endeavor, critical deficiencies and gaps exist in many areas, which require careful consideration and definition of a research agenda. For purposes of this article, we will examine a focused set of research gaps or deficiencies, those that must be addressed to advance the mechanism(s) of measurement and reporting as a tool to systematically improve quality of care in the United States.[3]

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The Case for Investment in Quality Research

What is the case for the nation, through government-sponsored and foundation- and privately funded efforts, to invest in quality-of-care–related research? The fundamental argument is that if we do not know what is wrong with the current system—where current practice is failing to meet its potential—we cannot fix it. To answer that question, we must have reliable and valid tools for measuring quality, appropriate data to which such tools can be applied, adequate mechanisms for disseminating the results to those who can act on the information, and proper incentives in place to reward those who strive to improve quality and related health outcomes.

There are notable examples of sentinel research that has informed policy, management methods, and clinical practices in efforts to systematically improve the quality of care. Although the reduction of medical errors has recently emerged as a high priority, stimulated by the Institute of Medicine (IOM) report *To Err is Human*,[4] research in the early 1960s by E.M. Schimmel[5] found that approximately 20% of patients at a university hospital suffered from iatrogenic illnesses and/or medical errors and highlighted the importance of accreditation programs and internal quality control. Wennberg's reports[6,7] of unexplained regional variation in health care services have led to a body of methodologic and empirical work on underuse, overuse, and misuse of health care services over the past three decades. Beginning in the late 1970s, Luft and colleagues[8] documented an empirical relationship between surgical volume and mortality for 12 procedures, which led to designating "centers of excellence" and embracing management mechanisms such as selective contracting.[8–10] The Patient Outcomes Research Teams (PORTs), sponsored by the federal Agency for Healthcare Research and Quality (AHRQ), are one example of government-funded research initiatives that have influenced the practice and delivery of health care. For example, AHRQ's stroke-prevention PORT stimulated the Peer Review Organizations to implement more than 70 projects in 42 states to increase the proportion of stroke patients undergoing anticoagulation therapy. Increasing anticoagulation therapy rates from 58% to 71% may have prevented as many as 1,300 strokes.[11]

Each of these research projects provided insight into the presence and nature of a quality problem, which in turn enabled the development of programs to improve care. Investing in the science of measuring and reporting on quality of care will enable the nation to realize the benefits of advances in medicine. A new drug, technology, or surgical technique must be routinely used with appropriate patients to maximize its potential. Quality measurement and reporting represent key links in the process of accelerating the diffusion of advances in medicine and assuring their proper application.

Defining a Quality Research Agenda

With use of the conceptual framework developed by the Strategic Framework Board (SFB) (see Fig. 1 in McGlynn[3]) and a selective review of the literature to identify gaps and deficiencies, a research agenda can be defined for the task of supporting the implementation of a national quality measurement and reporting system (NQMRS).

We begin by identifying the key research questions that are linked to the conceptual framework and in turn relate these questions to the larger body of literature on measurement and reporting. The SFB also used a model (see Fig. 1 in Berwick et al[12]) of how measurement and reporting can lead to improvements in care. This model posits that, for improved care to occur, both pathways in the model (accountability/selection and change) must be activated and neither is working effectively at present. The key research needs derived from the model focus on identifying how measurement and reporting functions can influence both selection and behavioral change more routinely.

Specific Research Gaps and Deficiencies

A selective review of published and unpublished literature was conducted to evaluate research strengths and weaknesses. Because of rapid changes within the state of the art, only literature from 1995 to 2000 was reviewed. The goal was to describe research needs by identifying general areas of research gaps and illustrative specific research questions or topics. Table 1 summarizes the priorities we identified. Five broad categories of research needs emerged from the literature:

TABLE 1. Research Priorities: Critical Needs

- The need to improve measurement methods and tools
  - Assessing the validity of data sources
  - Developing common measures for important areas
  - Developing better measures of case-mix/severity
  - Improving specific methodologic deficiencies (in areas such as survey research and attribution analysis)
- Improving the use and effectiveness of performance data
  - Identifying exactly what data, in what format is most usable
  - Determining the role of the public;
    - —What threshold of awareness is necessary to stimulate?
    - —Assessing intended/unintended effects of public engagement
  - Determining most effective means to increase clinician use of data
- Organizational, cultural and professional attributes and actions
  - Assessing the impact of incentives (financial and non-financial) for quality improvement
  - Evaluating evidence of effectiveness for commonly used strategies, guidelines, quality teams, data feedback, etc.
  - Determining structural, cultural, and organizational features which correlate with higher quality performance
  - Business case for quality from the provider perspective
- Building clinical informatics capacity
  - Identify high priority conditions with necessary subset of data elements
  - Evaluate most effective method for clinician entry and use of data
  - Analyze options for predictable investment in capacity building
- Evaluating impact
  - Describe the evidence base to support quality measurement and reporting as a mechanism to improve care
  - Evaluate impact of measurement and reporting on patient care and patient outcomes
  - Evaluate impact on costs (at various levels to various constituents)

- Measurement methods and tools
- Use(s) of quality performance data
- Organizational and cultural factors
- Information and informatics
- Impact evaluation/research

The Need to Improve Measurement Methods and Tools. Research in this area is aimed at improving the measurement tools we have. Impressive progress has been made in this relatively young field, but notable deficiencies remain. Four specific subtopics with illustrative questions can be defined:

- Assessing the validity of data sources: what is the validity of the most widely used data sources—medical record, administrative data, and respondent survey—for measuring quality? How can the validity and reliability be improved?
- Developing a comprehensive set of measures: which critical areas for quality improvement are lacking adequate measures? We identified gaps in measurement for mental health and substance abuse services, rare clinical conditions, children, and obstetrics. Reflecting the historic focus of quality efforts on hospitals and health plans in the past decade, there are inadequate quality measures available for ambulatory, long-term care, and home health care.[13–15] Measures related to patient safety and error reduction are needed across all care settings; inpatient hospital measures currently dominate this area.
- Developing better measures of case-mix and severity of disease: further methodologic research is required to increase clinical meaningfulness and reliability and to specify the conditions under which case-mix and severity adjustment is warranted when using quality measurements.[16]
- Addressing methodologic weaknesses: several methods were identified as needing validation and/or further testing and refinement. For example, research to examine the usefulness of tools, such as paretogams or cause–effect diagrams, to diagnose the root cause of quality problems is lacking.[17] Survey instruments may need refinement as the average amount of error variance in typical health care measures is relatively greater than in other types of survey research.[18] Methods for valid attribution and accountability assignment at the provider level and for assessing variation inter- and intra-organizationally are needed.

Making Performance Data Usable. Berwick, James and Coye[12] posit that it is important to increase the use of performance data among those

exercising choice and selection as well as among those who use the data to improve the processes of care they deliver. Although there is much discourse and a sense of urgency to produce performance data that will inform decisions and choices on the part of clinicians, managers, payers, consumers, and policy-makers, there is insufficient research that clearly and unequivocally defines what kinds of data propel what kinds of actions. One review of the evidence suggests that publicly reported information has had little impact on provider motivation to improve quality.[19]

Common sense dictates that careful scrutiny of detailed quality-of-care data will not appeal to the public at large. Therefore, it is important to determine what level of awareness is required by the public to provide sufficient demand to improve performance in the health care market. Research is also needed to define the data and levers for change necessary to induce providers to systematically pursue evidence-based quality improvement.

Identifying Organizational and Cultural Attributes Linked with Improvements in Quality. Too often, quality measurement is perceived as an end rather than as a means to an end. The end can be identified as systematic quality improvement in a health care system. An NQMRS is one mechanism to focus attention and resources on areas to improve quality of care, service, or outcome.

Local acknowledgement of a problem, coupled with dedicating resources to ameliorate it, is believed to be significantly driven by organizational environment and/or cultural milieu. Understanding the cultural dimension has been, and must continue to be, a high priority area for research. Critical research areas include:

- Identifying organizational features that correlate with higher quality of care and structural measures that predict quality[20–22]
- Evaluating the impact of incentives (financial and nonfinancial) on quality[23,24]
- Understanding the impact of physician leadership in promoting quality improvement[25,26]

Clinical Informatics Capacity Essential for Quality. Much of quality improvement is reliant on information technology (IT) and medical informatics, as was described in the paper by James in this issue of *Medical Care*.[27] For example, the IOM report, *To Err Is Human*,[4] finds that an underlying cause of medical errors and unnecessary deaths is the lack of the right information available to caregivers and patients at the right time. The same deficiency of clinical information that impedes systemic and systematic efforts to improve quality of care at the bedside also deters population-based measurement and reporting improvement efforts.

An adequate clinical information set to support meaningful quality and measurement capabilities for the nation will require investments in IT and routine input of data by clinicians. Even if investment problems were solved, we would still be left with uneven acceptance and use of automated data by clinicians. The priority research questions for clinical informatics are:

- Which methods work best to get clinicians to routinely and preferentially use automated data systems for the generation and storage of medical records?
- How should we identify the subset of data elements that are essential to clinical process management, improvement, and reporting?

Impact of Quality Measurement and Reporting. A curious aspect of the field of quality measurement and reporting is the relative dearth of objective measurement of its impact. In other words, objective evaluation with a feedback loop for learning, which is a fundamental tenet of quality improvement, is insufficient in its self-application. Much of the "evidence" of the effectiveness of quality measurement—its alleged power to lead to quality improvement—is anecdotal narrative. Systematic research on the impact of quality measurement and reporting is desperately needed to point toward proven mechanisms. Priority questions would include:

- What evidence exists to support quality measurement and reporting as a mechanism to improve care?[28]
- What impact does quality measurement and reporting have on direct patient care?[23,29]
- What are the intended and unintended consequences of measurement and public reporting on clinical practice,[30] systems improvements, and policy-making at state and federal levels?

Strategic Issues

Defining research gaps and needs is one step toward realizing an adequate and sustainable

quality research agenda. Three other strategic considerations require attention: the policy rationale, funding mechanisms, and sustainability.

Policy Rationale

The policy framework or rationale is a prerequisite for a sustainable research agenda. An explicit public statement of the important role of quality measurement, reporting, and improvement has been articulated by the Advisory Commission on Consumer Protection and Quality in the Health Care Industry.[31] However, missing from that document was a detailed research agenda including a long-term funding strategy. Measurement and reporting is increasingly viewed as a critical competency to improve health care quality. There is insufficient attention to identifying the associated resources required, including research and development. Realizing the high expectations, priority must be given to improving the efficiency and impact of current measurement methods, creating the requisite informatics infrastructure, and focusing on areas in which evidence exists that measurement differences are meaningful and that performance data leads to constructive change.

Funding

There is little reason to believe that the private sector will be a reliable and significant funding source. Thus far, private-sector interest in funding methodologic research into quality measurement and reporting has been weak, notwithstanding such notable initiatives as the Coordinated Autos/United Auto Workers Reporting System for Health Plan Performance[32] and the Leapfrog Group,[33] as well as various private foundation initiatives. Because the incentives for industry funding are not readily identifiable and private foundations' missions often lie elsewhere, the most likely funding source is the federal government.

This is not an unreasonable assumption. The federal government currently spends $20 billion to support biomedical research through the National Institutes of Health (NIH). By contrast, the fiscal year 2003 President's budget for the Agency for Healthcare Research and Quality (AHRQ) is less than 1% of the President's fiscal year 2003 NIH budget, with a significant portion coming from a 1% "tap" on other federal health agencies' budgets. Yet AHRQ's health services research complements the biomedical research of the NIH by helping clinicians, patients, and health care institutions make choices about what treatments work best, for whom, when, and at what cost. Closing this gap between basic science research and its dissemination and use is one reason why we believe that the current investment in health care quality measurement, reporting, and improvement is inadequate.

Further investment in AHRQ as the government's primary funding source of such research would likely pay significant dividends in terms of lower health costs and better health quality. To determine an appropriate funding level, it may be useful to examine the level of investment made by other sectors of the economy for similar activities. Such investigations would (1) aid in forming a national consensus around the level of investment, (2) provide an empirical justification for the recommended budget allocation, and (3) possibly help to garner political support for such a recommendation. As a result of such studies, a target level of funding should be established as a proportion of total health care spending allocated to research in quality measurement, reporting, and improvement.

In particular, it is imperative to determine who will make the necessary resource investment to build the information systems capability. Currently, there is a spirited debate over whether this is a private-sector responsibility or one that rightly belongs to the public sector. In the meantime, investment is made in the private and public sectors, but without an overarching design or coordination of research and development, resulting in disjointed, inefficient, and unpredictable initiatives.

Research is needed to determine the investments in information systems and other infrastructure development that are necessary to support quality improvement efforts. The health care sector in the United States lags behind other industries in its investment in information infrastructure. By studying and establishing an investment target, AHRQ could establish the level of increases that are necessary to support an NQMRS.

Sustainability

Critical to successful long-term funding of quality measurement and reporting research is consid-

eration of the rapid pace of health services innovation. Whatever the source, the chief funding mechanism(s) must build in a systematic process for updating tools and methods to keep pace with changes in clinical care, service provision, and population health. We must move beyond isolated research studies to defining the body of work to advance the state of the art while simultaneously effecting change in the delivery and outcomes of health care.

Research can support advances in the quality-of-care field. It can provide a foundation of information and evidence to effect national changes in clinical practice, shape formulation of regulation and oversight, and guide management decision-making.

Conclusions

The SFB has proposed a design for an NQMRS that is evidence-based. A clear implication of this recommendation is the need to examine the adequacy of the evidence base for quality measurement and reporting. In so doing, we, not surprisingly, found deficiencies that require attention if the NQMRS is to be successful. A more formal, consensus-driven mechanism for creating a full research agenda around quality measurement and reporting would likely accelerate the development of appropriate studies. In the meantime, we have identified some key areas that require attention (measurement methods and tools, uses of performance data, organizational and cultural factors, information and informatics, and impact evaluation/research). Private and public funding agencies might use these areas to set research priorities in the near term. In addition to identifying the key areas that require research, we highlight the importance of addressing three strategic concerns: the policy rationale, adequate funding levels, and sustainability. These issues will have to be resolved to ensure that the NQMRS has an adequate evidence base to inform decisions in the future.

References

1. **Lansky D.** Measuring what matters to the public. Health Aff (Millwood) 1998;17:40–41.

2. **Codman EA.** A Study in Hospital Efficiency as Demonstrated by the Case Report of the First Five Years of a Private Hospital. (Published privately, 1916.) Reprinted by the Joint Commission for the Accreditation of Healthcare Organizations; 1998.

3. **McGlynn EA.** Introduction and overview of conceptual framework for a national quality monitoring and reporting system. Med Care 2002;41(suppl):XX–XX. (In this issue – Please update.)

4. **Institute of Medicine.** To Err Is Human. Washington, DC: National Academy Press; 2000.

5. **Schimmel EM.** Hazards of hospitalization. Ann Intern Med 1964.

6. **Wennberg J, Gittelsohn A.** Small area variations in health care delivery. Science 1973;182:1102–1108.

7. **Wennberg J, Gittelsohn A.** Variations in medical care among small areas. Sci Am 1982;246:120–134.

8. **Luft HS, Bunker JP, Enthoven AC.** Should operations be regionalized? The empirical relation between surgical volume and mortality. N Engl J Med 1979;301:1364–1369.

9. **Luft HS.** The relation between surgical volume and mortality: an exploration of causal factors and alternative models. Med Care 1980;18:940–959.

10. **Bunker JP, Luft HS, Enthoven AC.** Should surgery be regionalized? Surg Clin North Am 1982;62:657–668.

11. **Agency for Healthcare Research and Quality (AHRQ).** Impact: Case Studies Notebook. Compiled by the Office of Health Care Information; 2000.

12. **Berwick DM, James B, Coye MJ.** The connections between quality measurement and improvement. Med Care 2002;41(suppl):XX–XX. (In this issue – Please update.)

13. **Lohr KN.** How do we measure quality? Health Aff (Millwood) 1997;16:22–25.

14. **Baskin ST, Shortell SM.** Total quality management: needed research on the structural and cultural dimensions of quality improvement in health care organization. J Health Admin Ed Winter 1995;13:143–154.

15. **McGlynn EA.** Six challenges in measuring the quality of health care. Health Aff (Millwood) 1997;16:7–21.

16. **Eisenberg JM.** Health services research in a market-oriented health care system. Health Aff 1998;17:98–108.

17. **Grol R.** Research and development in quality of care: establishing the research agenda. Qual Health Care 1996;5:2325–2242.

18. **Mishre DP.** An empirical assessment of measurement error in health care survey research. J Bus Res 2000;48:193–205.

19. **Marshall M, Shekelle PG, Leatherman S, et al.** What do we expect to gain from the public release of performance data? A review of the evidence. JAMA 2000;283:1866–1874.

20. **O'Kane M.** Who will synthesize and disseminate research findings for users? FrontLines, June 1998. Available at: http://www.ahsr.org/publications/frontline/june98/quality.htm.

21. **Kerr EA, Mittman BS, Hays RD, et al.** Managed care and capitation in California: how do physicians at financial risk control their own utilization? Ann Int Med 1995;123:500–504.

22. **Kerr EA, Mittman BS, Hays RD, et al.** Quality assurance in capitated physician groups. Where is the emphasis? JAMA 1996;276:1236–1239.

23. **Chassin MR.** Assessing strategies for quality improvement. Health Aff (Millwood) 1997;16:151–161.

24. **Ogrod ES.** Compensation and quality: a physician's view. Health Aff (Millwood) 1997;16:82–86.

25. **Weiner BJ, Shortell SM, Alexander JA.** Promoting clinical involvement in hospital quality improvement efforts: the effects of top management, board, and physician leadership. Health Serv Res 1997;32:491–510.

26. **Shortell SM, Bennett CL, Byck GR.** Assessing the impact of continuous quality improvement on clinical practice: what it will take to accelerate progress? Milbank Q 1998;76:593–624.

27. **James B.** Information system concepts for quality measurement. Med Care 2002;41(suppl):I-71–I-79.

28. **Pettiti DB, Contreras R, Ziel FH, et al.** Evaluation of the effect of performance monitoring and feedback on core process, utilization and outcome. Diabetes Care 2000;23:192–196.

29. **Blumenthal D.** The role of physicians in the future of quality management. N Engl J Med 1996; 335:1328–1331.

30. **Casalino LP.** The universal consequences of measuring the quality of medical care. N Engl J Med 1999;341:1147–1150.

31. **Advisory Commission on Consumer Protection and Quality in the Health Care Industry.** Quality First: Better Health Care for All Americans. Final Report to the President of the United States. Washington, DC: US Government Printing Office; 1999.

32. **McGlynn EA, Adams J, Hicks J, et al.** Creating a coordinated autos/UAW reporting system (CARS) for evaluating health plan performance. Santa Monica, CA: RAND; 1999. DRU-2123-FMC.

33. **Milstein A, Galvin RS, Delbanco SF, et al.** Improving the safety of health care: the leapfrog initiative. Eff Clin Pract 2000; 3:313–316.