Physician performance improvement: an overview of methodologies

J.R. Hartig[1], J. Allison[2]

J.R. Hartig, MD; Jeroan Allison, MD, MS Epi.

[1]Division of General Internal Medicine, Department of Medicine; Division of General Pediatrics, Department of Pediatrics; [2]Center for Outcomes Effectiveness Research and Education; Divisions of General Internal Medicine and Preventative Medicine, Department of Medicine, University of Alabama at Birmingham, Birmingham, Alabama, USA.

Please address correspondence to: J.R. Hartig, MD, BDB 335, 1530 3rd Avenue South, Birmingham, AL 35294-0012, USA. E-mail: Jhartig@uab.edu

Received and accepted on August 2, 2007.

Clin Exp Rheumatol 2007; 25 (Suppl. 47): S50-S54.

Key words: Guidelines, physician performance, outcome assessment, benchmarking, quality of health care.

Competing interests: none declared.

ABSTRACT

As the science and study of medicine has continued to evolve over the last 30 years, the concept of physician performance has not only taken shape, but risen to the forefront of our daily practice. "Pay-for-performance," "quality," "audit" and "computerized-care" are terms we recognize and use ever more frequently. Yet, as we strive to improve our care, we have failed to identify a single or best method for translating the growing body of knowledge into regular practice. Multiple methods exist, including evidence-based guidelines, continuing medical education conferences, academic detailing, opinion leaders, audit and feedback, public reporting, pay-for-performance, and computer-based reminder systems. Each method holds potential to improve performance. As attempts are continually made to change the care provided, we should be mindful to ensure that these measures actually improve our performance and our patients' lives.

> "In theory, there is no difference between theory and practice. In practice, there is."
>
> *Yogi Berra*

Introduction

Over the past two decades, the science of medicine has evolved. The concept of the "Lone Ranger" physician (1) combing data and literature, or performing original studies, in attempts to solve clinical questions has largely been replaced by ready access to large amounts of data and resources.

Physicians recognize, despite the growing body of evidence, that unacceptable delays exist in incorporating findings into clinical practice. Thus, the "quality" of practice varies significantly from region to region, hospital to hospital, and physician to physician. Regardless of which definition of quality one applies, the process of measurement and methods for improvement remain similar.

No one argues that a physician's ability or competence is based solely upon an ability to interpret and implement new information. The "art" of caring for patients and appreciating the complexity of medicine cannot be replaced by technology and systems of improvement. Yet, even the wisest, most experienced clinicians can improve their practice. Continuous improvement is not only in demand by the public, government, and third-party payers; it is a trait we should expect of ourselves.

Currently, efforts to improve quality of care are summarized by stating: No single intervention is universally effective. Combinations of approaches produce greater effects than single interventions. As one might expect, behavior change is not a simple science. Studies and data are fraught with bias and design difficulty. Yet, some methods show promise.

In the following discussion, we review the most common quality improvement methods, illustrating potential benefits and pitfalls.

Evidence-based guidelines and practice recommendations

Evidence-based guidelines and practice recommendations are now common in all subspecialties of medicine. The number of available guidelines increased significantly in the 1990s. In fact, the sheer number of guidelines produced an interesting backlash. In a hypothetical patient suffering from several common medical conditions, Boyd *et al*. demonstrated that strictly following all pertinent clinical practice guidelines resulted in 12 prescriptions, a cost of $406/month, and possible drug interactions (2). Though often supported with evidence from original studies, many guidelines incorporate expert opinion when a conclusive, evidence-based answer is unavailable.

Practice guidelines increase physician knowledge and awareness of variations in care, but have little impact on the adoption of recommendations into practice (3, 4).

Continuing Medical Education

Continuing Medical Education (CME) is a general term encompassing many methodologies. From classic didactic lectures to interactive, internet-based technology, CME forms the foundation of a concept of "life-long learning." Arguably the most common form of practice improvement methodology, MEDLINE contains more than 1,500 CME-related articles since 2001. Physicians are estimated to spend an average of one to three weeks per year at educational meetings (5-7), Many states require CME hours for continued licensure. Similar to practice guidelines, CME articles and lectures increase physician knowledge (3). Do they improve practice performance? Data would suggest that "old" techniques such as didactics and articles do not (8, 9).

Although the standard didactic lecture format does not appear to work, strategies that more actively involve the learner (physician) demonstrate change in behavior and improvement in performance (8). Using a format based in adult education theory, Centor *et al*. demonstrated that a telephone, case-based conference which actively engaged physicians improved prescribing patterns of cholesterol lowering medications (10). A larger Cochrane Review concluded that interactive workshops have varying degrees of success. But many factors, such as group size, method of interaction, opportunity to practice skills and follow-up are yet to be optimized (8).

Academic detailing

Academic detailing draws upon a concept successfully demonstrated by the pharmaceutical industry and, as one might predict, appears to have the greatest influence on physician prescribing practices (11, 12). A key component of the concept involves an actual, personal visit with the physician by another health professional. While mailing routine drug information has little impact on physician drug management, visiting the physician office influences behavior (13). Ray *et al*. demonstrated this concept by showing office visits to physicians with poor antibiotic prescribing patterns yielded a positive effect (14). Soumerai and Avorn found that the effect of academic detailing is most profound on practitioners exhibiting the targeted behavior the most (15). Further, the method may be of a favorable cost-benefit ratio if targeted at costly "system-issues" such as drug expenditures (16).

While academic detailing holds promise as a means of influencing physician behavior, the interventions themselves require significant levels of time and effort. This often prevents their implementation on a large scale. The ideal number of visits and follow-up is not known. These barriers currently prevent widespread use.

Opinion leaders

Supported by the theory of diffusion of innovations and the social influences model of behavior change, opinion leaders have also been shown to be an effective method of intervention in practice (17, 18). Here a physician identified by colleagues as "educationally influential" promotes and models a desired behavior (19). Although the effect is difficult to separate into specific acts or characteristics, the model is successful in various situations. Opinion leaders are, in fact, similar to academic detailing efforts as described above. However, opinion leaders are frequently "members" of the desired intervention group and do not meet personally with each physician.

Soumerai *et al*. found that local opinion leaders successfully improve the care of patients with acute myocardial infarction (20). In this study, the intervention group included the use of local opinion leaders to implement practice guidelines. Successful outcomes in the intervention group included the increased appropriate use of aspirin and beta blockers compared to the control group. However, no improvement occurred in the use of thrombolytics even when proper indications existed. Additionally, this study holds interest as the control group employed audit and feedback as a single intervention, raising the question as to whether local opinion leaders or combinations of interventions are more influential than audit and feedback alone.

Local opinion leaders have a complicated influence on the practice habits of others. It remains unclear how leaders change colleagues' behavior. And in several studies, improvement in the quality of care provided did not occur (21). Thus, although the use opinion leaders may be of benefit, it is not clear under what circumstances their use is best employed.

Physician audit and feedback

Audit and feedback of physician practice performance has been shown to be a significant means of changing physician behavior. A growing area of research and study, the method involves measurement of an indicator of quality or outcome and confidential presentation of that variable to a practicing physician with a reference range (based upon peers' practice, evidence-based goals, or other standards.) The method relies upon the simple assumption: "that which we measure we tend to improve."

Audit and feedback is further enhanced by the addition of "achievable benchmarks." A benchmark is identified by the level of performance of the top 10% of physicians for a specific indicator. Achievable benchmarks were demonstrated to enhance feedback in a large randomized controlled trial by Kiefe in the care of diabetic patients (22). Audit and feedback has also been attempted in the management of glucocorticoid-induced osteoporosis (23). (Results are discussed in sections to follow).

The Cooperative Cardiovascular Project, a program of the Health Care Financing Administration, documented important improvements in the quality of care delivered to Medicare patients suffering an acute myocardial infarction using audit and feedback methods (24). Others have demonstrated similar effects in the improvement of care related to sexually transmitted infections and the care provided in nursing homes.

However, results are not consistent. In a large, inclusive review, Jamtvedt *et al*. found that the pooled effect of audit and feedback ranged from -9% to +71% (25). Possible explanations for this may include the large variability in the information provided to the practitioner (25). Consent for involvement in the process and an active role by the participating physician in choosing the indicator are likely to have a greater effect on change of behavior than selection of the indicator by an external factor (26).

Public physician report cards

To date, publicly available reports of quality of care have largely focused on the performance of hospitals or systems. But with the ever-increasing demand for comparative information, the future is likely to involve group practice and individual physician performance report cards. Indeed, this tactic is used in New York, California, and several other states which report the individual surgeon's risk-adjusted mortality rates for coronary artery bypass grafting (CABG) (27-30).

Report cards can be divided into two simple categories: outcome measures and process measures. The example given above is a measure of outcome. An example of a process measure (quality measure) is yearly referral of diabetics for dilated retinal exams. Process quality measures are assumed to be related to outcomes based on previous study.

The assumption that public reporting of quality measures will drive the improvement of quality of care is based upon multiple factors (31). The public must be aware of such reports. Data suggesting increased public awareness of report cards is found in a 2004 study demonstrating an increase from a previously noted 27% to 35% of people who acknowledge having seen comparative quality data (32, 33). However, many studies indicate that patients do not trust or know how to use the information provided, prefer a friend or relative's recommendation, or report that comparative statistics are not used in their choice of care (34). Rather than individual patients, referring providers or health organizations could use report cards to determine their choices in care. However, studies indicate that the use of report cards in this manner is relatively uncommon (35).

Report cards may have negative consequences. Initial studies in New York demonstrated an overall reduction in CABG mortality rates from 3.52% in 1989 to 2.78% in 1992 after the introduction of report cards (36). However, further review showed that an increasing number of high-risk patients were referred out of state (37). A significant widening in racial disparity associated with the release of CABG report cards was also noted (38). The implication that physicians would alter patient selection and treatment to improve a specific outcome measure is a significant unintended consequence.

Public reports will play a role in the future evaluation of quality of care. However, more study is needed to confirm appropriate use and outcomes.

Pay-for-performance

Systematic reviews by the Cochrane group concluded that the role of payment in the performance of primary care physicians may affect behavior, but insufficient evidence existed to make further conclusions (39, 40). Another Cochrane review, completed in 2000, examined the role of target payments (payments made to physicians only if minimal levels of service are provided) in the quality of care. Two studies demonstrated increased immunization rates, but only one study reached statistical significance (41, 42).

More recent data suggest that target payment rewards only those performing at a high baseline level of quality rather than improving the overall quality of care provided by groups (43). Yet pay-for-performance is growing in popularity as a method of reimbursement in large arenas, including the state of California where it is estimated that approximately 33,000 (50%) physicians receive some form of payment in this manner (44).

The Centers for Medicare and Medicaid Services adopted this concept as a future direction for reimbursement. A study concluded that pay-for-performance could significantly reduce the expense of care while significantly improving outcomes (45).

As pay-for-performance continues to evolve, careful attention should be given to the design of markers of quality. Focus on too few, or inappropriate measures may lead to the neglect of important aspects of care creating the so-called "spotlight" effect. Although seemingly an attractive concept, pay-for-performance may also lead to undesirable outcomes similar to those seen in public reporting, such as decreased access to care and widening racial disparity (46).

Computer-based systems

The increased use of computers in all aspects of medical care is regarded as an improvement in the quality of care delivered. In general, this notion is supported by theory and some data, though relatively few studies exist. In one systematic review from the Cochrane Library, computerized assistance in the dosage of drugs with narrow therapeutic indices reduced the time to therapeutic control, toxic drug reactions, adverse reactions, and the length of hospital stays (47). Another study demonstrated a 55% reduction in serious in-patient medical errors after installing a computerized provider order entry (CPOE) system (48). Computers have also been used to improve the quality of preventive services provided to patients. In a non-randomized, prospective controlled trial, investigators found an improvement in the ordering rate of mammograms, no change in the rate of fecal occult blood testing, and an actual decrease in the ordering of cholesterol profiles (49).

Electronic health records (EHR) hold significant promise for improving the overall performance of physicians and the satisfaction of patients. Physicians are increasingly using health information technology at the bedside and in the encounter room. A recent study by Hsu *et al*. reported that both physicians and patients felt that the use of EHR not only improved the efficiency of the visit, but the quality of the information discussed (50).

However, computerized systems have negative impacts as well. Yong *et al*.

reported an unexpected increased mortality rate from a baseline of 2.80% to 6.57% after the implementation of a CPOE system (51). The purported explanation for the finding was delay in the administration of medications caused by the processing time and centralized location required in the new CPOE system.

The increased use of and dependence upon computerized systems for medical care holds significant promise for the delivery of higher quality of care. Computerized decision support mechanisms and drug dosage systems may reduce the number of medical errors. Care must be taken, though, to study the intended as well as the unexpected outcomes.

Conclusions

Although methods to improve provider practice and quality of performance continue to evolve, further research, design and study are needed to determine the best interventions. Currently, no single method produces consistent results across situations. In general, multiple methods appear to be more effective than any single measure alone. Enlisting the involvement of practitioners in workshops, audit and feedback, and computer-based interventions is more successful. Fee-for-performance is growing in practice and will continue to shape our collective futures. The cost-effectiveness of interventions should be measured. Finally, any attempt at behavior change must be assessed for the desired as well as the unintended outcomes.

References

1. SMITH M, SCHMITZ T: Epitaph for the Lone Ranger, MD: Adapting continuing medical education to the twenty-first century. *J Contin Educ Health Prof* 2004; 24: S9-12.
2. BOYD C, DARER J, BOULT C, FRIED L, BOULT L, WU A: Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. *JAMA* 2005; 294: 716-24.
3. DAVIS DA, THOMSON MA, OXMAN AD, HAYNES RB: Changing physician performance: A systematic review of the effect of continuing medical education strategies. *JAMA* 1995; 274: 700-5.
4. EBHC: Getting evidence into practice. *Eff Health Care* 1999; 5: 1-16.
5. FRANK E, BALDWIN G, LANGLIEB AM: Continuing medical education habits of US women physicians. *J Am Med Womens Assoc* 2000; 55: 27-8.
6. GOULET F, GAGNON RJ, DESROSIERS G, JACQUES A, SINDON A: Participation in CME activities. *Can Fam Physician* 1998; 44: 541-8.
7. NYLENNA M, AASLAND OG: Primary care physicians and their information-seeking behaviour. *Scand J Prim Health Care* 2000; 18: 9-13.
8. THOMSON O'BRIEN MA, FREEMANTLE N, OXMAN AD, WOLF F, DAVIS DA, HERRIN J: Continuing education meetings and workshops: Effects on professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library*, issue 3, Oxford: Update Software, 2003.
9. MILLER GE: Continuing education for what? *J Med Educ* 1967; 42: 320-6.
10. CENTOR R, CASEBEER L, KLAPOW J: Using a combined CME course to improve physicians' skills in eliciting patient adherence. *Academic Medicine* 1998; 73: 609-10.
11. WAZANA A: Physicians and the pharmaceutical industry: Is a gift ever just a gift? [see comments]. *JAMA* 2000; 283: 373-80.
12. SOUMERAI SB, MCLAUGHLIN TJ, AVORN J: Improving drug prescribing in primary care: A critical analysis of the experimental literature. *Millbank Q* 1989; 67: 268-317.
13. RAY WA, FINK R, SCHAFFNER W, FEDERSPIEL CF: Improving antibiotic prescribing in outpatient practice. Non-association of outcome with prescriber characteristics and measures of receptivity. *Medical Care* 1985; 23: 1307-13.
14. RAY WA, SCHAFFNER W, FEDERSPIEL CF: Persistence of improvement in antibiotic prescribing in office practice. *JAMA* 1985; 253: 1774-6.
15. SOUMERAI SB, AVORN J: Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA* 1990; 263: 549-56.
16. SOUMERAI SB, AVORN J: Economic and policy analysis of university-based drug "detailing". *Med Care* 1986; 24: 313-31.
17. GREER AL: The state of the art versus the state of the science: The diffusion of new medical technologies into practice. *Int J Tech Assess Health Care* 1988; 4: 5-26.
18. MITTMAN BS, TONESK X, JACOBSON PD: Implementing clinical practice guidelines: Social influence strategies and practitioner behavior change. *QRB* 1992; 18: 413-22.
19. HISS RG, MACDONALD R, DAVID WR: Identification of physician educational influences in small community hospitals. Washington DC, *Proceedings of the 17th Annual Conference on Research in Medical Education*, 1978: 283-8.
20. SOUMERAI SB, MCLAUGHLIN TJ, GURWITZ JH *et al.*: Effect of local medical opinion leaders on quality of care for acute myocardial infarction: A randomized controlled trial. *JAMA* 1998; 279: 1358-63.
21. STROSS JK, HISS RG, WATTS CM, DAVIS WK, MACDONALD R: Continuing education in pulmonary disease for primary-care physicians. *Am Rev Respir Dis* 1983; 127: 739-46.
22. KIEFE CI, ALLISON JJ, WILLIAMS OD, PERSON SD, WEAVER MT, WEISSMAN NW: Improving quality improvement using achievable benchmarks for physician feedback: A randomized controlled trial. *JAMA* 2001; 285: 2871-9.
23. CURTIS JR, WESTFALL AO, ALLISON J *et al.*: Challenges in improving the quality of osteoporosis care for long-term glucocorticoid users: A prospective randomized trial. *Arch Intern Med* 2007; 167: 591-6.
24. JENCKS SF: HCFA's health care quality improvement program and the cooperative cardiovascular project. *Ann Thorac Surg* 1994; 58: 1858-62.
25. JAMTVEDT G, YOUNG JM, KRISTOFFERSEN DT, THOMSON O'BRIEN MA, OXMAN AD: Audit and feedback: Effects on professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library*, issue 3. Oxford, Update Software, 2003.
26. MUGFORD M, BANFIELD P, O'HANLON M: Effects of feedback of information on clinical practice: A review. *BMJ* 1991; 303: 398-402.
27. PENNSYLVANIA HEALTH CARE COST CONTAINMENT COUNCIL: *A Consumer Guide to Coronary Artery Bypass Graft Surgery*. Harrisburg, Pennsylvania Health Care Cost Containment Council, 1992.
28. NEW YORK STATE DEPARTMENT OF HEALTH: *Coronary Artery Bypass Surgery in New York State, 1990-1992*. Albany, New York State Department of Health, 1993.
29. NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES: *Cardiac Surgery in New Jersey*. Consumer Report, 2003.
30. CALIFORNIA CABG MORTALITY REPORTING PROGRAM: *The California Report on Coronary Artery Bypass Graft Surgery: 1997–1998 Hospital Data*. Summary report, 2001.
31. WERNER RM, ASCH DA: The unintended consequences of publicly reporting quality information. *JAMA* 2005; 293: 1239-44.
32. KAISER FAMILY FOUNDATION AND AGENCY FOR HEALTH CARE RESEARCH AND QUALITY: *Americans as Health Care Consumers: An Update on the Role of Quality Information*. Washington, DC, Kaiser Family Foundation, 2000.
33. KAISER FAMILY FOUNDATION AND AGENCY FOR HEALTH CARE RESEARCH AND QUALITY: *National Survey on Consumers' Experiences with Patient Safety and Quality Information*. Washington, DC, Kaiser Family Foundation, 2004.
34. GIBBS DA, SANGL JA, BURRUS B: Consumer perspectives on information needs for health plan choice. *Health Care Financ Rev* 1996; 18: 55-74.
35. SCHNEIDER EC, EPSTEIN AM: Influence of cardiac surgery performance reports on referral practices and access to care: A survey of cardiovascular specialists. *N Engl J Med* 1996; 335: 251-6.
36. HANNAN EL, KILBURN H JR, RACZ M, SHIELDS E, CHASSIN MR: Improving the outcomes of coronary bypass surgery in New York State. *JAMA* 1994; 271: 761-6.
37. OMOIGUI NA, MILLER DP, BROWN KJ *et al.*: Out-migration for coronary bypass surgery in an era of public dissemination of clinical outcomes. *Circulation* 1996; 93: 27-33.
38. WERNER RM, ASCH DA, POLSKY D: Racial profiling: The unintended consequences of

coronary artery bypass graft report cards. *Circulation* 2005; 111: 1257-63.

39. GOSDEN T, FORLAND F, KRISTIANSEN IS *et al*.: Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians (Cochrane Review). In: *The Cochrane Library*, issue 3. Oxford, Update Software, 2003.
40. GIUFFRIDA A, GOSDEN T, FORLAND F *et al*.: Target payments in primary care: effects on professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library*, issue 3. Oxford, Update Software, 2003.
41. KOUIDES RW, BENNETT NM, LEWIS B, CAPPUCCIO JD, BARKER WH, LAFORCE FM: Performance-based physician reimbursement and influenza immunization rates in the elderly. The primary-care physicians of Monroe County. *Am J Prev Med* 1998; 14: 89-95.
42. RITCHIE LD, BISSET AF, RUSSELL D, LESLIE V, THOMSON I: Primary and preschool immunization in Grampian: Progress and the 1990 contract. *BMJ* 1992; 304: 816-9.
43. ROSENTHAL MB, FRANK RG, LI Z, EPSTEIN AM: Early experience with pay-for-performance: From concept to practice. *JAMA* 2005; 294: 1788-93.
44. STEWART D: Aligning physician incentives: Lessons and perspectives from California. Pacific Business Group, 2005.
45. PREMIER INC.: *Centers for Medicare and Medicaid Services*. Orlando, Florida, Premier Conference Webcast, 2006.
46. CHIEN AT: The potential impact of performance incentive programs on racial disparities in health care. *In* WILLIAMS RA and AYANIAN JZ (Eds.): *Eliminating Healthcare Disparities in America: Beyond the IOM Report*. Totowa, New Jersey, Humana Press Inc., 2007.
47. WALTON RT, HARVEY E, DOVEY S, FREEMANTLE N: Computerised advice on drug dosage to improve prescribing practice (Cochrane Review). In *The Cochrane Library*, issue 3. Oxford, Update Software, 2003.
48. BATES DW, LEAPE LL, CULLEN DJ *et al*.: Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. *JAMA* 1998; 280: 1311-6.
49. GOLDBERG HI, NEIGHBOR WE, CHEADLE AD, RAMSEY SD, DIEHR P, GORE E: A controlled time-series trial of clinical reminders: Using computerized firm systems to make quality improvement research a routine part of mainstream practice. *Health Serv Res* 2000; 34: 1519-34.
50. HSU J, HUANG J, FUNG V, ROBERTSON N, JIMISON H, FRANKEL R: Health information technology and physician-patient interactions: impact of computers on communication during outpatient primary care visits. *J Am Med Inform Assoc* 2005; 12: 474-80.
51. YONG YH, CARCILLO JA, VENKATARAMAN ST *et al*.: Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics* 2005; 116: 1506-12.