The Impact of Clinical Guidelines on Practice

8

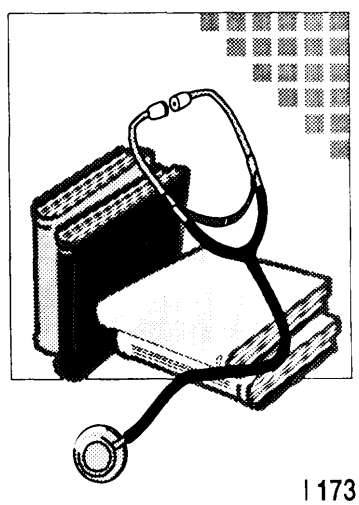
To improve health outcomes and health care costs, the evidence produced from evaluations of health technologies and practices must be disseminated to providers and patients in a manner that will convince them to adopt new findings and recommendations into everyday decisionmaking. This chapter focuses on the impact of evidence. and specifically evidence assimilated and presented as guidelines, on clinical practice.

The chapter first outlines alternative behavioral models of clinical decisionmaking, the major forces that shape physician practices, and some of the strategies that have been used to change behavior. ' It then examines the interventions used to implement clinical practice guidelines and discusses factors that can affect their impact.

ANATOMY OF PHYSICIAN BEHAVIOR

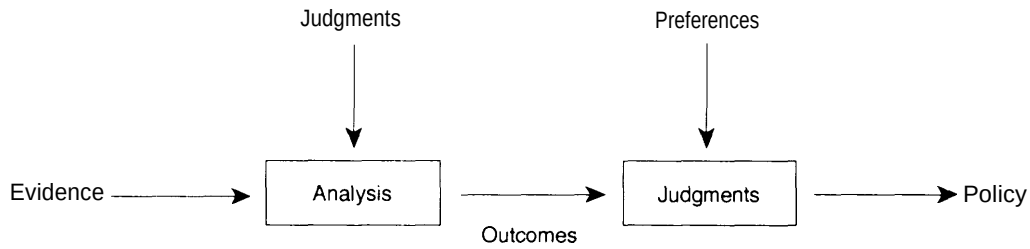
Modeling Clinical Decisionmaking

Behavioral models of clinical decisionmaking can provide insights into the forces that shape individual clinical decisions. Traditional models of clinical decisionmaking have emphasized the role of information as an influence on practice. One of the simplest models of clinical decisionmaking presents it as a two-step process (see figure **8-1) (198). In the first step, the decisionmakers consider evidence about the possible outcomes—the benefits,**



[1]This chapter focuses on the physician as the professional clinical decisionmaker, since the available 1 iterature is best developed for physicians. However, many of the principles discussed also apply to nurses, physicians assistants, and other clinical service providers.

FIGURE 8-1: A Simple Model of a Clinical Decision



SOURCE D M Eddy, ' ClinicalDecision Making from Theory to Practice—Anatomy of a Decision,' *Journal of the American Medical Association* 263(3) 441-443, Jan 19, 1990 Reprinted with permission

risks, and costs—associated with each possible alternative. If the decision was about the use of mammography to screen for breast cancer, for example, this step would involve considering information on factors such as the relative risk of death from delayed vs. early discovery of breast cancer, the likelihood of a positive finding, the risks of radiation exposure from the test, and the risks of extra biopsies that might be performed if the mammogram is suspicious. In the second step, patients and physicians make judgments about the relative desirability of those outcomes and decide whether they want the screening,

According to this model, the link between evidence and practice is improved by increasing the quality and quantity of evidence available, devoting more effort to soliciting and incorporating patient preferences, and ensuring that physicians and patients follow the decision steps. This perspective underlies the expectation that increasing the supply of results from effectiveness research to physicians will improve the quality of clinical decisions and patient care.

Many simple clinical decisions (e.g., prescribing antibiotics for certain types of infections) can be made according to such a model of physician behavior. The model applies well when the evidence for benefit is clear, patients have no complicating conditions, and preferences for outcomes are predictable.

Many other decisions, however, are more complex and challenging. Complexity arises when good evidence from clinical studies is not available to provide reliable estimates of risks and benefits for a particular type of patient, and when the decision involves the balancing of multiple factors and less predictable outcomes. Challenges can also arise in assessing patient preferences, or in deciding what level of risk for bad outcomes the physician and patient are willing to endure.

Evidence and preferences are fundamental elements of every clinical decision. However, many other forces are also known to affect clinical deci - sionmaking, and more elaborate models are required to explain many individual decisions and broader patterns of practice. These other factors help explain why actual clinical practice often differs from expected or ideal practice, and why evidence and patient preferences alone do not always determine clinical choices.

The more complex models of physician behavior owe much to the work conducted over the past several decades in such areas as adult learning theory, technology diffusion, and communication. Drawing on the studies in these areas, several authors have developed models that view clinical decisions as emerging from a balance of a range of forces in the health care environment (214,240, 466,682). One such model, for example, characterizes physician decisionmaking as influenced

by educational, administrative. economic. patient. community, and personal forces (see figure 8-2) (466).

These more complex models have several important implications for the design of strategies to incorporate new evidence into clinical practice:

1. Evidence is only one of many inputs to decisionmaking and may be overwhelmed by other forces.
2. Simple dissemination of information to physicians may be ineffective in changing behavior.
3. Information may flow to physicians through a variety of channels, and its impact may be increased if multiple information channels are used.
4. In different contexts. one or another force may be dominant, suggesting that strategies for changing practice need to be tailored to fit the circumstances of the physician, the medical condition, or the type of practice involved.
5. Since the forces that influence practice are always active, the ability of interventions to produce lasting change is the best measure of their value (466).

Sources of Influence on Physician Practice

In order to design interventions that are efficient and effective for communicating new information and changing behavior. it is useful to develop a clear understanding of the full range of factors that underlie current practices. The factors that may affect physicians" willingness to change their practices should also be considered.

Prevailing theory. The conceptual foundation underlying current practice serves as the basis for incorporating new information, and it will affect the readiness with which new information is received (240).

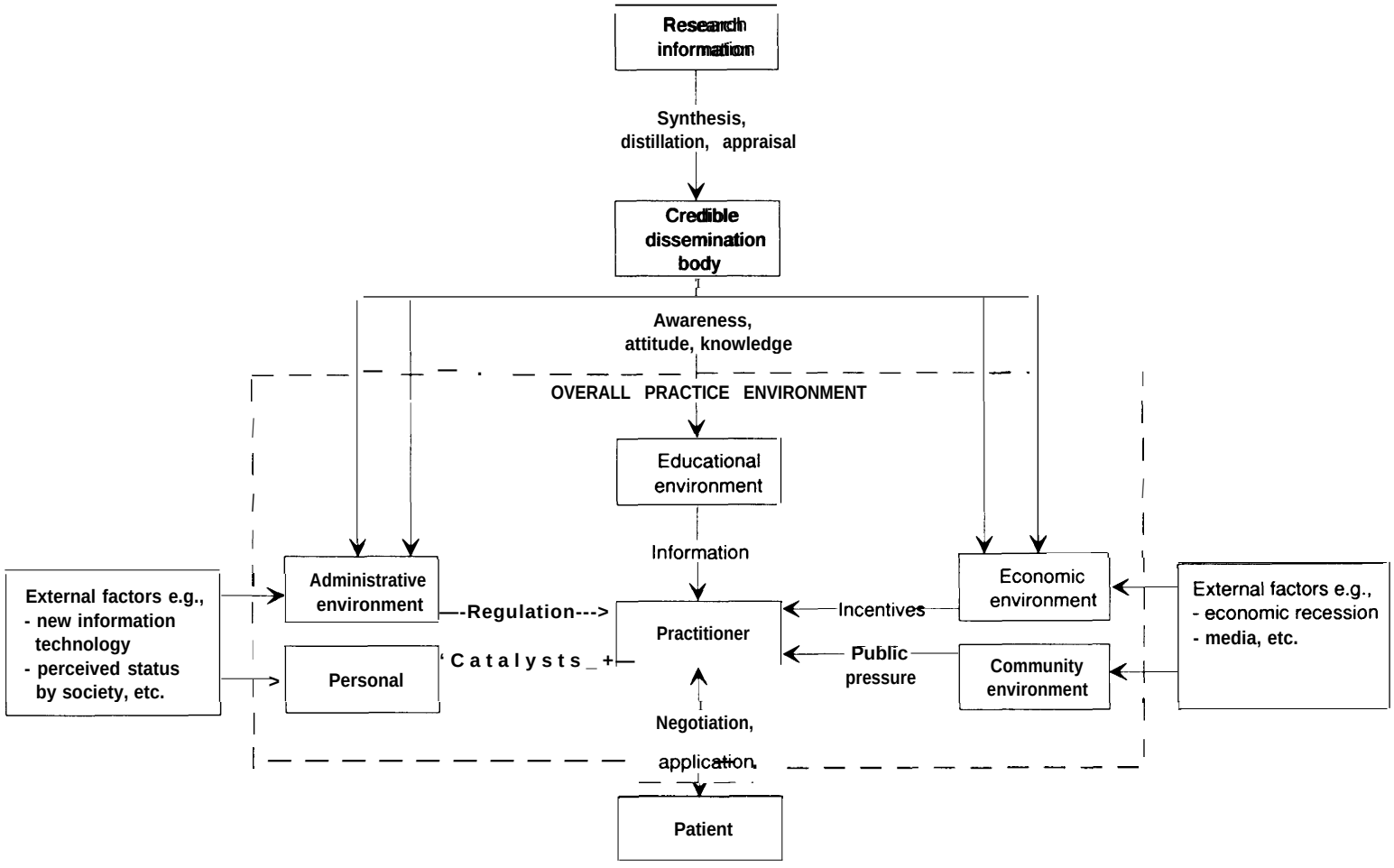
Nature of the innovation. The nature of the change in practice influences the extent and rapidity of change (240). Physicians are much less likely to adopt new practices that involve major changes from existing practice than those that involve only slight modifications (265). New behaviors are also more likely to be adopted if they are simple and relatively inexpensive. represent major and easily observable improvements over current practice, are easily understood according to accepted principles, build on existing skills and abilities. and are usable on a trial basis and easily abandoned if found inadequate (644.73 1). Physicians may also be slow to incorporate recommended practice changes if they do not have the necessary skills or resources to implement them.

Type of clinical decision. The ability to change existing practice depends not only on the characteristics of the current and the proposed practices, but also on the nature of the clinical problem (243,643,937). The dynamics of decisionmaking for preventive practices differ from therapeutic decisionmaking (240), and deciding which oral antibiotic to prescribe is different from deciding which diagnostic test to use. Decisions that can be reduced to explicit and clear algorithms may be more easily influenced by new evidence than decisions that involve a delicate balancing of numerous considerations.

Physician characteristics. The individual characteristics of a physician+. g., technical skills. demographic characteristics, attitudes. and other personality features-an affect the physician's openness to new information and his or her ability and willingness to change practice. Some group characteristics are also influential. For ex - ample. residents may be more receptive than other physicians to new information (21 4.679). Generalists and specialists have been shown to differ in their illfc~rnlation-seeking practices and in their attitudes about different types of evidence (240). Different styles of medical training can also influence practice style (226).

Practice setting. Characteristics of a physician's practice setting can influence the degree to which he or she responds to information (240.71 3). Such characteristics include the number and type of colleagues (e.g., solo vs. group practice; single vs. multiple specialty; office-bascd or institutional). degree of interaction among colleagues, involvement of physicians in medical education, characteristics of the patient

FIGURE 8-2: A Coordinated Model of Implementation of Clinical Evidence



SOURCE J Lomas, "Retailing Research Increasing the Role of Evidence in Clinical Services for Childbirth," *Milbank Quarterly* 71 (3) 439-475, 1993 Reprinted with permission

population, workload, organizational culture, and practice styles of colleagues.

- **Environmental incentives and constraints. Environmental factors shown to influence physician practice and physicians' choice of therapy include regulatory influences (e.g.,** drug approval), insurance benefit coverage and payment policies, availability of resources, quality assurance and utilization review activities. and legal considerations. Government regulation and other environmental influences affect institutional decisions to acquire facilities and technologies, and those choices can in turn influence clinical decisions.

- **Credibility of information source. Physician decisions are strongly affected by the beliefs and practices of their clinical colleagues. Physicians are more likely to respond to information if it comes from** sources they know and respect, or from organizations with which they are associated (240,265,33 1,768). In contrast, physicians often reject information or directives that come from sources they perceive as antagonistic, such as health insurance companies or government entities (57,73,265.29 1). The adoption of a new practices by locally or nationally credible individuals (or organizations) may accelerate its diffusion in the medical community (306,466).

- **Channel of communication. The** source and mechanism by which messages are transferred affect their reception (240). Social networks and face-to-face communication with respected peers are particularly influential (102,69 1).

Local networks of communication are particularly important vehicles for transmitting information concerning new medical practices (306). Physicians may rely on these local networks because of uncertainties involved in adapting new clinical management strategies to their own patient population--either because of the particular characteristics of their patients or the resource constraints under which they practice. They may feel more comfortable adopting new recommendations if they know that their colleagues are doing the same.

- **Decisionmaking process. Decisions made by single parties can be changed more easily than those requiring multiple participation, particularly if institutional decisions are required (243). On the other hand, institutional decisions are increasingly** responsible for promoting changes in practice among groups of individuals, and they may foster a greater magnitude of change after a somewhat longer initial delay.

- Evaluative methods and evidence. The quali-(y of the evidence supporting a change in behavior may have an impact on the extent to which information affects physician practice. The quality of evidence may exert its influence via the discrimination of individual physicians, guidelines developers, or other institutions that review evidence and attempt to infuse it into practice. Even the most rigorous evidence. however, does not necessarily affect practice directly (box 8-1).

- **Patient factors. The patient's role in clinical decisionmaking has increased substantially over the past several decades. Patient preferences are important and legitimate determinants of the** course of diagnosis and treatment of medical conditions (41 9).

APPROACHES TO CHANGING CLINICAL PRACTICE

Approaches to changing clinical practice *range* from passive dissemination of research results or other information to more active strategies to incorporate those results into practice. Simple active approaches employ a single type of incentive--e.g., an economic inducement-to promote change. More complex approaches employ a variety of different incentives in combination. This section reviews selected evidence of the effective - ness of various approaches, especially as they relate to the implementation of clinical practice guidelines.

Passive Dissemination

The simplest approach to changing clinical practice is through the passive dissemination of in-

BOX 8-1: Clinical Trials and Changes in Clinical Practice

Researchers have noted numerous examples of cases in which the results of large, well-designed studies did not appear to influence clinical practice (27) In a review of 28 studies that examined the impact on practice of specific clinical trials, nine showed that practices changed in the direction suggested by the trial. Only two, however, provided reasonable evidence that practice changed as a consequence of trial findings (240) Many Instances of new therapies that have been rapidly adopted in the absence of any clinical studies proving their value have also been documented (240),

Trials that have had an impact seem to share some common features Often, these trials study conditions and treatments for which the most relevant endpoint is death, an unambiguous negative outcome, In addition, most involved a discrete pharmacological intervention that was easily reproducible at other sites For example, in the case of the use of aspirin to prevent second heart attack, the intervention is inexpensive, simple to administer, and safe; and the avoidable outcome is severe. Affecting physician practice may be some what difficult when the results of trials in which the potential negative outcomes are less serious, less observable, and a broader range of therapeutic interventions are studied.

SOURCE Off Ice of Technology Assessment, 1994 based on sources as shown Full citations are at the end of the report

formation. Publication of a study's results in a medical journal, for example, is a long-standing mechanism for information dissemination. The appeal of this strategy is that it is generally relatively inexpensive, straightforward, and can make use of mechanisms already in place. However, the more complex models of physician behavior predict that its impact would be limited, and experience generally supports this prediction.

Studies of the impact of large, well-publicized randomized controlled trials (RCTs), which are hailed as the "gold standard" of clinical evaluation methods, on clinical practice illustrates both the possibilities and the limitations of the passive dissemination approach. In some cases, the publication of large RCTs has indeed had a strong influence on clinical practices. For example, the percentage of physicians reporting routine use of thrombolytic therapy after heart attack rose from 3 to *68* percent after the release of a major randomized study showing its benefits (137).[2] Changes of similar magnitude have been noted in response to large, well designed trials involving the use of aspirin for patients who have suffered a heart attack (438).

But passive dissemination is not dependable, even as a method of implementing high-quality evidence. The dissemination of the results of laser treatments for diabetic retinopathy (an eye disease common in persons with diabetes) provide a compelling example. In 1976, the first of a series of clinical trials was reported, showing that laser treatment for diabetic retinopathy was highly effective in preventing blindness if performed during the early stages of the disease (163). **The results were cited over 70 times in the medical literature between 1976 and 1979 (240). However,**

[2]Interestingly, a very large trial that reported similar benefits from thromboly tic therapy one year prior to the first surv ey had not had any effect on these physicians. 1(is possible that the results of this first study, though they failed to promote the recommended change on their own, helped predispose physicians to change once the results were corroborated by the later study.

18 months after the results were first reported. only one-third of internists and family practitioners were familiar with them. and most of those had learned about them from a colleague (737). In addition, most physicians were found to be unable to properly identify the condition itself during routine ophthalmoscopic examination (74 1 }—an inability which may have led them to ignore the trial results. Underdiagnosis and undertreatment of this condition are still widespread (65.79).

Whether or not mere disseminate ion of information is capable of influencing practice, the information itself does often serve a critical supportive function. Evidence from clinical evaluations can predispose or enable physicians to follow new practices or abandon inappropriate ones. It can also reinform the continued use of appropriate practices (298).

Active Approaches

More active approaches to changing behavior have relied heavily on three particular sources of influence on clinical behavior: the economic and administrative environment: the influence of patients: and the influence of clinical peers. Several basic strategies have evolved that take advantage of these influences. In recent years. more integrated strategies for changing physician behavior have also emerged, combining elements that have been found to be effective in motivating change.

Economic Approaches

Most analysts agree that the influence of economic incentives on clinical practice can be substantial (1 ,344,682). A number of studies, for example, have linked physician ownership of facilities with higher rates of patient use at those facilities for services such as diagnostic imaging (345), radiation therapy (534), physical rehabilitation. and psychiatric testing (743). In contrast, when faced with strict financial constraints for a particular service, physicians reduce the amount of that service that they provide (345). The rates at which physicians hospitalize patients or see them as outpatients have also been found to be associated with reimbursement (344).

Strong economic incentives can affect practice even when the incentives are targeted to institutions. For example. implementation of prospective, diagnosis-based payment for inpatient services under Medicare in 1984 resulted in shorter lengths of stay for patients with many diagnoses and, consequently. decreases in Medicare spending for inpatient care (706).

Although powerful. economic incentives have clear limitations, and they can be overshadowed by other factors. For example. recent studies of Cesarean delivery rates in managed care settings showed high rates of procedures considered to be inappropriate, even though no economic motive could account for these procedures (55). Another study found that reducing the insurance payment for Cesarean delivery to make the payment equivalent to that for vaginal delivery did not alter the Cesarean delivery rate (597).

Given that other factors appear to have equal or greater influence on physician behavior, strategies that use only economic incentives may be crude and inefficient mechanisms for changing physician practices. They may also sometimes produce undesirable results (e.g., by reducing the use of valuable as well as wasteful services}. In the RAND Health Insurance Experiment,[3] which randomized consumers to insurance with differing levels of cost-sharing, patients received up to 50 percent more care when the care was free to them (489). The additional serviecs were not necessari - ly the most valuable ones. however: payment incentives affected the rates of appropriate and inappropriate services equally, in both outpatient and inpatient settings (464,740). Likewise. studies of geographic variation in the use of high-cost procedures have found that areas that have a higher frequency of a procedure do not necessarily have a higher proportion of inappropriately performmed procedures. These findings suggest that

[3] The RAND Health Insurance Experiment was conducted between 1074 and1982.

broad economic incentives might not succeed in selectively reducing inappropriate use (115,118, 444,909).

Finally, financial incentives can sometimes have powerful unintended effects. For example, implementation of prospective payment to control Medicare spending on inpatient care spurred concomitant increases in outpatient care spending (61 7,756). In addition, many hospitals responded to reductions in Medicare income by raising their charges to patients with private insurance (616).

Administrative Approaches

Physicians make decisions within the context of the institutions with which they work. Purposeful structuring of administrative rules, policies, and procedures thus can be a significant force for changing practices. Institutions implement such strategies for various purposes, including cost containment, quality assurance. and risk management (535).

A common administrative strategy to constrain the use of certain products is the use of prescription drug formularies. Requiring the use of special forms or other additional steps to obtain approval for nonformulary prescription drugs has been shown to significantly alter physicians' prescribing patterns (93,275).

Administrative strategies can also increase adherence to desired practices by eliminating hurdles or by facilitating a process. For example, in one study, a policy allowing nurses to administer influenza vaccines without physician orders increased the frequency of vaccinations (491). Computerized reminders have also been used successfully to change physician practice (e.g.. computerized dosing protocols to improve the accuracy of dosing for potentially toxic drugs (401)).

Utilization review (UR) is an administrative strategy used frequently by third-party payers to contain costs and monitor the quality of care. Traditional UR involves case-specific review of the appropriateness of care being contemplated or provided and includes techniques such as prior review, preadmission review, continued stay review, second surgical opinions, and case management of high-cost cases (369). All of these techniques rely on the creation of a parallel decisionmaking entity that independently assesses the appropriateness of an intended clinical action.

Empirical evidence on the effect of these traditional UR programs is mixed. Some studies show that payers who use UR programs have lower rates of hospital use than those who do not (231). However, some of these savings may be offset by increases in the use of outpatient services. Little evidence exists to suggest that long-term patterns of expenditure growth are altered by adoption of UR methods (369). A comprehensive review of second surgical opinion programs concluded that the impact of these programs has not been adequately demonstrated (460). Few studies have addressed the impact of UR programs on quality of or satisfaction with care.

In the past few years, UR has evolved from a narrow focus on length and necessity of hospital stays to more detailed assessments of the clinical appropriateness of the care provided. Several commercial UR firms now provide employers and insurers with detailed reviews of the appropriateness of anticipated clinical procedures. Experience with this more detailed level of review is still limited. Anecdotal evidence suggests that it may reduce procedure rates in some cases, but it is possible that some of this reduction comes from patients who are not referred for surgery even though the surgery would be considered appropriate for them.

Administrative and economic interventions may be particularly useful when desired practices can be described simply, are well supported by clinical studies, and are unlikely to provoke significant physician or patient resistance. Like economic incentives to promote practice change, however, administrative strategies can have unintended consequences if applied without appropriate quality controls. For example, limits on Medicaid prescription drug reimbursement were associated with increased hospital and nursing home admissions among Medicaid-dependent

elderly patients (714). The increased admission rates not only reflected a compromise in the quality of care, but probably also more than offset any savings generated by the prescription drug limits (714).

Physicians may seek to circumvent restrictions that they believe are unjustified or externally imposed (57). If the restrictions do in fact lead to compromised quality of care, such circumvention may be desirable. However, if physicians rebel against medically justified recommendations, quality of care may also be compromised and the administrative strategy can become costly to enforce.

Both administrative and economic incentives—even those that are effective in producing short term changes in behavior—may need to be continually applied to prevent a return to previous practices. The lack of durability of change associated with these externally applied strategies has been documented in association with computerized presentation of laboratory test costs (760) and telephone reminders to encourage early discharge for some diagnoses (902).

Approaches Using Patient Influences

Most strategies to change clinical practice are aimed at physicians. But the idea that physicians can be unilateral decisionmakers, divining patients' preferences and incorporating them into a clinical decision, has been increasingly challenged, and the role of patients in decisionmaking is becoming more prominent (419,698).

Patient involvement in clinical decisionmaking is a legal requirement as well. All 50 states have statutory requirements for informed consent in medical care (615). Although the required elements of disclosure and specific legal formulation vary from state to state, the basic concept of informed consent is that patients must be informed of the risks and benefits of alternatives therapies before undergoing treatment by a physician.

Patients are participants in clinical decisionmaking and clearly affect the choice of medical therapies. Recognizing this, pharmaceutical companies and other commercial interests now frequently market their products directly to patients. High demand for many experimental therapies, such as autologous bone marrow transplant for metastatic breast cancer (see chapter 5), and experimental drugs for other cancers and AIDS (acquired immunodeficiency syndrome) (787) are examples of how patient demands can influence clinical practice.

Patient education has frequently been used to promote certain disease prevention practices and long-term management of chronic conditions. For example:

- Compliance with cancer screening recommendations has been improved through a program that combined patient and physician interventions (516).
- A program that encouraged diabetic patients' participation in their care improved both control of blood sugar and overall quality of life (302).
- The functional status of patients with arthritis has been improved by educating patients concerning what to ask their doctors during clinic visits (415).
- Use of prostate screening tests has been reduced by preparing physicians to respond to patient inquiries on the topic (738).

Several groups have developed standardized methods for incorporating patient preferences into clinical decisions. The most sophisticated system to date uses video disc technology to present information on risks and benefits of alternative choices in therapy. The Foundation for Informed Medical Decisionmaking has developed video discs addressing four common medical problems: benign prostate disease, high blood pressure, low back pain, and early stage breast cancer (940). The best studied of these applications is benign prostate disease (see box 8-2).

The importance of patient preferences and the impact of soliciting those preferences varies with the clinical condition involved. For example, choice of treatment for benign prostate disease involves balancing the risks and benefits of various

BOX 8-2: Use of Video Discs To Inform Patients of the Risks and Benefits of Alternative Treatments for Prostate Disease

The Foundation for Informed Medical Decisionmaking, a nonprofit organization, has developed video discs to facilitate informed decisionmaking by patients for four common medical problems: benign prostate disease, high blood pressure, low back pain, and early-stage breast cancer (940) Benign prostate disease is the best studied of the video disc applications

The disease was chosen in part because research showed significant complication rates for men who had undergone surgery, and there was concern that the risks were not being reliably communicated to patients by their surgeons (918) The primary benefits of surgery for this disease are reduced frequency of urination and increased force of the urinary stream; risks include impotence, retrograde ejaculation, and urinary incontinence Research also suggested that the level of concern about particular risks varied considerably across patients, and could not be predicted by any objective measures (e.g , clinical history, physical findings, urine flow, or even level of symptoms) (918)

The video disc program discusses on the risks and benefits of alternative treatments for benign prostate disease The Information is presented by clinicians and by patients who have undergone the treatments and experienced more and less desirable outcomes. Use of the video was expected to decrease surgery rates

Results of a cohort study begun in 1990 suggest that patients who watched the video disc frequently choose conservative management (i.e., watching and waiting) over surgery (548,918) In two prepaid group practices that participated in the cohort study, application of the video disc has also reduced overall surgery rates for benign prostate disease (91 8). An ongoing research effort is examining the extent the changes noted in patient preferences and decline in surgery rates can be attributed to the video disc intervention (41). Other factors, such as a general trend towards conservative alternatives to surgery and the availability of new drugs to treat the symptoms of benign prostate disease, may explain part of the reduction in surgery rates (41).

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functional impairments. However, some patients with chronic or potentially fatal illnesses may prefer aggressive treatment even if it promises only a small probability of benefit. In a recent example, demand for a newly approved drug for multiple sclerosis has substantially exceeded supply, despite absence of evidence of long-term benefit (455). On the other hand, other patients with known terminal conditions may prefer less intensive intervention at the end of life.

Improving patient involvement in decisionmaking is fundamentally an ethical goal, driven also by legal considerations. In some cases, patient involvement may facilitate reductions in inappropriate care, potentially reducing the costs of care. In others, however, it will increase the use of appropriate or desired services, leading to improved health for patients (but not always lower costs). For example, while the video discs for low back pain and benign prostate disease might be expected to reduce the use of surgery, similar interventions for high blood pressure and early stage breast cancer might be expected to increase the use of certain hypertensive drugs and chemotherapies (699). Patient education and communication might also increase appropriate resource use con-

siderably when applied to populations that have been historically underserved.

Thus, strategies that rely on educating patients and increasing their involvement in clinical decisionmaking should improve people's health and satisfaction with care. Policy makers cannot necessarily expect these strategies to reduce costs, however.

Approaches Using Clinical Peer Influences

The influence of experts and local information networks (see p. 5) is illustrated by the effectiveness of "opinion leaders" in causing changes in practice. The opinion leader strategy makes use of individuals within a local community who are regarded by their professional colleagues as authori - tative sources for information and advice. The success of the strategy thus depends on the willingness of the opinion leaders to both accept and promote the practice in question. Opinion leaders have been successful in improving clinical management of patients with arthritis (736), reducing rates of Cesarean delivery (470,527) and reducing length of stay for intensive care unit patients (193).

A related form of peer influence strategy, "detailing, " was first developed and used for commercial purposes. For years, drug companies have capitalized on the credibility y of local sources of information and communication networks, using informal personal contacts between drug company representatives and physicians to market their products (31,1 02,470,712,736,937). The essential features of detailing programs are one-on-one interactions between the educator and the physician, precise assessment of information needs, use of a credible source, carefully crafted messages, and attractive informational materials (31,7 12). The same principles have been successfully incorporated into educational interventions such as promoting the use of safer, less expensive drugs; encouraging more appropriate dosing intervals; and reducing inappropriate blood transfusions by surgeons (32. 153,296,467,536,712,7 16). The effectiveness of detailing has been demonstrated in both outpatient and inpatient settings (710,7 12).

Not all detailing efforts have been successful. In one failed effort to reduce use of antipsychotic drugs in nursing home patients (627), it was suggested that educators were not credible and that the educational visit was too brief and involved limited interaction (536). Detailing programs are labor-intensive and require development of materials tailored to specific target populations, making this type of intervention potentially costly. These approaches may, however. provide savings greater than their cost when directed to reduction of use of wasteful or expensive therapies (711),

Practice Profiling and Feedback

Practice profiling, information feedback to physicians, and other techniques that combine data gathering with peer influence are approaches being increasingly used with the goal of reducing variation in the rates with which physicians perform specific procedures. Physicians in Maine, for example, have successful y used profiling and feedback to reduce the variation in the rates of hys - terectomy and prostatectomy (see box 8-3).

Practice profiling involves collecting data describing the practice patterns and outcomes of clinicians and feeding these data back to them so they can compare their own practice patterns to those of their colleagues or, in some cases, to an objective "benchmark" (441). Activities commonly measured in practice profiles include rate of use of selected services (e. g., screening tests), clinical outcomes for certain types of services (e.g., proportion of cardiac bypass surgery patients who die within 30 days of surgery), and costs of care. Common uses of profile data include educational feedback to physicians. utilization review, and coverage decisions by insurers.

Reviews of the literature on use of physician profile data as an educational feedback tool have found it to be an effective means of changing prac - tice (153.296,536,543,677). The technique has been particularly useful for improving prescribing practices, increasing use of preventive services, and decreasing use of laboratory or x-ray tests. Feedback interventions designed to increased use are especially effective, while those designed to

BOX 8-3: The Use of Practice Profile and Feedback by the Maine Medical Assessment Foundation

An ongoing effort by the Maine Medical Assessment Foundation (MMAF) uses profile data to reduce regional variation in the rates of selected procedures within the state. MMAF emerged from a collaboration of physician health services researchers, the Maine Medical Association, and Blue Cross and Blue Shield of Maine

MMAF convenes specialty study groups to focus on a number of medical conditions and surgical procedures (483), Each study group meets periodically to review data on utilization rates of certain practices. Groups are headed by a physician leader selected for prominence within the relevant specialty When regional variations are noted, the group examines potential reasons for the variability. The groups do not develop specific protocols or indications for practice, nor do they attempt to determine optimal procedure rates (483),

When significant variation is noted, MMAF takes its data to physicians in high rate areas and sponsors meetings among those physicians to discuss reasons for the variation Although the variations discussed are compiled as regional rates, the small number of providers from each region means that participants are usually able to determine which geographic rates apply to them, thereby providing "individual" feedback (423), Physicians have been surprised and uncomfortable to learn of the degree to which their own practices may not be typical and are motivated to bring their practice patterns more into greater conformity with that of their peers (1 14,423), The intervention thus takes advantage of the importance of locally defined community practice standards, as well as the use of opinion leaders, who participate as leaders in each study group.

This "consciousness-raising" approach has reportedly reduced the variability in practice in treatment of prostate disease, hysterectomy, back pain, and pediatric hospitalizations—most often by reducing the rates in areas of Maine with high utilization.

For example, rates for hysterectomy declined precipitously in the region noted to have the highest rates within a single year after data were presented to the area physicians at a group meeting (483) The meeting was attended by representatives of the state medical association and BCBS,

decrease use are somewhat less so (677). The strategy is most successful when it is individualized, delivered by a respected peer, and involves comparisons with the performance of peers (214).

The success of feedback interventions may depend on the fact that they are usually tested in settings where clinicians have already agreed to the process of review and response (424,483,543, 920). Strategies that provide feedback passively to clinicians have been less successful than programs in which feedback was preceded by some discussion or standard-setting exercise. Physicians must also be convinced that the proposed new practice is in fact of equal or greater benefit to patients than the old practice. In a study of the use of computerized feedback to lower prescription drug costs by encouraging residents to substitute lower cost alternative medications, for example, no effect was observed because the physicians were not convinced the substitute medication was as effective (543).

Profile information has been most useful when it is delivered in a form that can be translated into a specific improvement effort (677). Informing a hospital that it has a higher than average death rate from pneumonia provides little information about the causes or solutions for that problem. On the other hand, profile information that relates surgi-

BOX 8-3 continued: The Use of Practice Profile and Feedback by the Maine Medical Assessment Foundation

as well as by two professors of obstetrics and gynecology from the University of Portland These well known and respected clinicians had previously been involved in training several of the younger practitioners from the high volume area (1 14) Multiple factors probably contributed to the observed change in practice, Including the educational value of the profile data, the desire of physicians not to be practice outliers, and the potent effect of personal mentors who were expert clinicians.

In the case of variation in use of back surgery for management of lumbar disc disease, the MMAF-sponsored group discussion led to recognition that there was very little objective evidence to provide guidance on selecting patients who would be most likely to benefit from surgery. Despite this lack of reliable guidance, surgeons with high rates did subsequently lower their rates, even though no explicit changes were made in patient selection criteria (1 14). It is widely believed that surgery is overused Reduced use of surgery for back pain is probably an Improvement in care, since many disc problems are resolved with bed rest However, in the absence of valid patient selection criteria, it is possible that physicians are reducing their rates while still providing surgery to the wrong patients In fact, despite continued meetings of orthopedic study groups, rates of disc surgery in Maine have begun to rise again, a phenomenon that may be due in part to the absence of convincing evidence on the relative benefits of surgical vs. conservative strategies (424)

For other services, such as cardiac catheterization, the process has not had clear effects (483) For this and other services, however Interpreting data on the effects of MMAF feedback activity can be difficult, because they do not account for underlying trends in utilization rates that might not be associated with the group Intervention.[1]

[1] To help address this prob'em AHCPR has funded a five-year, $32 million dollar study 10 look at the impact on practice of these study group methods in Maine New Hampshire and Vermont

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cal wound infection rates to the timing of antibiotic prophylaxis administration gives better guidance on how to improve care. However, in order to provide information in this more useful form, profile data developers may need access to data other than what is routinely available in an administrative database. Practice improvements using profile data are therefore likely to require planning. effort, and expense.

An implicit assumption of profiling efforts that attempt to bring "outlier" physicians closer to the average practices of their colleagues for certain procedures is that "average" practice is appropriate. This is not always the case. For example, profiles of current practice would suggest that over 20 percent of women should have Cesarean deliveries—a suggestion strongly contradicted by available research evidence.

Furthermore, research has shown that physician practices vary considerably across both institutions and geographic areas (see chapter 2). The average practice in one institution could be appreciably different from the average practice in another.

Maine's experience with profiling feedback through peer group discussion (described in box 8-3) shows that it is possible to change practice without generating any new information about the relative effectiveness of alternative management

strategies. By studying those practices that are suspected of being overused, or that have recently increased in use without explanation, the assumption is generally made that high utilization rates are inappropriate. As illustrated by the experience with feedback on treatment for back pain, however, when objective evidence of effectiveness is limited, the group model may be less effective.

Incorporating evidence-based benchmarks of appropriate practice, rather than averages, as the standard for comparison improves the likelihood that practice will actually move towards better quality care. Where strong evidence is not available, profiling efforts can still attempt to analyze data in ways that suggest appropriate paths for change (e.g., by examining patient outcomes), rather than simply to encourage a move towards "average" practice.

Combining Feedback and Economic Incentives

Insurers are increasingly using profile data rather than detailed review of individual cases for utilization review. A number of anecdotal reports suggest that physician practices may change considerably when payers provide information showing them that their rates of use of specific services are significantly above normal range. One payer, for example, found that clinicians reduced rates of colonoscopy when informed their rates were unusually elevated (677). The ability of the payer to deny payment, or institute other sanctions, may reinforce whatever educational value the profile data offer. Similar threats of payment denial based on outlier status have been effective at shortening lengths of stay and reducing the prices charged for specific services (677).

Publication of cardiac surgery mortality data in New York State offers a more subtle example of how financial and social incentives can reinforce feedback of profile data to influence practice. For the past several years, the New York State Health Department has required all hospitals that perform cardiac bypass surgery to submit a standardized data form on their patients. From these data, risk-adjusted mortality rates for each hospital have been developed. These data have revealed significant variation in the death rates among the hospitals. The state originally intended to provide the data confidentially to hospitals and surgeons, but as the result of a lawsuit, the data were released publicly in a newspaper article (739).

In the two years since initial release of the data, adjusted mortality rates for cardiac surgery have fallen in the state, despite increases in the rates of cardiac surgery and in the average severity of illness of patients undergoing surgery (447). This trend is consistent with the possibility that hospitals and surgeons took actions that improved their surgical procedures, and there is evidence that some at least attempted to do so. One hospital, for instance, temporarily closed its cardiac surgery unit while investigating potential causes for poor outcomes. Several hospitals sought the assistance of the health department in determining the cause of poor outcomes (739).

The mortality profiling strategy relied in part on the social influence of having one own clinical practices compared with the practices of one's peers. Data derived from this strategy also raised the possibility that physicians' care was resulting in avoidable patient deaths, a severe outcome that served as a strong motivator to identify and correct inadequate practices. Moreover, public release of the data raised the possibility of lost prestige and income, which reinforced the motivation to change practice despite uncertainty regarding the validity of the information.

This example illustrates some of the dangers of using provider profiles alone as quality indicators. The validity of the profile information was highly sensitive to both the accuracy of the data provided on each physician and the at tent ion to other factors that could have influenced rate differences. For example, it has been suggested that the apparent improvement in mortality after release of the data could be due to increased documentation of patient severity of illness, which could have artificially reduced the risk-adjusted mortality rates (362). It has also been suggested that physicians may have become more reluctant to operate on sicker patients for fear of unfavorable outcomes-

an unintended consequence that would not only lead to decreased surgical mortality, but potentially hamper access to surgery for patients with the greatest need. Interestingly. despite the considerable controversy concerning public release of the data, there is no evidence that patients' choices of surgeons have so far been affected by the information.

Continuous Quality Improvement

Continuous quality improvement (CQI) systems, the formal application of quality improvement techniques, are being increasingly applied to clinical practice (57,68. 157.326 .402,571,692.703,7 19).

In essence. CQI is an integrated administrative strategy that involves three phases: problem identification, clarification of the sources of the problem, and design of a strategy to resolve the problem. Clinical practice profile data are often used in CQI to identify areas where performance problems may exist, usually to help understand why the problem is occurring, and to track changes in results when actions are taken to resolve the problem (677), CQI methods have also been used to promote implementation of clinical research findings (93) and practice guidelines (376).

The conceptual basis for CQI is that it is more effective to improve the average performance of all members of a system than to identify and penalize the small fraction with the worst performance (57). Physicians who vaccinate too few of their patients could be singled out and penalized in order to provide an incentive for them to improve, However, it may be that tight scheduling of patients makes it easy to forget to order vaccinations, and that vaccination rates could be improved overall by using a simple computer tracking system that provides reminders or automatic orders (57).

While few CQI efforts have generated sufficient data to document an impact, there is a broad belief that such initiatives can improve clinical outcomes, increase patient and provider satisfaction. and even reduce costs of care. Among the best known examples of the successful application of CQI methods to change practice are the efforts of the Harvard Community Health Plan (HCHP) and Intermountain Health Systems. The experiences of these providers, described briefly in box 8-4, illustrate the significant improvements that can be achieved through application of CQI methods, but they also show that a CQI system can be time-consuming to design and implement and that its success may depend heavily on the availability y of computerized support systems. Application of CQI techniques may be less successful for services where disagreement about risks and benefits exists, or that involve more complex legal or economic factors.

Also important to note is that HCHP's successful improvement in screening for cervical cancer (box 8-4) relied on increasing the use of a service that is viewed as desirable by physicians and patients. CQI methods may not be as successful in reducing the use of services that some physicians still feel arc appropriate. An effort at HCHP to reduce the inappropriate use of x-rays and endoscopy for evaluation of stomach pain was not successful in changing practices. even among the physicians who participated in the team that developed the protocols (301).

CQI methods do incorporate important features known to be associated with change and learning. They are noncoercive and typically encourage active participation by local clinicians. The gradual nature of the process, and the emphasis on exploration of the causes of problems, helps to ensure that new information is fully understood by those who are expected to change their behavior. The available experience suggests that where institutional commitment is high, time and resources are adequate, and data systems are available, CQI may result in improved processes of care.

Lessons from the Literature

The previous section reviewed a variety of strategies that have been used to change physician behavior. Unfortunately, the literature on physician behavior change has four serious limitations that make it difficult to evaluate the relative effectiveness of different strategies.

BOX 8-4: Using CQI to Promote Practice Change: Two Examples

The Harvard Community Health Plan (HCHP), a large staff-model health maintenance organization in Massachusetts, has successfully used continuous quality improvement (CQI) methods for a number of years to change medical practice (676), One example involved an attempt to improve the quality of the cervical cancer screening program by ensuring that screening was performed on all eligible patients, specimens were adequately collected by physicians, and appropriate responses to results of the test were undertaken To Improve the adequacy of specimens collected, all physicians were trained in use of a cervical brush, which was added to all cervical smear collection kits Use of this brush was known to dramatically improve the quality of specimens A working group then reviewed clinical studies and developed an algorithm for the clinical actions indicated by each possible smear result, The actions were printed on the laboratory result form A computerized patient information system also automatically checked that the recommended action was completed—a step that markedly increased adherence to the protocol. After SIX months, 99 percent of patients receiving smears had received care indicated by the algorithm (676)

In a few cases, CQI efforts have actually revolved identifying the relative effectiveness of different care practices and implementing the more effective ones more broadly One of the best known examples of this use of CQI is an effort by Intermountain Health Systems, a multihospltal system in Salt Lake City, Utah, which has a highly developed medical information system that IS being used to track data on hundreds of different patient treatments and outcomes (1 25),

Intermountain examined computerized data to compare rates of surgical wound infections for nearly 3,000 patients undergoing elective surgery The data revealed that patients who received antibiotics two to 24 hours prior to surgery had much lower rates of post-operative infection than those who received antibiotics within two hours before surgery or within three hours after surgery (124) Since the study, 96 percent of surgeons at Intermountain are giving antibiotics more than two hours before surgery, and the surgical wound infection rate has dropped from 18 percent to O 4 percent, resulting in significant cost savings for Intermountain hospitals (493),

Practice change in this case may have been enhanced by several factors, First, almost all surgeons were using antibiotics, and the new practice only involved a small change in the timing of that therapy, Second, the practice was simple to undertake—no additional time or equipment was necessary Third, the data were undeniably applicable to the surgeons involved, since the data were drawn from their own patients Fourth, the magnitude of the difference in infection rates was large enough to make the result both credible and perceived to be of clinical significance Surgeons pay attention to infection rates in their patients, since for the most part post-operative infections are considered to be avoidable and are thus a reflection on surgical technique and competence The success of Intermountain initiatives may not be readily generalizable to other settings due to this provider's unusually high degree of record computerization (1 25)

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First, efforts to evaluate behavior change strategies have not been particularly rigorous. They typically rely on quasi-experimental methods and, sometimes, on purely anecdotal information. A recent review of 777 articles describing educational interventions found that only 86 were conducted as randomized trials and only 50 provided enough data to be part of the researchers overview (153). In another review of behavior change literature, the reviewers demonstrated that every well-controlled study of one strategy was negative, whereas all uncontrolled studies for the same strategy showed a positive impact (7 12).

A second, related problem is that many studies do not address all relevant aspects of the clinical problems involved, the procedure involved, or environmental characteristics such as the practice setting in which the strategy was implemented. Lack of attention to such factors makes difficult the determination of which aspects of the strategy accounted for its success or failure. and whether the results arc generalizable to other physician populations.

Third, most studies concentrate on the clinical practices that tend to be the easiest to measure: compliance with preventive care guidelines, use of laboratory testing, and drug prescribing (216). These services, while important, represent only a small portion of the range of health care decisions (679). Because the bulk of research on practice change has focused on only a few types of decisions, it is difficult to generalize findings about successful strategies to more complex clinical decisions, such as choosing between medical or surgical treatments.

Finally. most studies used resident physicians and medical students as subjects. Students and residents are generally more motivated information seekers and probably more impressionable than arc other physicians. Thus, many strategies that prove effective in these populations may not be as effective at changing the behavior of more experienced physicians.

Despite these limitations. the existing literature does reveal some consistent themes. Recent detailed reviews of the literature (153,296) have concluded that educational interventions were most likely to be successful if they had the following characteristics:

- Opportunist y for direct participant ion and personal interaction (296). In many cases, substantive changes are not required. on] y a sense of having put a personal mark on the product (290.376).
- Strong support for the practice change among community physicians (296).
- Smaller group settings (153).
- Individual instruction and feedback (153).
- Use of respected clinical leaders(116,382,488).
- Identifying the specific learning objectives of participants (1 53).
- Higher specificity in both the subject matter addressed in an educational program and in the audience targeted (153.923).
- Flexibility to modify and adapt innovations to local circumstances (731).
- More intense interventions (153).

The literature also suggests quite strongly that combinations of interventions are more likely to be effective than single intervention strategies (153,296,467,). Strategies that combine educational and administrative interventions may be particularly effective in altering clinical practices (467). Educational strategies themselves are more likely to be successful if they are interactive and personalized, delivered by respected peers, and coupled with practice profiling and structured feedback.

The success of strategies to change practice also varies depending on the type of clinical task involved. Davis and colleagues (153) reviewed studies evaluating strategies to change physician practice in the areas of test ordering, drug prescribing, use of preventive services. clinical management strategies, and patient counseling. Ten out of the 11 test-ordering interventions studied were successful. These interventions represented a range of strategies, including feedback, reminders, and chart review: providing cost information; and training in clinical reasoning. Five out of 6 drug prescribing interventions were found to be successful in altering practices, predominantly through use of academic detailing or feedback of

information on drug use to individual providers. Fewer of the interventions to modify clinical management and patient counseling were successful. When successful, these interventions were more likely to involve individual interaction with experienced clinicians and computer-generated reminders (153).

Practice setting is also clearly important to success. For example, Soumerai and colleagues (7 13) note that feedback and reminder systems may work best in group practice settings, while in other settings detailing is more potent. The increasing trend towards health maintenance organizations (HMOs) and group practice may bode well for future efforts to systematically promote changes and improvements in medical practice.

Medical school **curricula** increasingly are experimenting with means of improving clinical decisionmaking. This includes training that highlights the importance of patient preference in decisionmaking; enhancing skills in searching, critiquing and using the published literature (330); and greater sensitivity to the costs of diagnostic and treatment services (229,760,936).

Given the variety of circumstances that surround clinical medicine, there can be no single "magic bullet" strategy for changing clinical practice. Rather, interventions need to be targeted to the condition and practice considered, taking into account the physicians' characteristics, clinical setting, and other relevant factors.

IMPLEMENTING CLINICAL PRACTICE GUIDELINES

Clinical practice guidelines are a potentially powerful tool for communicating the findings of clinical studies to practitioners. The current federal interest in sponsoring guidelines development is motivated in part by the expectation that guidelines will result in changes in clinical care, improving the quality of care and reducing use and costs of unnecessary care.

At present, most guideline development efforts at the federal level rely on educational approaches for this implementation. National Institutes of Health (NIH) consensus statements and AHCPR-sponsored guidelines, for example, are disseminated through direct mailings, and through publication in popular medical journals (box 8-5). The results of research sponsored by these agencies similarly are disseminated through journal publications or presentations at medical conferences.

In the near future, however, policy makers will not necessarily be content to rely on passive education to promote guidelines. More coercive administrative and financial strategies are being contemplated, and some are already being implemented. Medicare, for example, is developing utilization review strategies based on guidelines sponsored by AHCPR and others (533). One private insurer recently announced that coverage for a series of different clinical interventions would depend on whether clinicians had followed clinical practice guidelines (74). A number of policymakers and commentators have suggested that health insurance benefits under health reform should be based on evidence regarding effectiveness and clinical practice guidelines (see chapter 2). These strategies assume that educational and other relatively benign strategies alone will not be sufficient to change practice.

Impact of Guidelines on Clinical Practice

The impact of guidelines is measured most often by changes in physician practices. Few studies have examined the impact of guidelines using patient outcomes. The literature that exists is also somewhat contradictory. Some reviews suggest that guidelines have had little impact on practice, while others report greater promise.

For example, an extensive review of the products of the Consensus Development Program at NIH concluded that physician practice is usually unaffected by the results of these recommendations (41 1,43 1). A recent review of 19 studies that evaluated the impact of these and other consensus statements on practice concluded that few instances of impact are identifiable (465). Substantial discrepancies between guideline recom-

BOX 8-5: Guidelines Dissemination at AHCPR

In establishing the Agency for Health Care Policy and Research (AHCPR), Congress was particularly concerned that the results of the work of the agency be widely disseminated As a result, one divison of the agency is dedicated entirely to this task The primary method of disseminating AHCPR guidelines is direct mailing, based on established mailing lists as well as requests received through a toll-free telephone number.[1] The demand has been strong, with several million of the first eight guidelines having been malted, About half of requests have been from clinicians, with the other half coming from consumers and other interested individuals Demand has been stimulated by media coverage of the guidelines One large surge of requests for publications, for example, was stimulated by reference to a guideline on urinary incontinence in a column by Ann Landers Many of the guidelines have been excerpted and published in peer-reviewed medical journals as well To enhance the visibility and credibility of the guidelines it sponsors, AHCPR also actively seeks the endorsement of relevant professional societies, and it has received many endorsements for each guideline

While a number of anecdotes have been collected suggesting that AHCPR guidelines have been well received in certain cases, there is as yet no empirical evidence of their effects on cliniclans' or patients' awareness, beliefs, or practices. This is due in part to the relative newness of the program AHCPR has issued a request for proposals and will fund research on patterns of use related to the guidelines (822)

AHCPR sponsors some research in dissemination methods and has initiated several studies specifically to evaluate various strategies for implementation of its guidelines Most of these studies involve comparisons of the range of strategies discussed in the chapter (e g , opinion leaders, CQI, practice profiling) as approaches to altering physician behavior (805).

In order to facilitate use of guidelines in generating performance benchmarks for profiling care, AHCPR is also working on methods to translate guidelines into review criteria This Involves deriving a discrete set of steps though which the recommendations in the guideline are converted into "yes" and "no' questions, which can then be applied to the review of patient care Application of such criteria could be used for a variety of purposes, ranging from providing practice feedback to physicians to potential use by payers to make coverage decisions Review criteria based on well-founded guidelines would clearly be preferable to more arbitrary or less evidence-based review criteria. However, the potential use of guidelines-based review criteria by payers may affect the expert panels' willingness to issue explicit recommendations for practice, and it might undermine physicians' confidence in the guidelines as an educational tool.

[1] AHCPR guidelines are produced in three formats a book version of about 100 pages a clinician summary of about 20 pages and a consumer pamphlet of four to eight pages

SOURCE Office of Technology Assessment 1994 based on information from the U S Department of Health and Human Services Public Health Service Agency for Health Care Policy and Research, and other sources as shown Full citations are at the end of the report

mendations and actual practices have been documented for a variety of clinical situations, including use of screening mammograms (5 17, 556,943), diagnostic staging studies for cancer patients (26 1), dehydration in treatment of childhood diarrhea (60), and others. This cumulative evidence was interpreted by recent reviewers to indicate that "clinical practice guidelines have been remarkably unsuccessful in influencing physicians" (153).

Other reports of the influence of guidelines are considerably more positive. Decreased use of cardiac pacemakers (425) and increased routine use of monitors during anesthesia have been attributed to clinical practice guidelines (211 ,608). Other studies have shown guidelines to lead to reductions in overall lengths of hospital stay and reduced use of intensive care units (193,470, 902,903), more accurate dosing of therapeutic drugs (439,630), and improved health for diabetics patients (887). A recent systematic review of 59 evaluations of the effect of clinical guidelines on medical practice found that all but four of the studies reviewed identified significant changes in practice in the direction proposed by the guidelines (308). The magnitude of change varied considerably across the studies, however.

The conflicting conclusions of these two bodies of evidence concerning the impact of guidelines on clinical practice deserve closer attention. A review hereof selected guidelines development and dissemination efforts helps to illuminate some of the factors that underlie the mixed results.[4]

Preventive Care Guidelines

The use of widely accepted screening tests for common cancers and other conditions has been well below expected levels, suggesting that the simple existence of recommendations from national guideline panels on preventive services is inadequate to alter practices (332,5 17,556,943). Increasing the rate of preventive screening even through more active measures is sometimes difficult. In one study, performance did not improve among resident physicians who were taught about the recommendations of guidelines in small groups, nor did any change occur when patient-specific recommendations were taped to the front of each patient chart (333).

Computer-generated reminders, however, have been successful in most of the studies of the use of this technique in improving use of preventive services (40,504,505,506,654,759). These reminder systems use patient age, gender, and risk-factor information to determine which preventive services are indicated for the patient.

Generalizations from these studies of preventive practices to guidelines involving other clinical tasks may not be warranted, however. Preventive care is generally a population-based practice that involves minimal tailoring for individual patients. Screening guidelines also differ from guidelines for many other services in that they present relatively discrete and explicit recommendations for practice.

Cardiac Pacemaker Implantation

A marked decrease in the use of cardiac pacemakers occurred in the early 1980s. The decrease has been credited to the dissemination of guidelines issued by the American College of Cardiology (ACC) and the American Heart Association (AHA) (425). The impact of the ACC/AHA guidelines was probably not the result of simple dissemination alone, however. First, public attention to inappropriate use of cardiac pacemakers was high in the late 1970s and early 1980s, with several research studies and a Senate hearing contributing to the concern (120,304,588,791). Sec-

[4] Studies included in this review were obtained through a MEDLINE® search, and from existing reviews of guideline implementation, as well as bib] iographies of relevant articles and personal collections of experts (153,216,376,40 1,535.946). Only the reviews by Dav is et al. (153), Grimshaw and Russell (308) and Johnston et al. (40 1) provide an explicit description of the methods of I iterature search and study selection used in their over-views.

end, a number of health care payers, including Medicare, used the guidelines as a basis for prior authorization review of pacemaker implantation and denied authorization for patients not meeting the guideline criteria *(304).*

Cesarean Deliveries

A rapid increase in rates of Cesarean delivery prompted national guidelines in both the United States and Canada that concluded that at least some reasons for performing the procedure were unjustified (492,744,841). Several studies documented that U.S. Cesarean rates did not decrease after publication of the NIH-sponsored guidelines (283,43 1). Similarly, in Canada, 90 percent of physicians were aware of the national guideline, and over 80 percent agreed with the recommendations, but rates of the procedure continued to increase following guideline dissemination (468). Frustrated by the lack of response to guidelines based on such a strong evidence base, researchers and institutions turned to more active implementation strategies.

In Canada, Lomas and colleagues carried out a randomized controlled trial comparing the impact of different strategies to reduce rates of Cesarean delivery for women who had undergone a previous Cesarean---a clinical decision about which the guideline was quite explicit (470). Strategies tested included simple passive dissemination. profiling and feedback, and the use of opinion leaders to influence clinicians. No changes in practice were noted in either the passive dissemination group or the profile and feedback group.[5] In the opinion leader group, however, there were substantial increases in trials of labor and vagina] deliveries for women with prior Cesareans, as well as a reduction in the overall Cesarean delivory rate, with no detected change in birth outcomes (470). The success of this intervention may be due in part to factors such as the strong base of evidence in support of the recommendations (106,324), the large amount of inappropriate use suspected, and the clarity and simplicity of the recommendation involved. However, despite these favorable characteristics, an active implementation strategy was still required.

In the United States, an active intervention at Mt. Sinai hospital in Chicago reduced the rates of Cesarean delivery from 17.5 to 11.5 percent over a two-year period (55 1). Explicit policies were developed to encourage a trial of labor for women with previous Cesarean deliveries, and the policies were provided to both physicians and patients. Physicians were required to obtain and document a second opinion prior to performing a Cesarean delivery (other than emergency procedures). Data on each physician's rate of Cesarean delivery were available so that physicians could compare their own performance with that of their colleagues. Cesarean deliveries not complying with the practice criteria were judged inappropriate, and "this judgment was communicated directly to the physicians involved, either in conference or by the department chairman or the director of perinatology" (551).

Offering economic incentives to reduce Cesarean delivery rates (by equalizing payments for Ce - sarean delivery and vaginal birth), in contrast to the above interventions. has not been successful in the few studies that have been done (422). The success of noneconomic interventions and failure of economic explanations for rates of Cesarean delivery reinforce the idea that a variety of forces are important in determining patterns of clinical practice.

Anesthesia Monitoring Guidelines

The development and dissemination of standards for patient monitoring during anesthesia have been credited with influencing clinical practice, reducing anesthesia-related deaths. and reducing malpractice insurance premiums (21 1,425.608). In 1987, a major malpractice insurance carrier in

[5] Profiling and feedback may hav c failed because no individual-level data were provided: the involved physicians chose to decline this in formation (470).

Massachusetts offered a 20-percent reduction in premiums for physicians who agreed in writing to follow guidelines, developed by the Risk Management Foundation of Harvard Medical Institutions, intended to reduce anesthesia-related deaths. The insurer reported a reduction in anesthesia-related claims following implementation of the program (608). After the guidelines were subsequently adopted as national standards by the American Society of Anesthesiologists, malpractice insurers across the country reported similar results (608).

Not all of the reductions in the number of anesthesia-related claims can be attributed to the guidelines. Over the past decade, a general downward trend in rates of adverse anesthesia events has been observed, possibly related to the guidelines but possibly also related to other changes in the availability and use of new technologies (580,608,664). A number of other factors may have contributed to the apparent success of the anesthesia monitoring standards as well:

- The guidelines were purposefully promulgated as minimal criteria for adequate practice (212).
- The standards describe the recommended practice in simple and explicit terms.
- The practices are simple to undertake and require inexpensive. readily available equipment.
- The burden of adherence is trivial compared with the potential catastrophic consequences of failure to comply.
- Economic incentives exist to follow the guidelines (i.e., reduced malpractice insurance premiums).

Hospital Length-of-Stay Guidelines

Decisions about the duration of time that a patient stays in the hospital, or in a special care unit, involve a different set of considerations about risks and benefits than decisions about whether to order a particular drug or test. Thus, guidelines about length of stay maybe affected by different factors as well.

In one study investigating the impact of, guidelines on the length of stay in the intensive care unit (ICU) (193), guidelines were developed internally by staff with the input of respected outside experts. These guidelines were part of daily discussions on the care for each ICU patient. In addition, a weekly review of patient care was conducted, with focused exploration of all cases in which the guidelines were not followed. The intervention reduced the ICU length of stay in one subset of patients (those who were admitted to the ICU primarily for observation), but not others. The study suggested that guidelines on length of stay, developed locally and applied intensively in a teaching setting, can influence how long certain types of patients are kept in the ICU.

Another study examined the impact of a guideline promoting early discharge for low-risk patients admitted to the hospital with chest pain. In this study, patients identified by the guidelines as being "low risk" had a note placed on their chart indicating that they could be discharged within 48 hours, with little risk to their health, if their tests did not confirm a heart attack (902,905). If the patient remained more than 24 hours despite the note, telephone contact was made by a utilization management physician (a respected local practitioner) who reinforced the guideline recommendation. This intervention resulted in a reduced length of stay and estimated savings of $1,400 per low-risk patient, without any detected adverse effects on a wide range of measured patient outcomes (902,905). However, the impact on length of stay did not persist when feedback was discontinued, suggesting that the note and phone call served as necessary reminders to follow the guideline (902,905).

Interestingly, an identical intervention for patients with congestive heart failure (CHF) in the same hospital was not successful in reducing the length of stay (901). Several differences between the interventions may explain the differences in study outcomes. First, the guideline for CHF patients was more complex and less easily understood than the chest pain guideline. Second, the CHF guideline was developed by a local investigator using local data, but was not shown in independently published studies to be an accurate tool

for safely managing the site of care of heart failure patients. In contrast. the chest pain protocol was based on studies published in the pm--reviewed literature.

Drug Prescribing and Test Ordering

Use of pharmaceuticals and diagnostic tests arc areas where changes in practice may have considerable potential for reducing the costs of care, but experience in using guidelines to affect practice in this area are mixed. For example, physician practices have been shown not to correlate well with recommended use of antibiotics to prevent heart valve infections in patients undergoing procedures that might introduce bacteria into the blood (87,634). Dissemination of guidelines on antibiotic selection in another study failed to influence use of these antibiotics (671). One study did report a decrease in unnecessary use of albumin therapy for hypovolemia in France with repeated distribution of a guidelinc (189). Guidelines have also been used successfully to reduce the use of x-rays (262,66 1) and diagnostic blood tests (673, 718).

Guidelines for use of blood products have been a high priority interest area, Transfusion practices of surgeons were altered through a detailing intervent ion based on guidelines from a national blood banking organization (7 16). However, in some cases, adverse outcomes may dissuade physicians from following new guidelines. For example, a hospital-based intervention intended to reduce use of platelet transfusions caused two episodes of bleeding in patients with low platelet counts, which eliminated physician compliance with the guideline (695).

Clinical Management Guidelines

Many of the guidelines noted above target specific components of patient care or specific interventions. giving relatively explicit recommendations for the use of selected services. other guidelines, however, focus mow broadly on management of a giving clinical condition over time. Such guidelines tend to be more complex and less explicit than procedure-oriented guidelines.

Chart review studies suggest that, in many cases, current clinical practices do not conform to the specifications of existing clinical management guidelines. In treatment of pediatric diarrhea. for example, a guideline recommendation for rapid dehydration was followed properly by only a minority of pediatricians (60). Another study on guidelines for cancer staging and radiation therapy consultation showed a low rate of compliance despite the fact that the physicians who participated in the study also developed the guidelines (261).

Greater compliance was achieved in a program that used preprinted order sheets based on guidelines for management of pediatric asthma (93). The order sheet specified nursing ratios, oxygen monitoring, drug dosing schedules. and laboratory orders. Pediatricians in the protocol group had changes in practice consistent with the protocol. Guidelines that can be reduced to explicit algorithms that outline care for a complex and serious medical problem were in this case a well accepted intervention, although the study was not able to show whether compliance with the guideline improved patient outcomes (818).

A guideline-based intervention for management of patients with peptic ulcer disease that used a variety of administrative strategies was successful in altering drug prescribing practices and reducing the use of' endoscopy (93). Physicians were encouraged to use a less expensive ulcer medication by requiring prior authorization for the more expensive alternative. Fewer endoscopies were performed after active implementation of locally modified guidelines from the American Gastroenterological Association (93).

Factors Influencing the Impact of Guidelines

Because of major limitations in the literature, it is difficult to draw firm conclusions as to which factors are the most influential in promoting practice change via guidelines. First, studies on the impact of guidelines are often poorly documented, and in many cases they arc inaccurately characterized in review articles. Second, because many of the in-

terventions studied involve multiple variables (e.g., an intervention may use both educational and financial incentives), it is difficult to isolate which of the features were important and which were irrelevant to the outcomes. Only on rare occasions are comparisons made between interventions that differ according to only one variable. Third, much of the "evidence" is in the form of anecdotal comparisons between guidelines implementation and broader utilization trends. Such comparisons do not control for other factors that may have influenced changes in utilization rates and are therefore not compelling evidence of the success of guidelines.

Taken collectively, however, the guideline implementation activities reviewed above and by others suggest that a variety of factors are important to successful implementation. Many of these factors mirror the elements of the influences on physician behavior discussed earlier in this chapter. They include:

- **Intensity of dissemination efforts-Local dissemination efforts (e.g., computerized protocols, formulary restrictions, telephone reminders) increase the likelihood that national guidelines will be followed (153,298). Multiple strategies may be needed to bring about a desired practice change. To be successful, implementation models must be tailored to address the variety of influences relevant to a given practice.**
- **Follow-through of dissemination efforts—Continued efforts may be necessary to ensure that guidelines have a lasting impact on clinical practice. It is well recognized that even when changes in practice occur, they often do not persist beyond the period of intervention (216,679,760).**
- **Type of clinical problem and clinical tasks addressed by the guideline—Guidelines that attempt to alter a single, well defined practice (e.g., performance of a screening test) seem to be more effective in changing practice than more complicated or general guidelines addressing more complex behaviors. Physicians may also be more compelled to follow guidelines that aim to prevent potentially catastrophic outcomes through the use of relatively simple and inexpensive interventions (as in the anesthesia example). Guidelines that promise only marginal improvements in outcomes or that prescribe new practices that are difficult or expensive to implement maybe less successful at changing practice.**
- Source of the guideline—Guidelines issued by respected sources seem to be more easily accepted (768). Physicians are most likely to distrust guidelines developed by organizations that they perceive to be biased or to have a financial interest in the recommendations.
- Physician participation in the development or adoption of the guideline—Physician involvement in the development or adoption of guidelines used in the intervention seems to increase the likelihood of successful implementation. Even simply being included in the deliberation process enhances the clinicians' sense of participation.
- **Form and specificity of the guideline's recommendations--Guidelines that are simple, clear, and explicit are more likely to be effective than ones that are complex and leave much room for interpretation or judgment (307).**
- **Legal considerations—Guidelines that suggest a minimum standard of care maybe particularly influential, because physicians may believe they suggest a legal standard.**
- **Financial and administrative mechanisms—These can be powerful tools to reinforce guidelines but if used alone often have unwanted side effects.**
- **Strength of evidence on which the guideline is based—Physicians maybe influenced by the strength of evidence on which a guideline is based. Also, if a protocol has proven effective at a number of different sites, cl inicians may be more likely to adopt its prescriptions. Guidelines for screening tests backed up by strong, consistent evidence, for example, may be more influential than those based on weaker or more controversial evidence.**

There are a number of instances where high-quality evidence from clinical trials appears to have contributed to the success of guideline implementation. For example, in the case of pacemakers, consistent, strong, and high-quality evidence supported a clear and explicit recommendation that was reinforced by payment policy (304). Similarly. efforts to reduce Cesarean delivery rates in Ontario and at Mt. Sinai Hospital in Chicago (470,55 1) were buttressed by strong studies showing that outcomes for mother and child were not worse when vaginal deliveries were attempted (250). In contrast, the lack of good quality and widely accepted evidence supporting guideline recommendations might explain some of the failures to implement the guideline to reduce critical care unit stays for patients with heart failure (904).

Guidelines can sometimes be successfully implemented even if based on studies with less-than-ideal designs, however, if the likely effect from changing practice is sufficiently large and the outcome to be averted a severe one. In contrast to the guidelines on Cesarean delivery. which were supported by a number of high-quality studies, the anesthesia guideline recommendations were based primarily on a review of a case series of adverse events (21 2).

The relationship between quality of evidence and impact on practice has not been well studied. However. as discussed in chapter 7, consistent high-quality evidence improves expert group consensus, which in turn enables the panels of experts to make strong, clear recommendations about appropriate practice (470). It also presumably lessens the chance that the recommendations of separately developed guidelines will conflict and confuse users.

CONCLUSIONS

Physicians' (and patients') decisions are shaped not only by information on the potential risks and benefits of possible alternative therapies, but also by a range of external forces that include economic and legal pressures, the wishes of patients and their families, the practice styles and input of colleagues and local experts, and the set of administrative rules within which physicians operate. Because of the multiple forces affecting clinical decisions, no single strategy to change physician practice is likely to be identified. For any given clinical situation. a few sources of influence on practice are likely to predominate. Efforts to alter practices may be most efficiently achieved when the forces that shape those practices are identified, and this knowledge is used to select and design an intervention to alter that practice.

Financial and administrative mechanisms can have a potent influence on physician and patient behavior, but they are often unselective and can have unintended, undesired secondary effects. As a means of implementing guidelines they do provide motivation, but their benefit depends on the degree to which secondary impacts are minimized and on the validity of the guidelines themselves.

Patients are involved in clinical decisions, and patient demand influences physician behavior. Educational strategies aimed at patients can be successful in altering clinical practices to improve the benefit to the patient, though health care costs do not necessarily decrease as a result.

Physician decisions are strongly affected by the beliefs and practices of their clinical colleagues. Physicians are more likely to receive and incorporate information from sources they know and respect, or from organizations with which they are associated. Informal networks of information through local medical communities have been shown to be important routes of information exchange among clinical providers. In contrast. physicians typically doubt or reject information that comes from distant sources, particularly if they have any reason to suspect the presence of a bias they do not share.

Physician involvement in the process of change appears to improve the success of interventions to alter practices. This has been observed in small group educational workshops, practice auditing with feedback. clinical guideline development, conduct of clinical trials. and continuous quality improvement.

Data collected in the course of patient care are being used. often effectively, to change practice via practice profiling, feedback, and CQI. However, none of these applications can provide reliable evidence regarding which alternative medical practices work best unless they are combined with evidence (alone or interpreted through guidelines) on the most effective practices.

Although even passive dissemination of information often plays an enabling role for future efforts, the development and distribution of guideline statements is often ineffective in altering physician practices, no matter how important the issue or how valid the guideline method. Specific strategies to implement guideline recommendations are necessary to ensure practice change, and the existing studies suggest that more intensive efforts to alter practice are generally more successful. Implementation of guidelines will require considerable effort and skill. Implementation is also more effective if tailored to the particular condition, type of clinical task, and patient population involved.

Impact on practice change is increased by strong, well defined recommendations for a specific practice. Firm recommendations are enhanced by strong and consistent evidence. Thus, where there is variation in clinical practices and no good evidence about which practices are most effective, performing high-quality clinical trials is important not only to resolve the question but to convince physicians of the answer.

The literature on physician behavior suggests that locally developed guidelines may be more influential than guidelines issued from remote sources. However, many physicians may prefer a flexible set of national guidelines to a panoply of more specific and potentially conflicting guidelines from payers, local government, institutions, and other entities. The challenge for federal guidelines efforts will be finding effective means of disseminating their guidelines through the local networks of communication that have been so effective in influencing physician practice. Allowing for some local adaptation and modification of clinical strategies developed outside physician communities would help ensure that the information has an effect on practice.

Additional research is needed on the forces and strategies that influence clinical decisionmaking. It would be particularly useful to have studies that carefully control all but a single aspect of an intervention, in order to begin to identify specifically the elements required for effective dissemination. It is also important to test strategies for categories of clinical practice other than the few that have been extensively studied to date and to apply practice change interventions to physician populations other than residents and medical students. Evaluations of practice change interventions should carefully document all of the forces and factors associated with the intervention so that its impact can be interpreted with full knowledge of all variables that might account for observed effects.