Changing Pediatric Practice in a Changing Medical Environment: Factors That Influence What Physicians Do

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The rate of organizational change in the medical industry, particularly in the last 10 to 15 years, has been almost as impressive as the pace of its clinical and technologic change. Despite the information “superhighway” and other modern information systems, growth in medical knowledge continues to outpace its proper dissemination and assimilation. Physicians in practice 20 years or more have experienced the most dramatic change in context, characterized often as a “profound loss of autonomy.” ¹ From an era of open-ended choices regarding diagnostic workup, length of hospital stay, therapeutic modalities, and frequency of follow up—essentially unscrutinized practice—physicians now work in a managed environment, characterized by utilization review, quality assurance, cost concerns, and explicit financial expectations. Integrated health care organizations and third party payors, including federal and state governments, attempt to influence medical decisions toward efficient resource utilization.

Physicians who entered the medical labor force more recently, and for whom the culture of scrutiny may be somewhat more familiar, still face a bewildering and rapidly changing array of clinical choices and contractual arrangements. ² These changes in medical care organization have enormous potential for improving the quality of health care. But even constructive changes can challenge the delivery of

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quality care because of the turbulence that transition engenders.

The rapid growth in managed care and increased social concern about the balance between health care costs and quality of care have led to increased scrutiny of physicians' decisions, the manner in which those decisions are implemented, and their outcomes. Pediatricians have been protected from some of these changes due to the special nature of their work. However, they will be cloistered no longer as marketplace changes continue. A wide range of attempts to influence physician behavior, as well as research evaluating the impact of these attempts, has been undertaken. We review this literature with emphasis on identifying gaps in our understanding of the rapidly changing medical environment. To the extent that these changes may be new to some pediatricians, we review what they may expect as the next millennium approaches.

THEORETICAL CONSTRUCTS

Several theoretical constructs have been described and catalogued the influences on physician practice. One approach identifies six mechanisms to changing physicians' behavior: education, feedback, participation, administrative change, penalties, and incentives. More recently, these influences have been grouped into either rules or incentives. Here, we will discuss three categories by dividing "rules" into two sub-categories, education and structure. Educational influences include the use of clinical practice guidelines, consensus development, provider participation in algorithm development, continuing medical education, academic detailing, and the impact of opinion leaders. Structural influences include audit, feedback, and reminder systems. Financial incentives include the basic method of physician payment, ancillary financial mechanisms, and related contractual arrangements to influence what physicians do.

Financial incentives may be direct or indirect and they are generally effective, although often at the expense of physician alienation, particularly if the use of positive (reinforcing, rewarding) and negative (punitive, restrictive) incentives is unbalanced. Studies of financial influences on physicians include three major types: the use of large administrative data sets and multivariate models for description and prediction; experimental techniques, using study and comparison groups to observe change with efforts to control for confounding secular and demographic trends; and anecdotal case studies of the effects of administrative action on policy decision making.

Educational and structural methods may be less threatening than incentives, as they are consistent with the idea of lifelong continuing medical education (CME) taught in medical school and residency. And, research on educational and structural modalities also has a longer history than research on financial influences. Nonetheless, the results of attempts to alter medical practice through education, in particular, continue to be ambiguous. Educational processes are traditionally difficult to evaluate, as the rapid transition in medical care renders some practices obsolete before they can be fully evaluated. Although theory may anticipate an orderly progression from learning to behavior change to improved outcomes, the actual relationship among them remains elusive. In general, educational and structural initiatives are thought to have transient impact at best, and less influence than structural influences and financial incentives.

Difficulty in studying influences on physician behavior arises from the diversity of methods and analytic approaches used. Research may be based on national samples, multiple practice settings, single practices, individual providers, patients, or patient visits, with sample sizes ranging from less than 10 to many thousands. Time frames vary from several weeks to 4 years or more and some reports describe ongoing activities with more than a decade of accumulated experience. The actual subject matter of the intervention—for example, acute care or prevention—also is variable. But even when the clinical subject is similar, as with prevention, problem definition and data collection vary. The reporting of the effects of interventions also is nonstandard, using absolute differences, relative differences, comparison of ad hoc composite scores, or occasionally providing the results of statistical tests (eg, beta coefficients, P-scores) with or without reference to the raw data. Finally, studies vary in the intensity with which providers are exposed to a given intervention. Again, the influence of such variation is difficult to quantify and assess.

Nonetheless, some underlying principles guide successful efforts at administering and evaluating financial incentives, structural changes, and physician education. First, local consensus is critical to the acceptance of change. The active participation of those providers who will be affected by change is probably the single most important factor in its acceptance. Second, acceptance of change depends on good information, logically presented. Information presented at the time of the clinical encounter (eg, reminders) has the greatest immediate impact on providers' action, whereas information presented after the encounter (eg, audit and feedback), has less effect. Pre-encounter education and exhortation, untied to financial incentives, seems to have the least effect. Third, simplicity, clarity,
and relevance enhance the effectiveness of interventions, and influences that are continual and recursive do best. Financial maneuvers cannot work in a social vacuum; they must be introduced and evaluated in context with the other extant influences.12,13

Influences on physicians can also be categorized relative to when they occur in the provider-patient encounter—whether before, during, or some time after the clinical interaction. Many traditional educational approaches (CME; clinical practice guidelines; physician participation in goal setting; use of opinion leaders; academic detailing; and dissemination of consensus statements) provide practitioners with skills they bring to the clinical encounter. Clinical algorithms, reminders, and financial incentives, particularly with physician participation, may be part of a prior educational process, but their purpose, of course, is to influence the content of clinical interaction itself. Finally, the process of medical audit, with feedback of results to practitioners, occurs after the clinical encounter as part of either an individual or group process.

Most evaluations and efforts at influencing physicians have been directed at primary care physicians, including internists, family practitioners, and OB-Gyn. Because these methods are now spreading to all types of physicians including specialists, pediatricians should beware their impact, to the extent they have not already borne it.

EDUCATIONAL INFLUENCES ON PHYSICIAN BEHAVIOR

Clinical Practice Guidelines, Consensus Development, and Provider Participation

The development of clinical practice guidelines is burgeoning.14 The AMA’s Directory of Practice Parameters lists several thousand guidelines developed for clinical and preventive care by government agencies, professional organizations, voluntary groups, HMOs, and pharmaceutical companies.15 Far more attention has been devoted to the development of guidelines, than to their evaluation.

Guidelines may be developed externally or internally. Consensus of external experts is used by the Clinical Efficacy Assessment Program of the American College of Physicians17 and by the Agency for Health Care Policy Research.18 Experts produce exhaustive background documents, which are then translated into a published, peer-reviewed position paper. Internal consensus, as exemplified by the ongoing process at the Harvard Community Health Plan,19 involves project planning, consensus development, and protocol review. The extremely important difference between the two approaches is that internal consensus building involves the medical staff who will implement the clinical guidelines. Often external guidelines are the starting point for internal review, modification, and implementation.

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Guidelines have been used in a number of local clinical settings, including the coronary care unit,20 treatment of asthma,21,22 and treatment of low back pain.23 Unfortunately, enthusiasm for the process is not always matched by reported results.24,25,27 In the case of pediatric status asthmaticus treatment, guidelines did result in demonstrable improvement in the process of care, but did not improve patient outcomes. The adult low back pain intervention resulted in both under- and over-utilization of the targeted diagnostic procedures.

On a more positive note, pediatric guidelines to decrease the use of superficial cultures for neonatal sepsis did cause considerable cost savings.28 This change in behavior was accomplished with much effort, including the use of opinion leaders, CME, immediate feedback, and the creation of barriers to the use of microbiologic specimens. Successful guidelines reflect both the larger perspective of external developers and local needs.29

The overall results of implementing consensus guidelines at a regional or national level are equally disappointing. Obstetricians had poor knowledge of national consensus recommendations on Cesarean section two years after their issuance.30 In fact, despite a perceived decrease in their use of Cesarean sections, examination of medical records revealed that actual rates were 15 to 49 percent higher than reported. Similarly, no impact on physician practice of the National Institutes of Health Consensus Development Program could be demonstrated.31

Summary judgments about the value of clinical guidelines must be made with caution. Although there is evidence of effectiveness in some circumstances, results are not uniformly encouraging. Effect size and duration do seem to correlate with the size and duration of the influence.

Continuing Medical Education

Continuing medical education (CME) takes a variety of forms, including conferences and courses (eg, annual society meetings), periodic lectures, distribution of written materials, correspondence courses, and on-site short-term training. Although CME sometimes alters behavior,30,32-34 few studies show improvement in patient outcomes. In addition, physician education does not appear to be of value as a cost-containment strategy.35-38 Several attempts to
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train physicians to counsel patients about smoking (including adolescents and pre-teens) have shown reasonable impact on the frequency with which physicians counsel patients, but effects on actual smoking cessation have been minimal.32-33

Importantly, effective CME programs were not limited to education alone.3 CME improves performance when it communicates or disseminates relevant information, facilitates desired change, or reinforces the change through feedback or reminder. Educational interventions confined to the pre-encounter period are less likely to be effective than those which span the clinical encounter or are combined with other interventions.

Academic detailing and opinion leaders

Academic “detailing” simulates the direct one-on-one provision of information to physicians by pharmaceutical companies.59 The process has a theoretical base in communication theory and may influence physician prescribing in a number of settings.60-65 In some instances, peer physicians are enlisted as the “detailers”, best results are achieved when the detailing physicians are opinion leaders.66-68

Structural Influences on Physician Behavior

Audit, feedback, and reminder may be considered sub-categories of educational influences (or “rules”). We separate them here because of their generally better performance as influences on physician decision-making compared to other forms of physician education.

Audit and feedback

Providing information to physicians about their practice patterns—i.e., utilization management or review—usually has been implemented and evaluated in conjunction with some form of educational program, making the individual effects of each difficult to sort out. Audit and feedback has been associated with positive results,48,75-83,92-96 more so than with negative results.55,56,84-91

Once again, methodologic differences among studies of audit and feedback makes summary statements difficult. Feedback has a positive effect on a number of utilization measures, such as reducing length of hospital stay, reducing prescription rates, and increasing screening.8 Similar to education, feedback seems to succeed when physicians “buy into” and participate in the process, when they can act on the feedback, and when the lag between feedback and required action is short. Social or psychological peer issues, such as most physicians’ preference to avoid being seen as outliers, also may be responsible for the positive effects.

Reminder systems

Messages to physicians at the time of the clinical encounter generally have been successful in influencing physician behavior, whether manually-generated (e.g., the colored sticker on the patient record; the wall chart) or computer-generated. Reminders are a subset of a much larger movement in health care toward the use of decision support systems. Although their use, of course, is not without failure,97-99 “reminders” generally do bring about desired clinical action.34,36,73,86,95,100-110 Such impact seems greatest for a number of preventive activities (e.g., pediatric vaccines), where the clinical action is straightforward, simple rules can be invoked, and a major obstacle to performance of the desired task—lack of information in hand—is removed. Reminders are a form of prospective feedback, mitigating errors of omission before they occur. As with all influences on physician behavior, reminder systems work best when they are part of a larger process for quality improvement,92 and, especially, when they ease, not add to, providers’ workload.

Financial Influences on Physician Behavior

We divide financial incentives into three groups for purposes of discussion: basic compensation, ancillary mechanisms, and a variety of organizational initiatives usually used along with the first two. Physicians do respond to financial influences. Recent change in the organization of medical care provides an opportunity to observe the influence on physician activity of alternate forms of payment and ancillary fiscal mechanisms.

The most significant difference between managed care organizations and traditional indemnity insurance plans (that is, the situation in which physicians are paid in retrospect by their patients’ insurance carriers for each service performed), is the redistribution of financial risk from the insurer somewhat to the provider and the patient. Managed care plans share financial risk with the physician by altering the basic form of payment and by creating additional payment mechanisms that provide incentives for the physician to be “cost-aware.”

Basic compensation

Three basic forms of payment are used in managed care: fee-for-service, salary, and capitation.111 Although each is a form of exchange of money for service, effects vary with respect to influences on the
In the traditional American model, with no regulatory oversight, both doctor and patient had positive incentives to use services.

Ancillary mechanisms

Three basic ancillary mechanisms have emerged for influencing physicians' activities above and beyond the basic form of payment: bonuses, withholding accounts, and penalties. The first is a positive incentive, the second a threat of financial loss, and the third a form of negative sanction. "Carve outs", partial capitation, and stop-loss accounts are other mechanisms that can mitigate or magnify the impact of the basic form of payment.

That various kinds of financial mechanisms have an influence on what physicians do has long been known. In 1987, two-thirds of all contractual arrangements among HMOs provided for a portion of payments owed to primary care physicians to be withheld until year-end budget reconciliation. The HMOs with less socialized infrastructure, such as Independent Physician Associations (IPAs) were more likely to use withholding accounts to influence physician behavior than the more structured HMOs such as staff-model plans, whose physicians interacted often. Only 3% of staff-model HMOs used withholding accounts compared to 83% IPAs. Other practice settings were intermediate between these extremes. For-profit HMOs were statistically more likely to use the accounts than the not-for-profit HMOs (70% versus 58%).

Thus, there is a continuum of influence that HMOs may exert on physicians behavior. HMOs that are Independent Physician Associations, operate for profit, and reimburse on a fee-for-service basis make considerable use of withholding accounts, probably because the accounts are viewed as a necessary lever for cost containment in an otherwise uncontrolled setting. At the other end of the spectrum, not-for-profit staff-model HMOs that employ salaried physi-
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Physicians have the smallest use for withholding accounts. In the same survey, 30% of HMOs used financial penalties to reduce costs, in addition to withholding accounts. These penalties took a variety of forms, including increasing the percentage of the amount withheld in subsequent years, placing liens on future earnings, decreasing the amount of capitation payments, excluding physicians from a plan, and reducing the amount of distributed fund surpluses. Although multiplan organizations were less likely than others to penalize physicians, and older plans were more likely, no other clear patterns emerged.

Positive incentives, in the form of fixed dollar payments, a fixed percentage of any budget surplus, or a bonus based on productivity commonly were used. Although the underlying motivation for the explicit form of bonus is difficult to unravel, a large majority of HMOs find some mechanism of positive incentive to be a valid way to influence physician prescribing habits, and, in general, that mechanism is tied to some measure of peer group productivity.

More recently, financial influences have been increasingly tied to quality of care, in addition to productivity. Capitation and bonuses have continued to grow, while withholding has not, probably due to physician resistance. Although the arithmetic of bonuses and withholdings can result in similar dollar amounts, physicians clearly prefer positive “carrots” (bonuses) than lose money they thought they were due (withholds).

Physicians’ personal responses to HMO incentives are predicted by a priori expectations of rational economic action. Primary care physician turnover in HMOs (the proportion of physicians who leave a particular setting) is higher for physicians for whom HMO enrollment is a larger part of their practice, perhaps due to the higher regulatory burden such situations impose on individual behavior. Physicians are more likely to leave if their compensation is dependent on group activity, probably because each physician wants control of his or her own financial destiny. Turnover is decreased if bonuses are based on group activity where-in common financial goals breed good relationships between primary care doctors and specialists. The extent to which other HMO competitors exist in a given market area also has an important impact on physician turnover. Thus, financial arrangements and the organizational context in which they are used have an important effect on physician behavior.

ORGANIZATIONAL INFLUENCES

Financial influences must be evaluated with respect to the company they keep. None are used alone, nor should they be evaluated alone. The context of care, especially other organizational attributes, is crucial to understanding how physicians respond to attempts to influence their use of resources. An example of this complexity is demonstrated by the finding that managers use the same financial incentives to increase the intensity of some types of medical care (more frequent visits, increased ordering of x-rays) as to decrease the intensity of medical care (fewer hospitalizations, fewer specialist referrals).

Risk pools

A number of different types of organizational arrangements have evolved, some of which attempt to overcome concerns about possible conflict of interest and some of which emphasize these concerns. At one end of the spectrum are influences that reward or penalize individual physicians for the parsimony of their approach with respect to only their own patients, a situation that brings extreme incentives to bear. At the other end are programs that link incentives to the experience of groups of physicians with pools of patients, a situation which dilutes the “negative” incentives substantially. When financial incentives are applied to a risk pool of IPA physicians (separated geographically), variability in their responses is greater than would be the case for physicians who practice in close proximity and interact as a peer group to discuss payment (and, hopefully, quality of care).

The size of the risk pool has substantial influence on physician performance, because, as noted, larger risk pools spread risk more effectively. In the 1989 survey, 18% of HMOs, primarily for-profit plans, held individual physicians at risk, rather than measuring and rewarding collective performance. The Health Care Financing Administration (HCFA) has been an important influence in this regard by disallowing individual risk and other financial incentives that, in their view, might overly influence physicians to use too few services for Medicare and Medicaid patients.

Number of tiers

Although the standard structure of a managed care entity consists of a panel of physicians and the plan’s management (a two-tiered organization), many HMOs have developed a middle management tier interposed between these two (a three-tiered organization). These middle tiers serve a variety of functions. If, for example, the middle tier represents the medical staff of a hospital or a physician group, they may have a substantial impact on the financial incentives and contractual arrangements initially offered by the HMO. The most common impact of the middle tier in this situation is to change capitation payment
to salary or FFS, and to reduce physician micromanagement by distancing the insurance company administrators from providers. The impact on costs and quality of a middle tier has not been studied.

**Interaction between primary care physicians and specialists**

Characteristics of physicians' practices have a major impact on how incentives work.125 Specialists, for example, many of whom retain at least some individual fee-for-service practice, may be even less amenable to capitation and "negative" incentives than primary care doctors. A difference in reimbursement, therefore, (the most common being capitation for primary care doctors, FFS to specialists) often causes conflict. Primary care physicians (under capitation) resent the difference in incentives as well as the feedback from specialists who are eager for referrals and who prefer, under FFS, to prescribe many services.

In addition, the patient mix seen by specialists differs from that of pediatricians and other generalists. Cardiologists are likely to see older patients with poor functional status, lower well-being scores and more chronic illness compared to pediatricians and family practitioners, whose patients tend to be younger and more functional.126 Likewise, pediatric specialists may be more intensive users of medical resources than general pediatricians, and by the nature of their work, may appear to be less efficient. Recent studies have validated the need for specialists in certain clinical circumstances, although it has not been resolved whether this means only specialists should care for patients with certain chronic illnesses, whether they should at least be involved with that care, or whether they can teach primary care physicians how to make the favorable difference.

**Cost**

Although organizational profits (or "retained earnings" in the case of not-for-profit organizations) are an important motivator to organizational behavior, the need to cut costs and premiums is a powerful countervailing force, engendering organization-wide efforts to decrease the intensity of services. Lower hospitalization rates, lower frequency of test ordering, and fewer referrals to specialists all contribute to the fiscal solvency and quality of a health care organization, assuming, of course, the excluded services are inappropriate. As a result, the regular substantial increase in employer premiums for health care are no longer observed.135-137

Cost reduction has long been a central theme of the managed care industry. 28% less cost, attributable to a 40% lower hospital admission rate and 40% fewer hospital days.138,139 Traditional fee-for-service physicians had higher rates of hospitalization, lower frequency of office visits, and more prescription drug use than physicians in managed care settings during the early 1990s, despite adjusting for multiple potential confounders (disease prevalence, severity, comorbid conditions, general health perceptions, and seasonality). Lower costs in the HMO setting cannot simply be related to a healthier patient population.140,141

**Interactions of influences**

The complex interaction of factors that may influence physician behavior has been evaluated using multivariate models. As predicted, capitation produced lower hospital rates than fee-for-service arrangements, and physicians at risk as individuals and for whom the penalties could exceed the withhold amount had fewer outpatient visits.122 On the other hand, physicians with a higher proportion of HMO patients had more frequent outpatient visits, perhaps as an attempt to substitute visits for higher cost services. The break-even point for HMOs was related to the age of the organization (older HMOs fared better), to the presence of personal risk for the use of outpatient lab tests, and to HMOs that had physicians with high percentages of HMO patients in their panels of patients, all situations that should capture physicians' attention to the need to contain costs.122 These findings, and others, showed that incentives do have an influence, that the influence is complex and inter-active, and that some incentives work better than others.138

**Thresholds**

Moreover, to have effect, incentives must meet certain thresholds. For example, a financial incentive to residents to reduce test ordering failed because of the inadequacy of the incentive, which was diffused over a large pool of physicians, and which was conducted in the absence of any education program or endorsement by recognized opinion leaders.142. In 1982, SAFECO Insurance Company's incentive formula failed, due to inadequate incentives.143 Each primary care physician had too few SAFECO patients to capture the physicians' attention. This problem may recur when managed care plans "share" physicians but do not exert coordinated influence on their practice. Furthermore, when physicians belong to many managed care plans, as they commonly do, there is potential for
conflicting priorities and protocols due to the imposition of multiple systems of rules and rules. Fortunately, physicians seem to avoid differentiating among their patients by insurance coverage, instead forming a collective approach that they apply to all patients in their panel.

In the 1990s, investigations continue to demonstrate the impact of payment mechanisms on physician behavior, with proven linkages to quality still elusive.\textsuperscript{18,148,149} For example, in a recent comparison evaluation of a pediatric Medicaid setting, the introduction of capitation reduced referrals to specialists, again showing that primary care givers usually do respond to financial and organizational cues.\textsuperscript{150} Successful financial incentives in managed care settings are multidimensional initiatives, requiring a combination of incentives sufficient to capture physicians’ attention, coupled with other influences (eg, rules and reminders) that prevent an overly parsonistic response to the incentives.\textsuperscript{111,123,124,144,146,147} Success also is linked to the attitudes and practices of management, which must establish a balance between cost efficiency and quality assurance.\textsuperscript{143}

CONCLUSION

Rapid change has caused a fundamental turbulence throughout the practice of medicine.\textsuperscript{151} As such, the need to know how pediatricians (and other providers) react to different incentives and organizational structures is imperative. Demonstrating the effect of these variables on outcomes of care also is imperative, and, for the most part, has not yet been elucidated. Pediatricians who have not yet been exposed to the full gamut of mechanisms used to influence physicians should prepare, for they are sure to come. Perhaps the best preparation is to understand why past and current mechanisms work (or do not work).

This review demonstrates that influencing physician behavior is a complex process, not yet fully understood. Although the impact of structural arrangements (audit, feedback, reminders) on behavior is starting to be clarified, the consequent impact on quality of care is far less well understood. Educational modalities seem to influence behavior transiently, but that influence is probably small in most situations. Financial measures may have the greatest impact, but cannot be used or evaluated in a vacuum. They must be counterbalanced with rules, guidelines, and quality assurance to assure appropriate use of health services. Interestingly, despite the turbulent health care environment, the basic tenets for the successful influence of physicians persist—local consensus, physician involvement, immediacy, a conducive social setting, clarity, relevance, and continuity.

We have not reviewed the large, somewhat older, body of literature that explains physician and patient behavior from a sociological perspective. However, we believe that the focus on the more recent litera-

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