Quality Improvement: An Imperative for Medical Care

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For continuous process improvement to be successful at the site of care, an organizational structure for quality improvement should be in place. Quality improvement requires (1) an environment for quality improvement and (2) tools for improvement, including statistical and meeting tools. Physicians and all other care givers and support personnel must cooperate for process knowledge to be complete and usable. Perhaps there is no such thing as a purely "clinical" system, because the contiguous systems influence clinical behavior so completely they are almost inseparable.

Process improvement specifications are not the same thing as standards as we now understand them. Process improvement specification are process based. They expect, are designed for, and handle divergent pathophysiologic conditions by focusing on processes. Individual institutions define and measure their outputs, but these outputs are judged against their customers' needs and expectations (thereby becoming outcomes) for performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. Outcomes research as known today can help us understand the needs and expectations of our customers. Moreover, any team can improve the framework of quality improvement.

Imagine a group of physicians, perhaps in managed care or in private practice, seriously interested in improving the quality of care delivered to their patients. They are tired of the traditional quality assurance. The bureaucracy that has been added to ensure greater efficiency and effectiveness has siphoned off valuable resources for health care. Quality assurance seems to them to add tremendous cost and hassle of inspection with little benefit to the patient or anyone else. Although standards are met at their institution, patients, employers, major purchasers, the government, and the physicians still are dissatisfied with the results of care. All these customers of health care are searching for a way to slow the rate of health care expenditures and a way to continually better health care outcomes. These physicians feel the tension and are frustrated by the inability of current methods to increase efficiency. Traditional quality assurance helps sort out the "bad apples," those providers not performing adequately. But these physicians are not in that number; they are earnest about making quality better for their patients and for those who pay for care. They want to improve the health care delivered to their patients in a systematic way. They are ready for a new quality.

Imagine, too, that these physicians have formed a team to examine the process of care. The team has made a flow chart of the explicit process of care they provide their patients. They have collected data on that flow chart and have causally linked their process of care to the results of care.

They are sitting in the doctor's lounge at 4:30 PM discussing the results of last night's report to the general staff meeting by the transurethral resection of prostate (TURP) process improvement team. This team of physicians, working with all who are involved in the process of care, have reduced the wait time before surgery 20%, decreased the median stay in the hospital 2 days, and decreased the use of hospital resources 32%. Moreover, they have reduced the incidence of hyponatremia twofold and have reduced bladder neck failure after transurethral resection of the prostate 16%. The story board on the wall of the doctor's lounge is one of many displayed for all to see. The trends all indicate that the improvement in results continue.

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At the same time, across the city, in a board room of a Fortune 100 company, it's budget time. Health care costs have risen at a 10% to 20% rate over the past few years (100% in 5 years) and now threaten the company's ability to make a profit and remain competitive in the global environment. Stockholders are increasingly dissatisfied. Attempts to contain or even predict health care costs for employees through PPOs, reimbursement limits, and health planning have been largely unsuccessful. Health care still costs more than it should, and the rate of increase is not slowing. Employees have had their health benefits cut and are increasingly dissatisfied with their coverage. The company has done extensive research to determine both explicit and hidden costs of health care by body system. The results are clear: health care is their fastest growing expense; moreover, it is an unpredictable cost. Unless something is done about health care costs, the company's global competitiveness and its employee's personal life styles will be affected adversely. The company faces a hard decision: again cut health care benefits with much employee dissatisfaction or risk going out of business because of the cost.

Imagine, too, that this company thinks about quality in a new way in everything they do. They apply a new technology called continuous process improvement (or "quality improvement" in the vernacular) to their work processes to increase efficiency. They invite their customers and suppliers to participate with them in their production processes. The manufacturers who supply products to this Fortune 100 company are invited to actively participate in decisions about how these products are supplied and used. This company knows that health care is its biggest supplier and exactly how much it spends on health care and how much is lost to costs it never sees on the accounting books—together called the total burden of illness. Using the new quality framework, this company perceives itself as a customer of the health care system. As a concerned customer, they see it as their responsibility to involve providers of health care in their processes of health care at their plants just as they involve their other customers and suppliers. Their focus is to work together with physicians and the health care system in improving health care.

The Fortune 100 company and the physicians from local health care institutions (those earnest about improving the quality of health care) come together to improve health care. This Fortune 100 company and health care providers take a "Let's get better together" attitude. Together, they define quality. Theirs is a rigorous approach to getting better every day at what they do. The company and physicians form teams to look at variation in the process of health care. These teams address the variation they find in a rigorous, scientific manner. They cooperate to continually improve the value of the health care delivered to patients and employees.

Using lessons learned form a scenario much like this one, we describe the framework for continuous improvement of health care processes by both providers and purchasers of health care. We first describe the paradigm shift that has occurred in consumers and how it affects their needs, desires, and expectations for health care. New definitions of customer, process, output, outcome, and key values of the customer are needed to place the paradigm adequately in the context of medicine.[1-3]

The New Quality

Avedis Donabedian, Health Care, and the New Paradigm

Continuing a tradition established by Florence Nightingale and Ernest Amory Codman, Avedias Donabedian articulates the paradigm of quality in medical care for the last 20 years.[4] He states that "system design and performance monitoring are two inseparable, mutually supportive components" of quality. He makes the distinction between production efficiency and clinical efficiency. Furthermore, Donabedian states that optimal care is optimal production and clinical efficiency assessed jointly by "the health care practitioner and the fully informed patient, guided by the patient's own valuations and interest.[4] Donabedian advocates the creation of parsimonious care, care that is more efficient without being less effective. Inefficiencies may be introduced by "externalities" of care. Systematic examination of the "externalities" of care dictates a new paradigm for quality, a paradigm based in systems thinking.[5]

We must study the "externalities" of care to understand the inefficiencies introduced by those externalities. Thinking first about how we perceive the current state of health care delivery can help us better understand what we perceive.

A paradigm is a way of thought, a filter through which we perceive reality. Experience dictates that new paradigms (new perceptions of fact) are required to solve old problems. The expectations of the health care delivery system in the United States are undergoing a paradigm shift similar to that for other services and hard goods industries. In the last 10 years, there has been a shift in the way consumers value the goods and services they consume. Value has taken on increasing meaning to the people who use services, among which cost and quality are only two of many possible attributes of value. Health care has not been immune to the paradigm shift among consumers, nor is it immune to the need for new thoughts to solve old problems.

Donabedian's paradigm has carried us toward a new level of understanding quality. Yet, Donabedian's model falls short because it does not account for the system of care (linked process) nor does it account for variation in the process of care. Using the new paradigm of process improvement, we move toward better health care value through studying the externalities of care and then improving care by improving the externalities of care. The new paradigm not only helps us understand how we might sort out the "bad apples" that provide health care but also helps the great numbers of good providers move toward providing better care every day.

Many organizations succeeding in the increasingly competitive global economy think about quality in a new way.[3] Originating among hard goods manufacturer's here and abroad, the scientific techniques of quality improvement (QI) have grown from the relatively simple concepts of statistical process control to a rich and complex management system with application to every process of manufacture and business, whether product or service.

Dramatic results have been obtained in other industries[3,6] using the new paradigm of the customer and the Shewhart/Deming model to combine customer knowledge, process knowledge, and statistical thinking. The model is now being applied to medicine (see box, page 372), and we in health care have an opportunity to learn from the models of efficiency used in industries using process based technologies to improve.

The three fundamental concepts of continuous process improvement are customer knowledge, process knowledge, and statistical thinking.

The New Customers

Beyond health care, customers are changing the way they perceive the products and services they consume, and this change dictates a new age of consumerism.[7] However, the term "customer" has taken on a new meaning. The customer is broadly defined as any person or product receiving an output of a process. Customers in today's world have their needs, desires, and expectations known and met (even exceeded) by hard goods and service companies. Customers drive the new model and have changed the way they consume goods and services based on the ability of the companies that produce those goods and services to meet their needs. Organizations that delight their many customers are almost guaranteed success.[8]

The new paradigm is simple: customers demand service that continuously integrates customer needs and expectations into design, delivery, and evaluation. The successful integration of these elements translates into services that continuously improve to meet customers desires, needs, and expectations (Fig. 1).

Customers (patients, payers, regulators, providers, and the government) demand the same attention from health care. Providers are expected to become increasingly sensitive to their customers' needs and expectations about services. However, in health care we lack not only our many customers' input but also a systematic way to incorporate input into improving the system. This is true not because customers are so diverse, but because health care is not structured to know and respond to customers' needs, desires, and expectations nor are health care providers trained or accustomed to respond to the explicit needs and expectations of our customers. Good information on the needs and expectations of our customers is scarce. Health care providers can learn to address quality in meeting customer needs at the same time that our country's major employers are claiming the right (and the responsibility) to assume

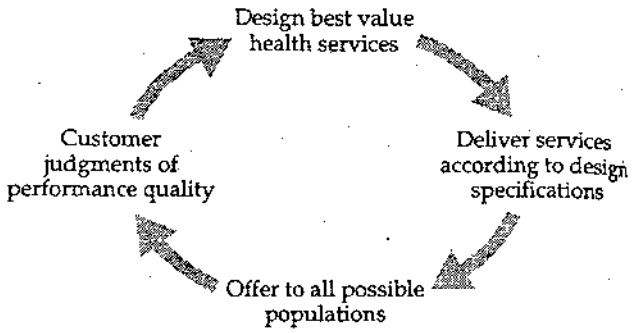

Fig. 1. Shewhart/Deming cycle of continuous improvement applied to health care.

the role of an informed customer of the health care system. New tools lead first to increased health care efficiency within the health care system. Thereafter the opportunity for enormously productive relationships between health care providers and the business community becomes both natural and essential. However, before health care providers can begin to meet the needs of their customers, they need to marshal an understanding of the two other essential elements of the new quality: a process focus and statistical thinking.

Process Focus, Statistical Mindedness, and the New Paradigm

Health care is evaluated by the end results of care by its customers, for example, the use of Medicare mortality statistics to evaluate hospitals' competence. Anyone who knows the process in health care knows that such a comparison is almost meaningless. Causality between the antecedent hospital processes and the resultant outcome is assumed but never demonstrated. Without seeking to better establish causality, the results are meaningless in evaluating the processes of a hospital. Yet similar comparisons are used every day to evaluate the "goodness" of health care (Fig. 2).

By understanding the process of care—care as it actually happens—we can seek to better establish causality between the process of care and its results. In the new model of quality improvement, great pains are taken to establish the process of care as it happens. All participants of care meet as a team and construct a flow chart that represents their best understanding of the care process. The team then verifies the flow chart of the process of care by observing the process to determine if it is as they collectively thought. Once the flow of the process is verified, the team develops a data collection plan and collects data on the process to determine the greatest source of variation within the process. The team then uses time series statistics to analyze the care process to distinguish variation inherent in the process from variation occurring as a result of special events. Using the Shewhart cycle, the team will select an improvement, plan the change in the process, implement the change, and continue to collect data to determine whether the anticipated change in the process achieves an improvement of results.

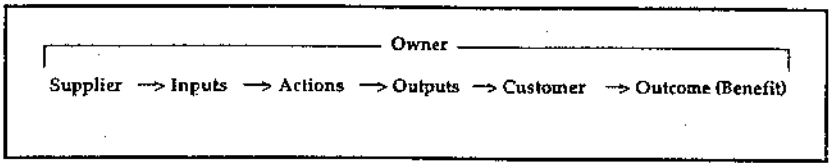

Fig. 2. Process: Owner. The owner of a process is the person who has or is given the responsibility and authority to lead the continuing improvement of that process. Process ownership is driven by the boundaries of the process.

In this manner, a cause-and-effect relationship between process and results has been systematically established. Variation has been studied, and hypotheses about the variation can be tested scientifically and validly. The end results of health can be systematically titrated to the needs of our customers, something heretofore unlikely.

Implications for Health Care

Think Like Suppliers. Under the new model, health care providers learn to perceive themselves as suppliers to many more customers in addition to the patient. A process-based quality framework in health care takes into account the familiar customers of care (the practitioner of care, the patient, the purchaser of care, and external regulator). Continuous process improvement involves the radical placement of customers in each step of the process. Customers are asked to supply information about what is most important to them in the care process. Customers evaluate care and provide input to the design of care, the provision of care, the monitoring of care, and the revision of the health care system to better provide care. All outputs of the system are judged against the customers' explicit needs and expectations about the output. Design and monitoring are enclosed into a continuous loop of process improvement.[9,10] In this way, providers of care have explicit, organized input from their customers by which they can objectively judge the efficiency of care provided. A dramatic contrast is apparent when traditional health care quality concepts are compared with a quality driven by customer needs, continuously improving, and internal to the system of health care. Using this new technology of quality, medicine rids itself of regulators and their overhead, and regains the professional control of medicine (Table 1). Under the new paradigm, the opportunities to consider new relationships among major interest groups in health care is striking.

Internalize Inspectors. Part of process improvement's success in industry comes from internalizing inspectors. Health care is now extensively inspected, at a burdensome cost, by examining the population of health care providers.[11] Little success has been made in attempts to take action on the population of providers by external customers: payers, regulators, and the government. The external inspection of health care has added marginal benefit (at best policed care) but does little to *improve* care. Monitoring of care is brought internal to the process of care by those performing care, by those who know the care process. In the new health care, those who perform the duties of care are the same, logically and physically, as those who "monitor" the product of their services, thus increasing the efficiency of the service. The customer and process data are analyzed statistically, and the process is improved with intimate knowledge of customers' needs and expectations, thus eliminating the need for inspectors external to the process. Continuous process improvement is ipso facto more efficient, less costly, and more able to change processes for the better than is the current quality assurance.

The Role of Occupational Medicine: Create the Environment for Quality Improvement. The occupational physician can play a pivotal role in facilitating continuous quality improvement. An environment for quality improvement has to be created. To get to an informed state of the organization (and further to manage that informed state) requires guidance and structure, which can be the domain of occupational medicine physicians in the future. The proximity of occupational medicine physicians to the site of industry, and thus to industry's management, is the key to the successful creation of an environment conducive to quality improvement, and then integration of continuous process improvement in the work site and the health care system. Occupational medicine physicians are critical to the successful integration of several very important customers: the patient, the physician, and the payers of health care as well as the work environment. Occupation medicine physicians can become teachers of the environment of continuous process improvement, counselors to health care managers, and custodians to the structure of an environment conducive to continuous quality improvement. Health care can be structured to best meet the needs and expectations of our customers in light of their paradigm shift using the techniques of continuous improvement.

Purchasers and Providers: Structuring Quality into Health Care

In an environment of collaboration, purchasers and providers of health care can attack health care costs while increasing the efficacy of services delivered on two fronts: (1) with the patient in mind and clear knowledge of health care costs, organizational expectations of health care are made explicit; (2) providers of health care take the explicit needs, desires, and expectations of purchasers and providers and translate them into practice. Both purchasers and providers have the responsibility to create an environment to meet the

TABLE 1
Quality Improvement/Quality Assurance Comparison

New Way	Old Way
Improve continuously	Meet standards
Rely on process control and design improvement	Rely on inspection to improve
Understanding improves quality	Incentives improve quality
Leaders enable and support	Leaders extort and enforce
Defects come from process design	Defects come from people
Workers try hard	Workers don't try hard enough
Improvement is possible and necessary	Quality is fine
Quality saves	Quality costs
Not enough time not to	Not enough time
Suppliers are partners	Suppliers are problems
Customers are partners	Customers are problems
Improve across functions	Improve within functions
Learn from data	"Gut fact" understanding

needs of all health care customers using the techniques of process improvement.

The Puchaser-Provider Partnership: The Environment, Bad Data, and Technology Transfer

The successful integration of continuous process improvement in health care requires input from the organizations that purchase health care. Currently, we find in organizations two major barriers to improving health care. First, an understanding of process improvement technology and a willingness to work with health care providers within the context of the framework needs to be present. Second, data that can direct quality improvement efforts in health care are essential to continuous quality improvement.

The Environment for Process Improvement. Organizations that purchase health care need to understand the process improvement framework to improve their own processes as health care embarks on its process improvement journey. Using the framework of process improvement, health care providers and purchasers can come together in a much needed cooperative environment to begin to examine the processes of health care. Instead of focusing the energies now often spent in an adversarial environment in which purchasers and providers both function, health care purchasers could approach their own processes to understand variation to know where health care providers and purchasers should focus their resources for maximal improvement. For example, we recently tried to marshal interest in a provider-payer coalition in one very active health care market. After 3 months of searching for a purchaser of health care to enter into a dialogue of process improvement with us, we came up empty handed. No company would take the time to participate in improving the value of health care. Increasing health care costs were seen as the provider's problem to solve and not as an opportunity to improve the process of care (including costs) for all involved. The lessons are numerous, and several are obvious. Although it is easier to complain and blame others for the ills of the health care system, health care providers and purchasers need to realize that we are at once both the cause and solution for inefficient health care. A higher level of thinking is required to begin to make inroads into health care costs and efficiency. Health care providers and purchasers need to enter into long-term partnerships, to commit process improvement, and to roll up the sleeves to begin making processes better.

Data: Total Burden of Illness Focuses Resource Allocation for Improvement. Adequate data resources are needed to improve processes. Data on direct and indirect health care costs at the 3-digit International Classification Diseases (ICD)-9 level can help direct providers and purchasers to focus on opportunities for greatest improvements in the value of health care. Accurate data on the total burden of illness act as a resource allocation tool. Studying cost data leads to a focus on the variation in health care processes. An understanding of health care variation leads to allocation of resources to areas of health care where process improvement energies might be best spent (Fig. 3). Corporation-wide data at the 3-digit ICD-9 code are often hard to obtain (McEachern JE, unpublished data).

A case study from our recent development efforts illustrates relevant points on data needs. In developing customer survey instruments, we formed a team with several large (Fortune 100) companies to begin addressing health care costs and opportunities for improvements. To understand costs for process improvement, we sought to understand the costs at the basic body system level. None of these corporations could easily retrieve charge data by diagnosis-related groups or ICD-9, yet all had excellent information systems. These corporations did not use their direct health care costs to focus their health care purchasing activities. These purchasers were missing an opportunity to predict and control costs and to reduce variation in their health care purchasing agreements. Once charge data at the 3-digit ICD-9 level were retrieved, none of the corporations knew the indirect costs of their health care. Indirect health care costs are the costs that are accountable to an episode of illness but are not directly related to the ill person. For example, if a secretary is ill, the corporation not only pays for her health care and sick leave (direct costs) but also must find and train a replacement for her for the duration of the illness (indirect costs). Using data from the National Medic

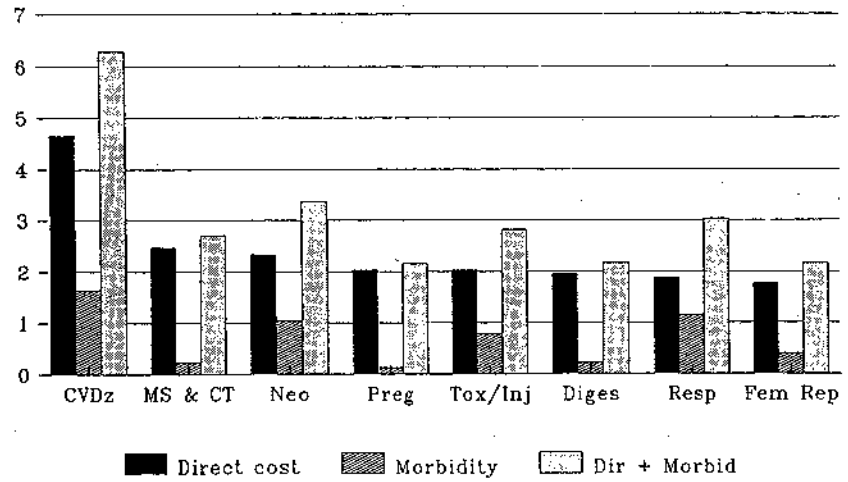

Fig. 3. Total burden of illness data from a Fortune 50 company (millions of dollars), direct and morbidity costs. CVDz, cardiovascular diseases; MS & CT, musculoskeletal and connective tissue disorders; Neo, neoplasms; Preg, pregnancy; Tox/Inj, toxic accidents and injuries; Diges, digestive disorders; Resp, respiratory diseases; Fem rep, female reproductive disorders.

Care Utilization and Expenditure Survey study,[12] we calculated both indirect and total costs of health care for these corporations (Fig. 3).

Indirect and direct costs, when added, can be called the total burden of illness. If total costs to the corporation are unknown, it is difficult to allocate resources to predict and contain cost and to improve health care value in an intelligent way. Moreover, without specific cost knowledge, there is little way to measure against oneself or others, and it is difficult to improve. It is hard to imagine a corporation that doesn't know the costs, both direct and indirect, of something that accounts for a relatively large percentage of its total gross revenue. Yet this is the case with health care. If the idea of the total burden of illness is extended to include the effects on the family, home life, and all other individuals as well as the workplace, the total cost of an inefficient health care system is staggering (Gustafson D et al, unpublished results).

Cooperation: Process Focused, Data Driven. The key to better value in health care is the creation of an environment for constructive change between providers, consumers, and payers of health care. Cooperation is an essential element of successful health care systems that meet and exceed customers' needs and is essential to address the severe cost and quality pressures in the face of gross inefficiencies in the age of the new paradigm. Through a partnership—a structured dialogue—all parties can better understand the needs and expectations of the other and seek to design a system that will meet those needs and expectations.

Before the structured dialogue begins, purchasers of health care can take a careful look at health care costs, direct and indirect. Armed with data that focus the corporation on true total costs (total burden of illness) a resource allocation decision can be made about health care costs. A Pareto chart of total costs to a health care purchaser can help all involved decide on which process to focus first. Using these resource allocation decisions within the context of a structured dialogue, the needs, desires, and expectations about care can be made explicit. Both the provider of care and the purchaser expect these needs and expectations will translate into design attributes of care. The corporate customers, including patients, work together with providers to develop a list of the most important attributes, key quality characteristics, of health care for them. The key quality characteristics can be defined operationally and data elements explicated for collection. The provider and purchaser now know the elements of care that are important to each other and how the care provided will be evaluated. In this dialogue, other customers such as patient groups, regulators and business coalitions could be involved. Such an example of a partnership has developed between Health Corporation of America, Xerox, Hewlett-Packard, and Prucare.[13] The partnership uses this methodology to develop a framework to first examine the care bought and then to continuously improve the processes of care within both the care site and the work site (Fig. 4 and Fig. 5).

The Job of the Provider: Process Improvement

In continuous quality improvement, the provider has a new job: to manage the environment of care to maximize the performance of health care processes. Again, a two-front approach is taken: (1) understand the needs of one's customers; and (2) know the care process and the outputs it produces.

Customers' Needs. An understanding of customers' needs comes not only from the explicit statement of purchaser needs and expectations but also from feedback from patients, regulators, other customers, and other clinicians.[14] With customers' explicit essential needs, clinicians can focus their energies on elements of care.

To design the maximally efficient system, customer knowledge and process knowledge must be married in a structured environment of collaboration where we all

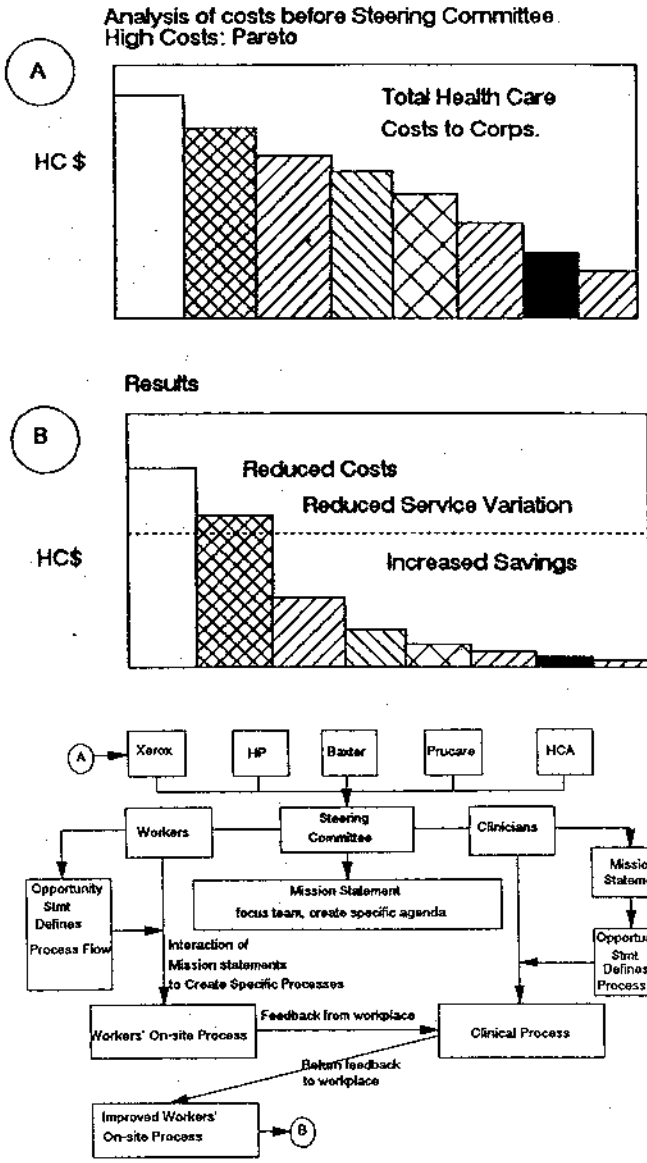

Fig. 4. Purchaser-provider model. Purchaser-payer interaction.

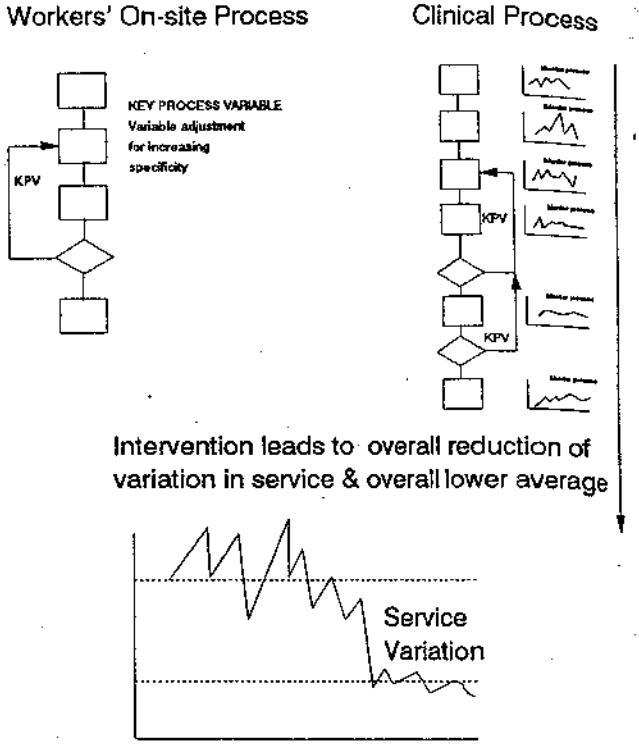

Fig. 5. Clinical and work site process improvements.

continually seek to become better at what we do based on data from the process. The team involves all participants in the care process in its explication and its outputs, the ward clerk, the office and unit nurses, the lab and pharmacy, referring physicians: everyone. The process is understood using team tools,[15] the Shewhart/Deming cycle,[10] and other tools of process improvement.[16] Using these tools, the team can link its process (a series of actions) to its output and understand the causes of variation inherent in the processes. In surprisingly little time, the team can create a map of the actual process of care, the Clinical Process Map (CPM). The clinical process map differs significantly from algorithms in that it represents how care is provided, taking into account not only the physician's thought processes but also the environmental factors of care and the actual flow of care. Opposed to the algorithm (created as an ideal), the CPM allows the actual process of care to be traced as well as data collection on each step and thereby leads to a better understanding of the function of the care system. The CPM is process focused, data driven. It accounts for "real world" factors. Using the CPM and explicitly defined needs, desires, and expectations of customers, clinicians collect data on each step of the process.

Variation is central to every process, and the team can understand the causes of variation within its process using analytical statistics. With an understanding of variation, the team selects a step of the process (an action) that significantly impacts a key quality characteristic and then begins to systematically change that action to decrease its inherent variation. Thus, the CPM serves as a two-way tool: the clinician can create the best understanding of the process of care and check it against reality by collecting data on the process. The clinician can benefit from the added information about the process and can modify behavior of the system to increase the efficiency of all processes involved. A better understanding of the actual function of a system leads to better design when customers' needs and expectations are taken into account.[16] Structured design of more efficient processes of care that expects variation of inputs, robust design, can begin to take place. Using Taguchi's robust design methodology,[17] health care systems are designed to accommodate different pathophysiologies within the same process of care while maximizing efficiency.[18] The more efficient design of care can be benchmarked (compared to other systems of care) to find the most optimal care system in the world.[19] From an understanding of the process of care, a framework for care processes can be established: continuous process improvement specifications. Process improvement specifications (developed with the provider, patient, and purchaser) are descriptions of how the health

care environment can be structured to encourage improvement in health care processes as well as outcomes. Process improvement specifications can be used locally and applied globally.

Examining the process of care has several advantages over examining only the pathophysiology of care. The care process is strikingly similar for patients of sometimes vastly different pathophysiology. For example, the process of a lung examination sputum collection and examination, charting, and then obtaining a chest radiograph and report are very similar for a patient with *Klebsiella*, pneumococcal, or viral pneumonia. By focusing on the process of lung diagnosis, we are not limited to small numbers of patients with different pathophysiologies. All patients with lung examinations can be considered. The clinicians' thought processes are but one step in the total process. Clinicians also have action and communication steps. Thought, action, and communication processes are surrounded by numerous other processes in the health care environment, such as the delivery of the chart to the place of care, the support processes of the nurses, pathology laboratory, radiology, and respiratory therapy, as well as the environment of care represented by the resources available in equipment, financial arrangements of care, and many other processes. Our experience leads us to believe that clinicians thought processes rarely occur out of context of expectations of the support structures around their practices.[20] Otherwise stated, a clinician's assumptions about the outpatient setting, the hospital, and the patients' (and clinician's) home life play a very large part in the decision-making process.[20]

Summary/Visions

This radical approach to quality leaves many lingering questions. Are process improvement specifications the same as standards? How can be reconcile process thinking and the current climate of outcomes research? How do we change organizational structures of institutions to embrace quality improvement? What then needs to change in organizations earnest about achieving quality? How can we go about reducing fear to gain process knowledge? How can those who work on the front lines of providing care (including physicians) become less fearful, so that information will be forthcoming on the actual process of care? How can we create a dialogue about the process of care with as little fear as possible? How can we recognize fear explicitly, pay homage to fear at every turn?

The challenge for occupational medicine physicians in this area is immense but so is the opportunity. We cannot think of any other specialty organized by the juxtaposition of clinical medicine and the work site to become a leader in the transformation of the medical care system in the 1990s. The toughest job will be to marshal the environment for partnership between providers, payers, and patients and in each develop the process knowledge, customer knowledge, and statistical mind-set necessary before process improvement can occur. Occupational physicians can offer valuable knowledge to the new understanding of quality in medicine because of their knowledge of processes at the work site and clinical processes. By its nature, occupational medicine combines disciplines that now need to work closely to improve processes and thereby the efficacy of the system. Occupational medicine physicians have an opportunity to develop the interface between the corporate customers of care, the providers of care, and patients. The opportunity to introduce process improvement to occupational medicine and to the medical care purchased by employers is an opportunity too valuable to waste.

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