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An Introduction to Applied Child Health Services Research

Connecting Knowledge and Action

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This chapter introduces important trends and conceptual frameworks in the field of **child health services research (CHSR)**. Child health services range from one-child-at-a-time clinical interventions in a clinician's office to regionwide public health and social services and interventions. CHSR examines the **structure**, **processes**, and **outcomes** of health services for children (see Chapter Seven, by Seid, Sobo, Zivkovic, Nelson, and Far) for the ultimate purpose of improving the health and well-being of children.

This volume is specifically concerned with **applied child health services research**, which has a distinctly proactive purpose. The methods used in applied research, and the results of that research, have *immediate* impact on service design, delivery, and outcomes. This requires close collaboration between the investigators, the providers of services, and the end users of the research findings.

One example of applied CHSR is the collaboration, for program design and evaluation, of investigators with a community-based organization providing services for children with asthma. Another is real-time, rapid-cycle program improvement facilitated by investigators working with primary care physicians to increase immunization rates for a defined population of children.

Applied CHSR can take place in at least two different settings. Research findings can lead to actions in organizations separate,

distinct, and usually distant from the researchers and the site of the research. Conversely, investigators can generate new information within the same organization that uses the findings to modify service delivery. Most organizations do not have internal applied CHSR capabilities and therefore implement findings from the work of others. Even organizations with active applied CHSR programs make use of both internally and externally derived information.

The concurrent short-cycle-time nature of the evaluations often required in this type of work presents applied CHSR with important challenges. However, we believe that rigorously designed research can be performed, even when many variables cannot be controlled, and the results can be used in real time to inform and improve the services being studied.

While the overarching goal of applied CHSR is to improve health services for children in order to improve their health and well-being, contributing to the accumulated knowledge within CHSR is also critically important. But knowledge not coupled tightly to action, whether that action consists of new policies or improved interventions, has limited ability to improve the health of children.

Complex Adaptive Systems and Applied CHSR

The modern health care industry is widely considered to be the most complex industry in America. For example, delivering the right medication to the right patient at the right time in a single hospital involves many highly trained individuals and many separate steps in several different locations. This seemingly simple yet critically important process is only one of the hundreds of complex activities routinely performed within a hospital, and a hospital is only a small part of the overall health care system providing services to children. Because of the greater availability of data, particularly at the process level, when compared to health services delivered in

ambulatory primary care or specialty offices, much more applied CHSR has been undertaken in hospital settings.

In addition to being a complex system, health care can also be described as an **adaptive system**. An adaptive system is one that can learn from its environment and change its behavior based on that new knowledge (Zimmerman, Lindberg, & Plsek, 1998). The constant changes in the science, organization, and delivery of health services demonstrate the adaptability of the health care system. Some of these changes are adaptive; that is, improvements in service delivery are achieved. Other changes are maladaptive and lead to decreased effectiveness and efficiency. Many of the behaviors used by health care organizations to survive in managed care, such as the race to buy physician practices, have in fact led to the financial ruin of significant segments of the system (see Chapter Eight, by Richardson, Sobo, and Stucky).

Complex adaptive systems, such as a health care delivery system, adapt and change in order to increase their likelihood of survival (Stacey, 1996; Zimmerman et al., 1998). Survival for a health care organization can be defined as both financial stability and the ability to achieve its stated mission. Organizations survive by taking in new information, processing that information, and behaving differently due to the knowledge gained from the new information. Applied CHSR works with the system's need to do all those things. Applied CHSR can influence this evolution in organizational behavior by helping to determine how and what health services delivery systems learn. For example, applied CHSR can influence and help shape an organization's improvement efforts by adapting the science and practice of industrial quality improvement to a health care setting.

As survival increasingly hinges on the consistent delivery of high-quality services, health care organizations have much learning and adaptation to do if they are to reliably deliver services that are safe, effective, efficient, child- and family-centered, timely, and

equitable (Institute of Medicine, 2001). Investigators engaged in applied CHSR can, and often do, take on the added responsibility of diffusing adaptive innovations throughout the field. Discovering effective practices and publishing results is not sufficient for improving child health. Proven, effective practices must be widely and openly shared so as to positively affect as many children and families as possible.

CHSR'S Broad Mission

Our practice of applied CHSR consists of the design, implementation, evaluation, and improvement of health services for children and families. Evaluation is the essential component of all applied CHSR. The remaining components of service design, implementation, and improvement occur in various frequencies and combinations or may not be present at all in a given project. Applied CHSR investigators and practitioners must be skilled and prepared to use all of these components.

Adding to the challenge of applied CHSR is the complexity inherent in evaluating services for children. Simply defining what services are to be evaluated can be a complex task. For example, children, depending on their age, spend a great deal of time in day care or school, often receiving some type of health services in those settings. But these same children also receive health services in private offices, community clinics, urgent care settings, or the home. Therefore, when planning an evaluation of the impact of health services on specific health outcomes, determining which sites of care and which types of caregivers are included in the evaluation will shape both the methods and the findings of the evaluation.

The fundamental models of health and disease that applied CHSR uses also present challenges to research design and implementation. While much adult-focused health services research (HSR) concerns itself with a particular physical condition or dis-

ease, CHSR uses a broad definition of health, best exemplified by the contention that health is not simply the absence of disease; it is a state of complete physical, emotional, and social well-being (World Health Organization, 1948). Such a broad definition of health is necessary because even though most children are physically well, they still have important needs, often unmet, relating to their behavioral, social, and mental health.

Such a broad definition of health makes it difficult to classify and organize outcomes of health services. The Center for Child Health Outcomes (CCHO) at Children’s Hospital and Health Center, San Diego, developed and employs the Healthcare Matrix (Seid, Sadler, Peddecord, & Kurtin, 1997) to organize its approach to evaluating the outcomes of health services for children. The matrix shown in Table 1.1 contains three broad categories of health outcomes: clinical, financial, and patient-based. In contrast to clinical and financial outcomes, patient-based outcomes must be assessed by the child or family and include satisfaction, access, and functional status or health-related quality of life. These various outcomes can then be assessed in an individual child, in a group of similar children (such as children with asthma), in a defined population of patients (such as children covered by a particular managed care

Table 1.1. The Healthcare Matrix.

| | Individual | Disease Group | Defined Population | Community | Employees |
|---------------|------------|---------------|--------------------|-----------|-----------|
| Financial | | | | | |
| Clinical | | | | | |
| Patient-based | | | | | |

Source: From *Accountability: Protecting the Well-Being of America’s Children and Those Who Care for Them* (p. 10), by M. Seid, B. L. Sadler, K. M. Peddecord, and P. S. Kurtin, Alexandria, VA: National Association of Children’s Hospitals and Related Institutions. Copyright © 1997 by Children’s Hospital, San Diego. Reprinted with permission.

contract), and in the community at large. Because children are embedded in their families and families are embedded in the community, community outcomes must often be included in an assessment of child health outcomes (see Chapter Four, by Simmes, Lim, and Dennis).

Evaluating Quality

Unfortunately, there remain significant methodological difficulties in rigorously assessing the quality of health outcomes for children. For example, what type and strength of evidence is needed to compare outcomes of different providers when so much is at stake? How does this differ from the type of evidence needed to inform quality improvement projects within an organization? The data needed to compare providers must be very strong conceptually and rigorously measured because the providers held accountable by the results will carefully scrutinize and criticize the results. The concern of providers is valid because of the difficulty in reliably and rigorously measuring quality with methods that are neither too expensive nor burdensome to implement.

Another concern for the field of CHSR is that quality for the full range of child health services has not yet been specifically defined. This makes quality in child health services hard to measure. But when quality is given a conceptual and **operational definition** (that is, when it is defined in a way that can be measured) and that definition is broadly adopted, quality can be evaluated in a manner that will influence the design and delivery of health services for children. In addition, with measures of quality that are both broadly adopted and well understood by the many stakeholders in child health care, it will be possible to adequately inform the choices of purchasers, payers, and consumers. Perhaps most important, with broadly adopted and well-understood quality measures, it is possible to hold providers accountable for their performance. Local improvement efforts, such as at the single clinic or hospital level, can be successful with local definitions of quality. Likewise, all stake-

holders in large-scale, communitywide improvement efforts must agree on specific operational definitions of quality to be successful in achieving their goals.

Using Measures to Inform Improvements

Despite the many difficulties, over the past several years, frameworks for quality assessment and specific measures of quality have been established in child health—for example, the Foundation for Accountability, or FACCT (Lansky, 1996), and the Health Plan Employer Data Information Set, or HEDIS (Kuhlthau et al., 1998). While the work of developing quality measures for the full spectrum of child health services is certainly not complete, there is an emerging shift in the focus of applied CHSR from developing appropriate, reliable measures to *using* those measures to inform improvement efforts. This shift, which is new to health care, acknowledges the difference between measures used for accountability and measures used for improvement. The skills, tools, and conceptual approaches needed for health service improvement are being adapted from fields outside of health care, such as the manufacturing and service industries (Berwick, 1996). These approaches to improvement have provided new methods for applied CHSR to shape the delivery of child health services.

Four Challenges

Four significant challenges face health care service delivery:

1. Unnecessary variation (Wennberg, Freeman, Shelton, & Bubolz, 1989)
2. The gap between knowledge and practice (Forrest, Simpson, & Clancy, 1997)
3. The need for systems thinking (Batalden & Mohr, 1997; Institute of Medicine, 2001)
4. Patient safety (Kohn, Corrigan, & Donaldson, 1999)

These challenges have, in many ways, resulted from HSR efforts to identify and document important shortcomings in the provision of health care. The tools and techniques of applied CHSR will be pivotal in addressing these problems.

Almost twenty years of HSR has substantiated the first challenge facing health care, **unnecessary variation**, which means variation in the care of patients with similar conditions that is not due to patient need or preference or science but rather to provider preference and habit. This variation is found between regions of the country (Wennberg et al., 1989), as well as between individual physicians practicing in a single hospital (Kurtin, Richardson, Seid, & Sadler, 2002). Decades of work in the field of industrial quality improvement have shown that unnecessary variation leads to higher costs and lower quality (Deming, 1982/2000). This results in customers (patients) and payers, either commercial insurers or the government, receiving lower value for their health care dollars.

Second is the gap between knowledge and practice, including the gap between best practice and usual practice. The vast majority of routine medical care is not based on rigorous medical science but rather on personal experience, personal discretion, and anecdotes. Unfortunately, even when evidence regarding the most effective practices does exist, clinical guidelines based on that evidence are often not followed (Flores, Lee, Bauchner, & Kastner, 2000). This gap contributes significantly to unnecessary practice variation and is an important contributing factor in the delivery of services that are less than maximally effective.

Third is the need for **systems thinking**. Thinking in terms of processes or systems is essential in health care because no single individual or institution acting alone can provide consistently high-quality services throughout the entire continuum of care. This is especially true for pediatric patients because they receive health services in such unusual sites as the home or school and from a variety of fragmented and uncoordinated programs and providers. Health care services must be designed, implemented, evaluated, and

improved with a systems perspective that recognizes the needs and contributions of the many stakeholders in health care and the systems that create it (Institute of Medicine, 2001).

At the level of an organization, systems thinking means creating and providing services based on an understanding of the interrelationships and interactions of its many processes and providers in meeting the needs of its customers. In an organization, a particular group of providers, with their associated technology, information resources, and work processes directed toward meeting all the needs of a group of patients or clients, can be considered a **microsystem** (Nelson et al., 2000). A microsystem can be used as the unit of analysis and improvement for the delivery of health services.

For the individual provider, systems thinking requires shifting the focus from one patient at a time to groups of similar patients. This allows the provider to obtain better and more generalizable outcomes information in order to change practice, if necessary. Systems thinking requires the provider to evaluate his or her own practices and decide how best to deliver care for all patients with similar conditions. Providers must individually take on the task of improving the access to and quality of the services they provide to their patients. This approach forms an intersection between one-patient-at-a-time clinical medicine and population health. It challenges individual providers to develop consistent, effective, and efficient practices for the population of patients they care for.

The fourth challenge is patient safety. The recent Institute of Medicine report *To Err Is Human* (Kohn et al., 1999) clearly demonstrated the need to make safety a fundamental property of the health care system. Systems thinking teaches that safety, like quality, cannot be added onto a process as an afterthought but must be designed and built into the fabric of the process itself. Unnecessary variation within a process, as just described, may exacerbate any tendency toward error. *To Err Is Human* is a national call to action to significantly improve patient safety, first within hospitals and then throughout the continuum of care.

These four challenges to the current health care system are, in large measure, due to increasing demands for demonstrable high-quality, high-value health care from purchasers, payers, and consumers. The Institute of Medicine report *Crossing the Quality Chasm* (2001) offers multiple suggestions for the kinds of transformational changes needed throughout the health care system if we are to dramatically improve health care for all U.S. residents, children included.

What Is Quality Health Care?

In *Crossing the Quality Chasm*, the Institute of Medicine (2001) proposes to begin this transformation by instituting a new and very broad definition for quality health care. As noted earlier, according to this definition, quality health care has six dimensions: it is (1) safe, (2) effective, (3) efficient, (4) patient-centered, (5) timely, and (6) equitable. Further, quality care must be customized, with the needs and preferences of the patient and family placed first, and quality care must actively engage those who are served. That is, care decisions should not be left only to clinicians to make; patients and families should be encouraged to share decision-making responsibilities to the degree they wish to be involved.

Crossing the Quality Chasm also stresses the need for new and more effective ways to implement the necessary improvements to make this type of quality a reality. Lessons learned by individuals and organizations in improving the quality and safety of health care must be quickly and efficiently disseminated in ways that dramatically increase provider and consumer participation as well as significantly decrease time to adoption. Applied CHSR must now include in its toolbox reliable methods to rapidly share and effectively diffuse best practices (Rogers, 1995).

Innovation and Dissemination

One approach to the rapid spreading of best practices is the use of collaboratives such as the Child Health Accountability Initiative (CHAI), a group of fourteen children's hospitals collaborating to

improve health care for hospitalized children. CHAI was created in October 1997 to focus attention on the quality of care of hospitalized children and children with special health care needs (Kurtin, Sadler, Payne, & Bates, 2001). These populations of vulnerable children were usually not included in other national efforts to define and improve quality of care for children.

There are several other examples of groups collaborating to improve child health. These include the American Academy of Pediatrics' Pediatric Research in the Office Setting group, the Vermont-Oxford Neonatal Network, the National Initiative for Child Health Quality, and the many groups of providers working on quality and process improvements in short-term collaboratives such as those organized as part of the Institute for Healthcare Improvement's Breakthrough Series. Each of these collaboratives has reported advances in improving health care for children (Bocian, Wasserman, Slora, Kessel, & Miller, 1999; Gardner et al., 2000; Homer, Kleinman, & Goldman, 1998; Horbar, 1995).

As with CHAI, many of these child-focused collaboratives were organized in response to the lack of knowledge on how best to design and deliver high-quality services to children in specific settings such as the neonatal intensive care unit or the private pediatrician's office. This lack of evidence on the effectiveness of child health services also presents barriers to providers of complex pediatric care who are hoping to compete in the marketplace by stressing the quality of the services they provide. For example, children's hospitals and university pediatric programs perform the vast majority of pediatric tertiary care in the United States. However, these sites are also among the most expensive, due to the large amount and wide range of resources needed to care for children of different sizes (from a 1-kg premature infant to a 100-kg adolescent) who present with a large number of relatively rare conditions. Because there are no widely accepted measures of quality for the work done in these specialized sites, the quality of the services provided is difficult to assess. Families often use an organization's local reputation or a recommendation from a friend as surrogate measures in defining a

presumed level of quality (Sobo, 2001). It is also easy for payers to assume (and hard to prove otherwise) that quality of care for these conditions is fairly similar among different providers. Because **value** equals *quality per unit cost*, quality is assumed to be equal and held constant among providers, and so the debate between providers and payers over value gives way to a debate over cost. The way for providers to increase their value to payers is then limited to lowering the price of their services. Thus it has been in provider organizations' best interests to form collaboratives in order to develop quality measures and add quality to the value equation.

The Development of CHSR Units Within Organizations

The inability of local and national organizations to define quality and shift the debate toward true value is now coupled with a national demand for **accountability** (Seid et al., 1997). Accountability has become a popular theme in many U.S. business circles. Although the locus of accountability in health care is not clearly defined, consumers, purchasers, and payers for health care services expect it of providers; that is, they expect providers to be able to document the quality of their outcomes with quantifiable and eventually comparable measures. Against this background of increasing demand for accountability, documentation, and improvement in the quality of services, a number of health care organizations have instituted CHSR units. For example, it was this new emphasis on accountability that led Children's Hospital and Health Center in San Diego to establish the Center for Child Health Outcomes (CCHO).

CCHO was conceived as an *applied CHSR* team. That is, like the collaboratives, its goal was to conduct research that directly led to the improvement of health care quality for children served by Children's and its affiliated physicians. Also, like the collaboratives, one of the first tasks faced by CCHO members was to improve the field's tools for quality measurement (some examples are provided in the chapters that follow).

CCHO's first and overarching objective is to help evaluate, design, and improve health services provided by its parent organization. Children's, along with its affiliated medical groups and wide-ranging partnerships, is a natural laboratory for conducting and implementing its own applied health services research as well as applying the research findings of others. CCHO's second objective is to inform consumers and payers on the quality of services provided by Children's and its affiliated physicians. CCHO's third objective is to influence public policy and the practice of pediatrics by sharing its work widely with the field, and its fourth objective is to train future practitioners in the science and practice of quality improvement.

Connections to the Organization

As the need for health care organizations to demonstrably and continuously improve the clinical and financial quality of their performance has grown, a number of models linking organizations with applied CHSR have developed. An important distinction in these models is the degree of connection, if any, between applied CHSR investigators and the day-to-day operations of the organization. CCHO depends on a very close, interactive, iterative relationship with the organization's daily operations. CCHO produces research that is immediately applied; it is conceived as applied from the outset. Other centers are based on a more academic model, in which acting on research results by the parent organization occurs rarely, if at all. Such centers are only loosely connected to their organizations' operations.

Although these models have been in existence for only a few years, early experience suggests that a CHSR unit's ability to affect the quality and nature of health services provided is highly dependent on the closeness of the connection between investigators and front-line operations. In other words, the more directly applied the focus of the research and the more relevance the work is perceived to have by the organization, the more likely the research findings will be incorporated into organizational practice.

Demonstrating CHSR's Value to Organizations

To advance an outcomes and quality improvement agenda throughout the organization, it is critical that an applied CHSR unit demonstrate the value of its work to the various groups of internal stakeholders. At Children's, organizational support grew over time as the research findings of CCHO helped produce sustained improvements in both clinical and financial outcomes. Although clinical quality and social justice are important motivators of much applied CHSR, the bottom line, as demonstrated by cost savings, is a crucial factor when soliciting organizational backing or the support of external grantmaking institutions.

The foundation of CCHO's effort to build support relies on the approach the group has taken toward the science and methods of health services research and quality improvement. The development, implementation, evaluation, and ongoing improvement of **clinical pathways** (see Chapter Eight, by Richardson, Sobo, and Stucky) became the initial means to achieve the goal of improving both clinical and financial outcomes. Pathways also became the means for addressing and reducing both unnecessary variation in care and the gap between knowledge and routine practice. Because pathways are developed using an interdisciplinary approach that takes into account the complexity of health care processes, pathways also help acculturate staff to the systems approach to health care improvement.

Physicians are key stakeholders in any health care organization. In our experience, before physicians will change their practices and adhere to practice guidelines or pathways, they need to understand the health services science behind the pathways, and they need concrete demonstrations that these pathways do improve the care of hospitalized children. For example, the first concept presented to the physicians by CCHO, and supported by internal data, was that great variation in practice existed between and among the physicians caring for similar children and that this variation was driven not by

patient need but rather by physician preference and habit. The second concept presented to the physicians and documented with internal data was that there is a substantial disparity between actual practice and what the evidence shows is best practice. The majority of physicians did not follow national practice guidelines, even when these guidelines were created by their own professional societies.

The third concept presented to the physicians was that of clinical **epidemiology** and population health. The physicians were asked to consider several hundred children with asthma as a group rather than to take the one-child-at-a-time approach of routine clinical care. This helped physicians think beyond their own personal preferences and what worked for them (or what they thought worked for them) to appreciate the positive impact that routinized processes of care, when standardized to excellence, could have for all children with a given condition.

The final concept presented to the physicians came from the field of quality improvement and the work of W. Edwards Deming, Joseph M. Juran, and others (Deming, 1982/2000). These applied quality improvement pioneers demonstrated that unnecessary variation in a process leads to two outcomes: higher costs and poorer quality. If variation could be reduced, quality would improve and costs would decrease. This is exactly what was found to occur by CCHO; pathways based on the best available medical evidence reduced unnecessary variation in care, decreased the costs of care, and improved clinical outcomes (see Chapter Eight, by Richardson, Sobó, and Stucky). Due to our pathways work, Children's received the 2002 Ernest A. Codman Award from the Joint Commission on Accreditation of Healthcare Organizations for demonstrating excellence in using outcomes measurement to improve the quality of care.

The overwhelming success of our Pathways Program, as evidenced by eight years of improved quality with reduced costs of care, has helped transform the culture of patient care here at Children's. CCHO's performance improvement record at Children's confirms that an organization can actively seek out and apply the results of

CHSR within its own walls. However, the vast majority of organizations are without internal, applied CHSR capability and must find and apply research results from the outside. By seeking such new information, each organization, being a complex, adaptive system, acquires new knowledge and changes its behavior to enhance its ability to survive and thrive as a health services delivery organization.

It is important to note that this work has taken place primarily in the inpatient setting and in selected specialty clinics. However, the same type of improvement initiative can occur in primary care offices (Bocian et al., 1999; Gardner et al., 2000). Often, in fact, improvement in offices is dependent on improvement in the larger systems they are part of, as with the provision of expensive information technology. Office sites are often too resource-constrained, with inadequate information technology and inadequate staff time, knowledge, and skills to appropriately evaluate their current practices and improve as needed. With the coming changes in residency training that include providing the knowledge and skills needed to evaluate and improve one's own practice (Chesney, 2001), the relatively unmet need to improve care in ambulatory settings will, we hope, begin to be addressed.

CHSR's Methodological Orientation

Working on improvement projects within an organization or on behalf of an organization requires a mixed approach of both qualitative and quantitative methods. The methods selected are dependent not only on the questions asked but also on time constraints. As in international health, which has a long history of rapid method implementation (Nichter & Nichter, 1996; Peltó & Peltó, 1997), applied CHSR has short timelines with multiple and diverse audiences requiring regular communications. The methods used in applied CHSR will also depend on the ultimate use of the obtained information (for example, for internal improvement or for marketplace comparisons of different providers). Because all CHSR methods are

heavily dependent on appropriate data and information, which is much more readily available in inpatient settings than in ambulatory settings, it is currently easier to change inpatient care than to change ambulatory care.

Rapid-Cycle Improvement

One method frequently used in CCHO is called **rapid-cycle improvement**. The utility of sequential cycles of improvement has been well described by Tom Nolan and others (see Berwick & Nolan, 1998). Nolan's fundamental improvement method, called **plan, do, study, act (PDSA)**, has been modified to fulfill a more rapid-cycle approach emphasizing the importance of thoughtful, quick, incremental improvements.

CCHO has further refined the rapid-cycle approach by adding routine reality checks. If the goals of improvement become too internally focused—that is, if they are of importance to internal audiences but not the marketplace—an organization can become better at things that may not matter and miss opportunities to improve other, more relevant processes. This suboptimization of a process or even of an entire organization can have devastating costs by focusing the organization on the wrong things. In a rapidly shifting marketplace like that of health care, regular checks relating one's work to the real world must be used to shape research design and methods as well as to help in the selection of findings for application. For example, designing care models for a prepayment, capitation model of reimbursement will suboptimize reimbursement if the primary method of reimbursement is fee-for-service or per diem payments.

Applying CHSR in the Real World, in Real Time

Linking applied research to improvement requires a multifaceted, nimble, interdisciplinary team that has the capacity to employ a variety of methods and has the desire to collaborate closely with the end users of the research findings. This requires an explicit

acknowledgment of the identity of the end user and how, if at all, the findings are to be applied. This is true whether the findings are to support business decisions in an organization or the policy decisions of local or national governments.

Due to time constraints or the inability to control most variables, the types of research designs needed to improve or make business decisions are often different from those needed to compare providers or prove hypotheses in the usual scientific sense. The health services marketplace does not give time for multiyear randomized controlled trials such as those used to establish the efficacy of a specific medication or intervention. The marketplace does understand, however, rigorous annotated time-series or quasi-experimental designs that suggest, yet may not prove, causality.

Ultimately, applied CHSR seeks information to help answer questions such as these: What are the real-world ramifications of the results of the services being investigated? Is the implementation of recommendations based on the findings even feasible? Will the research questions being asked provide answers that can be used to modify service delivery and organizational thinking? Or will the organization review the findings and say "So what?" because the findings have no obvious operational value? Without answering such questions prior to beginning the investigation, research findings can rarely be applied in real time.

Making the Business Case for Quality

No matter how good the science, important the findings, or responsive the investigators, applied CHSR units cannot expect long-term, ongoing organizational support if no business case is made for keeping them. The inability of an organization to make a business case for quality is one of the biggest impediments to organizational investment in quality improvement (Bringewatt, 2001; Coye, 2001; Galvin, 2001). In today's health care marketplace, with its current reimbursement mechanisms, much of the financial benefit accruing

from a provider's quality improvement efforts reverts to the payer and does not benefit the provider. For example, when Children's asthma disease management program significantly reduced emergency department visits and hospital days for children with severe asthma, income was lost due to the decrease in patient days that would have been reimbursed on a per diem or fee-for-service basis. The financial savings went to the payers. The actual financial benefit to providers resulting from their quality improvement work depends on the mechanisms of payment. For example, a provider reimbursed via prepaid capitation will benefit financially by reducing unnecessary utilization, whereas a provider paid via a fee-for-service plan will not. But at least in theory, providers of high-quality care will ultimately benefit by attracting a larger market share.

However, this vision of purchasers and consumers shifting their business to high-quality providers has not yet occurred (Robinson, 2001). Whether payers and consumers do not really understand the types of quality outcome data they are given or whether consumers use other measures (such as personal references) to choose providers, the shift to quality providers has been slow and uneven around the country.

To speed up the public's embrace of the quality agenda, purchasing coalitions such as the Pacific Business Group on Health or the Washington Business Group on Health use quality measures to compare providers. These large health care purchasing groups have also proposed incentives for high-quality providers (Milstein, 1998). The full impact of these efforts remains to be seen.

Because health care in the United States is fundamentally a local or regional business, providers must develop individual strategies to attract business on the basis of demonstrated quality. In CCHO's local marketplace experience, the regular and routine presentation of outcomes data (CCHO's second objective) to purchasers and adult-focused medical groups, highlighting the quality of Children's programs, has been very successful. This is evidenced by Children's significant increase in market share over the past several years.

Maintaining an Applied CHSR Focus

Informing the regional managed care marketplace of the outcomes of services at Children's and of how those services have improved over time expanded the audience for the types of information generated and communicated by CCHO. Even as the areas of child health in which CCHO works have extended beyond the boundaries of Children's to include regional, statewide, and national health services for children, two practices remain firm. First, the prime objective of improving organizational performance in order to improve the quality and value of its services is always given priority within CCHO; the organization's goals are always the first to be met, and CCHO's close connection to the organization is maintained. Second, CCHO remains committed to the approach of applying the results of its investigations firsthand with close collaborators and partners, both inside and outside Children's.

In the rapidly changing, complex, and competitive world of health care, where organizations struggle to survive and thrive, CCHO tries to keep in mind the advice of Albert Einstein: "Out of clutter find simplicity; from discord, make harmony; in the middle of difficulty lies opportunity." These three rules for work represent a worldview from which all who would productively engage in applied CHSR might benefit.

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