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Microsystems in Health Care

Microsystems in Health Care:

Part 2. Creating a Rich Information Environment

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In the first article of this series on microsystems in health care, we outlined the qualitative research completed and findings on 20 high-performing microsystems from the care continuum.[1] We stressed the strategic and practical importance of focusing on the small, functional, frontline units that provide most health care to most people. This article further advances microsystems knowledge by demonstrating the importance of creating a rich information environment that supports microsystem functioning.

Some microsystems—medical practices and clinical units—consistently generate superb clinical care, based on science, on compassion, and on specific and unique knowledge of what "this patient" wants—and needs—right now. These same microsystems consistently use data to review their performance—to monitor, manage, and improve quality, safety, and efficiency. This is exceptional. As an IOM report shows, it is not the way things work in most clinical units.[2] Most microsystems use data today the same way they did decades ago, with little thought given to planning the flow of information to support clinical decision making and to optimize total practice performance.

We present three case examples of clinical microsystems that are using data in everyday practice to provide high-quality, cost-effective care. After providing these cases, we offer principles for using data in microsystems and discuss some useful concepts and frameworks.

Article-at-a-Glance

Background: A rich information environment supports the functioning of the small, functional, frontline units—the microsystems—that provide most health care to most people. Three settings represent case examples of how clinical microsystems use data in everyday practice to provide high-quality and cost-effective care.

Cases: At The Spine Center at Dartmouth, Lebanon, New Hampshire, a patient value compass, a one-page health status report, is used to determine if the provided care and services are meeting the patient's needs. In Summit, New Jersey, Overlook Hospital's emergency department (ED) uses uses real-time process monitoring on patient care cycle times, quality and productivity indicator tracking, and patient and customer satisfaction tracking. These data streams create an information pool that is actively used in this ED icrosystem—minute by minute, hourly, daily, weekly, and annually—to analyze performance patterns and spot flaws that require action. The Shock Trauma Intensive Care Unit (STRICU), Intermountain Health Care, Salt Lake City, uses a data sytstem to monitor the "wired" patient remotely and share information at any time in real time. Staff can complete shift reports in 10 minutes.

Discussion: Information exchange is the interface that connects staff to patients and staff to staff within the microsystem; microsystem to microsystem; and microsystem to macro-organization.

Case 1. Specialty Care: The Spine Center at Dartmouth, Lebanon, New Hampshire

We needed a language to work with our patients. The value compass provides the language that helps our multidisciplinary team work with our patients to get them back to work, back to play, one back at a time.—James Weinstein, DO, Spine Center Founder

A Typical Illness Episode: Health Outcomes Tracking and More

A patient comes for his first visit to the Spine Center. He is greeted by the receptionist, given a touch pad computer, and asked to answer a set of important questions about his health, using the computer, before seeing the physician. He takes less than 30 minutes to answer questions about his back problem, functional status, expectations for treatment, and working status. When the patient finishes, he hands the computer back to the receptionist. The receptionist transfers the survey data to the reception desk computer, which has a custom-designed database application for processing and printing the patient value compass (PVC) on a one-page summary report (Figure 1, p 7). The PVC is used to enhance communication between the provider and patient to better meet the patient's needs. The PVC is then placed on the front of the medical record, and the patient sees the physician for an initial assessment, during which they review the PVC, which describes the patient's health status in areas such as bodily pain, physical health, mental health, and role performance compared to the average person of their age and sex.

This patient's PVC shows not only that he is suffering from acute back pain but also that he has an extreme sleeping problem, is possibly suffering from depression, has been unable to work at his job for 3 weeks because of his back problem, and has had chronic back pain for more than 3 years. The patient and physician discuss these results, and after gathering additional data through history taking and physical examination, they develop a care plan based on the patient's preferences and health needs that blends behavioral medicine, physical therapy, and occupational therapy.

On each subsequent visit to the Spine Center during the next 2 months, the patient uses the touch pad to record current health status and thereby update the changes in health outcomes such as back pain, physical function, and mental health that he has achieved. After 6 months, the patient is back on the job, is free from depression, and has pain that is only slightly worse than that of the average adult.[3]

Other Facts About the Center

- The Spine Center uses a data wall to display important indicators of clinical outcomes, patient satisfaction, and business performance. (A data wall displays key measures for use by the clinical team to show current performance and trends over time.) The various data displays create a "story" about practice performance that can be viewed by the entire practice staff.
- The practice views statistical process control charts and measures of processes and outcomes as essential keys to practice management and improvement.
- The Spine Center creates an outcomes-based annual report and uses it as the basis for an all-staff annual retreat to review improvements made and to set up small teams to work on needed improvements for the coming year.
- The Spine Center contributes data to the National Spine Network, which is composed of 28 independent clinics that share outcomes data, enabling cross-site comparisons.
- The Spine Center is the lead organization for a 15 million, 11-site, NIH-sponsored, randomized clinical trial on the value of spine surgery for the three most common diagnoses for which spine surgery is performed.
- Many patients are delighted with the care they receive, but the Spine Center has important improvements to make, especially with respect to improving access to care.

Case 2. Overlook Hospital Emergency Department, Summit, New Jersey

We have a culture of change right here that goes back many years to our first work with the reduction of thrombolytic cycle time. The ED moved to understanding how to use industrial quality improvement methods and microsystems thinking to be safer, more reliable, and better able to meet customer needs and expectations.—James Espinosa, MD, Medical Director

Patient Value Compass for a Typical Spine Patient

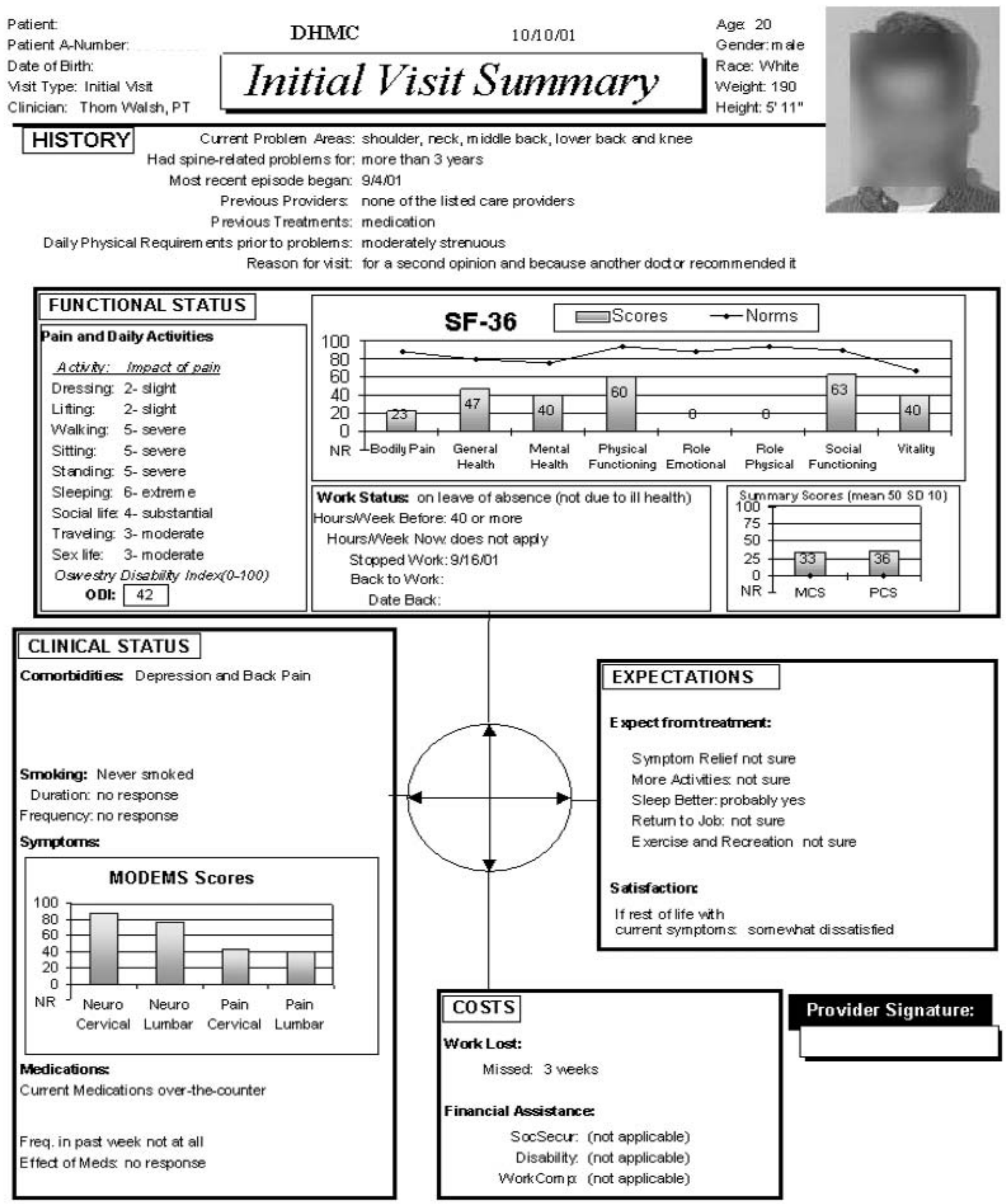


Figure 1. *The patient value compass provides a balanced view of clinical and functional status, patient expectations, and satisfaction with his or her clinical care management, and other data on the patient related to work status and costs of care.*

A Glimpse at the Uses of Data: Real-Time Flow Monitoring and More

The Overlook Hospital emergency department (ED) has made data a critical part of its continuous improvement efforts, which began in 1994. The following are a few examples of how the ED uses data to create a rich, self-aware information environment that supports improved flow, quality, productivity, and patient and staff satisfaction:

- Real-time process monitoring: Real-time data on patient care cycle times are monitored and displayed continuously on software to show if the system is flowing well or is experiencing bottlenecks.

Measures that are tracked in real time include time to initial treatment, time to transfer to an inpatient unit, x-ray time, and cycle time for fast-track and routine patients.

- Quality and productivity indicator tracking: A system of process and outcome metrics is compiled and displayed using control charts and other graphical displays. Process indicators monitor trends in many areas, such as x-ray false-negative report rates, patient fall rates, and other indicators of growth and safety.
- Patient and customer satisfaction tracking: The Overlook ED uses several formats to gain knowledge of its customers. It uses a national comparative database on patient satisfaction, in which it frequently scores at the 99th percentile, as well as locally developed customer satisfaction surveys for key internal customers (for example, residents in training, ED staff) and for "peer" microsystems (for example, pediatric intensive care unit, radiology, and emergency medical technician [EMT] squads).

These "data streams" create an information pool that is actively used in this ED microsystem—minute by minute, hourly, daily, weekly, and annually—to analyze performance patterns and to spot flaws that require action. Two regularly scheduled forums in which the staff use the data for continual betterment are (a) the dynamic monthly "Microsystem" meetings, chaired by Dr Espinosa, which are freewheeling exchanges of data, dialogue, and ideas, and (b) full-day annual retreats called "summits," which look back to review progress and problems and establish priorities and plans.

Other Facts About the Overlook ED

- 80% of the ideas that have surfaced during the annual summits in the past several years have been implemented.
- The ED has the highest staff satisfaction rating of any clinical unit in the four-hospital system.
- The ED has been recognized nationally—for example, HCFA's (Centers for Medicare & Medicaid Services) Best-Practice for Time-to-Thrombolytics, the Cardiology Advisory Board's North American Gold Standard for Thrombolytic Delivery, and the American Hospital Association's Quality Award.

Case 3. Shock Trauma Intensive Care Unit (STRICU), Intermountain Health Care (IHC), Salt Lake City

The data system allows us to monitor the patient remotely and share information at any time in real time. I get to see and use data and information to help me take better care of the patient.—a STRICU clinician

Daily Work—The Wired Patient and Real-Time Monitoring

The data system is built around the patient and the clinical care team and is used every minute of every day with every patient. The injured patient is "wired" to monitor vital clinical parameters, such as vital signs, intake/output, blood gases, and infusions, in real time. Each patient room has a bedside computer for entering all relevant information into the patient's electronic medical record (EMR). Every day starts with formal, interdisciplinary rounds that take 2 or more hours to review and plan the care for the 8 to 12 patients in the unit at any one time. During rounds the patient's clinical team—intensivist, nurse, technician, medical resident, primary physician, respiratory therapist, social worker, and family—reviews all aspects of the patient's status, with the assistance of the EMR projected on a large screen.

On the basis of the data and discussion of alternatives, the patient's team adjusts the care plan and tracks the impact of the changes on the patient's clinical parameters. Despite the complexity of the patients' conditions, the informatics environment makes it possible for staff to complete shift reports in 10 minutes. Physicians can dial in to the information system from home to monitor the patient remotely at any time of the day or night and can communicate with everyone on the care team any time and from any place. Current data, based on the local epidemiological profile, are available on the most common types of nosocomial infections, and decision support is built in to the informatics system to guide the cost-effective selection of medications for patients who acquire infections.

Time-trended statistics are a way of life in the STRICU. Trends over time on key performance indicators, such as medication error rates, protocol use rates, complication rates, and costs, are compiled and reviewed at monthly staff meetings by the unit's coordinating

Table 1. Tips and Nuggets to Foster a Rich Information Environment

Spine Center Specialty Practice

- Use full assessment of patient's health status to match treatment plan to the patient's changing needs.
- Integrate data collection and information technology into the flow of patient care delivery.
- Use information technology to provide patients and staff with tailored health status.
- Use outcomes tracking over time to evaluate results of care for individual patients and for specific subpopulations of patients.
- Build a clinical research infrastructure on top of a rich clinical information environment that makes use of structured data collection from patients and staff.
- Use leadership, cultural patterns, and systems to make a firm foundation for technology.

Overlook Emergency Department

- Improve patient flow by monitoring cycle times and visibly key results in real time to promptly initiate needed actions.
- Use comparative data to stimulate improvements in clinical processes and in patient satisfaction.

Shock Trauma Intensive Care Unit

- Use biomedical monitoring—for patients with complex, critical problems—to provide ongoing information on the patient's status.
- Use graphical and visual data displays to connect staff to staff and staff to patients to develop optimal care plans.
- Build local epidemiological knowledge and use it to guide clinical decision making.

council and at annual all-staff retreats to monitor, manage, and improve performance.

Other Facts About the STRICU

- Protocols, which address topics such as heparin use, prevention of deep vein thrombosis, and pain relief, are developed and refined locally (by any member of the clinical team); each is typically less than one page long.
- Inflation-adjusted costs have been reduced over time and are currently at 82% of their 1991 levels.
- Safety is a primary concern; more than 30 different types of errors are tracked.
- Current improvement projects involve potassium target levels, nosocomial infections, and sedation level reduction.

The EMR has been under development at IHC for decades, and the STRICU has a full-time staff member devoted to ongoing EMR/informatics refinements.

Tips and "Nuggets" to Foster a Rich Information Environment

The three cases reviewed give rise to a set of tips that may be useful to guide microsystems and macro-organizations in their quests to provide great care (that is, care that meets patients' needs) and to minimize delays and unnecessary costs. Some of the obvious tips or informatics "gold nuggets" embedded in these cases are listed in Table 1 (left).

Basics: Fundamental Principles for Creating a Useful Information Environment

In addition to the specific tips and nuggets, it is possible to identify a few main principles concerning information, information technology, data, and performance results. The principles (Table 2, p 10) come from a detailed qualitative analysis of the 20 high-performing clinical microsystems.[1]

Discussion

Information is the Connector of All to All

According to Figure 2 (p 11), information and information technology are a feeder system to support all four key success themes—leadership, staff, patients, and performance. Information exchange is the interface that connects

- Staff to patients and staff to staff within the microsystem;
- Microsystem to microsystem; and
- Microsystem to macro-organization,

Information technology facilitates effective communication. Multiple formal and informal channels are used to maintain accurate, honest, and timely dialogue among all parties.

Smallest Replicable Units (SRUs) of Activity and the Design of Information Flow

A rich information environment does not just happen, but it can be designed and improved over time. It can be

Table 2. Fundamental Principles for Creating a Useful Information Environment

1. Design it. Provide access to a rich information environment.

This is the first principle among all principles. Information guides intelligent action. Lack of information precludes the ability to take intelligent action. Processes that support Principle 1 are:

- Designing the information environment to support and inform daily work and to promote core competencies and core processes that are essential for care delivery.
- Establishing multiple formal and informal communication channels to keep all the microsystem players—patients, families, staff—informed in a timely way.

2. Connect with it. Use information to connect patients to staff and staff to staff.

The success of the microsystem (composed of patients in relationship to clinical staff and support staff) is contingent on the interactions between the players (patients and staff). The players must be connected for positive and productive interactions to take place and for the right things to be done in the right way at the right time. Processes that contribute to Principle 2 are:

- Giving everyone the right information at the right time to do the work.
- Investing in software, hardware, and expert staff to take full advantage of information technology to support medical care delivery.
- Hearing everyone's ideas and connecting them to benefit the patient and actions that support servicing the patient.
- Providing multiple channels for patients to interact with the microsystem and to receive information from the microsystem (for example, written information, telephone, e-mail, Web-based information, group visits).

3. Measure it. Develop performance goals and linked measures that reflect the primary values and the core competencies essential for providing needed services to patients.

To improve performance or to maintain performance in the desired range of excellence, it is important to set goals that are aligned with critical values, competencies, and processes and to measure goal attainment over time. Processes that promote Principle 3 are:

- Working with the microsystem team to set goals and linking rewards and incentives to measured results.
- Using measures to gauge performance, ideally in real time, in both "upstream" processes and "downstream" outcomes.

4. Use it for betterment. Measure processes and outcomes, feed back data, and redesign continuously based on the data.

This last overarching principle completes the loop. It emphasizes using the information being gathered to provide insight to all the players, to instigate actions to improve or innovate, and to use the information streams to determine the impact of design changes. Processes that promote Principle 4 are:

- Building data collection into the daily work of clinical staff and support staff.
- Creating and using "self-coding" forms and checklists as part of work flow.
- Turning the primary customer—the patient—into an information source for providing critical data elements in a standard or systematic manner.
- Designing work processes and supporting technology to automatically "throw off," or generate, important results that show how the system is working and the pattern of results that it is generating.

engineered in order to support the organization's ability to deliver high-quality services to patients (and customers) at the level of the SRUs of activity within microsystems.[4] For example, gathering patient registration data, collecting patient health status data, arriving at a diagnosis based on the data, and assessing changes in patient outcomes over the course of treatment all represent SRUs of activity that are embedded in clinical microsystems. Each of these

Success Characteristics of High-Performing Microsystems

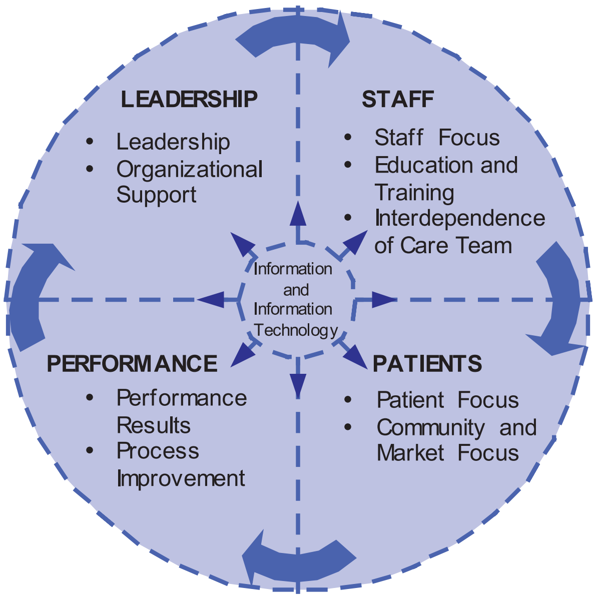


Figure 2. *Information and information technology are a feeder system to support all four key success themes—leadership, staff, patients, and performance.*

SRUs of activity can be supported by designing information systems—to capture, analyze, use, store, and reuse data—that fit well into the flow of work and support doing the right work in the right way efficiently. Quinn makes the point that the leading service organizations in the world do exactly this and that to do so is a strategic advantage.[4] To realize this advantage, however, requires a fundamental understanding of (a) the nature of frontline work and frontline processes and (b) the need to build the information system from its core process base and to capture data in its most disaggregated form at the SRU level. This can be done, as demonstrated in each case study in this article, but doing so is extraordinary in today's health system and needs to be ordinary in tomorrow's health system if we are to "cross the quality chasm."[2]

Making Progress by Building on Three Useful Frameworks

The path to the creation of a rich information environment can be made smoother and easier (though still not easy) by applying some useful frameworks:

- Feed forward and feed back;
- The PVC; and
- The balanced scorecard.

We now provide a short introduction to these frameworks and cite the aforementioned cases to illustrate how they can be adapted in the real world of clinical practice. It is possible to create a more powerful information environment by adapting these core ideas to specific clinical microsystems.

Framework 1. Feed forward and feed back—Can we use data to do the right thing right the first time every time? Figure 3 (p 12) portrays the idea of building an information environment that uses both feed forward and feed back data to manage and improve care. The general idea behind feed forward is to collect data at an earlier step in the process of delivering care and to save it and use it again at a later step in the process—to manage and inform service delivery—to do the right thing, in the right way, the first time (in real time) for each patient. The general idea behind feed back is to gather data about what happened to a patient, or a set of patients, and to use this information to improve care so that future patients will get the right thing, in the right way.

Both feed forward and feed back methods are commonly used in care delivery. For example, many medical practices caring for patients with hypertension have a nurse or medical assistant measure the patient's blood pressure level and feed these data forward to the physician, who uses the data to guide decision making concerning the treatment and the need for adjustments to the regimen. Likewise, many primary care practices show the level of control achieved by the panel of hypertensive patients under the care of each physician in the practice and will feed back these comparative data to identify degree of success and to identify improvement opportunities.

The case studies listed at the beginning of this article, however, contain examples of "advanced uses" of data feed forward. For example,

- the Spine Center uses touch pads to collect information on the patient's general and disease-specific health status; this database provides a sound basis for patient and clinician to engage in shared decision making to best match the patient's changing needs with the preferred treatment plan.

Feed Forward and Feed Back Data in a Microsystem

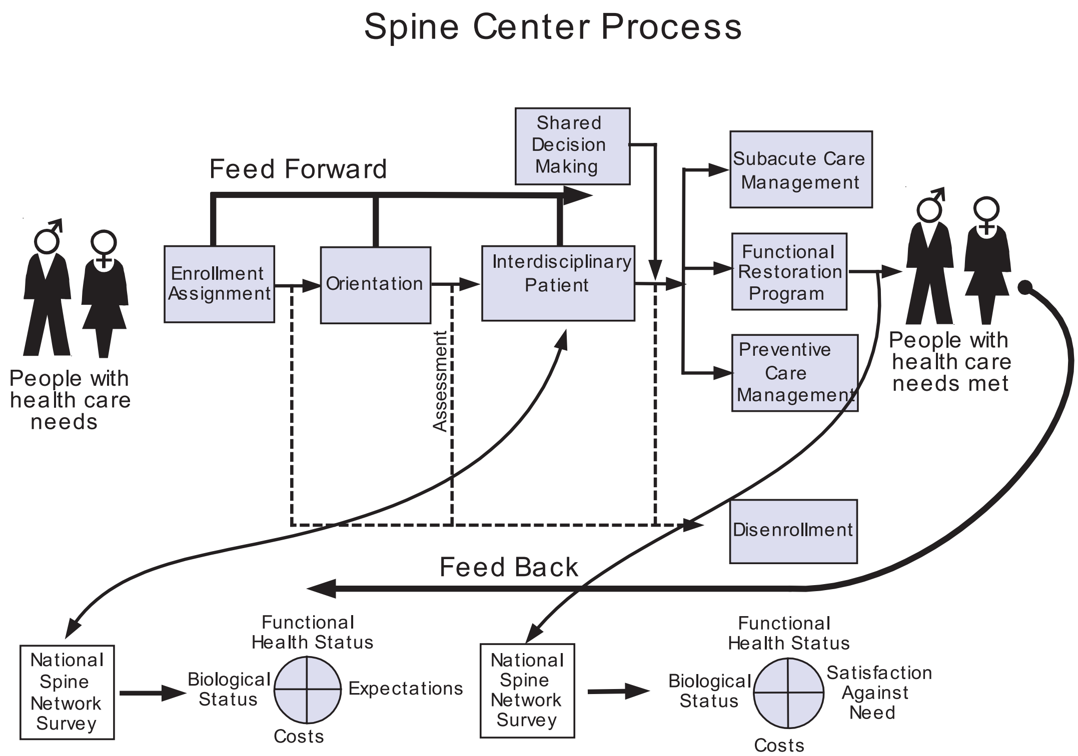


Figure 3. *This figure portrays the idea of building an information environment that uses both feed forward and feed back data to manage and improve care.*

- the Overlook ED uses cycle time monitoring to determine if and when patient flow bottlenecks are occurring; this provides a basis for taking immediate corrective action before a slowdown degenerates to a meltdown.
- the IHC STRICU uses real-time monitoring of each patient's clinical parameters to feed forward into daily rounds; this provides full-bandwidth data for the multidisciplinary team to use to make sure the care plan matches the patient's acuity.

Each of these three microsystems uses feed forward data concepts to engineer timely data collection/interpretation into the microsystem to enable staff to do the right thing at the right time. In addition, all three clinical microsystems use a variety of data feed back methods (such as graphic data displays, statistical process control charts, data walls, weekly/monthly/quarterly/annual reports) to "aggregate up" performance measures and to use the information to manage and improve care. It is possible to use process flow analysis methods, such as value stream mapping, to specify the flow of information that should accompany the flow of health care service delivery.[5]

Framework 2: PVC—Can we use data to measure and improve the quality and value of care? PVC thinking can be used to determine whether the microsystem is providing care and services that meet patients' needs for high quality and high value.[6–8]

The PVC was designed to provide a balanced view of outcomes—health status, patient satisfaction, and patient care costs—for an individual patient or for a defined population of patients. It has four cardinal points that can be used to explore answers to critical questions:

- West: What are the biological outcomes?
- North: What are the functional status and risk status outcomes?
- East: How do patients view the goodness of their care?
- South: What costs are incurred in the process of delivering care?

Patient Value Compass: Patients with Herniated Disk Who Underwent Surgery

Functional Health Status

SF-36 Norm-based (mean 50 SD 10)	Initial	Followup	Improved
Bodily Pain	26	40	77%
Role Physical	27	37	50%
Physical Component Summary	28	38	62%
Mental Component Summary	43	51	58%
General Health			
Excellent & Very Good	40%	43%	26%

Improved for SF-36 is a difference of 5 points or greater between Followup and Initial
Improved for General Health is a positive change in category from Initial to Followup

Clinical Status

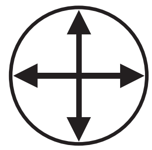
Common Health Problems	
Comorbidities besides spine condition	57%
Depression	18%
Frequent Headaches	18%
High Blood Pressure	14%
Osteoarthritis	11%
Heart Disease	5%

Symptoms	Initial	Followup	Improved
Oswestry Disability Index: How pain has affected your ability to perform activities	46	71	70%
MODEMS: Degree of suffering and bothersome			
Numbness, tingling, and/or weakness in lower body	41	70	69%
Numbness, tingling, and/or weakness in upper body	77	89	43%

Oswestry Disability Index (ODI): reported as low score is more disability
Improved for ODI is a difference of 10 points or greater between Followup and Initial
Improved for MODEMS is a difference of 5 points or greater between Followup and Initial

Pain at Followup	
Experience pain in the neck, arms, lower back, and/or legs most or all of the time	33%
Medications at Followup	
Taking medication(s)	61%

Patient Case Mix (July '98 to Mar. '02)	
Patients (have followup survey)	170
Follow-up rate (N=370)	46%
Average followup (SD) days	121 (47)
Average Age (SD) years	44 (12)
Female	42%
Chronic greater 3 years	35%
Prior surgery	14%
Hospital Surgery Indicators	
One Day Length of Stay	69%
Discharged to Home	91%
Average Charges	$7,721



Satisfaction

Results of treatment(s) met expectations:	
for ability to sleep	66%
for symptom relief	61%
for ability to do activities	55%
to return to work	54%

Satisfaction:	
Satisfied with treatment(s)	85%
Would choose same treatment(s)	85%

Costs

Work Lost	
Missed work (28 weeks average)	54%
On leave from work at followup	6%
Financial	
Receiving Worker's Compensation	17%
Litigation: Legal action pending	6%

Charges: One year episode spine specific ICD-9 codes						
Spine Center		Outpatient		Inpatient		
Professional	$48,481	Diagnostic Radiology	$63,498	Surgical	$1,525,132	
Physical Therapist	$71,032	Neurosurgery	$158,411	Inpatient	$2,810,156	
		Orthopaedics	$160,987	Other	$737,737	
		Pain Clinic	$34,769			
		Office, urgent, other	$32,918			
Total	$119,513		$450,583		$5,073,025	$5,643,121

Median per patient $13,330
Average $15,995 (SD $10,818)
Range $169 to $74,339

Figure 4. *The Patient Value Compass displays answers to critical questions, such as the percentages of patients who at 4-month follow-up who had improved in their ability to perform activities (70%).*

The PVC framework can be adapted to virtually any population of patients—such as outpatients, inpatients, home health clients, and community residents.[9] The model assumes that patient outcomes—health status, satisfaction, and costs—evolve over time and through illness episodes. For example, a person may be in generally good health at age 32 years and suffer a herniated disc and undergo short-term treatment for the disc problem and then regain full health. Then, at age 35 he may reinjure his back, suffer from prolonged chronic back pain, lose his job, and become clinically depressed. At each point in the patient's illness journey it is possible, with data collection, to explore that PVC for that point in time and compare it to his PVC readings at earlier points in time. PVC data can be collected and analyzed to answer the question Is this patient improving or declining with respect to health status and satisfaction against need for care and at what cost?

The Spine Center case illustrates the use of the PVC framework to design the information environment. First, feed forward data are used at each patient visit to create an up-to-date PVC, which is placed on the front of the patient's medical record and which launches the patient–clinician interaction (Figure 1). The individualized PVC puts the clinician in an excellent position to rapidly understand the patient's health strengths and health deficits and to codevelop a plan of care that best matches evidence-based medicine with the patient's own preferences and needs. Second, feed back data are used to evaluate the care for distinct subpopulations seen at the Spine Center, such as patients who underwent surgery for herniated disk (Figure 4, above).

Many clinical microsystems and health systems in the United States and abroad use the PVC to manage and improve the quality and costs of care. Moreover, the PVC framework can be used to blend together strategic thinking with specific objectives and target values for measurable results at the level of the system as a whole (the macro-organization) or at the level of operating units within the system (clinical microsystems).

Framework 3: Balanced scorecard—Can we use data to measure and improve the performance of the microsystem? The balanced scorecard approach developed by Kaplan and Norton can be used to answer the question Is the microsystem making progress in areas that contribute to operating excellence and strategic progress? It is a popular and powerful approach that has gained influence during the past decade.[10–14] In contrast to the PVC, which uses the patient as the unit of analysis, the unit of analysis in the balanced scorecard is the organization or a smaller unit within the organization. Just as the PVC can work at multiple levels—the individual patient or discrete subpopulation levels—the balanced scorecard can work at the level of the clinical microsystem or the macroorganization.

The balanced scorecard was designed to provide a well-rounded view for specifying and assessing an organization's strategic progress from four critical perspectives——learning and growth, core processes, customer viewpoint, and financial results. It covers four strategic themes and can be used to answer fundamental questions such as:

- Are we learning and growing in business-critical areas?
- How are core processes performing?
- How do we look in the eyes of our customers?
- How are we doing at managing costs and making margins?

The balanced scorecard approach can be adapted to virtually any type of organization—a manufacturing plant, a service enterprise, or a health care system. Balanced scorecards offer a simple yet elegant way to link strategy and vision with

- objectives for strategic progress,
- measures of objective,
- target values for measures, and
- initiatives to improve and innovate.

Other positive features of the balanced scorecard framework are the capacity to (a) align different parts of a system toward common goals, (b) deploy high-level themes to ground-level operating units that directly serve the customer, and (c) establish a succinct method to communicate results and provide a system for holding operating units accountable for generating essential results.

Figure 5 (p 15) shows a balanced scorecard for the Spine Center. Its balanced scorecard for 2002 emphasizes top-priority objectives in each of the four dimensions. The Spine Center has yet to meet its goal of having 80% of patients participate in the shared decision-making video. Patients having timely access to a provider is also targeted for improvement, and this is associated with the financial measure of utilization of clinic time for physicians.

Conclusion

We hope that readers will be able to use these cases, principles, and frameworks to create information-enriched health systems that will make it easier for caring and skilled staff to provide wanted and needed care. J

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Balanced Scorecard: Spine Center at Dartmouth Business Unit

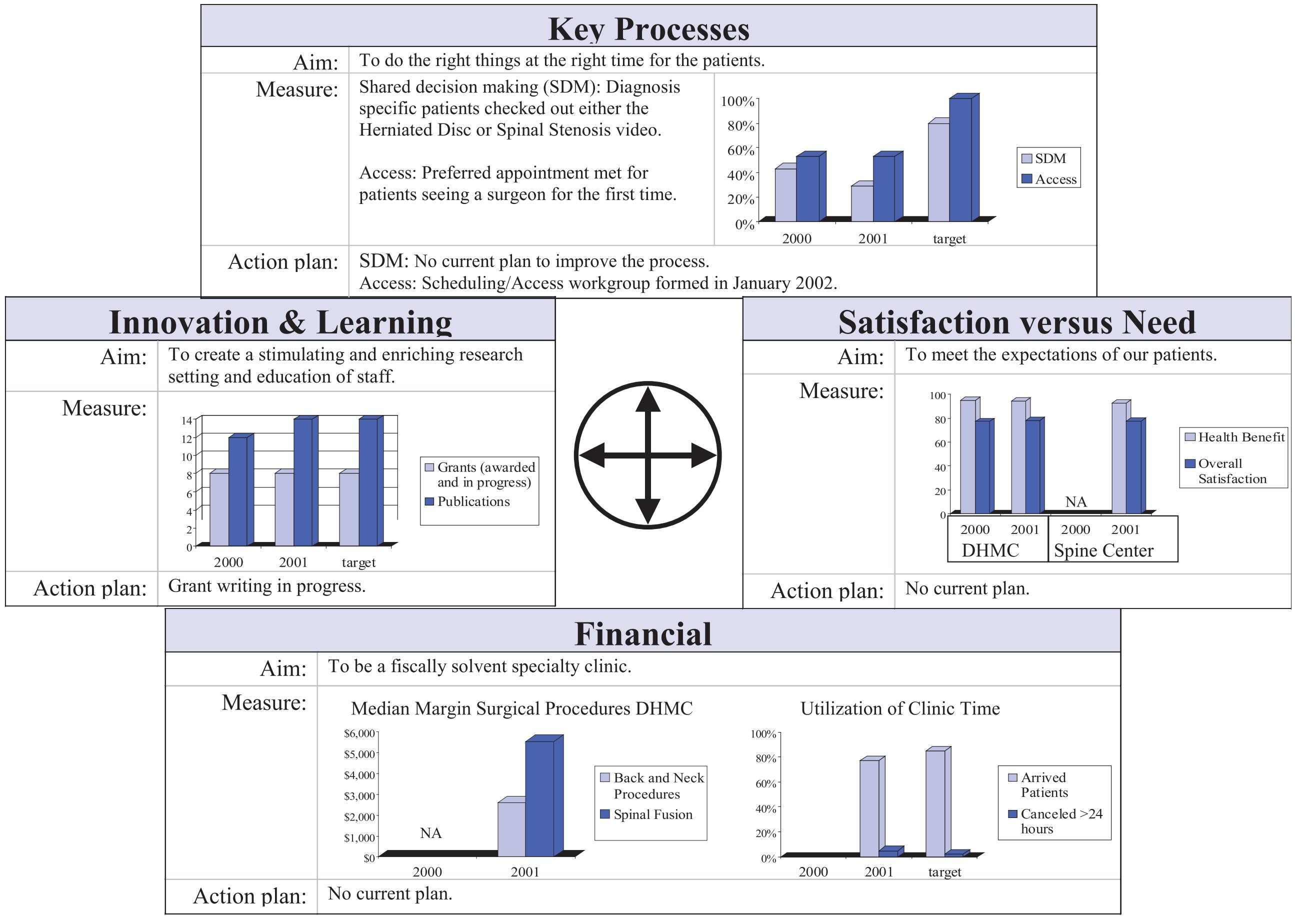

Figure 5. *The Spine Center at Dartmouth examines its scorecard at its annual retreats to review progress based on measured results and to sharpen its strategic focus for the upcoming year, based on an analysis of improvement imperatives.*

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