

## Chapter 8 Measure What Matters

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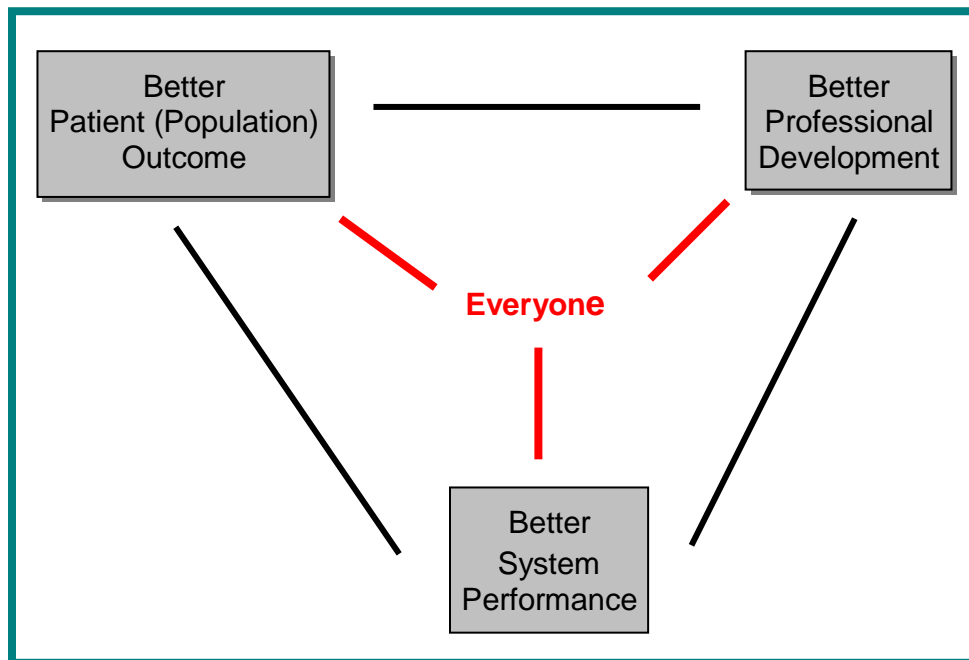
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Every health system that wants to grow and thrive in today's competitive world must be able to say "Yes" to three imperatives:

- Are we improving patient and population outcomes?
- Are we improving system performance?
- Are we able to grow and develop our staff?

As illustrated in Figure 8.1, these three imperatives combine to create a virtuous cycle that engages everyone in improving a healthcare system.<sup>1</sup>

**Figure 8.1 Quality Improvement in Healthcare**



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However, it is one thing to know what must be done and another thing to know if it is getting done. This chapter briefly describes some measurement tools that can be used to provide care to very low birth weight infants at high risk for poor outcomes:

- Two measurement frameworks called the *value compass* and the *balanced scorecard*
- Two measurement metaphors that we will refer to as a *cascade* for aligning health systems metrics that work at different levels of a health system and a *dashboard* for tracking the performance of clinical units.

Measurement *frameworks*, used in this context, provide a set of major categories of measures for the value of care or the performance of an organization. The frameworks provide general guidance on what types of things should be included to provide comprehensive and useful measures of specific phenomena. In the case of the *compass*, outcomes and costs are the focus, and in the case of the *scorecard*, it is organizational performance and success.

In contrast to measurement frameworks, measurement *metaphors* do not offer a specific set of key categories that require quantification. Instead, they provide a way of conceptualizing the properties of the measurement frameworks. A *cascade* is a metaphor for aligning measures at different levels of an organization. A *dashboard* is a metaphor calling for a customized set of measures designed for use in discrete locations by specific role players.

All four of these measurement devices are integrated in the Measure What Matters worksheet, which is presented at the end of this chapter, along with some case study implementations of the worksheet that illustrate how specific NICUs have adapted these tools to manage and improve care.

### The Compass and the Scorecard

Performance metrics can provide the best source of information on whether or not strategic intent is being transformed into operating reality. It is possible to use two complementary frameworks—the value compass and the balanced scorecard—to learn how well strategic intent is being converted into operating results in the real world of healthcare delivery.

In general, the compass framework can be used to provide data on patient and population outcomes, while the scorecard can be used to provide data on system performance and staff development. The compass was developed by clinicians and health services researchers seeking to measure patients' outcomes.<sup>2-4</sup> The scorecard was formulated by business school faculty attempting to measure business units' performance.<sup>5-7</sup> The frameworks are summarized and compared in Table 8.1.

**Table 8.1 The Value Compass and the Balanced Scorecard**

Topic	Value Compass	Balanced Scorecard
Question	Is our healthcare system providing high-quality, high-value care to patients and populations?	Is our healthcare business producing results needed to thrive in a competitive environment?
Dimensions	Clinical, functional, satisfaction, costs	Learning and innovation, core processes, customer satisfaction, finance and growth
Unit of analysis	The patient and patients aggregated to form a population	The business unit and business units aggregated to form an organization
Levels of aggregation	Patient, physician, microsystem, mesosystem, macrosystem, community, and region	Microsystem, mesosystem, and macrosystem
Special features	Can be used to: (a) Clarify and quantify the aims of a health system (b) Measure the value of what it produces (c) Represent the main interests of different stakeholders	Can be used to: (a) Convert strategy into measurable operational goals, current values relative to goal, and actions to take to reach goals (b) Promote accountability throughout the organization (c) Illustrate leadership's theory about what must be done to grow and thrive in a challenging climate

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### THE VALUE COMPASS

The compass (Figure 8.2) seeks to answer the question, “Is our healthcare system providing high-quality and high-value care to patients and populations?” The compass is patient-centered. The measures are taken on individual patients or specific patient populations, and therefore the unit of analysis is the patient.

**Figure 8.2 Clinical Value Compass Framework**

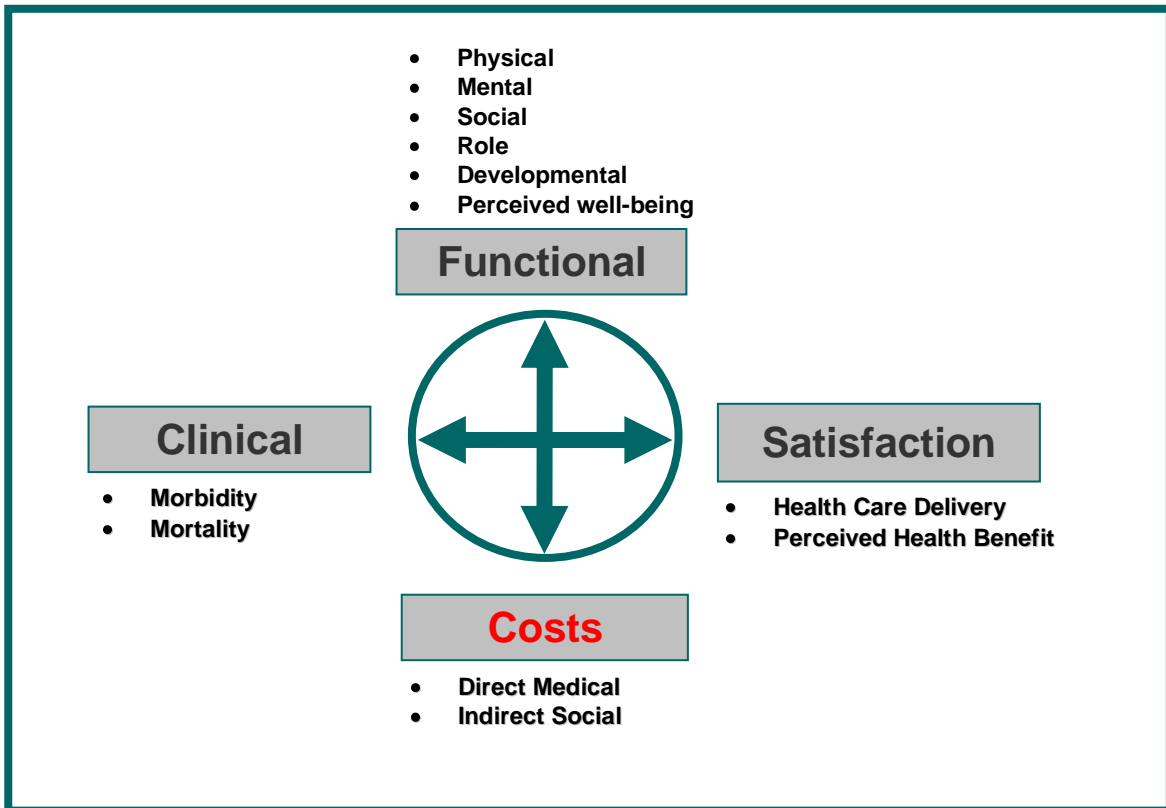


Figure 8.3 shows a value compass in the context of a Measures for Improvement chart developed by the Medical University of South Carolina (MUSC). The value compass appears in the upper-left panel of Figure 8.3. Figure 8.4 shows a close-up of the MUSC value compass.

Figure 8.3 MUSC Measures for Improvement Chart

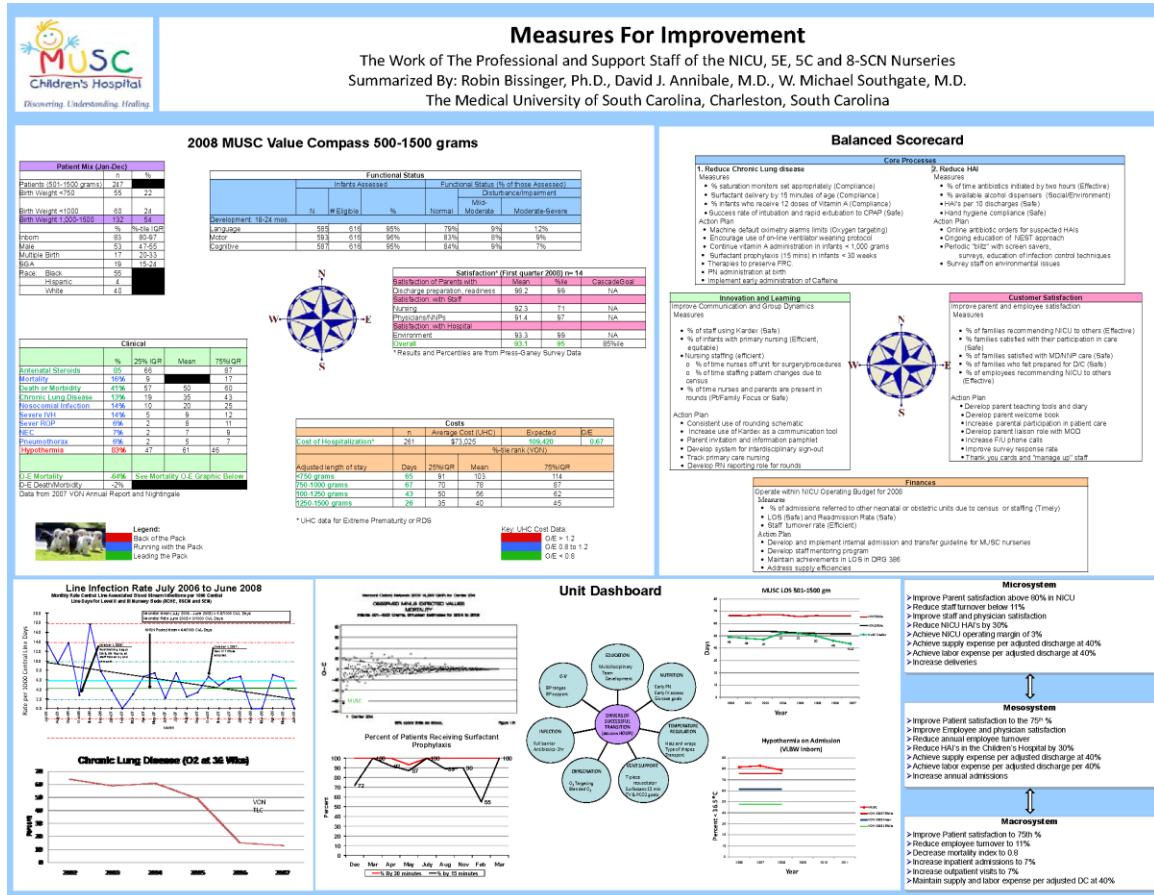
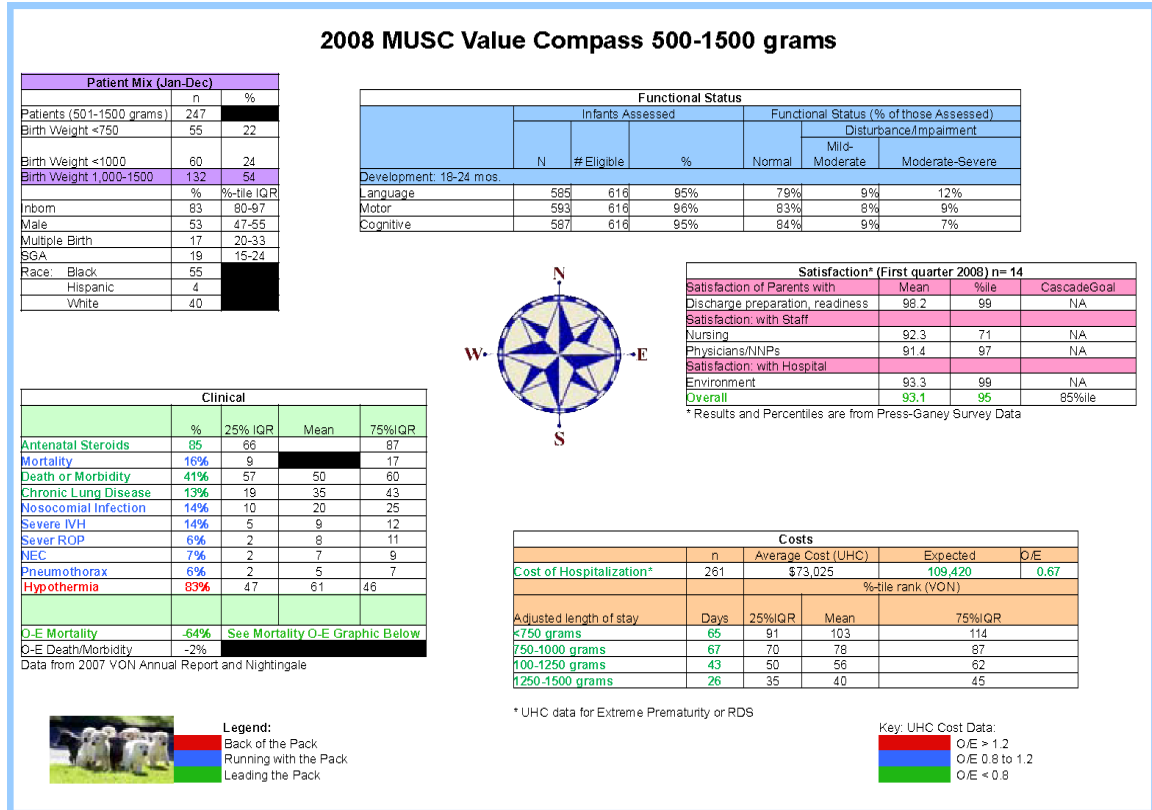


Figure 8.4 Value Compass Example: MUSC



The compass display focuses exclusively on low birth weight infants cared for in a particular location. It includes available data related to clinical outcomes, functional status, parent satisfaction, and costs. Some of the compass quadrants have substantial scope and depth (for example, clinical) while some of the quadrants have only limited information (for example, costs). This value compass for low birth weight infants shows areas of strength as well as opportunities for improvement. It can be used to set priorities for improvement, for monitoring changes over time and for evaluating the impact of improvement projects (as it is updated over time).

Like a handheld compass used for navigation, the value compass is divided into four primary quadrants that can provide data to answer critical questions:

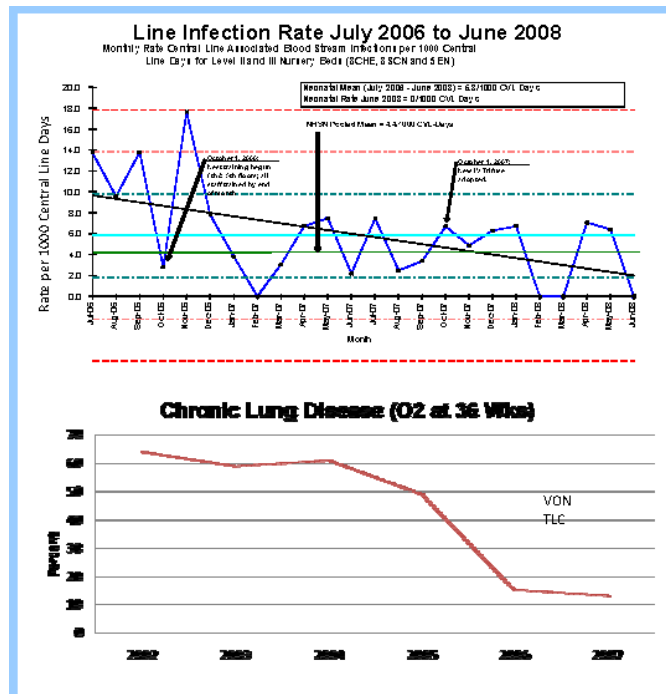
- Clinical status (west): What is the patient’s biological status, such as signs, symptoms, morbidity, mortality, complications?
- Functional and risk status (north): What is the patient’s functional status, such as physical activity, mental health, cognitive function, social and role function, vitality? What is the patient’s risk, such as smoking, BMI, exercise, and so on?

- Satisfaction (east): What are the patient’s perceptions about the quality of care and on how much their health benefited from treatment, relative to their expectations and needs?
- Cost (south): What are the direct costs of the patient’s medical care, including office visits, hospital stays, medications, tests, and treatments? What are the indirect social costs, including time lost from school or work, and reductions in work productivity associated with illness or injury?

The compass provides a comprehensive view of outcomes and is designed to suggest that outcomes should not be measured by a focus only on, for example, clinical or cost outcomes. Instead, the compass captures the primary interests of the different stakeholders. Doctors and nurses tend to focus on biological outcomes; patients and families key in on functional and satisfaction results (the patient’s everyday health status and their perceptions of their healthcare experiences); and employers and purchasers often fix their gaze on healthcare costs and lost productivity. The compass captures measures that are crucial to all groups.

In addition to being comprehensive, the compass is dynamic: it can be used to focus on changes in states over time. Each particular metric on a value compass can be shown as a trend and placed on an accompanying run chart—or a statistical process control chart—to reveal the change in any particular outcome over time and to show variation and trends in performance. The bottom half of Figure 8.5 shows trend data for the MUSC NICU example. In this case, the trend data show important outcomes such as infection rates and chronic lung disease.

**Figure 8.5 Charting Trends from the Value Compass Framework**



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It is also possible to create a value compass for individual patients and to show changes in their outcomes over time. For example, the Dartmouth Spine Center uses the value compass framework to track changes in individual patients by updating each person's clinical, functional, satisfaction, and cost data at the point of service. This helps the patient and the clinician to get on the same page with respect to how the patient is doing and to build a plan of care that matches the patient's needs and preferences.<sup>8</sup>

Finally, the compass can measure the value of care. Value can be defined and measured based on the outcomes in relationship to the costs over time. A basic value formula looks like this:

$$\text{Value} = \frac{\text{biological} + \text{functional/risk} + \text{satisfaction (over time)}}{\text{medical costs} + \text{social costs (over time)}}$$

By way of example, Figures 8.6 and 8.7 summarize two-year follow-up results in value compasses for patients with herniated disks and spinal stenosis. These patients participated in an NIH funded randomized controlled trial (RCT) on spine surgery. Consenting patients were randomly assigned to either receive surgery or nonsurgical care (if they did not choose *a priori* to have one or the other modes of treatment). The figures show the differences between groups who received surgical care versus nonsurgical care for these two different spine conditions. They also show the value of care measured in terms of the cost per "quality adjusted life year" conferred by surgery over nonsurgical care.<sup>12, 13</sup>

Figure 8.6 Compass Display of Outcomes and Value: Herniated Disks

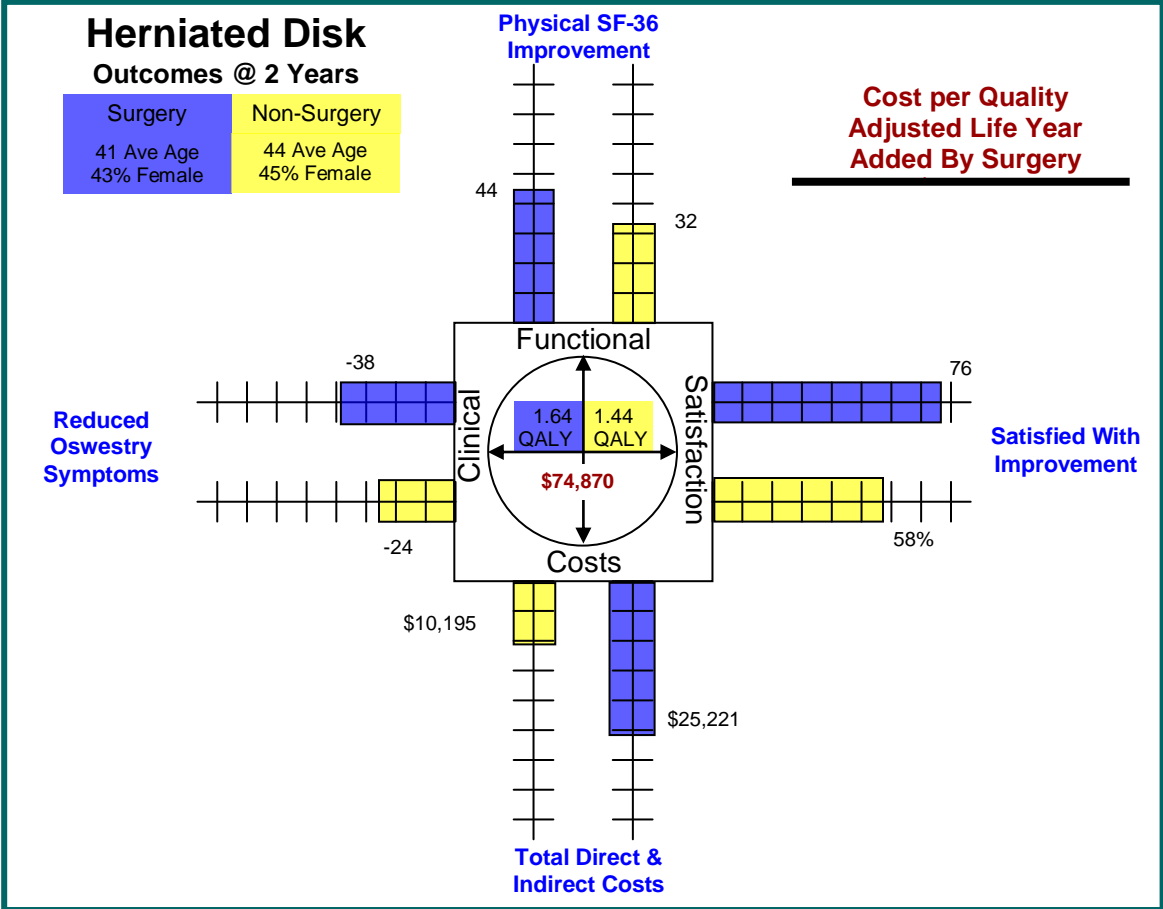
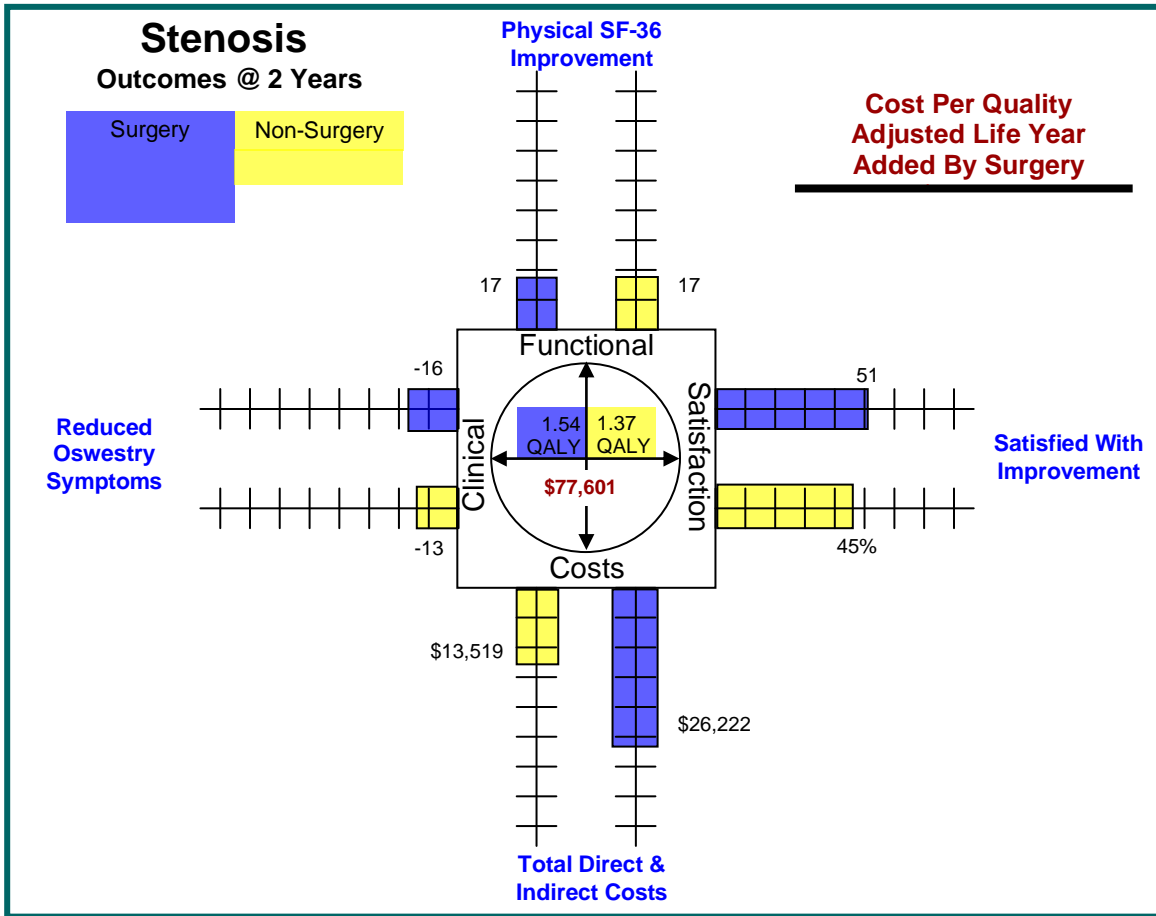


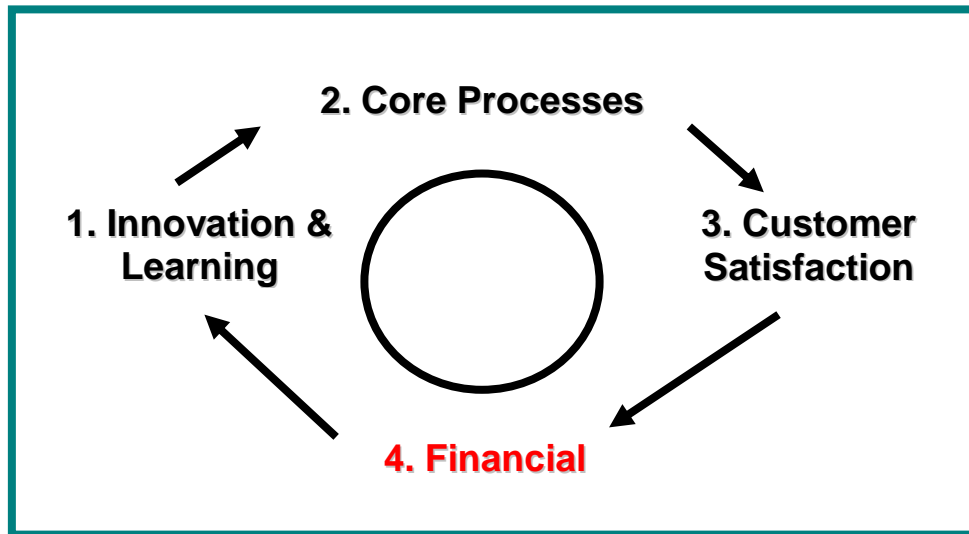
Figure 8.7 Compass Display of Outcomes and Value: Stenosis



**THE BALANCED SCORECARD**

The scorecard (Figure 8.8) strives to answer the question, “Is our healthcare business producing results needed to thrive in a competitive environment?” The scorecard is business-centered. The measures are focused on discrete business units, and therefore the units of analysis are cost centers within an organization.

Figure 8.8 Balanced Scorecard Framework



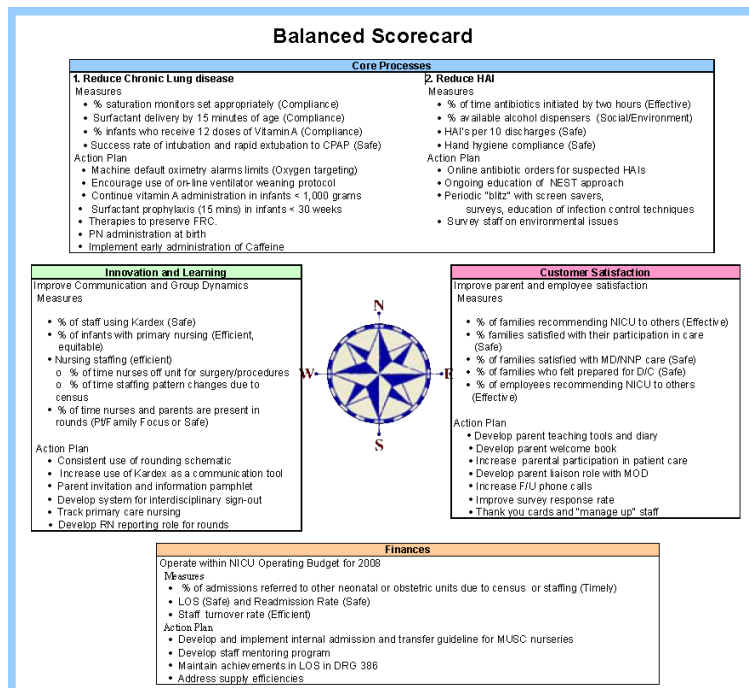
The scorecard is multifaceted and answers primary questions in four domains:

- **Innovation and learning:** What things must be developed or learned to meet customers' needs and face competitive challenges?
- **Core processes:** What things need to work well to provide high-quality services and products that meet customers' needs at a price they are willing to pay?
- **Customer satisfaction:** What are the perceptions of external customers (i.e., ultimate customers or people who benefit from services and who are employed by the service-providing organization) about the quality and value of the services and products? What do internal customers (i.e., coworkers or people who are employed by the service-providing organization and who depend on other staff to supply them with information, materials or services that are needed to meet needs of external customers) think about their own ability to do good work in a positive environment and to have their human needs for recognition and growth met?
- **Finance and growth:** How strong are the organization's financial underpinnings? Is the organization growing to meet customer demand and to expand market share?

Figure 8.9 shows a scorecard for the MUSC NICU. The scorecard focuses on low birth weight infants and calls for measures and actions related to innovation and learning (Improve Communication and Group Dynamics), core processes (Reduce Chronic Lung Disease and Hospital Acquired Infections), customer satisfaction (Improve Parent and Employee Satisfaction), and finance (Operate Within NICU Operating Budget for Fiscal Year). The MUSC scorecard is used to specify priority actions, to evaluate progress over time based on measured results, and to align this NICU's improvement and operating plan with the strategic and operating plan of the larger organization of which it is a part.

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Figure 8.9 Balanced Scorecard Example: MUSC



The scorecard can include time trend charts to reveal the dynamic nature of changes in key results. It can be used to show changes over time on vital drivers of enterprise success over time.

The scorecard is strategic and operational, reflecting the organization's overall strategy and its deployment to different operating units across the enterprise. The scorecard is also tactical and practical. A well-designed scorecard can summarize the overall strategic theme and specific metrics related to the theme, along with current values and target values, and who will take what actions, by when, to achieve target values. Finally, the scorecard meets the requirements for successful execution in real-world organizations. It links strategy with operations and with people, and does this in a transparent and measurable way.<sup>9</sup>

Another example of scorecard use comes from Dartmouth-Hitchcock Health (DHH), an integrated healthcare system serving New Hampshire and eastern Vermont. The number one quality and safety priority for DHH is to eliminate preventable harm, and a leading cause of harm in the DHH system is hospital acquired infections (HAIs); leading sources of HAIs, in turn, are poor hand hygiene and central line management. The DHH scorecard includes trends in HAIs as well as specific actions to improve hand hygiene and to reduce central line infections. Specifically, DHH's scorecard data show trends in hand hygiene compliance (with separate breakouts for hand washing rates among physicians and nurses) as well as trends in central line infections (days between new infections), and it associates these trends with specific actions that the ICN staff have taken to improve hand hygiene and to reduce central line infections.

### Cascades and Dashboards

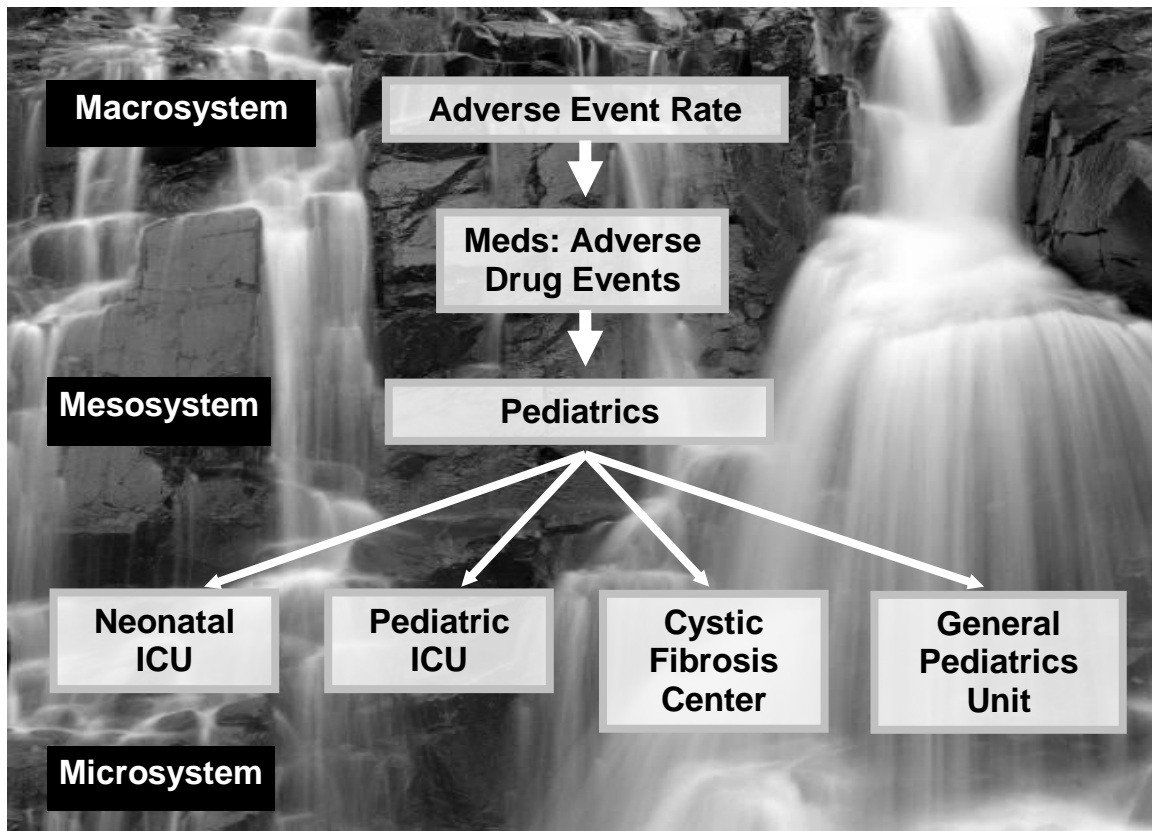
Now let's take a look at two measurement metaphors: measurement cascades and measurement dashboards. Both provide useful ways of thinking about the properties of measurement devices. Cascade thinking helps measures to fit together in a larger organization by providing alignment of actions and measured results across different levels of an enterprise. Dashboard thinking helps measures to have practical utility for staff who are managing processes and taking actions in complex working environments.

#### THE CASCADE

Imagine that you are the president of a healthcare system seeking to transform the system and to do this in a measurable way. You work with staff to establish the strategy and operating plan and system-level ("big dot") measures of success such as quality, safety, value, innovation, core processes, customer satisfaction, and financial strength. The challenge is to deploy the strategic and operating plan throughout all levels of the organization and to have line-of-sight measures that "cascade" down from the top of the organization and reach all the way to the front-line units where care is actually delivered.<sup>10</sup>

To illustrate the cascading metrics concept, consider a system-level measure like healthcare costs per person, or adverse events per 1000 patients. It is possible to disaggregate the big dots (at the macrosystem level, L1) to view performance at the mesosystem level (L2), and then to further disaggregate the measure to reveal performance at the microsystem level (L3). Thus, we develop the image of cascading metrics that go from the level of the whole system (the macrosystem, such as Dartmouth Hitchcock Health) all the way to a front line system (the microsystem such as the intensive care nursery). The measurement cascade enables the organization to take a system-level measure and to break it down into its contributing parts based on the source in the system. As shown in Figure 8.10, it would be possible to quantify what portion of all adverse events are related to adverse drug events (ADEs) and then to further categorize the ADEs occurring in different subpopulations served by the hospital (pediatrics, cancer, maternity, and so on). Finally, within pediatrics, you could trace the contributions made by patients in specific clinical units that serve this population, such as the intensive care nursery, the pediatric intensive care unit, and so on.

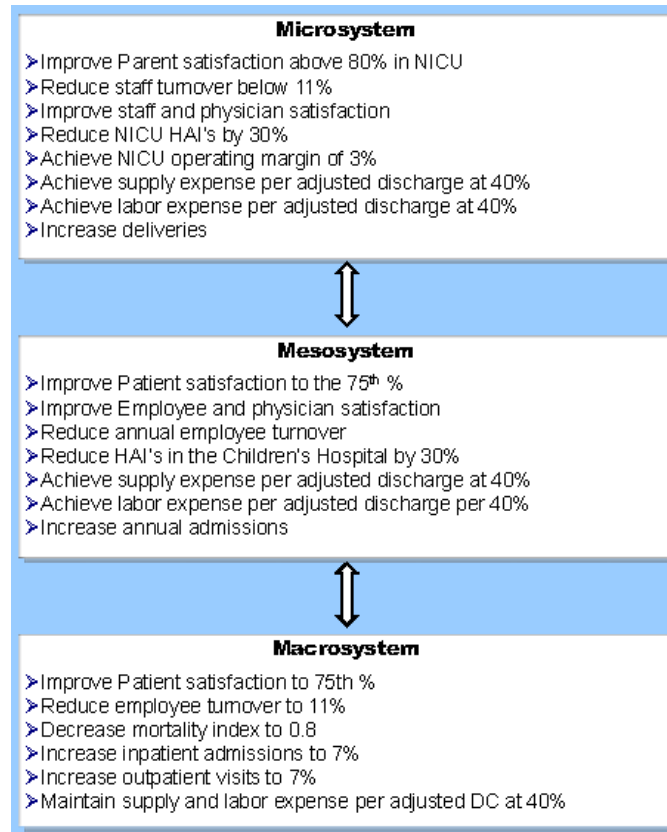
Figure 8.10 Cascading Metrics



The aim of cascade thinking, when applied to front-line microsystems, is to begin to connect the dots—from big dot to small dot and vice versa. A good way to start building measurement cascades that link the front office with the front line is to determine the specific things that take place in the microsystem that contribute to achieving system-wide aims. In this way, we use small-dot and big-dot thinking to provide a basis for aggregating and disaggregating key results. Cascades promote the alignment of improvement work at different levels of the organization in order to facilitate accountability for making performance improvements when needed, and to monitor that improvements are being sustained.

Figure 8.11 provides a real-life illustration of two measurement cascades—one for parent/patient satisfaction and another for employee turnover. In this case the cascade links the NICU (a microsystem) with the Children’s Hospital (a mesosystem) and finally with the Medical University of South Carolina (a macrosystem).

Figure 8.11 Cascade Example: Micro, Meso, and Marcosystems at MUSC



### THE DASHBOARD

Although dashboard (or instrument panel) thinking is relatively new in healthcare, it is accelerating and will likely become a prominent part of the future of healthcare.<sup>11</sup>

To understand the potential of the dashboard, consider the following thought experiment.

Imagine that you are a competent pilot flying a reliable airplane. You look at your aircraft's dashboard and at a glance you can read your gauges and dials to check on your airspeed, altitude, orientation, heading, and fuel level. You can monitor your flight path versus your flight plan, the electrical systems, and the engine temperature. If a core system malfunctions, you will be warned by alarms and flashing lights. You are confident that you will land safely at your desired destination.

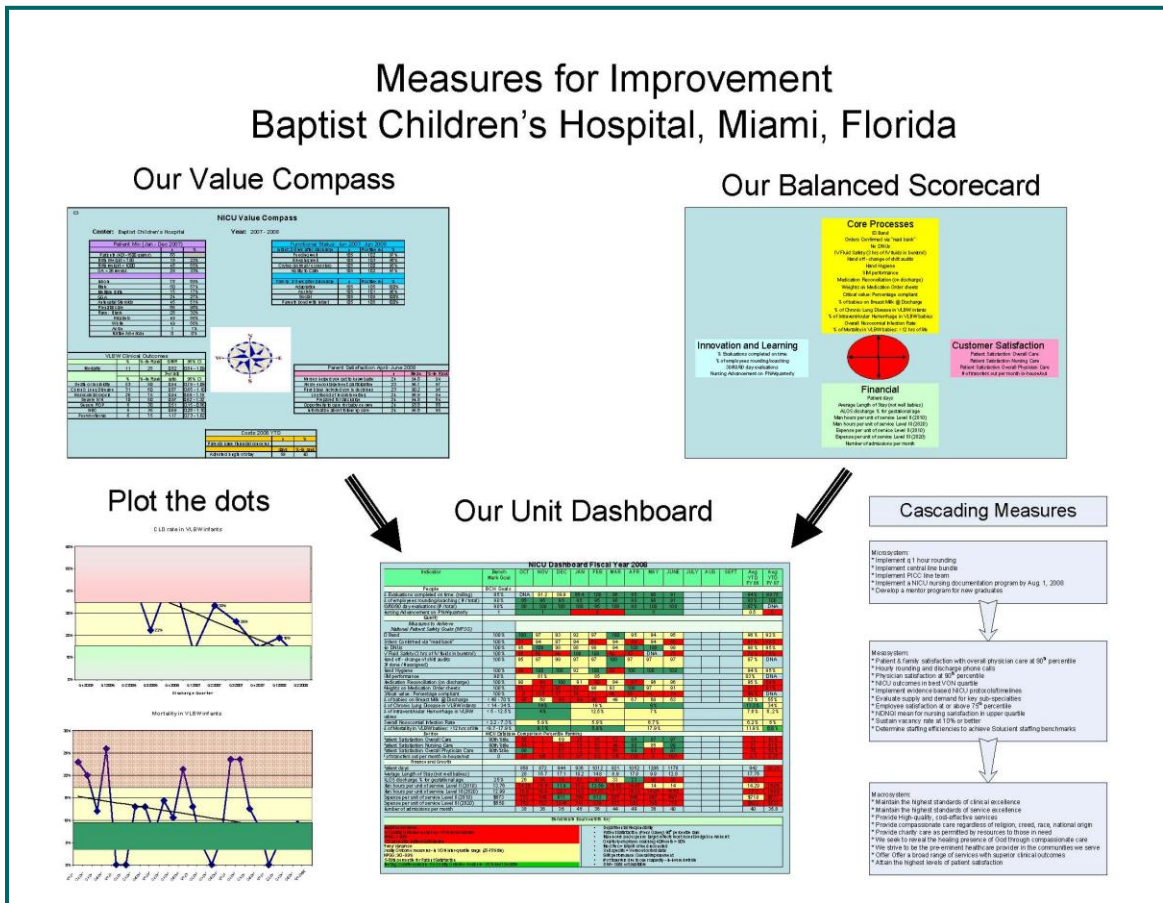
Now imagine you are flying this same plane, but that it is night, it is snowing hard, you need to land in a small airstrip between two mountains, and by the way, your dashboard suddenly goes dark. How confident are you about your chances of finding your airport and landing safely without the help of your dashboard?

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Compared to pilots, most healthcare professionals and health systems find themselves “flying blind” all too often. Dashboard thinking invites you to consider the vital information that you need to have at hand to safely and efficiently do the right thing in the right way at the right time. A good healthcare system needs to manage many critical processes simultaneously: to provide care for patients, to manage the health of populations, to get an early warning of impending problems, and to run the system in a way that optimizes patient outcomes, system performance, and staff vitality. Tomorrow’s electronic health records and visual display devices, if properly designed, can provide healthcare with useful dashboards capable of streaming real-time data into displays to guide intelligent, timely action.

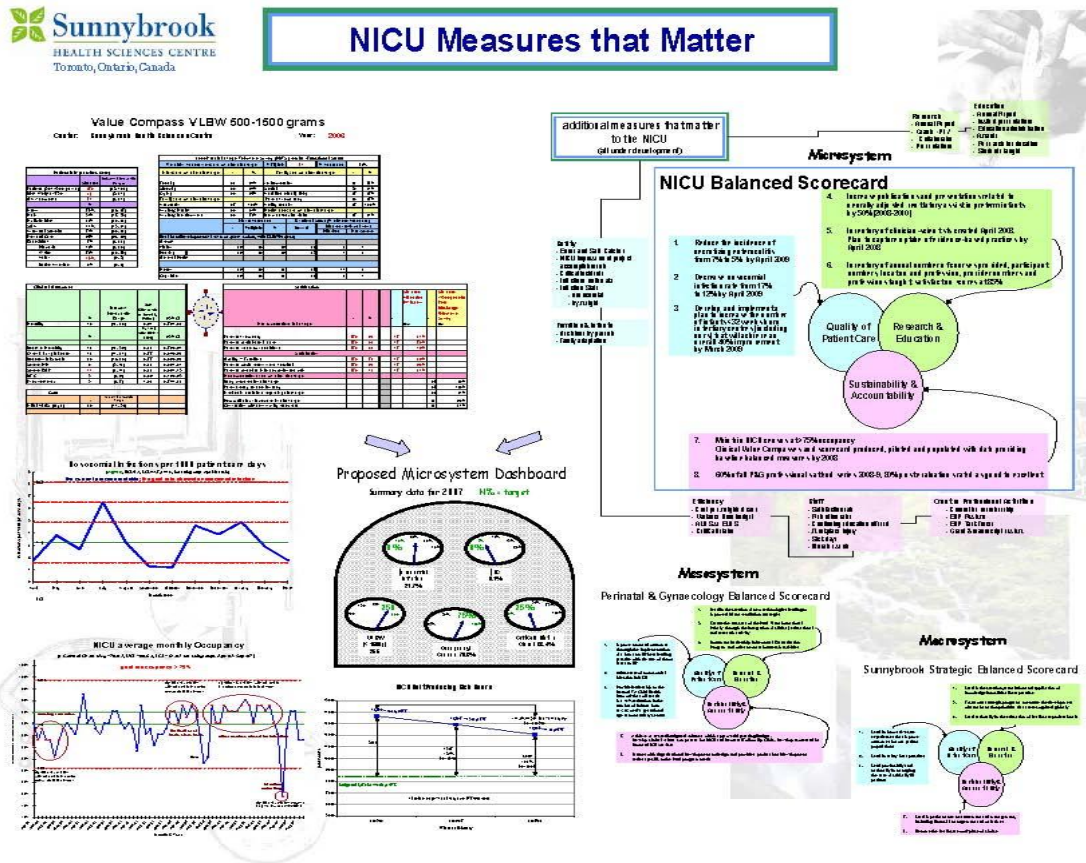
The goal of the dashboard idea is to help front-line microsystems like NICUs begin to construct an instrument-panel-like data display to improve their ability to provide safe, timely, effective, and efficient care. A good way to start building a dashboard for a NICU is to blend the value compass and balanced scorecard approaches to create a compact, unit-specific collection of data that includes vital “gauges” related to patient/population outcomes, system performance, and staff development and well-being. Figure 8.12, from Baptist Children’s Hospital, and Figure 8.13, from Sunnybrook Health Sciences Centre, show examples of dashboards for their NICUs based on a blending of compass and scorecard frameworks.

Figure 8.12 Dashboard Example: Baptist Children’s Hospital



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Figure 8.13 Dashboard Example: Sunnybrook



## The Measure What Matters Worksheet

The Measure What Matters worksheet (MWM), shown in Figures 8.14, 8.15, and 8.16, was designed to identify key measures for tracking and improving clinical unit performance. The worksheet aims to be a guide for constructing a way to display results—both at a specific point in real time and over time—by integrating all four of the tools we’ve described so far. Specifically, the MWM worksheet uses the value compass and balanced scorecard frameworks to create dashboards that are based on organization-wide measurement cascades (when possible).

The steps we recommend for using the MWM worksheet are as follows:

- Step 1. Create compass.** Create a clinical value compass for the microsystem or clinical unit to measure clinical, functional, satisfaction, and cost outcomes.
- Step 2. Create scorecard.** Create a balanced scorecard for the microsystem/clinical unit to measure strategic and operational progress on innovation and learning, core processes, customer satisfaction, and finance.

**Step 3. Determine strategic measures.** To understand the potential to create a measurement cascade, determine the organization's strategic measures and illustrate how specific measures descend through the organization from the macrosystem level to the mesosystem level and finally to the microsystem level of the enterprise.

**Step 4. Construct dashboard.** Use key value compass and balanced scorecard measures to construct a dashboard or instrument panel to monitor progress and performance. Use the dashboard to show trends by plotting points with data from run charts or control charts and by illustrating key results in tables or figures. The dashboard can include both point-in-time data displays as well as over-time displays.

**Step 5. Create cascading measures.** Make any further refinements and finalize the measurement cascades that align measured performance metrics at different levels of your organization.

To take full advantage of the MWM worksheet, keep the following critical principles in mind:

- Aim to show real-time results: The closer the data are to showing real-time results, the more useful the information will be in guiding intelligent and timely action for improving performance, maintaining performance, or quickly spotting positive or negative trends.
- Give the dashboard high visibility: The more visible the dashboard is to members of the front-line clinical microsystem and the more attention that is paid to it—in huddles, in team meetings, in all staff meetings, and at annual retreats—the more helpful it will be. By emphasizing the importance of the dashboard, you will tighten the linkage between measuring performance, improving performance, and maintaining high levels of safety and efficiency.

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## Figure 8.14 MWM Worksheet: Part 1

① **Create clinical value compass (unit of analysis is patients)**

- Whole population
- Subpopulation
- Disease specific subpopulation
- Individual patient

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## Figure 8.15 MWM Worksheet: Part 2

② **Create your balanced scorecard (unit of analysis is microsystem)**

**Determine where the 7 NICQ Themes Fit:**  
 Safe  
 Timely  
 Effective  
 Efficient  
 Equitable  
 Patient Centered  
 Socially Responsible

③ **Determine Organization's Strategic Measures**  
 What are the meso and macro system strategic goals that might create measurement cascades?

④ **Construct Microsystem Dashboard/Instrument Panel**

Use Key Value Compass and Key Balanced Scorecard Measures to create your dashboard

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Figure 8.16 MWM Worksheet: Part 3

③ **Create Cascading Measures**  
 Consider annual reports, organization's strategic plan, senior leadership and Board of Trustee driven measures.

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graph TD
    A[Microsystem] --> B[Mesosystem]
    B --> C[Macrosystem]
            
```

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- [www.clinicalmicrosystem.org](http://www.clinicalmicrosystem.org)
  - Click on "tools" on left hand menu, then streaming videos.

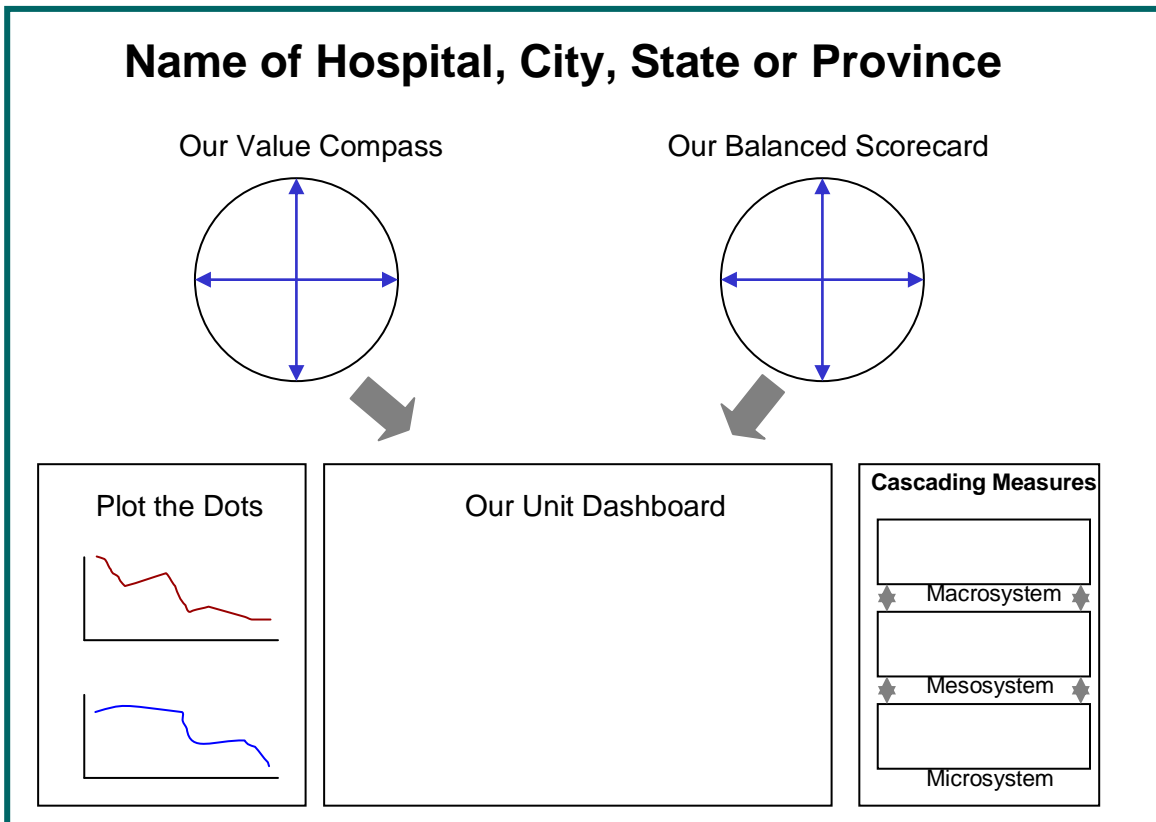
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## Examples: Using the MWM Worksheet in VON NICUs

The Vermont Oxford Network collaborative (VON NICQ 2007) started with the bold aim of using measures to improve performance and to enhance leadership by implementing the ideas presented in this paper. Over an 18-month period, dozens of NICU teams learned how to adapt the methods we've described—compasses, scorecards, dashboards and cascades—to their own clinical microsystems. In the final phase of the collaborative, the NICQ 2007 participants were introduced to the MWM worksheet and were shown an illustrative mock up of a measures for improvement data wall to bring all of their work together (Figure 8.17).

Figure 8.17 Sample Layout: Measures for Improvement Data Wall



More than 50 NICUs met the challenge, constructed their own data walls, and shared them at the final session of the collaborative. There were many excellent examples of how different intensive care nurseries took these principles and methods, made them their own, and began using them to manage and improve performance.

This chapter has shown three extraordinary examples of Measures for Improvement Data Walls—one from the Medical University of South Carolina in Charleston, South Carolina; one from Baptist Children’s Hospital in Miami, Florida; and one from Sunnybrook Health Sciences Centre in Toronto, Canada. Each of these three case examples shares the same overall structure: compasses and scorecards blended to form dashboards, data plotted over time, and line-of-sight metric cascades. Each has tailored the basic ideas to the unique context of their specific NICU.

## Conclusion

The aim to provide the best possible care in the most caring way to infants, mothers, fathers and families is widely shared. If we are to achieve this aim, however, we will need to get better at healing and helping. We will need to squeeze more health from fewer resources. We will need to engage everyone—paid staff as well as patients and families— not just in improving performance, but also in growing as professionals.

To know whether or not we are turning the corner on transforming healthcare and substantially improving health, we will need meaningful measures that can flow into a rich information environment—to provide early warnings of danger, to provide timely evidence of healing, and to connect trying specific methods and approaches with learning about the actual results of these efforts.<sup>14</sup> Compasses and scorecards can guide us on the journey and help us gauge our progress. Dashboards and cascades can keep us alert and aligned with the mission and vision.

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