

Clinical Microsystems

Clinical Microsystems, Part 3. Transformation of Two Hospitals Using Microsystem, Mesosystem, and Macrosystem Strategies

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Health care clinicians and leaders are faced with increasing pressures to deliver health care in different ways to meet the expectations of patients, families, payors, and the board. Literature and advice abound for leaders to implement “this” best practice or to install “that” quick and easy fix.

This article describes the ongoing transformational journeys of two hospitals—one, a large academic medical center in an urban area in the Midwest and the other, a community hospital in a rural area in the Northeast. The journeys entail a never-ending pursuit of excellence requiring a bold inspirational vision, spirited and engaged leadership, integration of information, and engagement of everyone at the micro-, meso-, and macrosystem levels of the organization.

Kanter et. al.^{1(p. 373)} state the following:

While the literature often portrays an organization’s quest for change like a brisk march along a well-marked path, those in the middle of change are more likely to describe their journey as a laborious crawl towards an elusive, flickering goal, with many wrong turns and missed opportunities along the way. Only rarely does an organization know exactly where it’s going, or how it should get there.

The two case studies clearly demonstrate how the organizations’ improvement paths have been supported by clinical microsystem knowledge, tools, and processes—along with other frameworks.

The differences between Cincinnati Children’s Hospital Medical Center (CCHMC) and Cooley Dickinson Hospital (CDH) are shown in Table 1 (page 592). Yet each hospital has chosen a similar microsystem-based approach to improvement, customizing the engagement of the micro-, meso-, and macro-levels, the improvement targets, on the basis of an understanding of the local context.

Cincinnati Children’s Hospital Medical Center

In 2000, CCHMC created a strategic plan to transform the

Article-at-a-Glance

Background: Two hospitals—a large, urban academic medical center and a rural, community hospital—have each chosen a similar microsystem-based approach to improvement, customizing the engagement of the micro-, meso-, and macrosystems and the improvement targets on the basis of an understanding of the local context.

Cincinnati Children’s Hospital Medical Center (CCHMC): Since 2004, strategic changes have been developed to support microsystems and their leaders through (1) ongoing improvement training for all macro-, meso-, and microsystem leaders; (2) financial support for physicians who are serving as co-leaders of clinical microsystems; (3) increased emphasis on aligning academic pursuits with improvement work at the clinical front lines; (4) microsystem leaders’ continuous access to unit-level data through the organization’s intranet; and (5) encouragement of unit leaders to share outcomes data with families.

Cooley Dickinson Hospital (CDH): CDH has moved from near closure to a survival-turnaround focus, significant engagement in quality and finally, a complete reframing of a quality focus in 2004. Since then, it has deployed the clinical microsystems approach in one pilot care unit (West 2, a medical surgery unit), broadened it to two, then six more, and is now spreading it organizationwide. In “2+2 Charters,” interdisciplinary teams address two strategic goals set by senior leadership and two goals set by frontline microsystem leaders and staff.

Discussion: CCHMC and CDH have had a clear focus on developing alignment, capability, and accountability to fuse together the work at all levels of the hospital, unifying the macrosystem with the mesosystem and microsystem. Their improvement experience suggests tips and actions at all levels of the organization that could be adapted with specific context knowledge by others.

Table 1. Cincinnati Children's Hospital Medical Center (CCHMC) and Cooley Dickinson Hospital (CDH) Vital Statistics*

	CCHMC	CDH
Beds	475 inpatient, plus 36 residential psychiatry	142 inpatient
Setting	Urban with 15 satellite locations	Rural with more than 20 satellite locations for various outpatient services
Demographics	Patients from all 50 states and 48 countries	Patients primarily from western Massachusetts
Medical Staff	1,258 (59% private practice) Hospitalists provide care for about 20% of all patients.	435 (75% private practice) Hospitalists provide care for about 70% of adult medical/surgical patients, and 90% of admitted children.
Employees	10,300	1,600
Union	No	Yes: Nursing
Residents and Fellows	250	0
NIH Annual Funding	\$92 million	0
Admissions	26,804	10,000
Surgeries	28,961	5,200
Outpatient Visits	778,994	130,000
Outpatient Services	General and specialized pediatric services, home health services, mental health services	Radiology, laboratory, rehabilitation, cardiology, anticoagulation, hemodialysis

* NIH, National Institutes of Health.

organization to accomplish this vision: "To be the leader in improving child health."² To accomplish this, key leaders, including the chairman of the board, the chief executive officer (CEO), and an influential physician-champion, determined that fundamental transformation of the clinical delivery system would be necessary. At the same time, the IOM report *Crossing the Quality Chasm* detailed the evidence for the need for transformation of health care systems and recommended the six aims for safe, high-quality care.³

In 2001, the Robert Wood Johnson Foundation funded an innovative program, Pursuing Perfection (P2),⁴ which was organized by the Institute for Healthcare Improvement (IHI), with the aim of identifying highly successful health care organizations willing to transform their patient care and management systems. CCHMC was selected as one of the 13 P2 sites.

CCHMC decided to pursue "perfection" goals rather than incremental improvement to emphasize the need for total transformation, to garner the attention of clinical leaders, and to align resources to support the vision. Physician leaders advised the CEO and chairman of the board that to gain physician commitment, the primary focus should be key clinical outcomes, including patient satisfaction, rather than financial efficiency.

The leadership realized that the organization had limited experience with quality improvement (QI) methods. The P2 leaders recommended using a "2-5-All" approach to gain experience rapidly and to learn from mistakes.

The mantra early on was "start before we're ready," as two initial strategic teams expanded their knowledge and paved the way for five more strategic teams by the end of the first year. During the next two years, additional strategic teams were added, with a goal of involving all aspects of the organization. The leadership theorized that transformation would occur as the organization moved from the five strategic teams to all. During this phase, CCHMC team leaders learned more about improvement methods and routinely shared progress with leaders from other P2 teams.

In the start-up phase, commitment of the board of trustees to transformation was essential, and the following significant insights were learned quickly:

■ **Business Case for Quality.** The chief financial officer engaged analysts to study the business case for cost savings that could be achieved by strategic improvement teams' work in preventing nosocomial infections. Additional analyses demonstrated benefits from avoiding unnecessary hospital days as the organization experienced a significant increase in demand for tertiary and quaternary care. This analysis allowed leadership, including the board of trustees, to gain confidence that investment in quality was a good business strategy.⁵

■ **Need for Transparency.** It was critical for executive leadership to support early QI efforts and to expect and accept failure as part of learning. When one of the first two strategic teams

learned that its clinical outcomes were average, compared with other sites, senior clinical leaders supported the frontline leaders in sharing these “less than stellar” outcomes with patients and families—while expecting timely improvement in clinical results.

■ **Need for Improvement Capability.** When the first two strategic teams began their work, only a very basic improvement infrastructure was in place and only a few leaders understood improvement science. In the next three years, 24 senior leaders attended an advanced training program.⁶ The CCHMC leaders realized that a significant investment would be needed to build essential improvement infrastructure and that quality and data expertise from outside health care needed to be identified and recruited to support the strategic teams.

By year three (2004), it became clear that transformation required moving beyond strategic initiatives. It was at this point that CCHMC leaders learned about clinical microsystem thinking from the experience of the P2 team in Jönköping County, Sweden.⁷ This team, in a 10-year improvement journey, was guided by a strategic plan to link strategy and improvement efforts at the micro-, meso-, and macrosystem levels. Jönköping demonstrated improvements in access to care, patient-centered and -driven health care, and clinical outcomes.

CCHMC leaders have been guided by the conviction that high-functioning microsystems are the fundamental building blocks of a transformed organization. Therefore, they focused on designing a strategy to support the development of microsystems, and launched, with the assistance of Dartmouth faculty, a microsystem development action-learning collaborative for six inpatient care units. During an 18-month action-learning period (December 2004–May 2006), physician and nursing co-leaders and interdisciplinary members of each microsystem-based team worked to improve measurably a specific outcome using improvement science (broad field of knowledge, concepts, theories, skills, and tools) and teamwork skills and striving to adopt the characteristics of a high-performing microsystem.⁸

Just as the microsystem leaders appreciated their roles in achieving strategic goals in terms of real-time unit-level data, strategic initiative leaders at the mesosystem and macrosystem levels began to understand the need for each clinical microsystem to be engaged in testing changes, sustaining results, and executing multiple strategic goals without overwhelming frontline staff.

Unit leaders identified the importance of building improvement expertise and the importance of developing discipline to reach goals on schedule and negotiated a sequenced plan for

addressing multiple strategic goals. Microsystem leaders and frontline staff began to understand this was more than a series of initiatives or projects. It was instead the new way of providing care and continuously improving. It became more common to hear leaders say that constant improvement is a crucial part of their roles. As they gained confidence in their ability to lead improvement, the conversations with more senior strategic improvement leaders moved from “yes or no” discussions to conversations of “how and when.”

Strategic changes are in place at CCHMC and continue to be developed to support microsystems and their leaders through the following:

■ Ongoing improvement training in a 12-day seminar, “Intermediate Improvement Science Series” (I2S2; see Sidebar 1 [page 594]) conducted in a six-month period. The seminar includes didactic information and tools combined with between-session action and application. Over time, all micro-, meso-, and macrosystem leaders at CCHMC will take I2S2.

■ Financial support for physicians who are serving as co-leaders of clinical microsystems

■ Increased emphasis on aligning academic pursuits with improvement work at the clinical front lines

■ Microsystem leaders’ continuous access to unit-level data through the organization’s intranet

■ Encouragement of unit leaders to share outcomes data with families. All units have outcomes data boards posted at the entrance of the unit.

Annual strategic planning and prioritization is evolving. It is neither top-down nor bottom-up. Goals and plans are developed via a series of back-and-forth negotiations between micro-, meso-, and macrosystem leaders. This iterative process, “catch ball,” is improving each year and leads to significant improvement goals that are connected to the front line where care and services are delivered and to the strategic organization plan. Figure 1 (page 595) illustrates the process.

WHERE IS CCHMC TODAY?

As CCHMC sharpens its focus on improving patient safety, the importance of high-functioning microsystems is found to be even more crucial. For example, A6S, one of the inpatient units that participated in the microsystem development action-learning collaborative, has shown improvements in code resuscitation (Figure 2, page 596) and provision of essential care within one hour of admission (Figure 3, page 597). Moreover, it has also achieved fewer than 1% “failures” (< 1% of those surveyed provide a rating of 0–6 on a 10-point scale, with 10 as “the best possible hospital”) for the overall rating of CCHMC on satis-

Sidebar 1. Cincinnati Children's Hospital
Medical Center Intermediate Improvement Science
Series (I2S2) Course Plan

Overall Aim of the Course

To develop an intermediate level of knowledge and skill to do improvement, to lead improvement, and to get results on a specific project.

Purpose

To prepare quality improvement leaders who can practice and teach improvement science and who can lead improvement teams. The course is designed to fill gaps in knowledge of improvement science and gaps in experience applying improvement science. Participants are expected to complete an improvement project with improvement in outcome and/or process measures to demonstrate competence in improvement science.

Target Audience

Physician, nurse, allied health professional, and administrator and support staff leaders.

Instructional Methods

Lectures, discussions, case studies, application exercises, 1:1 coaching for project completion.

Pre-Work

1. Complete the I2S2 assessment tool.
2. Read the following:
 - a. Journal article: Berwick D.: A user's manual for the IOM's "Quality Chasm" report. *Health Aff (Millwood)* 21:80–90, May–Jun. 2002.
 - b. Langley G.J., et al.: *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance*. San Francisco: Jossey-Bass, 1996, pp. xiii–xxix.
3. Improvement Project Identification
Come to the first class prepared to describe the problem(s) you've identified and why the problem is important. You will have 3–4 minutes to present your idea.
 - a. Identify a problem that needs to be fixed and that is in an area where you have control and are likely to be able to achieve a measurable (50%) change in about 6 months.
 - b. Identify whether any existing data are available. Choosing a project where data are already available is helpful.
 - c. Identify the people who will need to be involved.

Note: If you are currently involved in an improvement project: You can also identify a part of the project where you can take personal accountability for leading a small team (3–4 people) for achieving measurable results on 1–2 measures in 6 months.

Note: Each session will involve significant work on your project during the session and sharing your work with other participants. Project work cannot be delegated. You must be personally involved.

faction surveys of patient and family experiences.

This random sample telephone survey of families is completed every two weeks to show change over time. Some of the process improvements producing these results include the following:

- Standardized early warning system to detect clinical deterioration, including a decision algorithm for action by all staff to avoid code alerts
- Charge nurses' and senior residents' focused attention on children at risk for deterioration
- Unit-level leader "walkrounds" and real-time analysis of all key outcome failures
- Identification and mitigation by nurses to ensure that appropriate evidence-based care is being used and barriers to timely admission and discharge are addressed immediately
- Approaching parents systematically to elicit concerns and complaints and then addressing them immediately
- Simulation training at the unit level with nurses and physicians

The development of high-functioning clinical microsystems has emerged at CCHMC over the same time as other important changes, including the development of improvement infrastructure and expertise, the availability of outcome and process data at the microsystem level, and transparency and negotiation of improvement prioritization at all levels of the organization. It is not possible to single out any one individual change that has resulted in the transformation—the improved outcomes reflect a "web of causation."⁹

Coolley Dickinson Hospital

In its transformational journey, CDH has moved from near closure to a survival-turnaround focus, significant engagement in quality, and finally, a complete reframing of a quality focus in 2004 (Sidebar 2, page 598). In 1988–1997, CDH focused on financial survival and building the foundation on which quality resources and activities could be developed. In 1993, CDH joined the Dartmouth Hitchcock Alliance (DHA), a group purchasing organization centered at Dartmouth Hitchcock Medical Center (Lebanon, New Hampshire), with some QI activities among the membership benefits. With improved financial standing, CDH was able to focus on improvements to further enhance its financial status as shown in the "quality eras." CDH, in interaction with the faculty of The Dartmouth Institute (TDI), chose to engage more deeply in TDI microsystem and improvement activities and knowledge. During this period, CDH also joined the IHI Impact Network¹⁰ to advance its improvement activities.

Aligning Microsystem Improvement with Organizational Strategic Plan

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Aim: Organizational Transformation

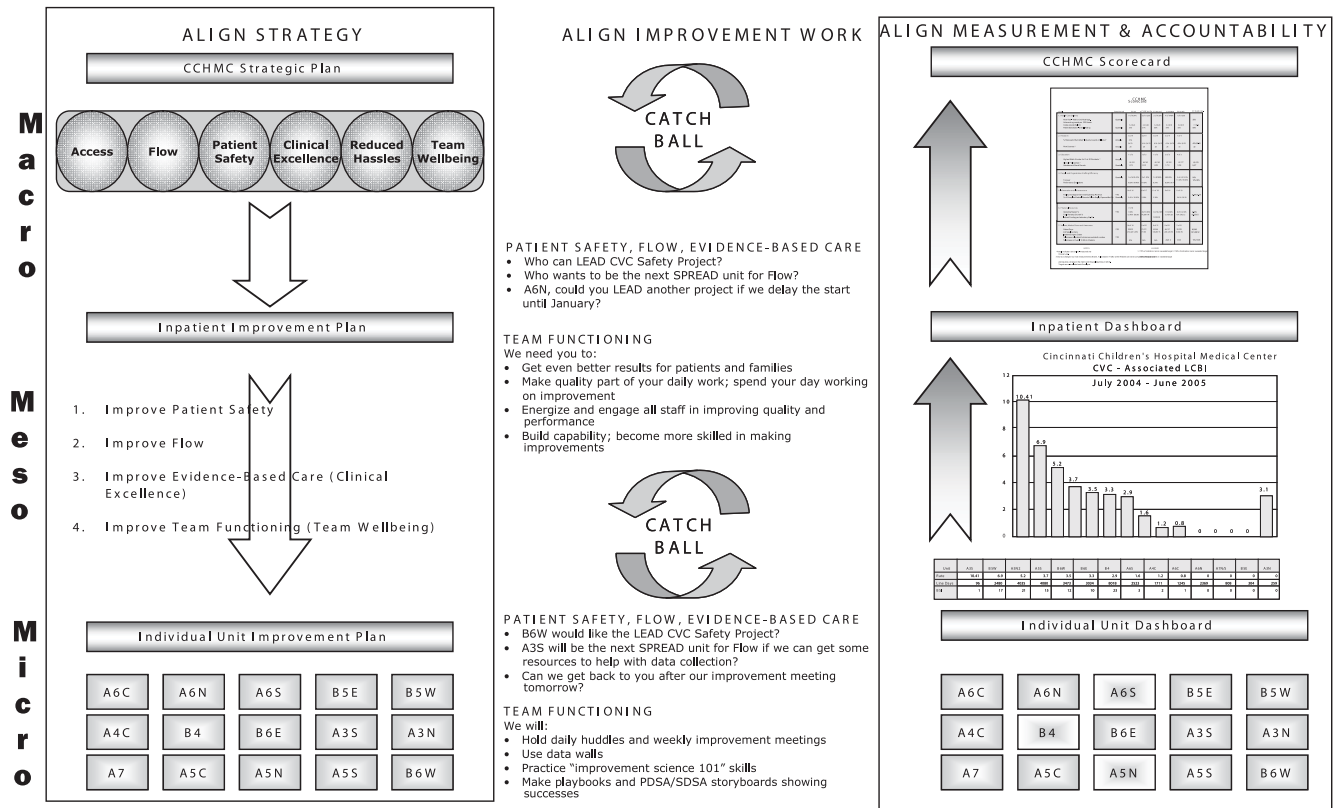


Figure 1. This education poster is used to demonstrate the importance of communicating and negotiating improvement goals and activities at all levels of the organization. Once there is agreement on the strategic improvement goals, the right-hand column provides the structure of high-level measures at the macrosystem, drilling down to more detailed measures at the meso- and microsystem levels. The execution of the strategic plan is carried out through engagement of the micro- and mesosystem and identification of detailed "how to" to reach the goals. The dialogue to negotiate improvement at all levels is the "back and forth" between macro/meso/microsystems to find the right balance to meet the organization goals while identifying the capacity and ability of the micro- and mesosystems to lead and spread improvement. Measurement of progress toward goals is displayed in the right-hand column at all three levels: CCHMC scorecard (for example, overall hospital infection rate); inpatient dashboard (mesosystem rate of central venous catheter-associated laboratory-confirmed bloodstream infection); and individual unit dashboards (microsystem-level rate for each unit). CCHMC, Cincinnati Children's Hospital Medical Center; CVC, central venous catheter; PDSA, Plan-Do-Study-Act; SDSA, Standardize-Do-Study-Act; LCBI, laboratory-confirmed bloodstream infection.

Since 2004, the hospital's vision has been to "become a model community hospital," which has three components:

1. Provide the best-possible community hospital care.
2. Continuously improve, either by creating new approaches to address care issues, or by adopting methods developed by others.
3. Share its learning with other hospitals and health systems

During the past three years, the hospital has adopted clinical microsystems as the conceptual pathway for its transformation to model care. The approach was tested in one care unit, broad-

ened to two, then six more, and is now spreading organization-wide while the hospital simultaneously further develops a supportive infrastructure. This approach enables the organization to gain early experience and success while building credibility and resources to support future units. Figure 4 (page 599) shows the CDH Road to Achieving the Vision.

Microsystem awareness at CDH began when the CEO [C.N.M.], chief medical officer, and director of case management attended TDI's graduate-level course on clinical microsystems in Spring 2006. In the 10-week course, 9 clinical units

Unit (A6S)'s Days Between Medical Resuscitation Team (MRT) Preventable Codes Outside the Intensive Care Unit, January 2004–April 2008

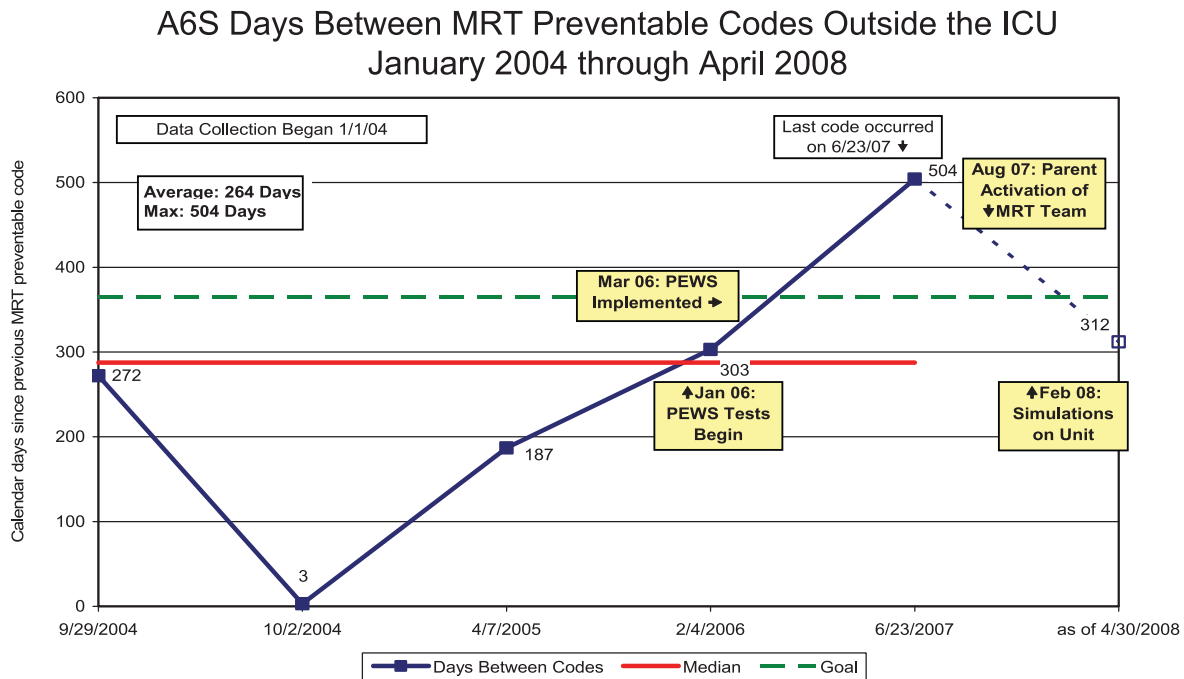


Figure 2. This unit has tested interventions to decrease code alerts. The results show that since January 2004 and as of September 29, 2004, the unit had reached 272 days without a code. In January 2006, the Pediatric Early Warning System (PEWS) was tested, then implemented in March 2006, continuing the days without a code and reaching 504 days June 23, 2007. As of April 30, 2008, 312 days had passed without a code.

from Dartmouth Hitchcock Medical Center and a CDH clinical unit—medical/surgical unit West 2—applied clinical microsystem framework and tools to manage the health and value of health care for a defined population of patients.¹¹ The CDH leadership and the West 2 interdisciplinary improvement team developed a plan to implement improvement recommendations.

In January 2007, to advance CDH's development of clinical microsystems, the CEO, vice president for medical affairs, chief nursing officer, and director of quality engaged a TDI faculty member [M.M.G.] as a "coach" and instructor; six monthly four-hour learning sessions on improvement knowledge and meeting skills were provided. West 2's clinical microsystem process was "restarted," and the emergency department (ED) team joined the learning sessions. West 2 and the ED developed the following strategic goals, each addressed by a core [interdisciplinary improvement] team:

■ West 2

- Improve collaboration and communication within the care team and with patients and families
- Improve patient satisfaction to 90th percentile

■ ED

- Improve timely transfers of patients to the inpatient units
- Decrease ED length of stay (LOS) to less than two hours

Each interdisciplinary core team was provided with an internal "coach," time to meet each week, and time to participate in the monthly learning sessions. Between learning sessions, the team members practiced hands-on applications of improvement knowledge in their own clinical settings.

During the six-month period, West 2 and the ED engaged in collaborative activities to improve transfer time from the ED to West 2 through the use of faxes for a more effective handoff and were able to adapt the shift huddle practice from West 2 to the ED.⁸

Unit (A6S) Percentage of Patients Receiving Essential Care Within 75 Minutes of Admission, January 2004–April 2008

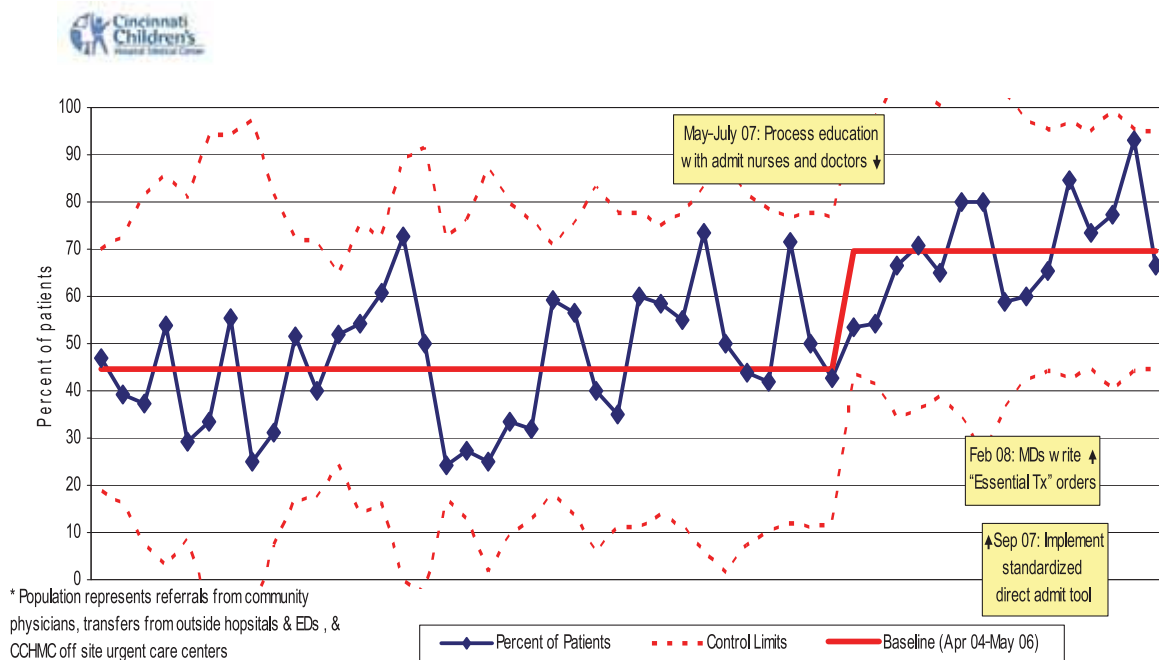


Figure 3. Standardized admission process, entering orders before arrival, and nurses' focus on the admission process and transparency of data, support the goal to improve reliability in care. The results, displayed over time, show initially that the percentage of patients receiving essential treatment within 75 minutes increased from 40% to 70%. ED, emergency department; CCHMC, Cincinnati Children's Hospital Medical Center; MD, physician; Tx, treatment.

Interdisciplinary staff engagement is a fundamental ingredient in the transformation process. The core improvement teams seek full staff input by displaying various improvement tools used to assess current state and to identify opportunities for improvement.¹²

■ During the six months of improvement capability development, the two clinical teams presented their efforts and results to the CDH board's quality committee and the board of trustees and then at the hospital's 2007 annual meeting. As shown in Figure 4, the cycle of learning and practicing at the front line of care continued after the initial six-month training period. Ongoing progress was made with the support of coaching for each microsystem and with the enhancement of the utility of the information system to quantify frontline work and progress. In (January to June) 2008, senior leadership participated in a second microsystem action-learning collaborative to learn about the microsystem improvement approach, demonstrate their commitment, and make improvements on processes important to their work. Staff observations on senior leader

engagement demonstrate the impact of leadership's learning and leading by example (for example, "The leaders are all on the same page now," "It is useful for the leaders to learn and understand the process.")

Where is CDH Today?

CDH continues to develop the capability of all microsystems in the organization and to develop further the infrastructure to support frontline microsystems. To maintain the balance of improvement initiatives from the micro-, meso-, and macrosystem perspectives, the senior leadership team has developed strategic "2+2 Charters." Senior leaders recognized the importance of enabling interdisciplinary teams to identify areas within their own microsystems that need improvement while at the same time working on the organization's top strategic initiatives. The "2+2" improvement charters were developed to address priorities perceived by both the front office and the front line. They include two strategic goals set by senior leadership and two goals set by frontline microsystem leaders and

Sidebar 2. Cooley Dickinson Hospital Finance and Quality Time Line

Survival Era: 1988–1989

- Seventh year of increasing losses
- Three days in cash
- Entire senior management turnover
- 10% reduction in force

Building Financial Foundation: 1990–1997

- 1990 Break-even
- 1990 Mortgage entire property for only \$8.6 million
- 1991–1994 Two more staff reductions
- 1993 Join Dartmouth Hitchcock Alliance (DHA)
- 1995 named “Midsized Comeback Hospital of the Nation” by American Hospital Association and Coopers and Lybrand
- 1996–1998 Tax-exempt financing with DHA partner

Quality Era 1: 1998–2003

- 1998 DHA partnership brings association with The Dartmouth Institute faculty
- 1999 Painful staff reduction galvanizes medical staff on quality
- 2000 Restructure board to focus on quality
- 2002 Join Institute for Healthcare Improvement (IHI) Impact Network
- 2003 Recruit senior director of quality, 8 staff

Quality Era 2: 2004+

- Vision: Model community hospital
- Recruit Vice president for Medical Affairs (VPMA)
- Join IHI 100,000 Lives Campaign on Day 1 of campaign
- Chief executive officer & VPMA attend Dartmouth Clinical Microsystems course
- Connect to Dartmouth faculty regarding new pay for performance
- Build measurement system based on whole-system measures
- Recruit chief nursing officer and chief operating officer
- Work with Dartmouth faculty to lead clinical microsystem expansion
- Join Massachusetts Blue Cross/Blue Shield LEAD program for quality transformation

staff. For example, one medical/surgical unit identified the need to improve the availability of supplies at the bedside—a staff goal (linked to the organization efficiency goal)—and to improve the response to call bells (linked to organization customer service and patient safety goals).

Each charter

- Has 90-to-120 day cycle times to achieve targets
- Identifies a senior leader sponsor and additional resources to support the improvement efforts, including a “coach”
- Provides current outcomes data
- Requires monthly progress reports and quarterly presentations

Microsystem teams have created data walls on the units to

remind all staff, patients, and families of the results the unit is achieving and what tests of change are producing which results. Senior leader “walkrounds” provide infrastructure to encourage staff; hold staff accountable to engage in improvement; and provide an opportunity for staff to offer insights and ideas and to explore barriers to their improvement efforts. Quarterly reports to senior leaders keep the rhythm and pace of improvement going and reinforce the drumbeat for strategic improvement.

West 2 continues to build improvement into daily work. Most recent results addressing the stated goals of improved collaboration and communication within the care team and with patient and families are shown in the reduction in call bells, even with increased patient volumes (Figure 5, page 599). The reduction in the number of call bells is a reflection of improved processes to anticipate patient needs:

■ **Interdisciplinary Rounds (IDRs):** In these daily rounds, all patients are discussed with physician, nurse, case manager, and rehab staff in attendance. Core measures are tracked, care planning occurs, and next-day 11 A.M. discharges are identified.

■ **Shift Huddle:** In a structured daily five-minute, change-of-shift, standing huddle, staff highlight overall patient issues, admissions, and discharges; share the news of the unit; and provide an update on the microsystem’s quality initiatives. The combination of interdisciplinary rounds and shift huddles have helped staff efficiently focus on patient and staff needs.

■ **Dry-Erase Boards:** Dry-erase boards at patient bedside are updated immediately after IDRs each day. Information includes target discharge day/time, plan for today, and activity plan to prevent patient deconditioning.

■ **Bedside Nursing Shift Report:** In these reports, off-going and oncoming nurses interact with the patient and review the information on the dry-erase board.

■ **“Focus on Comfort”:** These hourly rounds systems are conducted to ensure that patients’ comfort needs are met by staff. This structure helps staff to manage their work flow and reduce call bells by anticipating patient comfort needs.

Patient satisfaction data are trending in the right direction since microsystem development started in May 2007. The most recent patient satisfaction data (July 2008), for example, show a positive trend over time, with overall satisfaction at 85%, further reflecting the improved communication and collaboration with patients and families. The ED continues to improve processes to meet the goals of transferring patients to inpatient units in a more timely fashion and shortening the length of stay in the ED. Recently, the environmental services microsystem

Cooley Dickinson Hospital: The Road to Achieving the Vision

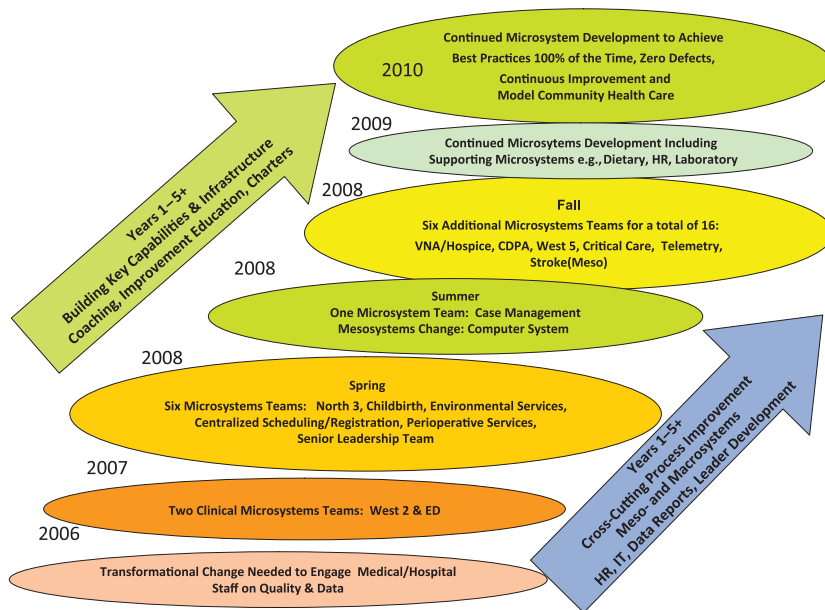


Figure 4. The hospital's strategic plan engaged two clinical teams in clinical microsystems in 2006 and in each subsequent year has spread microsystem thinking to more and more clinical and support units. ED, emergency department; HR, human resources; IT, information technology.

West 2 Reduction in Call Bell Volume Through New Processes to Improve Communication and Collaboration

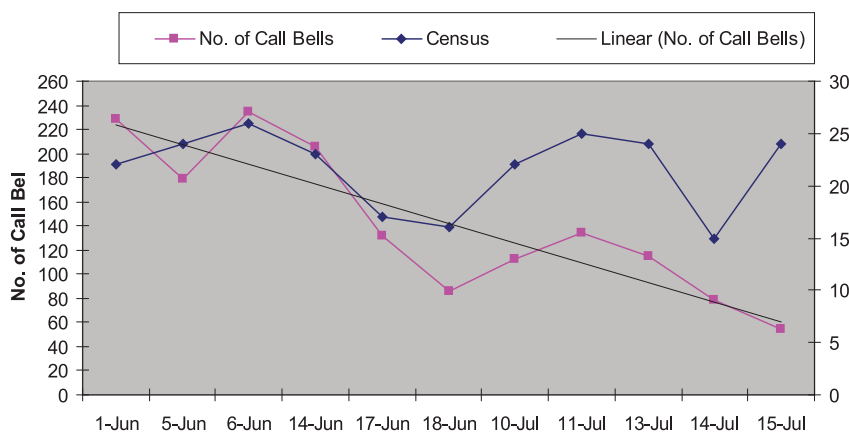


Figure 5. Reductions in call bells have been achieved through multiple process improvements in 2008. The number of call bells tracked were sampled from June 1st through June 18th. Initially, the volume was > 220 call bells in a 24-hour period. With the implementation of "Focus on Care" rounds and heightened awareness about patient needs, the call bell volume had decreased to < 100 call bells in the same 24-hour period by June 18, 2008, and to a lower volume of 60 by July 15th. The display also illustrates the decrease in call bell volumes despite increased patient census in July.

joined forces with the ED and inpatient units to improve the process of turning over beds once patients leave to facilitate the flow of admitted patients from the ED. The processes of notification of environmental staff, cleaning the bed, and room and final notification of the bed supervisor has been streamlined, with shorter cycle times.

Both the West 2 and ED clinical microsystems find that improvement has become woven into their daily care activities. Ongoing weekly interdisciplinary improvement meetings and continued testing of good ideas help them move toward their unit-specific and strategic organization goals. They are also benefiting from "second-generation" microsystem thinking through leveraging "mesosystems," as discussed in the environmental services example.

CDH has reframed its values and vision to focus on becoming a model community hospital, as intended, and improvement has become part of the workday instead of something dictated by the quality department. These achievements have required corresponding macro-system changes, including the board's sharpened attention to quality in its vision and systemwide measures, senior leaders' direct connection with frontline work and its improvement, and physicians' active engagement as clinical microsystem members. Mesosystem leaders are contributing to improving performance and are helping to reframe the organization's values, policies, and procedures. For example, human resource practices are evolving, information technology staff are designing and implementing new information systems to enhance quality and efficiency, and new facilities are being designed to support frontline success.

Discussion

Two different organizations have used the clinical microsystem approach in their own context with convincing success.

Execution for CCHMC and CDH had a clear focus on developing alignment, capability, and accountability to fuse together the work at

Table 2. Transformation Tips Learned*

Macrosystem
<p>Δ Redesign infrastructure to support QI strategy, e.g., clinical information systems, electronic health record, additional IT assets, and physical space.</p> <p>A. Board ownership of quality as a major priority is necessary to ensure high expectations are set, the organization's strategy and budget are focused on quality, and results are meeting or exceeding aims.</p> <p>B. Senior leader engagement is demonstrated by its individual and collective engagement: how they support efforts, promote tests of change, expect staff development, coach, etc. "Walkrounds" are a good vehicle for helping staff know leadership commitment.</p> <p>C. Board/medical staff discussion/collaboration about quality facilitates development of common agendas and plans to achieve high-level outcomes.</p> <p>D. Identify senior leaders to provide oversight and to monitor meso/micro progress toward goals and to identify barriers and difficulties.</p> <p>E. Plan monthly review process of improvement toward goals at all levels.</p> <p>F. Establish a finite set of strategic aims that reach across meso-macrosystems with time-limited goals toward breakthrough or perfection goals.</p> <p>G. Provide each interdisciplinary team with improvement expertise (e.g., coach), knowledge, data support, and time for improvement.</p> <p>H. Support opportunities for benchmarking and external learning opportunities for all levels of the organization.</p> <p>I. Engage external experts to stimulate and support improvement strategies.</p> <p>J. Determine improvement model and consistently use the same language throughout the organization.</p> <p>K. Develop a "Quality College" to continue to support organization development.</p>
Micro-Meso-Macrosystems
<p>L. Develop data system that clearly demonstrates progress toward strategic goals across micro/meso/macro levels. Develop quality dashboards for all levels.</p> <p>M. Negotiate goals and prioritize initiatives and sequencing at microsystem level as an iterative process with micro-meso-macrosystem leaders.</p> <p>N. Communicate and recognize QI, including presentations by microsystem members to board.</p> <p>O. Develop a deliberate plan to expand the numbers of teams working on microsystem development.</p> <p>P. Develop a multimedia communication plan to reach all levels to report progress and lessons learned.</p> <p>Q. Provide ongoing development of additional leaders at the micro-mesosystem levels to lead improvement initiatives and to build capability to achieve multiple goals simultaneously.</p> <p>R. Redesign Human Resource (HR) systems to integrate new values into HR value chain.</p>
Microsystem
<p>S. Establish physician and nurse co-leadership for all clinical microsystems where appropriate and include salary support for physician.</p> <p>T. Train co-leaders and interdisciplinary staff in improvement methods focused on key goals.</p> <p>U. Insist on patient and family engagement on strategic improvement initiatives with microsystem teams.</p>
<p>* QI, quality improvement; IT, information technology.</p>

all levels of the hospital, unifying the macrosystem with the mesosystem and microsystem. The organizations' infrastructures were strategically developed to support the improvement initiatives and development of capability.

Table 2 (above) provides tips and actions based on the two organizations' experiences that can be applied by others. In Table 3, the tips are "cross-walked" to the "M3" matrix for micro-meso-macrosystem transformation⁸ to show how the tips fit into an execution plan involving all levels of the organization.

Yet, the caution not to liken an organization's quest for change to a "brisk march along a well-marked path"¹ bears repeating.

The CCHMC and CDH paths reflect Nolan's tripartite framework for getting results from strategic improvement—will, ideas, and execution.¹³ The strong will to become a quality leader was observed in both CCHMC and CDH and was expressed through their bold visions and high bar aims. Ideas for improvement were discovered through expert knowledge and advice, participation in QI initiatives that include

Table 3. Micro-Meso-Macro (M3) Framework: The M3 Matrix Annotated with Tips*

Microsystem Level "Inside Out"	Mesosystem Level "Creating the Conditions"	Macrosystem Level "Outside In"
0–6 Months Pre-work: Visit http://dms.dartmouth.edu/cms/; Read Part 1, 8, 9 of series/watch Batalden streaming video[†]		
<ul style="list-style-type: none"> Form interdisciplinary lead team (patients/families). GSU Dartmouth Microsystem Improvement Curriculum GJT Learning to work together using effective meeting skills Rehearsing within studio course format Practicing in clinical practice Daily huddles, weekly lead team meetings, monthly all-staff meetings Learning sessions (monthly) Conference calls (between sessions) 	<ul style="list-style-type: none"> Link strategy, operations and people—"Make it Happen." GEM Support and facilitate meso-microsystem protected time to reflect and learn. GJ Identify resources to support meso-microsystem development, including information technology and performance measure resources. ΔGHMOQ Develop measures of microsystem performance. EFHL Address roadblocks and barriers to micro-mesosystem improvement and progress. BE Set goals/expectations. AFI 	<ul style="list-style-type: none"> Develop clear vision for macro-meso-microsystems. ΔA Set goals for improvement, which are reviewed monthly. EFM Design meso-microsystem manager & leadership professional development strategy. B Engage board of trustees with improvement strategies. ΔACJ Expect all senior leaders to be familiar and involved with meso/microsystem improvement. BDEJ Provide regular feedback and encouragement to meso-microsystem-level staff. BEF
6–12 Months		
<ul style="list-style-type: none"> Staff reinforcement by leadership BNP Clear understanding of organization strategic goals AEFM Colleague reinforcement EHNPT New habit development through repetition Improvement science in action G Add more improvement cycles. Build measurement into practice/dashboards/data walls. FL Playbooks & storyboards LT Relationships between microsystems (linkages) EJLP PDSA, SDSA improvement JKT Best practice using value stream mapping/lean design principles HIJK 	<ul style="list-style-type: none"> Convene meso-microsystems to work on linkages and handoffs. KJQ Facilitate system coordination. ΔA→U Link with electronic medical records. Δ Link business initiatives/strategic plan to microsystem level. HIM Attract cooperation across health professional discrepancy traditions. HNO Track & tell stories about improvement results and lessons learned at meso-microsystem levels. JLNP Include improvement as regular agenda item. CEHJNP 	<ul style="list-style-type: none"> Expect improvement science & measured results from meso-microsystems. EHJO Develop whole-system measures and targets/goals. HE Attract cooperation across health professional discrepancy traditions. CO Design review and accountability quarterly meetings for senior leaders. J Track and tell stories about improvement results and lessons learned at meso-microsystem levels. BJ Develop budgets to support and develop strategic improvement. Δ I Ensure resources to support meso-microsystem (e.g., IT). ΔG Plan time in schedule to round at meso-microsystem levels to observe improvements and progress. BD
12–18 Months		
<ul style="list-style-type: none"> Continue "new way of providing care, continuously improving and working together." GHIJKN Actively engage more staff. O Multiple improvements occurring L Network with other microsystems to support efforts. EGPQ Coach network and development JKP Leadership development ST Annual review, reflect, and plan retreats M Quarterly system review & accountability meetings to meso- and macrosystem leadership DEL 	<ul style="list-style-type: none"> Link performance management to daily work and results. HNP Support and coach microsystem leadership development. HQ Provide resources to support microsystem development. GIM Provide feedback and encouragement to microsystem. ENP Encourage and support search of "best practice." IJLNP 	<ul style="list-style-type: none"> Develop professional development strategies across all professionals. GIKMO Link HR selection and orientation process to identified needs of macro-microsystems. JR Link performance management to daily work and results. DEHJ Consider incentive programs for reaching target/goals. R Create system to link measurement & accountability at micro/meso/macro levels. DEH Develop "Quality College" for ongoing support and capability building throughout organization. HIJKMO

* Boldfaced initials and symbols correspond to tips listed in Table 2 (page 600). PDSA, Plan-Do-Study, Act; SDSA, Standardize-Do-Study-Act; IT, information technology; HR, human resources.

[†] Nelson E.C., et al.: *Acting Locally: Working in Clinical Microsystems* (CD-ROM). Oakbrook Terrace, IL: Joint Commission Resources, 2005. [9-part series]; Batalden P.B.: *A Microsystem's Self-Awareness Journey* (video). <http://dms.dartmouth.edu/cms/materials/videos/> (last accessed Aug. 25, 2008).

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change packages of best practices, benchmarking one's current performance against best known performance, and transparency of results to enable comparative analysis.

Perhaps the most cogent insight is that local adaptation of all models and strategies is essential. Thoughtful consideration of the context—including structural, political, cultural, educational, emotional, physical, and technological perspectives—helped CCHMC and CDH plan and execute strategic improvement. As Bate et al. state, leaders “can adopt ideas that have worked elsewhere, but they need to create their own one-of-a-kind change model through experimentation, learning, blueprint creation and most of all a strong focus on results.”¹⁴(p. 206)

On the basis of observations of successful hospitalwide transformation programs, Bate et al. provide a helpful framework for local adaptation and offer an assessment tool for organizations to help them fashion a sound improvement path forward.

Postscript

Microsystem development continues at CCHMC, with microsystem leaders struggling most significantly with the prioritization and sequencing of improvement initiatives. There are simply too many opportunities for improvement, and negotiating priorities remains stressful and difficult at times.

Mesosystem leaders, appreciating the crucial importance of aligning improvement goals with operational expectations, are refining meetings and periodic reviews to include discussion, monitoring, and action to ensure the linkage of improvement and execution.

For the macrosystem, identifying the most appropriate method to help new leaders adapt to the CCHMC culture and methodology is clearly an ongoing challenge. Leadership's discussion and use of improvement data is still variable across the organization, which can be frustrating for microsystem leaders who are more advanced in their thinking. Continued reinforcement of expectations of improvement within the daily work of leading, along with continued development of leaders, is a focus for all.

One new challenge for the organization's leadership is to align capital investment with strategic improvement goals.

CDH, as an organization midstream in implementing organizationwide use of clinical microsystems, has identified sustainability and measurement as areas in need of attention. Without efforts to hold the gains, signs of slippage are appearing in microsystems thought to be “hardwired.” CDH is currently exploring systems to support staff in maintaining new

ways of providing exceptional care and improving and avoiding sliding back to old habits because of lack of attention.

Linked closely to sustaining the gains is how measurement is built into the micro-, meso-, and macrosystems. Initially, CDH used run charts to display improvement, but it has recognized that statistical process control charts would better represent process variation and real gains over time. CDH is building unit-specific measures into mesosystem and macrosystem measures to communicate the advances the staff are making at the front line to the whole organization and to provide ongoing attention to sustain the gains.

Readers are invited to explore the CCHMC and CDH Web sites (<http://www.cincinnatichildrens.org> and <http://www.cooley-dickinson.org>) for further consideration of these hospitals' improvement work for trial and adaptation in their own health care systems. **J**

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