CHAPTER ELEVEN

INTRODUCTION TO MICROSYSTEM THINKING

Chapter Purpose

Aim. To describe the origin of clinical microsystem thinking, and the research on it, and to identify microsystems in your health care system.

Objectives. At the completion of this unit, you will be able to

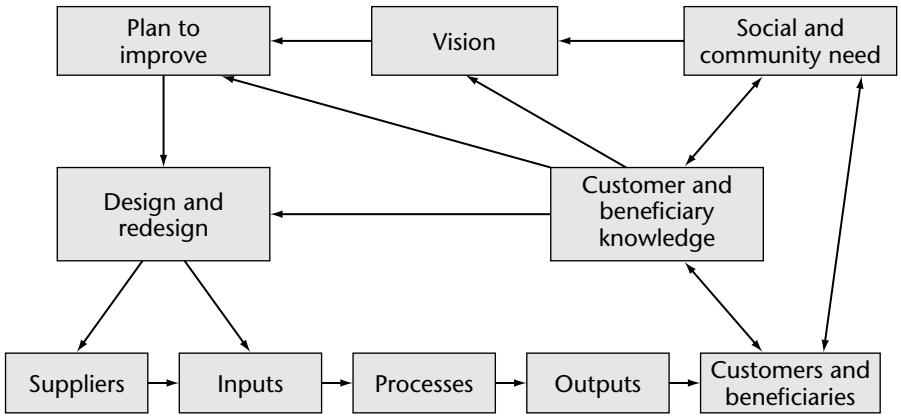
- Define and identify the clinical microsystems in your health care system.
- Describe how systems thinking is connected to microsystems.
- Link systems thinking with the microsystem.
- Describe the microsystem connections to research from the service industry and the Institute of Medicine.

This chapter will assist you and your interdisciplinary lead improvement team to gain insight about the origins and significance of clinical microsystems in your health care system.

What Is a System in Health Care?

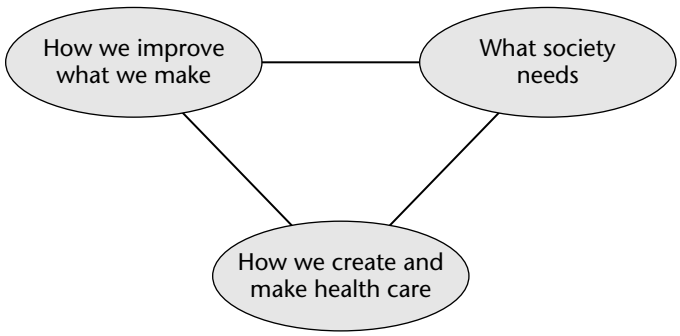
Building on Deming's *systems thinking*, health care is viewed as a system in Figure 11.1. A *system* is defined as a network of interdependent components that work together to try to accomplish a specific aim (Deming, 1986). A system possesses flow,

FIGURE 11.1. HEALTH CARE VIEWED FROM A SYSTEMS PERSPECTIVE.



Source: Adapted from Deming, 1986, by P. B. Batalden.

FIGURE 11.2. HEALTH CARE IS AN OPEN SYSTEM, CAPABLE OF CONTINUAL IMPROVEMENT.



constraints, sequence, and context. A system has an aim; absent an aim there is no system. In general, health care systems exist to meet the needs of patients, families, and communities. Further, health care can be viewed as an *open* system, one capable of continual improvement, as shown in Figure 11.2.

How Did Clinical Microsystem Knowledge Evolve?

In the last decade of the twentieth century J. Brian Quinn, professor emeritus of the Amos Tuck School of Business Administration at Dartmouth College, spent years studying the most successful service companies in the world. He observed that the world's fastest-growing, most profitable, and most successful companies—such as SAS, Nordstrom, Wal-Mart, McDonald's, and Intel—progressively learned to focus on the frontline work in their service organizations and their smallest replicable units (SRUs). Quinn's observations showed that all these top-performing organizations comprised small replicable units that connected the *core competence* of the enterprise to the customers of that enterprise. His findings were published in an extraordinary book titled *Intelligent Enterprise* (Quinn, 1992). He reported that the leading service organizations organized around, and continually engineered, the frontline interface relationships that connected the organization's core competence with the needs of individual customers. It was this frontline interface that was referred to as the *smallest replicable unit,* or the *minimum replicable unit.*

During the 1980s and early 1990s, Paul Batalden and Gene Nelson, considering the work of W. Edwards Deming, Joseph Juran, Avedis Donabedian, and others, adapted these thinkers' modern improvement concepts and methods to health care. Batalden and Nelson studied patient outcomes and researched ways to improve the design of health care systems. During this time, Nelson and Batalden also developed the clinical value compass framework to measure and improve the quality and cost of health care (Batalden, Nelson, & Roberts, 1994; Nelson et al., 1995; Nelson, Mohr, Batalden, & Plume, 1996).

Using their research findings, Batalden and Nelson began teaching what became known as the "microsystem course" in the graduate program at the Center for the Evaluative Clinical Sciences at Dartmouth Medical School. They also continued to study how clinical teams can design and manage small systems of care to provide services for specific patient populations. When they read *Intelligent Enterprise* and learned about Quinn's research and identification of the SRU, Batalden and Nelson realized that their work on "panels of patients" and Quinn's research on the smallest replicable units within the world's foremost service companies were closely related. They translated the smallest replicable unit (SRU) concept into health care, determining that—a clinical microsystem could be thought of as health care's SRU.

We described the continued development of clinical microsystem thinking in Chapter Two, which presented the clinical research we conducted to explore high-performing microsystems in health care.

What Is a Clinical Microsystem?

A clinical microsystem is the place where patients, families, care teams, and information come together. Whenever and wherever there is a patient who is being cared for by a clinician or a clinical team, there is a microsystem with that patient at its center. It is the place where quality, safety, outcomes, satisfaction, and staff morale are created. You know it as a primary care practice, an emergency department, an inpatient unit, or an extended care facility. A microsystem also exists where care for heart failure or diabetes or breast cancer is given and where patients, families, and visiting nurses come together in a home. A clinical microsystem is a system. It is, technically speaking, a complex, adaptive system. Our formal definition states:

> A *clinical microsystem* can be defined as the combination of a small group of people who work together on a regular basis to provide care and the subpopulation of patients who receive that care.
>
> It has clinical and business aims, linked processes, and a shared information environment, and it produces services and care that can be measured as performance outcomes. These systems evolve over time and are often embedded in larger systems or organizations.
>
> Like any living, adaptive system, the microsystem must (1) do the work, (2) meet staff needs, and (3) maintain itself as a clinical unit.

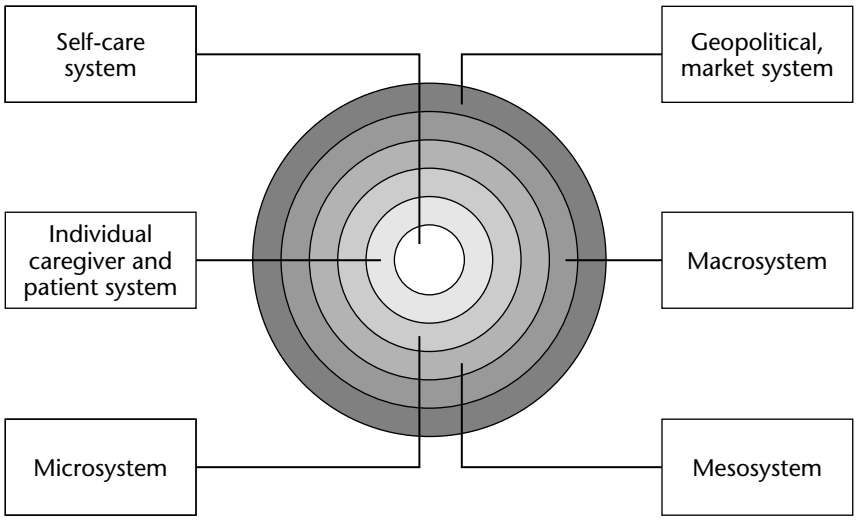
In short, a clinical microsystem consists of a small group of doctors, nurses, and other clinicians; some administrative support; some information and information technology; and a small population of patients, all of which are interdependent and work together toward a common aim.

Where Do Clinical Microsystems Fit in the Health Care Delivery System?

It is the nature of systems to contain systems and to be embedded inside systems. The living cell is a system, and together with other cells it forms organs, and organs form the human body, and humans form families, and families form communities—all systems. Figure 11.3 shows how it is possible to view the health care system as a set of concentric circles, with smaller systems embedded in larger systems.

The individual patient's self-care system is the innermost system. The patient is literally at the center of the health care system. The next system level is the patient and individual caregiver. The microsystem is next, with the patient, family,

FIGURE 11.3. THE EMBEDDED SYSTEMS OF HEALTH CARE.



physicians, nurses, technicians, nurse practitioners, physician assistants, nursing assistants, and other professionals working with the patient. The microsystem is nested within the mesosystem of health care, which often takes the form of service lines (such as cardiac care) or departments (such as surgery or nursing). All of this fits within the larger organization, or macrosystem. The outer layer of these embedded health systems consists of the environment—the community, health care market, and health policy and regulatory milieu. This general structure—of small health systems embedded in larger health systems—applies to most health care systems in the developed world.

What Does a Clinical Microsystem Look Like?

Clinical microsystems are omnipresent throughout health care systems. They are the building blocks of health care systems. They exist in various states—some being intentionally designed and well developed and others not being purposefully designed nor fully developed.

One typical example of a clinical microsystem is a pediatric practice with 2 physicians, 1 nurse practitioner, 1 medical assistant, and 1 secretary. This practice is part of (nests within) a department of 36 pediatricians, which is part of a

large medical center with 280 MDs and 1,200 staff, which is part of an integrated delivery system that serves a region.

Figure 1.3 (in Chapter One) shows the *anatomy* of a clinical microsystem. This anatomy includes the microsystem's purpose, patients, professionals, processes, and patterns.

The functioning, or *physiology,* of a microsystem (Figure 11.4) can be studied using process and systems thinking. The *inputs* are patients and families with health care needs; they enter a system of care and then emerge as *outputs,* with the hoped-for results being health care needs being met. The balanced measures on each side of the system of care show before and after measures of the goodness of the care system.

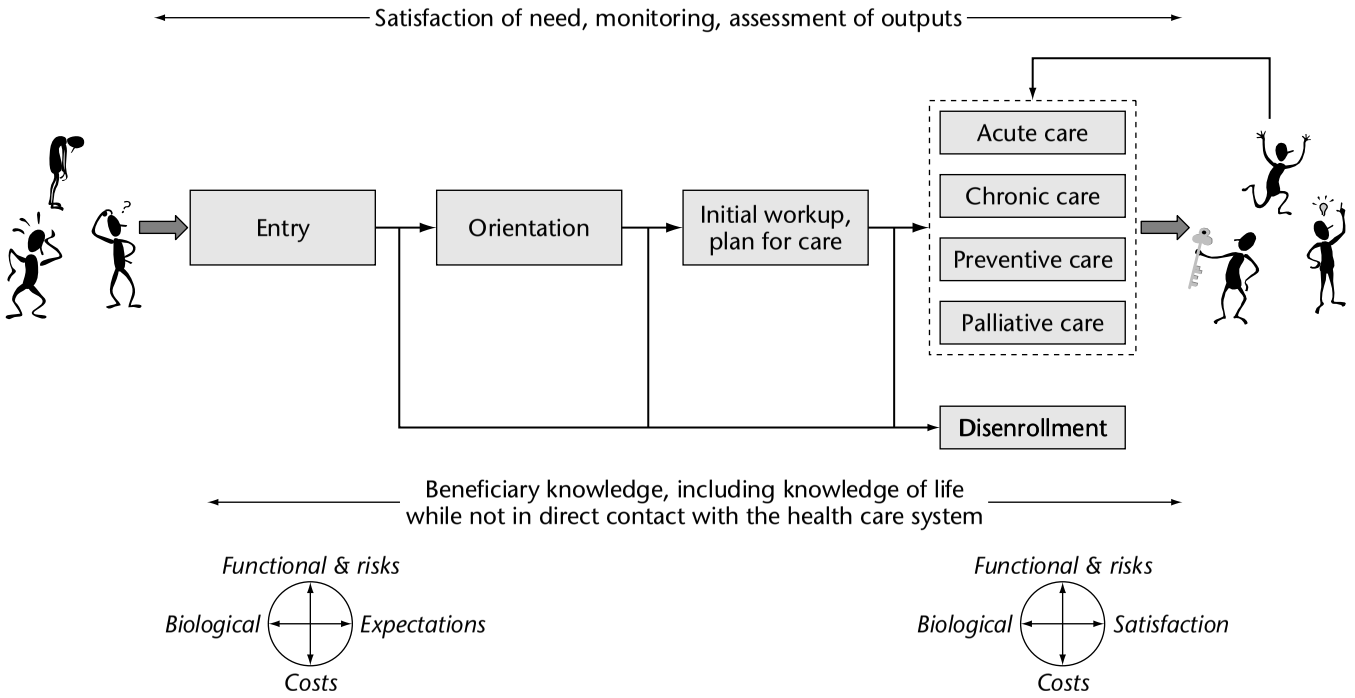
Why Focus on the Clinical Microsystem?

Wheatley and Kellner-Rogers (1996) state, "If we want to work with a system to influence its direction . . . a normal desire as we work with human organizations . . . the place for us to work is deep in the dynamics of the system where [its] identity is taking form" (p. 100). The clinical microsystem is the basic building block of any health care delivery system. It is where professional identity is formed and is transformed. It is the unit in which espoused clinical policy is put into practice (clinical policy-in-use). It is the place where *good value* and *safe care* are made. Most variables relevant to patient satisfaction are controlled here, and this is where most health professional formation occurs after initial professional preparation. The microsystem is where workplace motivators reside. The larger organization can be no better than the sum of its frontline units, or microsystems.

How Do Clinical Microsystems Link to *Crossing the Quality Chasm?*

The first clinical microsystem research was completed by Julie Mohr and Molla Donaldson in 2000 (Donaldson & Mohr, 2000). In this research the success characteristics of high-performing microsystems were first identified. The significance of the microsystem for improving the U.S. health system was called out by Berwick in the chain of effect for improving health care (Figure 1.1, in Chapter One), and this thinking lies behind the Institute of Medicine (IOM) report *Crossing The Quality Chasm* (Institute of Medicine [U.S.], Committee on Quality of Health Care in America, 2001).

FIGURE 11.4. THE PHYSIOLOGY OF A MICROSYSTEM: A GENERIC MODEL.



What Were the Findings of the Dartmouth Clinical Microsystem Research?

Research conducted in 2001, funded by the Robert Wood Johnson Foundation, resulted in the identification of primary success characteristics that built on the IOM research. Figure 1.5 (in Chapter One) shows these primary success characteristics: leadership, microsystem support, staff focus, interdependence of care team, performance results, process improvement, patient focus, and information and information technology. This research also identified the important, if not primary, characteristics of education and training, community and market focus, and patient safety.

Working to develop these success characteristics guides microsystems into the improvements that will make them into high-performing frontline units (see Chapter One).

What Does a Microsystem's Developmental Journey Look Like?

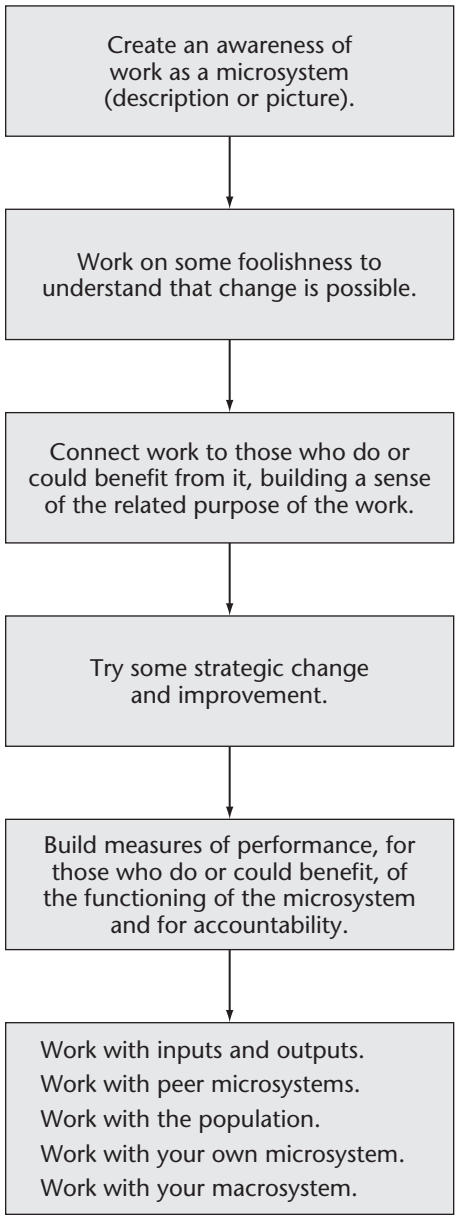
Microsystems evolve over time. Some move from a relatively low level of self-awareness to a high level of awareness and functional capability by taking several steps that can be thought of as a journey (as represented graphically in Figure 11.5).

A frontline unit's awareness that it is a microsystem often begins with an external provocation. Someone might ask a staff member, "Could you draw me a picture of how your microsystem works," or, "Could you help me understand the flow of daily activities from the perspective of the patient and family?" This picture is often the beginning of awareness of how people work together. It also often reveals some *foolishness,* things that people are not very proud of or things they recognize as not very dependable. With that recognition of some foolishness they might take action to minimize its impact in the microsystem. If they are successful in eliminating the foolishness, they often experience a sense of self and self-awareness that leads in turn to an understanding that the microsystem can improve itself and that change is possible without permission from anybody else.

This new sense of responsibility and awareness often gives staff important insights into the daily workings of the microsystem and the recognition that it is possible to change one's own work environment and that things are going along better than before. Eventually, someone will ask, "Why do we do what we do," and, "What is our purpose?"

A conversation begins about the patients who benefit from the microsystem's work. The microsystem staff begin to explore their own purpose in relation to the

FIGURE 11.5. A MICROSYSTEM'S SELF-AWARENESS JOURNEY.



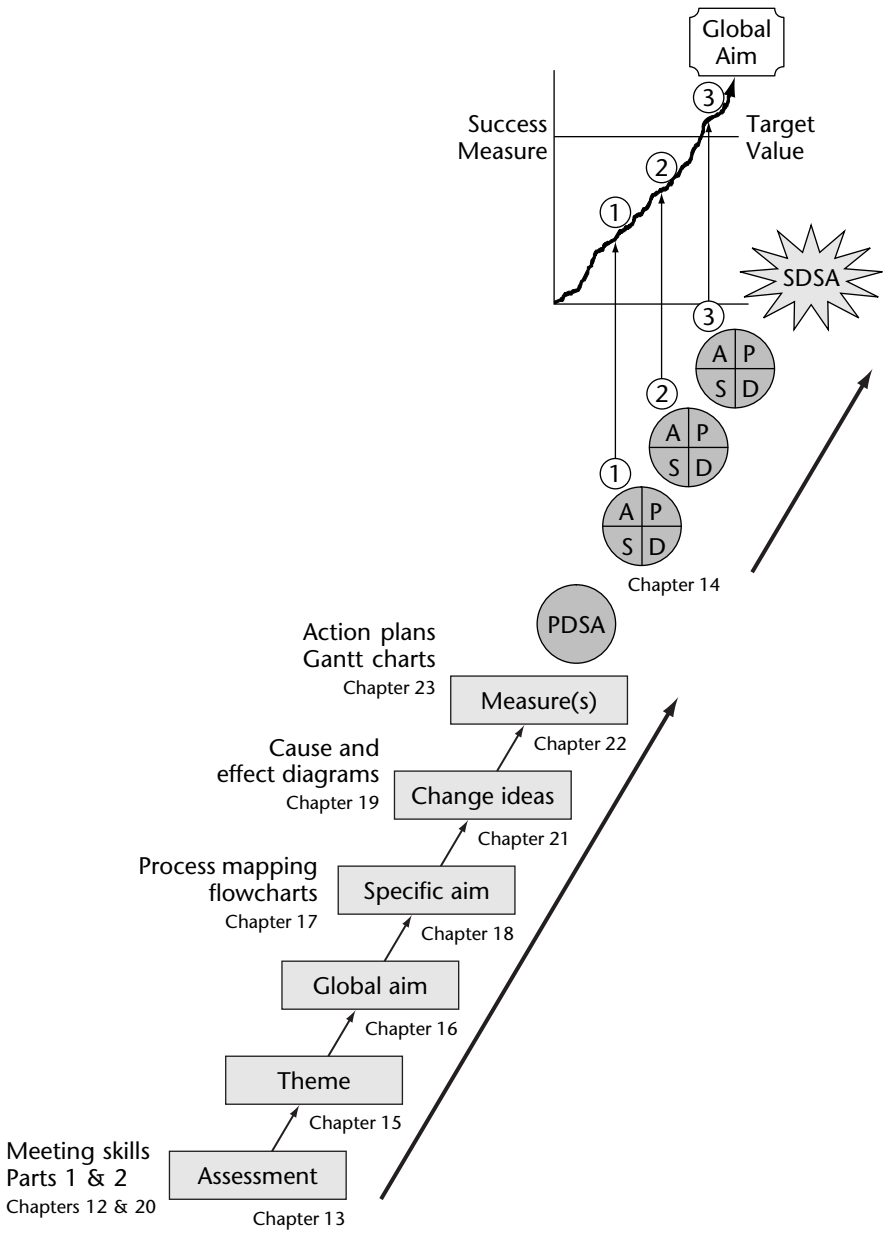
needs of patients. Making the purpose of the microsystem explicit is an important developmental step on the journey toward awareness of the microsystem as a system. The purpose, the interdependent members, the information and technology—all contribute to the functioning of this microsystem. This awareness then becomes people's basis for understanding the usual work of the microsystem when strategic improvement is introduced; the members of the microsystem can now begin to process the improvement against their knowledge of their own microsystem and the patients it serves. The path to systematic, sustained improvement is more than a recipe with steps to be followed. Microsystem members can complete the steps for short-term change but often cannot sustain the new way of doing things if they are not aware of themselves as making up a functioning system—a system now changed in a way that makes sense. Conversely, gains from change efforts are often sustained and further explored by the self-aware microsystem. The microsystem members become increasingly curious about the functioning of their microsystem and the ways they might change it. They often want to measure performance and understand who benefits and how much change is actually occurring. The process of change also feeds people's curiosity about the daily work in microsystems that understand their work as a system, particularly the work in other clinical units that they engage with to provide patients with all needed care. This curiosity leads a microsystem to interactions with peer microsystems and to explore the inputs it receives; staff work further to discover the expectations of the populations they care for and these populations' needs. These self-aware microsystems begin to work much more consciously on the relationship of their microsystem to its larger context, the mesosystems and macrosystem that contribute to its identity.

It's important to note that the steps and events just described may not happen in this order. They may not happen within any particular time period. However, these events, however ordered and timed, do often happen in microsystems that begin to get a sense of themselves and to build their own capability to improve themselves and to become better and better at self-organizing and self-improving.

Conclusion

Now you have a better understanding of how microsystem thinking evolved, the importance of the systems approach to improvement, and how microsystems can develop over time. The chapters that follow will support your efforts to increase self-awareness in microsystems to foster ongoing improvement, and they will provide detailed information about the Dartmouth Microsystem Improvement Curriculum (DMIC). The big DMIC picture is shown in Figure 11.6. Each

FIGURE 11.6. IMPROVEMENT RAMP.



subsequent chapter will focus on one aspect of this big picture, which takes the form of an *improvement ramp*.

Case Studies

Intermediate Cardiac Care Unit (ICCU)

The ICCU's lead improvement team attended a three-day educational program to learn about the fundamentals of microsystem improvement; the curriculum introduced general microsystem knowledge, tools for understanding the process of designing change, and improvement methods that could be built into the ICCU's daily routines. The program finished with drafting an action plan for the future. The lead improvement team consisted of the medical director, nursing director, cardiac fellow, nurses, a multifunctional patient care unit technician, and a social worker who functioned as a discharge coordinator. During each of the three days, they practiced new meeting skills and were coached by experts to encourage and guide them as they, together, discovered their work as a system. The vice president of Patient Services attended the opening and closing of the program to clarify expectations, to offer support, and to encourage them to begin and to continue their journey of improvement using microsystem methods. On the last day the vice president stated clearly her expectations for measurable improvements and told the staff that she would regularly visit the ICCU to witness and observe improvements and measured results.

Plastic Surgery Section

With the leadership of the lead physician, the practice manager, lead nurse, and lead administrative secretary, an interdisciplinary lead improvement team was convened to participate in a ten-week course to learn improvement application within the context of plastic surgery. The team held one-hour weekly improvement meetings to learn and apply improvement tools and methods.

Review Questions

1. What does a clinical microsystem consist of?
2. What is the connection between systems thinking and microsystems?
3. What research has been conducted specific to microsystems?
4. What are the success characteristics of a high-performing clinical microsystem?

Between Sessions Work

1. Begin to develop a microsystem wall graphic that models your own system and also offers physical space to display what people are learning, additional information, and results of the improvement work and the efforts to change.
2. Identify a communication strategy.

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