CLINICAL MICROSYSTEMS IN HEALTH CARE: THE ROLE OF HUMAN FACTORS IN SHAPING THE MICROSYSTEM

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The clinical microsystem provides a conceptual and practical framework for thinking about the organization and delivery of care. The purpose of this chapter is to provide a detailed description of the role that human factors play in shaping the microsystems and affect the microsystem’s ability to provide high quality and safe care.

INTRODUCTION TO CLINICAL MICROSYSTEM CONCEPTS

A clinical microsystem is a group of clinicians and staff working together with a shared clinical purpose to provide care for a population of patients (Bataklen, Mohr, et al., 1997; Mohr, 2000; Nelson, Bataklen, et al., 1998). The clinical purpose and its setting defines the essential components of the microsystem. These include the clinicians and support staff, information and technology, the specific care processes, and the behaviors that are required to provide care to its patients. Microsystems evolve over time, responding to the needs of their patients, providers, and external pressures. They often coexist with other microsystems within a larger (macro) organization.

The conceptual theory of the clinical microsystem is based on ideas developed by Deming (1986), Senge (1990), Wheatley (1992), and others who have applied systems thinking to organizational development, leadership, and improvement. The seminal idea for the microsystem as an organizational unit stems from the work of James Brian Quinn (1992). Quinn’s work is based on analyzing the world’s best-of-best service organizations, such as FedEx, Mary Kay Cosmetics, McDonald’s, and Nordstrom. He focused on determining what these extraordinary organizations were doing to achieve high-quality explosive growth, high margins, and wonderful consumer reputations. He found that these leading service organizations organized around, and continually engineered, the front-line relationships that connected the needs of customers with the organization’s core competency. Quinn called this frontline activity that embedded the service delivery process the smallest replicable unit or the minimum replicable unit. This smallest replicable unit, or the microsystem, is the key to implementing effective strategy, information technology, and other key aspects of intelligent enterprise.

In the late 1990s, under the aegis of the Institute of Medicine (IOM) and with funding by the Robert
Wood Johnson Foundation, Mohr and Donaldson investigated high-performing clinical microsystems (Donaldson & Mohr, 2000; Mohr, 2000). This research was based on a national search for the highest-quality clinical microsystems. Forty-three clinical units were identified using theoretical sampling, and their leaders were interviewed using a semistructured interview protocol. The results of the interviews were analyzed to determine the characteristics that seemed to be most responsible for enabling these microsystems to be effective. The results suggested that eight dimensions were associated with high quality of care—integration of information, measurement, interdependence of the care team, supportiveness of the larger system, constancy of purpose, connection to community, investment in improvement, and alignment of role and training. These eight factors became a framework for evaluating health care microsystems. Each of the dimensions can be thought of on a continuum that represents the presence of the characteristic in the microsystem. Increased awareness of the small front-line work unit as a microsystem means recognizing the characteristics that contribute to their identity and being mindful of the reliability of these characteristics.

The Dartmouth study (funded by the Robert Wood Johnson Foundation to continue and build on the IOM study) was based on 20 case studies of high-performing clinical microsystems and included on-site interviews with every member of the microsystem and analysis of individual microsystem performance data (Batalden, Nelson, et al., 2003a, 2003b; Godfrey, Nelson, et al., 2003; Huber, Godfrey, et al., 2003; Kosnik & Espinosa, 2003; Mohr, Barach, et al., 2003; Nelson, Batalden, et al., 2002; Nelson, Batalden, et al., 2003; Wasson, Godfrey, et al., 2003). As a result of this work, the dimensions of high-performing microsystems were further refined and expanded to include two additional categories. Table 6–1 lists the dimensions of high-performing microsystems and provides an operational definition of each.

The Microsystem Assessment Tool (see Figure 6–1) first published in 2002 is based on these dimensions (Mohr & Batalden, 2002). As we continue to move beyond conceptual theory and research to application in clinical settings, the emerging fields of chaos theory, complexity science, and complex adaptive systems have influenced how these concepts have been applied to improving microsystems (Arrow, McGrath, et al., 2000; Peters 1987; Plsek & Greenhalgh, 2001; Plsek & Wilson, 2001). This is evident in the work to bring together microsystems from around the world to learn and share best practices (for updates on these efforts see Trustees of Dartmouth College, 2004).

IMPROVING SAFETY WITHIN THE CLINICAL MICROSYSTEM

The clinical microsystem—as a unit of research, analysis, and practice—is an important level at which to focus patient safety interventions. It is at this system level that most patients and caregivers meet, and it is at this level that human factors and real changes in the patient care can be made. Human errors occur within the microsystem, and ultimately it is the functioning microsystem that can capture, attenuate, or mitigate these errors from causing patient harm. The case included in Box 6–1 is illustrative of a patient safety event and the resulting analysis that allows a microsystem to learn from the event. Throughout the story, as told from the perspective of a senior resident in pediatrics, there are many obvious system “failures.” One method that we have found to be useful for systematically looking at patient safety events builds on William Haddon’s framework on injury epidemiology (Haddon, 1972).

As the first Director of the National Highway Safety Bureau (1966–1969), Haddon was interested in the broad issues of injury that result from the transfer of energy in such ways that inanimate or animate objects are damaged. The clinical microsystem offers a setting in which this injury can be studied. According to Haddon (1972), there are several strategies for reducing injuries. First, prevent the marshalling of the energy; second, reduce the amount of energy marshaled; third, prevent the release of the energy; fourth, modify the rate or spatial distribution of release of the energy; fifth; separate in time and space the energy being released and the susceptible structure; sixth, use a physical barrier to separate the energy and the susceptible structure; seventh, modify the contact surface or structure with which people can come in contact; eighth, strengthen the structure that might be damaged by the energy transfer; ninth, when injury does occur, rapidly detect it and counter its continuation and extension; tenth, when injury does occur, take all necessary reparative and rehabilitative steps. All these strategies have a logical sequence that is related to the three phases of
### CLINICAL MICROSYSTEM ASSESSMENT TOOL

**Instructions:** Each of the “success” characteristics (e.g., leadership) is followed by a series of three descriptions. For each characteristic, please check the description that best describes your current microsystem and the care it delivers or use a microsystem you are MOST familiar with.

<table>
<thead>
<tr>
<th>Characteristic and Definition</th>
<th>Descriptions</th>
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<tbody>
<tr>
<td><strong>Leadership:</strong> The role of leaders is to balance setting and reaching collective goals, and to empower individual autonomy and accountability, through building knowledge, respectful action, reviewing and reflecting.</td>
<td>1. Leaders often tell me how to do my job and leave little room for innovation and autonomy. Overall, they don’t foster a positive culture. 2. Leaders struggle to find the right balance between reaching performance goals and supporting and empowering the staff. 3. Leaders maintain consistency of purpose, establish clear goals and expectations, and foster a respectful, positive culture. Leaders take time to build knowledge, review and reflect, and take action about microsystems and the larger organization.</td>
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<tr>
<td><strong>Organizational Support:</strong> The larger organization looks for ways to support the work of the microsystem and coordinate the hand-offs between microsystems.</td>
<td>1. The larger organization isn’t supportive in a way that provides recognition, information, and resources to enhance my work. 2. The larger organization is inconsistent and unpredictable in providing the recognition, information and resources needed to enhance my work. 3. The larger organization provides recognition, information, and resources that enhance my work and make it easier for me to meet the needs of patients.</td>
</tr>
<tr>
<td><strong>Staff Focus:</strong> There is selective hiring of the right kind of people. The orientation process is designed to fully integrate new staff into culture and work roles. Expectations of staff are high regarding performance, continuing education, professional growth, and networking.</td>
<td>1. I am not made to feel like a valued member of the microsystem. My orientation was incomplete. My continuing education and professional growth needs are not being met. 2. I feel like I am a valued member of the microsystem, but I don’t think the microsystem is doing all that it could to support education and training of staff, workload, and professional growth. 3. I am a valued member of the microsystem and I am aware of what I need. This is evident through staffing, education and training, workload, and professional growth.</td>
</tr>
<tr>
<td><strong>Education and Training:</strong> All clinical microsystems have responsibility for the ongoing education and training of staff and for aligning daily work roles with training competencies. Academic clinical microsystems have the additional responsibility of training students.</td>
<td>1. Training is accomplished in disciplinary silos, e.g., nurse, train nurses, physical therapists, residents, etc. The educational efforts are not aligned with the flow of patient care, so that education becomes an “add-on” to what we do. 2. We recognize that our training could be different to reflect the needs of our microsystem, but we haven’t made many changes yet. Some continuing education is available to everyone. 3. There is a team approach to training, whether we are training staff, nurses or students. Education and patient care are integrated into the flow of work in a way that benefits both from the available resources. Continuing education for all staff is recognized as vital to our continued success.</td>
</tr>
<tr>
<td><strong>Interdependence:</strong> The interaction of staff is characterized by trust, collaboration, willingness to help each other, appreciation of complementary roles, respect and recognition that all contribute individually to a shared purpose.</td>
<td>1. I work independently and I am responsible for my own part of the work. There is a lack of collaboration and a lack of appreciation for the importance of complementary roles. 2. The care approach is interdisciplinary, but we are not always able to work together as an effective team. 3. Care is provided by an interdisciplinary team characterized by trust, collaboration, appreciation of complementary roles, and a recognition that all contribute individually to a shared purpose.</td>
</tr>
<tr>
<td><strong>Patient Focus:</strong> The primary concern is to meet all patient needs — caring, listening, educating, and responding to special requests, innovating to meet patient needs, and smooth service flow.</td>
<td>1. Most of us, including our patients, would agree that we do not always provide patient centered care. We are not always clear about what patients want and need. 2. We are actively working to provide patient centered care and we are making progress toward more effectively and consistently learning about and meeting patient needs. 3. We are effective in learning about and meeting patient needs — caring, listening, educating, and responding to special requests, and smooth service flow.</td>
</tr>
</tbody>
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### Clinical Microsystem Assessment Tool - Continued -

<table>
<thead>
<tr>
<th>Characteristic and Definition</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7. Community and Market Focus</strong></td>
<td>- The community is a resource for the community, the microsystem establishes excellent and innovative relationships with the community. We focus on the patients who come to our unit. We haven’t implemented any outreach programs in our community. Patients and their families often make their own connections to the community resources they need. We have tried a few outreach programs and have had some success, but it is not the norm for us to go out into the community or actively connect patients to the community resources that are available to them. We are doing everything we can to understand our community. We actively employ resources to help us work with the community. We add to the community and we draw on resources from the community to meet patient needs.</td>
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<tr>
<td><strong>8. Performance Results</strong></td>
<td>- Performance focuses on patient outcomes, avoidable costs, streamlining delivery, using data feedback, promoting positive competition, and frank discussions about performance. We don’t routinely collect data on the process or outcomes of the care we provide. We often collect data on the outcomes of the care we provide and on some processes of care. Outcomes (clinical, satisfaction, financial, technical, safety) are routinely measured, we feed data back to staff, and we make changes based on data.</td>
</tr>
<tr>
<td><strong>9. Process Improvement</strong></td>
<td>- An atmosphere for learning and redesign is supported by the continuous monitoring of care, use of benchmarking, frequent tests of change, and a staff that has been empowered to innovate. The resources required (in the form of training, financial support, and time) are rarely available to support improvement work. Any improvement activities we do are in addition to our daily work. Some resources are available to support improvement work, but we don’t use them as often as we could. Change ideas are implemented without much discipline. There are ample resources to support continual improvement work. Studying, measuring and improvement are a scientific way essential parts of our daily work.</td>
</tr>
<tr>
<td><strong>10. Information and Information Technology</strong></td>
<td>- Information is the connector: staff to patients, staff to staff, needs with actions to meet needs. Technology facilitates effective communication and multiple formal and informal channels are used to keep everyone informed all the time, listen to everyone’s ideas, and ensure that everyone is connected on important topics. Given the complexity of information and the use of technology in the microsystem, assess your microsystem on the following three characteristics: (1) integration of information with patients, (2) integration of information with providers and staff, and (3) integration of information with technology. Patients have access to some standard information that is available to all patients. Patients have access to standard information that is available to all patients. We’ve started to think about how to improve the information they are given to better meet their needs. Patients have a variety of ways to get the information they need and it can be customized to meet their individual learning styles. We routinely ask patients for feedback about how to improve the information we give them.</td>
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</tbody>
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Side B

Figure 6–1. Microsystem Assessment Tool.
human injury, that is: preinjury, injury, and postinjury.

The Haddon matrix is a $3 \times 3$ matrix with factors related to a car crash injury (human, vehicle, and environment) heading the columns and phases of the event (preinjury, injury, and postinjury) heading the rows. Figure 6–2 is an example of the Haddon matrix that has been completed to analyze a car crash (Haddon, 1972). The use of the matrix focuses the analysis on the interrelationships between the factors (in this matrix version the human, vehicle, and environment) and the three phases of the crash (preevent, event, and postevent). A mix of countermeasures derived from Haddon’s strategies previously outlined are necessary to minimize loss. Furthermore, the countermeasures can be designed for each phase—preevent, event, and postevent. This approach confirms what we know about adverse events in complex environments—it takes a series of counter strategies to prevent and/or mitigate harm and death. Understanding injury in its larger context helps us recognize the complexity of systems and the inherent “unsafe” nature of systems, while highlighting the important work of humans to mitigate the inherent hazards (Dekker, 2002).
Building on injury epidemiology, we can also use the Haddo matrix to think about analyzing patient safety adverse events and their prevention. We have adapted the Haddon matrix to include phases labeled “preevent, event, and postevent” instead of “preinjury, injury, and postinjury.” We have revised the factors to include “patient/family, health care professional, system and environment” instead of “human, vehicle, and environment.” Note that we have added “system” to refer to the processes and systems that are in place for the microsystem. “Environment” refers to the context that the microsystem exists within. The addition of the system recognizes the significant contribution that systems and human factors make toward predisposing to patient harm in the microsystem. Figure 6–3 shows a completed matrix using the pediatric case presented in Box 6–1. The next step in learning from errors and adverse events is to develop and implement countermeasures to address the issues in each cell of the matrix.

Safety is a property of the clinical microsystem that can be achieved only through a systematic application of a broad array of process, equipment, organization, supervision, training, and teamwork changes. Table 6–2 builds on the research of high-performing microsystems by considering specific actions focused on improving safety within the organization linked to each of the dimensions of a high-performing microsystem. The list provides an organizing framework and a place to start applying patient safety concepts to microsystems. These actions can be taken by the leader of the macro-organization, working explicitly with individual members of the microsystems.

THE ROLE OF HUMAN FACTORS IN CLINICAL MICROSYSTEMS

Human factors emerged as a recognized discipline during World War II. Its use improved military system performance by addressing problems in signal detection, workspace constraints, optimal task training, cockpit design, and teamwork (AAMIHC, 2001). Nearly half a century of research and hands-on experience have produced a substantial body of scientific knowledge about how people interact with each other and with technology. Human factors knowledge and techniques have been productively applied to enhance human performance in a wide range of domains, from fighter planes to kitchens, emergency rooms, and trauma units (Barach & Weinger, 2005).

Human factors research and application is a logical fit in clinical microsystems because it affords the
<table>
<thead>
<tr>
<th>Factors</th>
<th>Patient/Family</th>
<th>Health Care Professional</th>
<th>System</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-event</strong></td>
<td>Consent (process, timing)</td>
<td>Not familiar with procedure</td>
<td>Several lines in patient</td>
<td>RN shortage</td>
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<tr>
<td></td>
<td>Anxiety (play therapy)</td>
<td>Lack of physician-nurse communication</td>
<td>Silos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient lines</td>
<td>Focus on anxiety and not on procedure</td>
<td></td>
<td>Scheduling delays</td>
</tr>
<tr>
<td></td>
<td>Mother’s presence</td>
<td>Assumed roles, made assumptions</td>
<td></td>
<td>Manufacturing (performance shaping factors, human factors)</td>
</tr>
<tr>
<td><strong>Event</strong></td>
<td>Anxiety (patient &amp; parent’s)</td>
<td>Fatigue</td>
<td>Work hours Protocols</td>
<td>Lack of process for risk analysis</td>
</tr>
<tr>
<td></td>
<td>No shared expectations</td>
<td>Aware of limitations</td>
<td>Standardization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No active participation</td>
<td>Training</td>
<td>Double checking</td>
<td></td>
</tr>
<tr>
<td><strong>Post-event</strong></td>
<td>Lack of explanation</td>
<td>Guilt</td>
<td>Lack of understanding of errors/systems</td>
<td>Regulatory</td>
</tr>
<tr>
<td></td>
<td>Disclosure</td>
<td>Lack of confidence</td>
<td>Lack of supportive environment for resident</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Who should talk to family?</td>
<td>Loss of face</td>
<td>Incidence report</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M&amp;M Analysis of event</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6–3. Completed patient safety matrix.

opportunity to study human interactions with devices and technology and systems and processes, with the overarching goal of enhancing safety and quality. Furthermore, human factors research on team decision making in complex task environments is of relevance to clinical microsystems (Brannick, Salas, et al., 1997; Foushee & Helmreich, 1988; Helmreich & Schaefer, 1994; Huey & Wickens, 1993; Swezy & Salas, 1992). There are many “performance shaping factors” that are known to play a role in degraded
human capabilities; these must be considered to understand how best to optimize clinical care (Weinger & Englund, 1990; Weinger & Smith, 1993).

The environment of the hospital greatly affects and shapes the outcomes of clinical microsystems. Factors that influence the team’s effectiveness include the performance of individual team members, the equipment they use, the care environment (e.g., established care processes and procedures), and the underlying organizational and cultural factors. For example, distracters such as information overload, noise, spectators, and physical obstacles can be a danger to both patient and health care professionals. Although there is insufficient space in this chapter to discuss all of the performance shaping factors of relevance to the clinical microsystems, a few of the more pertinent factors are described in more detail in the following sections.

### Sleep Deprivation and Fatigue

There is extensive literature on the adverse effects of sleep deprivation and fatigue on individual

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#### TABLE 6-2: Linkage of the Microsystem Dimensions to Patient Safety

<table>
<thead>
<tr>
<th>Microsystem Dimensions</th>
<th>What This Means for Patient Safety</th>
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<tbody>
<tr>
<td>1. Leadership</td>
<td>Define the safety vision of the organization</td>
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<tr>
<td></td>
<td>Identify the existing constraints within the organization</td>
</tr>
<tr>
<td></td>
<td>Allocate resources for plan development, implementation, and ongoing monitoring and evaluation</td>
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<td></td>
<td>Build microsystems participation and input to plan development</td>
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<td></td>
<td>Align organizational quality and safety goals</td>
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<td></td>
<td>Engage the Board of Trustees about the organizational progress toward achieving safety goals</td>
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<td></td>
<td>Recognition for prompt truth-telling about errors</td>
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<tr>
<td></td>
<td>Certification of helpful changes to improve safety</td>
</tr>
<tr>
<td>2. Organizational support</td>
<td>Work with clinical microsystems to identify patient safety issues</td>
</tr>
<tr>
<td></td>
<td>and make relevant local changes Put the necessary resources and tools into the hands of individuals</td>
</tr>
<tr>
<td>3. Staff focus</td>
<td>Assess current safety culture Identify the gaps between current work culture Conduct periodic assessments of safety culture Celebrate examples of desired behavior, e.g., acknowledgment of an error</td>
</tr>
<tr>
<td>4. Education and training</td>
<td>Develop patient safety curriculum</td>
</tr>
<tr>
<td></td>
<td>Develop a core of people with patient safety skills who can work across microsystems as a resource</td>
</tr>
<tr>
<td>5. Interdependence of the care team</td>
<td>Build PDSA* into debriefings Use daily huddles to debrief and to celebrate identifying errors</td>
</tr>
<tr>
<td>6. Patient focus</td>
<td>Establish patient and family partnerships Support disclosure and truth around medical error</td>
</tr>
<tr>
<td>7. Community and market focus</td>
<td>Analyze safety issues in community and partner with external groups to reduce risk to population</td>
</tr>
<tr>
<td>8. Performance results</td>
<td>Develop key safety measures Create feedback mechanisms to share results with microsystems</td>
</tr>
<tr>
<td>9. Process improvement</td>
<td>Identify patient safety priorities based on assessment of key safety measures Address the work that will be required at the microsystem level</td>
</tr>
<tr>
<td>10. Information and information technology</td>
<td>Enhance error reporting systems Build safety concepts into information flow (e.g., checklists, reminder systems)</td>
</tr>
</tbody>
</table>

*PDSA, Plan–Do–Study–Act.*
clinician performance (Gaba & Howard, 2002; Grantcharov, Bardram, et al., 2001; Howard, Roskind, et al., 2002; Taffinder, McManus, et al., 1998; Veasey et al., 2002; Weinger & Ancoli-Israel, 2002; Weinger & Englund 1990). Most studies of recurrent partial sleep deprivation have suggested that sleeping only 5 to 6 hr a night can lead to performance impairment (Bonnet, 2000). Sleep loss is associated with reduced performance on tasks requiring vigilance, cognitive skills, verbal processing, and complex problem solving (Veasey et al., 2002; Weinger & Ancoli-Israel, 2002). Performance decrements begin with a lack of appreciation of the skills being degraded and accumulate with continued partial sleep deprivation. This may be seen in physicians working regularly recurring on-call or night shifts. In the early morning hours, after nearly 24 hr without sleep (e.g., at the end of difficult on-call shift), psychomotor performance can be impaired “to an extent equivalent to or greater than is currently acceptable for alcohol intoxication” (Dawson & Reid, 1997, p. XX). Two recent laboratory simulation studies, involving sleep-deprived surgeons, demonstrated significant impairment in surgical skill (both speed and accuracy) in a virtual reality simulation of laparoscopic surgery (Grantcharov et al., 2001; Taffinder et al., 1998).

Although the impact of fatigue on team performance has thus far been sparsely studied, the results may be expected to be similar with trade-offs between the benefits of team compensation and redundancy on the one hand and impaired team communication on the other.

The effects of individual team member’s sleep deprivation (or other performance detractors such as working when ill) on the overall microsystem’s clinical performance will depend on many factors, including time of day (circadian effects), clinical experience, task demands, clinical workload, and other team members’ level of functioning. The message for organizational leaders is to acknowledge the potential effect of sleep deprivation and fatigue on individuals and on the microsystem and design work schedules to provide team members with adequate rest periods.

Environmental Factors (Noise)

The environment of care contains a number of factors that influence microsystem performance including noise, lighting, temperature, the need for protective gear, clutter, disorganization, and impaired physical access to the patient or essential tools/equipment. In the interest of brevity, only the effects of noise are discussed in detail. More detailed discussions of environmental noise are included in the handbook in “Noise and Alarms in Health Care—A Dilemma” (see Buss & Friesdorf, chap. 22, this volume) and “Physical Environment in Health Care” (see Alvarado, chap. 19, this volume).

The noise level for microsystems in acute care environments can be quite high. For example, continuous background noise in the operating room typically ranges from 75 dB to 90 dB, and can increase to almost 120 dB (e.g., during high-speed gas-turbine drill use; Weinger & Smith, 1993). Although apparently never measured, it is reasonable to assume that sound pressures in the typical trauma unit are similar or louder than those found in surgical suites. In the trauma unit, noise may be generated by multiple conversations, mechanical ventilation, suction, overhead pages, use of medical equipment, and uncoordinated alarms. High noise levels create a positive feedback situation, where noisy rooms require louder voices and louder alarms leading to increased noise levels, missed clinical events, and patient harm. There is a growing literature on how hospitals can incorporate sound insulation materials, avoid overhead paging, sound absorbing materials and more.

High noise levels interfere with effective verbal communication, which is always important, but may be critical during certain events such as resuscitations when it is vital for team members to hear clearly other members of the team. High noise levels in trauma units can also detrimentally affect short-term memory tasks, mask task-related cues, impair auditory vigilance (e.g., the ability to detect and identify alarms), and cause distractions during critical periods (Weinger & Englund, 1990; Weinger & Smith, 1993). Exposure to loud noise activates the sympathetic nervous system affecting mood and performance. The resulting stress response has been suggested to interact with other performance-shaping factors resulting in impaired decision making during critical clinical incidents (Selye, 1976).

Interpersonal Communication

Both verbal and nonverbal communication are critical to the success of microsystem performance (Kanki, Lozito, et al., 1989). Failures of team communication lead to medical errors and adverse outcomes (Donchin, Gopher, et al., 1995). In
TABLE 6–3  Problems and Pitfalls in the Teamwork

| Difficulties coordinating conflicting actions |
| Poor communication among team members |
| Failure of members to function as part of a team |
| Reluctance to question the leader or more senior team members |
| Failure to prioritize task demands |
| Conflicting occupational cultures |
| Failure to establish and maintain clear roles and goals |
| Absence of experienced team members |
| Inadequate number of dedicated trauma team members |
| Failure to establish and maintain consistent supportive organizational infrastructure |
| Leaders without the “right stuff” |

Note. Modified from Schull, Ferris, et al. (2001)

nonmedical highly complex domains involving teamwork (e.g., aviation crews, submarines), the
team has often been together a long time and is well
practiced. Effective team communications involve
unspoken expectations, body language, traditions,
general assumptions about task distribution, command
hierarchies, as well as individual emotional
and behavioral components. Failures of adequate
communication between teams of clinical care
providers in the intensive care unit contributed to
medical errors (Donchin et al., 1995). In this intensive
care unit study more than one third of all
patient care errors reported were associated with
failures of verbal communication. These communi-
cation failures occurred not only between nurses
and physicians but also between nurses. Similarly,
analysis of videotaped trauma team performance
showed that highly skilled teams communicat-
ed in a variety of ways, many of which were nonver-
bal and implicit (Xiao, MacKenzie, et al., 1998). Team
coordination breakdowns were manifested by con-
flicting plans, inadequate support in crisis situa-
tions, failure to verbalize problems, and poor
dlegation of tasks.

Team performance can be adversely affected by
dysfunctional interpersonal interactions among team
members. Such “miscommunication” often stems
from a lack of shared expectations, beliefs, or training
(Barach, 2002). Table 6–3 outlines some of the poten-
tial problems in teamwork. This suggests that teams
and microsystems can enhance their performance by
spending more time together, not just during formal
training, but also through joint conferences and social
events (Baker, Beaubien, et al., 2005).

Team members must make special efforts to
communicate clearly and unambiguously, espe-
cially when members of the team are new or less
experienced. Effective team communication is
more difficult when some or all of the team are
subjected to other stressors such as sleep depriva-
tion and fatigue.

CONCLUSION

The microsystem concepts have evolved from
systems theory and primary research on characteris-
tics of high-performing clinical units. Specific inter-
ventions can be made to embed quality and safety
into the microsystem. We offer several suggestions
related to each of the microsystem characteristics
that might serve as a guiding framework to adapt to
individual microsystems. Leaders should set the
stage for making safety a priority for the organiza-
tion, but they should allow individual microsystems
to create innovative strategies for improvement.
Table 6–4 provides examples of performance shaping
factors that affect the microsystem.

Simply bringing individuals together to perform
a specified task does not automatically ensure that
they will function as a team. Teamwork depends
on a willingness of clinicians from diverse back-
grounds to cooperate toward a shared goal, to com-
municate, to work together effectively, and to
improve. Each team member must be able to: (a)
anticipate the needs of the others, (b) adjust to each
other’s actions and to the changing environment,
(c) monitor each other’s activities and distribute
workload dynamically, and (d) have a shared under-
standing of accepted processes and how events and
actions should proceed.

Microsystems with clear goals and effective
communication strategies can adjust to new infor-
mation with speed and effectiveness to enhance
real-time problem solving. Individual behaviors
change more readily on a team because team iden-
tity is less threatened by change than are individuals.
Behavioral attributes of effective teamwork including
enhanced interpersonal skills, can extend to other clinical arenas.

Turning a clinical unit into an effective micro-system requires substantial planning and practice. There is a natural resistance to move beyond individual roles and accountability to the team mindset. One can facilitate this commitment by: (a) fostering a shared awareness of each member’s tasks and role on the team through cross-training and other team training modalities; (b) training members in specific teamwork skills such as communication, situation awareness, leadership, follower-ship, resource allocation, and adaptability; (c) conducting team training in simulated scenarios with a focus on both team behaviors and technical skills; (d) training team leaders in the necessary leadership competencies to build and maintain effective teams; and (e) establishing and consistently utilizing reliable methods of team performance evaluation and rapid feedback.

References


