Overview

Since at least the publication of the Institute of Medicine report *To Err Is Human* (1), most health care organizations have been struggling to find and eliminate hazards. Their struggle arises from the complex mixture of issues that plague any organization dealing with the seemingly easy problems to be solved by a new safety program. Many health care organizations soon realize they are dealing with organizational psychology issues that require tools from change management. Somewhat fewer facilities are aware of the problems ingrained in human factors engineering of systems, devices, and tools. We will define these terms and how they apply to Medical Emergency Teams (METs) throughout this chapter. A MET response is not just a wonderful tool to improve morbidity and mortality associated with hospital medical crises and cardiopulmonary resuscitation, it is also an indirect tool to address the struggles to improve quality and safety throughout a health care organization. Conceptually and empirically, most hospitals will likely need MET programs due to findings from human factors engineering and health care.

Creating and Sustaining Safety

The difficulty of creating and sustaining a patient safety program cannot be underestimated. Logistic and strategic questions quickly overwhelm the best and brightest: What are the most frequent or remediable adverse events that hurt and kill patients? Why did these adverse events occur? What can we do about the root causes of these events? What sources can provide effective remedies? Why are people so resistant to using safety remedies?

To answer these questions, hospitals have used safety methods required by regulatory organizations (e.g., Joint Commission on Accreditation of Healthcare Organizations (JCAHO)) or governments (e.g., state depart-
ments of health). These methods include root-cause analysis (RCA), failure mode and effect analysis (FMEA), and traditional quality improvement tools (2,3). These safety and quality approaches work best in organizations that are developing a so-called “high-reliability organization” (4). METs can complement RCA and FMEA activities that will be described more fully.

A MET can also provide the tangible proof that the organization is serious about the “safety culture” described for high-reliability organizations. Specifically, certain aspects of METs are especially suited to meet many of the criteria in a specific model of organizational change described by Rodgers (5), a model that has been accepted for many decades. This theory looks at factors such as perceived relative advantage, compatibility with existing values, and norms and trial-ability.

Definition and Relevance of Human Factors Engineering

The human factors engineering field is several decades old and has been applied in various organizations and domains when they face design, personnel, and policy issues such as those surrounding MET (6). Briefly, human factors engineering is the discipline that studies human capabilities and limitations and applies that information to safe, effective, and comfortable system design (7,8). It includes the design of tools, machines, and systems that take into account human capabilities, limitations, and characteristics. Ergonomics, usability engineering, and user-centered design are considered synonymous or closely related to human factors engineering, which is based on design-related aspects of several biomedical disciplines. From a systems perspective, a person is receiving input from a “clinical assessment machine,” processing that input, and creating an output that goes to the “health care machine.” Anthropometrics and biomechanics cover most of the physical aspects of input and output. The science of sensation and perception is related to input to the person. Cognitive psychology, which covers models and theories of human performance, memory, and attention, relates to the processing of the input and initiating the output.

Observations and studies regularly conclude that many design issues thwart even the best attempts at resuscitation and the application of critical care expertise (9). Some researchers have seen problems with using defibrillators—even those made for novices (10). Others have identified design problems with defibrillators, even when testing individuals like paramedics who use them often (11). The layout and human factors aspects of the medication drawers in many crash carts can add minutes of delay to well-intentioned and motivated clinicians and their ability to retrieve key medications (12). Lack of proper transitions of care and teamwork during and following resuscitation exists even in the best clinical care (13). The breakdowns and missed opportunities are accentuated by time pressure,