local developments such as those described here are making a difference, but ongoing and expanding effort is required if significant improvements in health are to occur.

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High reliability organizations

High reliability organizational change for hospitals: translating tenets for medical professionals

M J Shapiro, G D Jay

Health care will continue to struggle to improve patient safety until the medical industry and hospital leaders understand that the tenets of high reliability organizations can be translated for physicians and nurses.

Despite the significantly increased attention to patient safety, it remains unclear what role healthcare professionals—both individually and collectively—should play in supporting organizational change. Concurrently, the model of error is shifting away from the individual towards the system to search for solutions, which has left a void in the area of human performance. Medical industry leaders at the chief executive level have a vision which focuses on information systems and streamlined system improvements. These tangible technological solutions, such as Computerized Physician Order Entry (CPOE), share specificity to fix an identifiable problem, making them comfortable targets for patient safety initiatives. While this approach will yield positive results, it is important to remember that up to 75% of information technology solutions are likely to fail.[1] Complementary behavioral solutions such as teamwork should therefore be recognized for their potential to mitigate error and increase system resilience.[2 3] These human performance interventions, because of their broad adaptability, may have the potential to produce a greater reduction in adverse events. Reluctance to adopt lessons learned in other industries, some of them in the form of qualitative data, is partly what fuels the controversy between the evidence-based camps and healthcare safety experts who feel there is an urgency to act.[4 5] For example, the Institute of Medicine (IOM) recommendation 8.1 to adopt crew resource management (CRM) and proven training methods (simulation) and to train teams in the units where they actually function (IOM principle 3) has received limited application in large healthcare systems.[6] Without such training it is highly unlikely that loosely organized working groups will ever make the transition to superior performing teams.[7] As in aviation, the human contribution to adverse events in medicine is significant[8 9] and should be a priority for any comprehensive error reduction strategy. Conversely, human variability should be viewed as a defence barrier to prevent error if individuals and teams are properly trained to support the tenets of a high reliability organization (HRO).

HROs embrace (1) a preoccupation with failure avoidance, (2) a reluctance to simplify interpretations, (3) sensitivity to operations, (4) commitment to resilience, and (5) deference to expertise.[10] The tenets of an HRO have not been translated into healthcare industry terms to enable caregivers to initiate the cultural changes necessary to assist healthcare organizations function like HROs. We believe these tenets need to be distilled for application at the point of care delivery—the physician, nurse, and patient relationship. We also believe that (1) attitude change, (2) metacognitive skills, (3) system based practice, (4) leadership and teamwork, and (5) emotional intelligence and advocacy and assertion are the respective caregiver instruments which would help to drive the healthcare industry towards a high reliability organizational change (table 1).

A preoccupation with failure builds on the *primum non nocere* which every physician and nurse is familiar with and generally accepts. First "do no harm" is ever present in the lexicon of care providers and is very much in keeping with a preoccupation of failure. Unfortunately, some care providers have the illusion

Table 1 Relationship between high reliability organization (HRO) tenets and individual competencies

HRO tenet	Corresponding behavior of care provider
Preoccupation with failure avoidance	Attitude
Reluctance to simplify interpretation	Metacognitive skills
Sensitivity to operations	Systems based practices
Commitment to resilience	Leadership and teamwork skills
Deference to expertise	Emotional intelligence; advocacy and assertion

that we have accomplished this hypervigilance but, in reality, we have actually suppressed this tenet because it does not seem acceptable. An attitudinal change required to move forward is already underway with anonymous medical error reporting systems, more open discussion regarding error, and new requirements for error disclosure. In addition, care providers must internalize teamwork concepts consciously to cross monitor the actions of other providers, expand their responsibility beyond their individual tasks, and be accountable for the broader concern of safe delivery of patient care. While system change is the new mantra for medical error reduction, individual practitioners need to remain accountable for specific types of errors such as cognitive error or procedural competency, but it is imperative that these frontline caregivers be supported by a team structure to make them successful in a complex system.

Metacognitive skills are learnable skills which, when coupled with case based learning, provide experiential learning which will help physicians and nurses to avoid numerous human biases known to create and perpetuate chains of error.[11] Physicians in training are instructed to arrive at a diagnosis which fits the available data without an understanding of how cognitive biases affect their decision making. Medical training needs a formalized structure for teaching cognitive error recognition and forcing strategies to prevent diagnostic and treatment errors. Even experienced physicians and nurses who appreciate the benefits of bias awareness and the hypervigilance necessary to prevent error chains can benefit from a more comprehensive understanding of their cognitive processes.

A sensitivity to operation would be manifested by clinical treatment guidelines and judicial use of computerized information services which provide a shared exchange of clinical information for all caregivers on a team. This extends to ergonomic redesign of clinical environments to foster interchange. This is also true for other technological innovations, including the use of portable computer systems which enable clinicians to document and review patient charting in the highly mobile environment in today's hospitals. Existing policies and procedures attempt to define system based practices but most are too narrowly defined, overcomplicated, and not consistently applied. Systems based practice has only recently become an Accreditation Council of Graduate Medical Education (ACGME) competency requirement for US residency programs, a recognition that graduate physician training must encompass a broader perspective. However, the true meaning of system based practice remains elusive, and it is difficult to identify which improvement efforts require prioritization. Technically competent care providers cannot be completely successful in delivering safe and efficient care without a better working knowledge of the complex system in which they practice.

A commitment to resilience is evident in nursing practice by the recent debate on mandatory overtime. Both nurses and physicians are committed to never abandoning a patient as a principle, and are sensitive to its perceived occurrence. This value is truly a commitment to resilience and is translatable across all caregivers as emotional intelligence[12 13] which is formed in part from leadership and teamwork. Deference to expertise is intertwined in these skills, which is best manifested as advocacy and assertion on the level of the individual caregiver. Physicians, in particular, have been trained as individuals and practice in that way. The physician's value system prefers not to admit mistakes and to appear both erudite and correct most of the time. However, the increasing burden placed upon healthcare systems, coupled with the explosion of new information for which physicians and nurses are responsible, should override these concerns. Caregivers, regardless of rank, should advocate and assert corrective positions and actions when error is observed or anticipated. More importantly, the receiver of such a challenge should defer to this momentary expertise and do so in an emotionally intelligent way. These skills are also learnable in the context of training for teamwork and leadership. We believe that the end user HRO trait of commitment to resilience and deference to expertise can be learned in this way.

Health care will continue to struggle to improve patient safety until the medical industry and hospital leaders understand that the tenets of HROs can be translated for physicians and nurses. Curricula need to be developed and provided in a manner which serves as an educational foundation for individual responsibility and accountability to other care providers. Specific interventions such as improved information technology have their place in improving patient safety, but there needs to be a more balanced portfolio of solutions which will include training to improve human performance. At the same time, physicians and nurses must also understand that their efforts are needed to make cultural change possible. Further exploration and research is needed to clarify the interplay between the tenets of HROs and the individual caregiver-patient relationship.

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