

# Chapter 1. Introduction

This report will examine the empirical evidence concerning the relation between teamwork and patient safety. The available evidence suggests that organizing and training health care providers as a team constitutes a pragmatic, effective strategy for enhancing patient safety and reducing medical errors. We have adopted the Institute of Medicine's (IOM) definition of both *patient safety* and *error*, for the purposes of this report. Specifically, the IOM defines *patient safety* as “freedom from accidental injury”; conversely, *error* constitutes “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim.”<sup>1</sup>

## Background

### The Impact of the Institute of Medicine Report

In 1999 the IOM published *To Err Is Human: Building a Safer Health System*, a revealing indictment of medical care throughout the United States, with an emphasis on the frequent inadequacy of safety practices used in the treatment of patients.<sup>1</sup> Extrapolating from data gathered as part of the Harvard Medical Practice Study (HMPS) and the Utah-Colorado Medical Practice Study (UCMPS),<sup>2</sup> the IOM report estimates that medical errors result in 44,000 to 98,000 deaths annually—more than automobile accidents (43,458), breast cancer (42,297), or AIDS (16,516).<sup>1</sup>

The report also notes that in addition to causing human suffering and death, medical errors are costly. The IOM estimates the direct costs of inpatient medication errors in U.S. hospitals at approximately \$2 billion annually. There are other indirect costs, such as higher insurance premiums and copayments, as well as lost opportunities for the use of funding that instead must be spent to correct mistakes. In addition, such errors exact a price from the society-at-large, in the form of diminished employee productivity, decreased school attendance, and a lower state of public health. The IOM estimates the sum indirect costs of medical errors leading to patient harm at \$17 billion to \$29 billion annually. Finally—and equally perilous in the long run—medical errors undermine the collective confidence of patients and health professionals in the health care system itself.

To reduce the spiraling incidence of medical errors, the IOM recommended a four-tiered approach:

1. Establish a national focus on leadership, research, tools and protocols to enhance the safety knowledge base.
2. Identify and learn from errors through the use of immediate and strong mandatory reporting efforts.... (while encouraging).... improved voluntary reporting, leading to steady and systemic patient safety improvements.

3. Elevate standards and expectations for safety improvements with the help of oversight organizations, group purchasers, and professional groups.
4. Create fail-safe systems within (health care) organizations, through the introduction of best practices at the delivery level. This level is the ultimate target of all the recommendations.

Key to the present document's orientation towards teamwork-related research, the IOM further noted that the majority of medical errors are the result of health care *system* failures, rather than substandard performance on the part of individual caregivers. Thus, in conjunction with its drive to build organizational safety systems around best-use treatment practices, the IOM recommended establishing interdisciplinary team-training programs.<sup>1</sup>

The results of the IOM's source studies (i.e., the HMPS and the UCMPS) had been published previously in scientific journals. But the findings had not galvanized a national call to action.<sup>3</sup> In contrast, *To Err Is Human* generated a demand for new standards of care that was heeded by the Federal Government, the media, health care professionals, and the research community. In the service of this mandate, the Federal Government established agencies and task forces to radically improve patient safety. In turn, these groups are funding private–public research partnerships to investigate safety risks and propose scientifically sound, evidence-based methods for reducing the number and severity of medical errors.

## **The Role of the Quality Interagency Coordination (QuIC) Task Force**

Shortly after the IOM published its medical errors report, President Clinton established the Quality Interagency Coordination (QuIC) Task Force. The QuIC comprises representatives from the Department(s) of Health and Human Services (DHHS), Labor (DOL), Defense (DoD), and Veterans Affairs (VA), along with other federal agencies. The Coordinating Officer represents the Agency for Healthcare Research and Quality (AHRQ). The Task Force responds to the IOM's recommendations by sponsoring scientific research into the causes of medical errors and proposals for improving patient safety in a variety of health care settings.

As noted previously, the IOM's fourth recommendation—implementing organizational safety systems—is particularly relevant to our study of utility teams in medical settings. The QuIC's support for this recommendation includes:

- Promoting a plan to increase VA spending on patient safety programs—by more than \$47 million in FY2000 alone—including increased training for personnel, VA Quality Scholars fellowships for 10 physicians, individual awards for patient safety, and the posting of Patient Safety Checklists in the operating rooms of every hospital in the United States.
- Recommending a plan to install a computerized medical records system in all DoD hospitals and clinics, over a 3-year period (beginning in FY2001), at a cost of more than \$64 million.
- Endorsing a collaboration between several QuIC member agencies (DoD, VA, AHRQ, the Center for Medicare & Medicaid Services [CMS]), the Institute for Healthcare

Improvement, and the Task Force, to decrease the incidence of medical errors in hospital emergency and operating rooms, intensive care units, and labor and delivery facilities.

Of these initiatives, the work of QuIC Task Force member agencies to mitigate medical errors in high-risk specialties, has been the most germane to AHRQ's subsequent involvement with medical team-training and the associated potential for improved patient safety.

## **The Role of the Agency for Healthcare Research and Quality (AHRQ)**

As the lead Federal agency charged with supporting research and developing public-private partnerships for improving health care, AHRQ's patient safety responsibilities span three broad areas: (1) identifying the causes of errors and injuries in health care delivery; (2) developing, demonstrating, and evaluating error-reduction and patient-protection strategies; and (3) distributing effective strategies throughout the U.S. health care community.<sup>4</sup>

Following the National Summit Meeting on Medical Errors and Patient Safety, held September 2000, in Washington, D.C., AHRQ developed a research portfolio<sup>4</sup> designed to, among other things, "apply evidence-based approaches to the improvement of patient safety." Of particular relevance was AHRQ's desire for research that would evaluate and "extend the capabilities of patient safety staff." In light of this focus, and given that training is central to the development of professional skills, the ensuing discussion presents team training as a subset of professional training.

Given the IOM's assertion that systemic failures in the delivery of health care are responsible for many more errors than the poor performance of individuals, it could be reasonably argued that the crux of patient safety training is the coordination, interaction, and communication among individuals who, despite different medical specialties, all are accountable for the same patients' welfare. For purposes of the following evaluation, these responsible individuals comprise a *medical team*.

This discussion of teamwork and team training extends and expands an earlier review conducted by Pizzi and colleagues as part of AHRQ Evidence Report No. 43, *Making Health Care Safer: A Critical Analysis of Patient Safety Practices*. The report presents the relevant data on practices within and outside of health care with a potential for improving patient safety. Pizzi focused specifically on Crew Resource Management (CRM)—a sub-domain of team training—and its implications for health services.<sup>5</sup> These researchers concluded that the application of CRM to medicine has tremendous potential, based on its successes in the aviation industry, though additional research on this patient safety practice in health care is warranted. This review will address the full spectrum of team training research and, for the first time, its application to the field of medicine. Furthermore, it presents a comprehensive review and evaluation of the efficacy of current *medical* team training initiatives. Finally, it will present an overview of specific requirements for future research.

## **The Structure of the Evaluation**

Subsequent chapters in this report will examine the evidence concerning patient safety outcomes and the potential impact of training personnel as medical teams. Chapter 2 defines the

key characteristics of a team and describes the principles that serve as a foundation for successful teamwork and effective team training. Chapter 3 summarizes and evaluates research on the interrelationship between teamwork and safety in high-risk settings. Chapter 4 introduces current trends and relevant issues in medical-team training. Chapter 5 provides a conclusion and makes recommendations based on the materials used to frame the review. Finally, Chapter 6 suggests directions for future research into the realm of medical-team training.

## Methodology

Systematic methods for gathering and reviewing relevant documentation were employed in the course of this review. We began by searching the PsycARTICLES<sup>®</sup>, PsycINFO<sup>®</sup>, and Sociological Collection<sup>®</sup> databases for those articles on teams, teamwork, and Crew Resource Management (CRM) training with relevance to commercial or military aviation. Additionally, we conducted searches for journal articles involving medical-team training, or key terms such as “crew resource management,” “cockpit resource management,” “medical error,” “team training and aviation,” and “team training and medicine”, using the same databases, as well as MEDLINE<sup>®</sup> and HealthSTAR<sup>®</sup>.

Other key terms we used in searches included “team training” and medical specialties, such as “anesthesiology,” “obstetrics,” “gynecology,” “emergency medicine,” and “geriatrics.” Searches also were conducted using specific medical team training program names, such as MedTeams<sup>™</sup>, Medical Team Management, Anesthesia Crisis Management, and Dynamic Outcomes Management. Parallel searches, using the same key terms, were conducted with the aid of Internet search engines to uncover any unpublished studies on these topics. The reference lists from each of the articles were used to identify additional resources, after which we contacted experts in the field to obtain unpublished technical reports and in-press manuscripts.

These searches resulted in numerous journal articles and book chapters on teams, teamwork, team training, CRM training, and aviation. At the same time, little information about “medical team training” was revealed. Articles on team training efforts in geriatrics and anesthesia settings were uncovered, as were references to copyrighted programs such as MedTeams, and proprietary programs such as Medical Team Management, Anesthesia Crisis Management, and Dynamic Outcomes Management. We also found articles on the use of simulators in medicine, particularly in anesthesia.

The findings from these searches are presented in the following chapters. It is important to note that particular domains of team performance and training literature have been emphasized in the development of this report. Specifically, we focused our attention on research involving parallel, high-stress, and high-risk environments (e.g., military and commercial aviation) where the consequences of error are extreme.

We believe these environments to be the most comparable to that of medicine. For example, the operating room, labor and delivery, and the emergency room are all high-stress, high-workload, dynamic decision-making, technology-intensive environments where errors could result in death. These environments are quite similar to those of a commercial airliner cockpit during a complicated landing approach, a Navy Combat Information Center (CIC) during an air-threat exercise, or a P-3 submarine hunter aircraft on a mission to identify and track subsurface threats. Therefore, we have placed much less emphasis on the large volume of writings centered

on teams and their critical contributions to organizational effectiveness—these can be found in the management literature.

While important lessons can be learned from reviewing organizational studies, the most relevant and most appropriate evidence-based literature for improving patient safety through medical team training is represented in the review that follows.